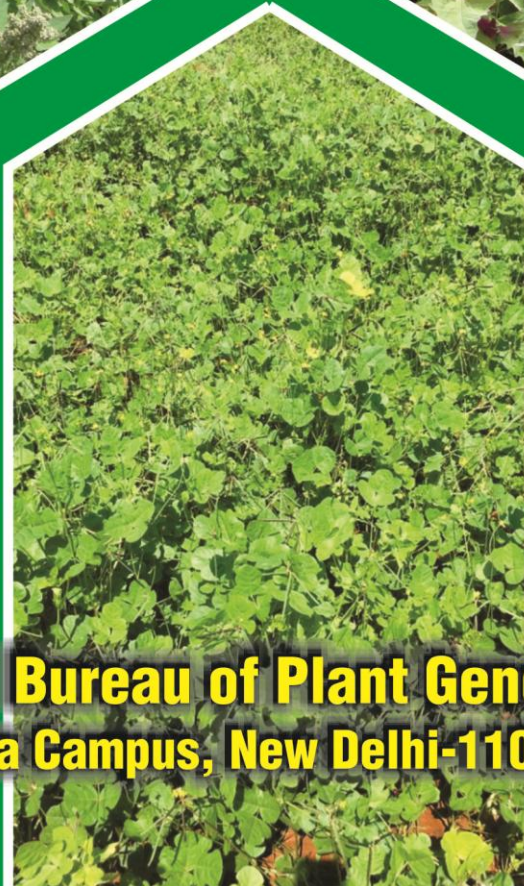


ALL INDIA COORDINATED RESEARCH NETWORK ON POTENTIAL CROPS

Progress Report (Kharif 2019)



ICAR- National Bureau of Plant Genetic Resources
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ALL INDIA COORDINATED RESEARCH NETWORK ON POTENTIAL CROPS

PROGRESS REPORT KHARIF 2019

Compiled by

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Citation:

Kaushik SK, HL Raiger, SK Yadav, Sandeep Kumar, MC Singh, SP Singh, RK Gautam and Kuldeep Singh. 2020. Progress Report Kharif 2019. All India Coordinated Research Network on Potential Crops, ICAR-NBPGR, New Delhi. P.409

Published by:

Network Coordinator
All India Coordinated Research
Network on Potential Crops
NBPGR, New Delhi 110012

Cover page photo identity-Clockwise from top
Paradise tree, Chenopodium accession EC896167, Amaranth entry SKGPA-74,
Pillipesara, Amaranth entry KBGA-5, Chenopodium accession EC507738.

Cover page (back page)
AICRN on Potential Crops Research Scientists

Published: June 2020

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I. PREAMBLE

The All India Coordinated Research Network on Potential Crops (AICRN-PC) was initiated in the year 1982 by ICAR during the VI Five Year Plan programme. The program envisages identification, augmentation and improvement of plant species with potential for commercialization as crops for climate resilient and sustainable food system. Since its inception the program aims at introducing new potential and useful plant species and evaluating these for acclimatization to local conditions; collecting, evaluating and conserving the germplasm of existing regional plant for potential commercialization; breeding new varieties through appropriate crop improvement approaches and standardizing their production and protection technology, through coordinated efforts and popularizing such potential crops for commercialization and establishing marketing linkages. The network is conducting research on 16 crops of food, fodder and industrial value through 16 co-ordinated, 7 co-operating and 12 voluntary centres located in diverse agro-climatic zones of the country. The present report embodies results of research work undertaken on PGR Management, Crop Improvement, Crop Production, Crop Protection, Quality Evaluation, Nutritional Quality and Value Addition and other studies in various potential crops at different centres during *Kharif* 2019. The compiled report is an outcome of the concerted efforts made by the scientists of AICRN main centres, cooperating centres and voluntary centres.

I would like to acknowledge with reverence and gratitude the encouragement and guidance received on all aspects of management and functioning of the network from Dr. T Mohapatra, Secretary, DARE and Director General, ICAR; Dr. TR Sharma, DDG (Crop Science), ICAR, Dr DK Yadav, ADG (Seeds), ICAR. I express my sincere thanks to Drs. S.K. Kaushik, Principal Investigators for Crop Improvement; HL Raiger, Documentation and Database Management; S.K. Yadav, PGR Management; M.C. Singh, Crop Production; S.P. Singh, Crop Protection, and Sandeep Kumar, Quality Analysis for compilation of results and preparation of the report. The assistance provided by Dr RK Gautam, Principal Scientist is also thankfully acknowledged.

I wish to record my appreciation for help in compilation of data and for neatly typing the report by Mr. Pankaj Kumar.

Dr Kuldeep Singh
Network Coordinator

The annual progress report for the kharif 2019 is presented under five different heads:

1. Plant genetic resources management
2. Crop Improvement
3. Crop Production
4. Crop Protection
5. Quality

II PLANT GENETIC RESOURCES MANAGEMENT

During the year 2019-20, a total of 123 new germplasm accessions of potential crops germplasm were collected, 98 accessions were introduced, 883 accessions were supplied to various indenters, 771 accessions were evaluated (Hill regions-296, Plain regions-475), 303 accessions were conserved in the National Genebank and 222 accessions in cryo preservation.

2.1 EXPLORATION AND COLLECTION OF GERMPLASM

During the period under report, a total of 123 accessions of different potential crops were collected during 16 explorations undertaken within the country by the division of Plant exploration and germplasm collection as detailed in Table 1.

Table 1. Collection of Potential Crops germplasm* through exploration missions.

Area Surveyed District Wise	Diversity crop wise	Total
Uttarakhand: Chamoli, Uttarkashi, Rudraprayag	Pseudocereals: <i>Amaranthus hypochondriacus</i> (6), <i>Amaranthus caudatus</i> (4), <i>Chenopodium album</i> (4), <i>Fagopyrum esculentum</i> (1), <i>Fagopyrum tataricum</i> (5) Legume: <i>Vigna angularis</i> (5) Oilseed: <i>Perilla frutescens</i> (3)	28
Arunachal Pradesh: Shi-Yomi, Lower Subansiri, Upper Subansiri, Kamle, West Siang, Lower Siang	Pseudocereals: <i>Amaranthus hypochondriacus</i> (2), <i>Fagopyrum esculentum</i> (5), <i>Chenopodium album</i> (3), <i>Coix lacryma-jobi</i> (5) Legume: <i>Vigna angularis</i> (2), <i>Vigna angularis</i> var. <i>nipponensis</i> (1) Oilseed: <i>Perilla frutescens</i> (4)	22
Nagaland: Kohima, Zunheboto, Wokha	Pseudocereals: <i>Amaranthus hypochondriacus</i> (1) Oilseed: <i>Perilla frutescens</i> (9) Vegetable Crop: <i>Psophocarpus tetragonolobus</i> (1)	11
Bihar: Munger, Bhagalpur, Katihar	Pseudocereals: <i>Amaranthus tricolor</i> (9), <i>Amaranthus dubius</i> (2)	11
Tamil Nadu: Erode, Nilgiris	Pseudocereals: <i>Amaranthus cruentus</i> (2), <i>Fagopyrum esculentum</i> (1)	3
Mizoram: Serchip	Pseudocereals: <i>Amaranthus dubius</i> (3) Legume: <i>Vigna angularis</i> (1) Oilseed: <i>Perilla frutescens</i> (1)	5
Sikkim: North Sikkim, East Sikkim	Pseudocereals: <i>Fagopyrum esculentum</i> (2), <i>Fagopyrum tataricum</i> (3)	5

Jammu & Kashmir: Budgam, Pulwama, Shopian, Anantnag	Legume: <i>Vicia faba</i> (28)	28
Nagaland: Kohima	Pseudocereals: <i>Coix lacryma-jobi</i> (4)	4
West Bengal: Murshidabad, Nadia, North 24-pargana	Pseudocereals: <i>Coix lacryma-jobi</i> (4)	4
Jharkhand: Sahibganj	Vegetable Crop: <i>Momordica dioica</i> (1)	1
Odisha: Keonjhar	Pseudocereals: <i>Coix lacryma-jobi</i> (1)	1

* The germplasm collection and explorations were done by Division of Plant Exploration and Germplasm Collection

Table 2. Germplasm collected through explorations crop group wise in Potential Crops.

Crop Group	Region of Collection	Total
Pseudocereals: <i>Amaranthus hypochondriacus</i> (9), <i>Amaranthus caudatus</i> (4), <i>Amaranthus tricolor</i> (9), <i>Amaranthus dubius</i> (5), <i>Amaranthus cruentus</i> (2), <i>Chenopodium album</i> (7), <i>Fagopyrum esculentum</i> (9), <i>Fagopyrum tataricum</i> (8), <i>Coix lacryma-jobi</i> (14)	Uttarakhand: Chamoli, Uttarkashi, Rudraprayag Arunachal Pradesh: Shi-Yomi, Lower Subansiri, Upper Subansiri, Kamle, West Siang, Lower Siang Nagaland: Kohima, Zunheboto, Wokha Bihar: Munger, Bhagalpur, Katihar Tamil Nadu: Erode, Nilgiris Mizoram: Serchip Sikkim : North Sikkim, East Sikkim West Bengal: Murshidabad, Nadia, North 24-pargana Odisha: Keonjhar	67
Legume: <i>Vigna angularis</i> (8), <i>Vigna angularis</i> var. <i>nipponensis</i> (1), <i>Vicia faba</i> (28)	Uttarakhand: Chamoli, Uttarkashi, Rudraprayag Arunachal Pradesh: Shi-Yomi, Lower Subansiri, Upper Subansiri, Kamle, West Siang, Lower Siang Mizoram: Serchip Jammu & Kashmir: Budgam, Pulwama, Shopian, Anantnag	37
Oilseed: <i>Perilla frutescens</i> (17)	Uttarakhand: Chamoli, Uttarkashi, Rudraprayag Arunachal Pradesh: Shi-Yomi, Lower Subansiri, Upper Subansiri, Kamle, West Siang, Lower Siang Nagaland: Kohima, Zunheboto, Wokha Mizoram: Serchip	17
Vegetable Crop: <i>Psophocarpus tetragonolobus</i> (1), <i>Momordica dioica</i> (1)	Nagaland: Kohima, Zunheboto, Wokha Jharkhand: Sahibganj	2
Total		123

2.2 GERmplasm INTRODUCTION AND PLANT QUARANTINE

A total of 98 accessions of faba bean were introduced from ICARDA Lebnaon by Germplasm Exchange Unit. All samples were processed for quarantine clearance. Out of 294 samples of 98 accessions, 121 were infested with immature stages of bruchid and adult *Bruchus dentipes* (quarantine insect to India). All the samples were salvaged by X-ray radiography and fumigation technique by the Division of Plant Quarantine, ICAR-NBPGR. The

2.4 GERmplasm EVALUATION

The potential crops under research in this project are adapted to distinct climatic conditions. Hence the potential crops germplasm is evaluated independently in hill regions and planis regions.

2.4.1 Hill Regions

A total of 296 accessions of germplasm were planned for multilocation evaluations in Hill regions. These included grain amaranth (50) having 25 accessions each in 1st and 2nd year of evaluation, buckwheat (75) having 50 accessions in 1st year and 25 accessions in 2nd year, chenopods (50) having 25 accessions each in 1st and 2nd year, adzuki bean (50) having 25 accessions each in 1st and 2nd year, Coix (50) and Perilla (21) during Kharif 2019. Experiments for each species were laid in augmented block design with standard checks at different locations. Below are the results presented crop wise.

2.4.1.1 Grain Amaranth (*Amaranthus* spp.)

Germplasm screening nursery consisting of 50 accessions supplied by NBPGR, Shimla (25) and NBPGR, Bhowali (25) were evaluated at four locations viz. VPKAS, Almora; UUHF, Ranichauri; CSKHPKV, Bajaura; and NBPGR RS, Shimla. The experimental details are presented in Table 3. The results were received from all four locations. The checks used were PRA 2, PRA 3, Annapurna and Durga. The list of promising lines including range and mean at all centres for all the descriptors is presented in Tables 4 to 15.

At VPKAS Almora, a set of 50 accessions (25 each in 1st and 2nd year of evaluation) along with four checks of grain amaranth was evaluated for ten descriptors. The promising lines and statistical parameters are given in Tables 4, 5 and 12 to 15. The genotypes EC289376, IC583610 and IC583624 were early in flowering (36 days) and statistically superior to the best check PRA 3 (49.6 days), while genotypes IC340825 (75 days) followed by IC583626 and IC340823 (77 days) were better in maturity compared to PRA 3 (100.4 days). Days to 50% flowering and maturity ranged from 36.0 to 61.0 days and 75.0 to 111.0 days, respectively. The genotype EC223672 (65.0 cm) followed by EC289378 (64.33 cm) possessed maximum inflorescence length and were better than the best check Durga (61.53 cm). The maximum plant height was observed in IC204092 (176.0 cm) as compared to the tallest check Annapurna (162.8 cm), while promising genotypes for dwarf plant height were IC038333 (82.67 cm) followed by IC583624 (87.0 cm) and IC031101 (92.33 cm) and were better than the best check PRA-3 (137.6 cm). Leaf width was maximum in IC406563 (8.43 cm) followed by EC289386 (7.8 cm) and IC396963 (7.07 cm) as against the check VL 44 (5.79 cm), while leaf length ranged from 7.47 to 13.90 cm and the best genotypes were IC444192 (13.9 cm), EC289386 (13.7 cm)

and IC436948 (13.67 cm). The seed yield per plant was found maximum in IC391433 (29.5 g) followed by IC444144 (23.2 g) as against the best check Durga (22.32 g).

At CSKHPKV Bajaura, a set of 50 accessions (25 each in 1st and 2nd year of evaluation) along with four checks of grain amaranth was evaluated for nine descriptors. The promising lines and statistical parameters are given in Tables 6, 7 and 12 to 15. The genotypes IC444183 (38.0 days), IC340823 and IC340971 (39.0 days) were early in flowering and better than the best check Durga (50.83 days), whereas, none of the genotypes were early in maturity than the best check Durga (146.0 days). The genotypes EC289378 and IC436948 (110.0 cm) followed by EC223672 (88.0 cm) possessed maximum inflorescence length and were better than the best check Durga (63.0 cm). The plant height ranged from 100.0 to 360.0 cm as against the best check Durga (196.5 cm), while none of the genotypes was better than the check PRA-2 (105.67 cm) for shorter plant height. The promising genotypes were EC289378 (360.0 cm), EC223672 (234.0 cm) and IC436948 (230.0 cm) for tallness. The seed yield per plant was found maximum in EC289386 (35.0 g) and EC289378 (27.0 g) and were better than the check Durga (26.87 g) whereas, IC469805 and IC583626 (8.0 g) were found promising over the best check Durga (7.33 g) for seed volume weight (g/ 10ml).

At UHF Ranichauri, a set of 50 accessions (25 each in 1st and 2nd year) along with four checks of grain amaranth was evaluated for seven descriptors. The promising lines and statistical parameters are given in Tables 8,9&12 to 15. In the set of 1st year evaluation, the range of germplasm for days to 50% flowering and days to maturity was observed to be 64.4 to 78.4 days and 128.2 to 173.0 days, respectively. None of the genotypes was found superior than the best check Durga (64.4 days and 128.2 days, respectively). The maximum plant height was observed in IC444144 (241.4 cm) followed by IC406563 (218.4 cm) and IC444141 (215.2 cm) and were also found promising over the best check PRA 3 (190.12 cm), while promising genotypes for dwarf plant height were IC469820 (136.60 cm) followed by IC444183 (149.20 cm) and IC469791 (150.60 cm) and were better than the best check Durga (162.92 cm). The inflorescence length ranged from 36.2 to 69.0 cm and the promising genotypes over the best check PRA 2 (52.6 cm) were IC444146 (69.0 cm) followed by IC444144 (65.6 cm) and IC 340878 (64.6 cm). None of the genotypes was better than the best check Annapurna (67.86 g) and PRA 2 (11.03 g) for seed yield per plant and seed volume weight, respectively. In the set of 2nd year evaluation, the early flowering genotypes were IC583626 (58.0 days) followed by IC583624 (59.0 days) and IC038301 (60.0 days) as against the best check Durga (64.6 days), whereas the early maturing genotypes were IC467883, EC289376 (141.0 days) followed by IC038171 (142.0 days) as against the best check PRA 2 (152.4 days). The seed yield per plant

ranged from 43.6 to 75.4 g and the promising genotypes IC540860 (75.4 g) followed by EC223672 (73.2 g) which were better than the best check PRA 3 (62.12 g). The genotypes promising than the best check Annapurna (10.91 g) were IC038182 (11.21 g) followed by IC038173 and IC038171 (11.17 g) for seed volume weight. The genotypes IC540860 (53.2 cm) followed by IC038301 (51.2 cm) and EC289376 (50.8 cm) were better than the best check Annapurna (46.96 cm) for inflorescence length. The promising genotypes for dwarfing plant height were IC583625 (29.8 cm) followed by IC583626 (78.6 cm) and IC583624 (84.8 cm) and were better than the best check Durga (139.08 cm).

At NBPGR Shimla, a set of 50 accessions (25 each in 1st and 2nd year) along with four checks of grain amaranth was evaluated for eleven descriptors. The promising lines and statistical parameters are given in Tables 10, 11 & 12 to 15. The early flowering genotype was IC583625 (38.0 days) and was earlier than the best check Durga (52.8 days). The genotypes IC038333 (80.1 cm) followed by EC289378 (76.4 cm) and IC038171 (75.1 cm) possessed maximum inflorescence length and were better than the best check PRA-2 (58.32 cm). The plant height in the germplasm ranged from 210.5 to 280.4 cm. The genotypes EC289378 (280.4 cm) and IC415314 (271.4 cm) were promising for tallness and were better than the best check PRA-2 (258.04 cm), while promising genotypes for dwarfing plant height were IC583625 (113.10 cm) followed by IC583626 (128.10 cm) and EC223672 (137.10 cm) and were better than the best check Durga (189.40 cm). The genotypes IC038333 (25.3 cm) followed by EC223672 (24.1 cm) and IC415314 (23.1 cm) were found superior over the best check PRA-3 (12.25 cm) for lateral spikelet length. The seed yield per plant ranged from 56.55 to 90.63 g having superior genotypes IC415314 (90.63 g) followed by IC038332 (79.65 g) and IC038339 (79.10 g) which were found better than the best check Annapurna (69.48 g). The genotypes that exceeded the best check Durga (7.88 g) for 10 ml volume seed weight were IC037153 (8.38 g) followed by IC038173 (8.23 g) and IC038171 (8.22 g).

Over the locations for all four centres viz., Almora, Palampur, Ranichauri and Shimla the performance of entries and best genotypes in comparison to the checks have been summarized in Tables 12 and 13. Significant differences were observed among the genotypes for days to 50% flowering, plant height (cm), Inflorescence length (cm) and Number of spikelets per plant. The range for days to flowering varied from 37.0 days to 61.0 days and the best performing check for early flowering was VL44 (52.0 days). The best performing genotypes for early flowering were IC340971 (43.0 days) followed by IC583610 and IC583624 (43.5 days). The maximum plant height over the locations was observed in genotypes EC289378 (248.5 cm) followed by EC223672 (196.3 cm), while dwarfing genotypes were IC340825 (113.8 cm) followed by IC038333 (122.8 cm) and IC583625

(125.0 cm) and were better than the best checks Durga (177.8 cm) and PRA-2 (133.2 cm), respectively. The inflorescences length ranged from 30.5 cm to 87.5 cm and the best performing genotypes than the check Durga (62.3 cm) were EC289378 (87.17 cm) followed by IC436948 (79.8 cm) and EC223672 (76.5 cm). Moe number of spiklets were recorded in EC289378 (63.8) and was better than the best check VL44 (59.87).

Table 3. Experimental Details of Germplasm Evaluation in Grain amaranth: Kharif 2019 (Hills)

S. No.	Items	Almora	Ranichauri	Palampur/Bajaura	Shimla
1	No. of genotypes	25+25	25+25	25+25	25+25
2	No. of Checks	5	4	4	4
3	Design	ABD	ABD	ABD	ABD
4	No. of Block	5	5	6	5
5	Number of Rows	2	2	2	3
6	Row Length (m)	3	3	3	2
7	Row spacing (cm)	50	45	40	50
8	Plant spacing (cm)	15	15	10	15
9	NPKS (kg/ha)	60:40:20	60:40:20	--	60:40:20
10	Plot size (m ²)	3	2.7	3	3
11	Sowing Date	26/6/2019	10/6/2019 & 14/6/2019	26/6/2019	28/5/2019 & 13/6/2019
12	Harvesting period	At maturity	18/10/2019 & 22/11/2019	27/11/2019	6/10/2019 & 12/10/2019

Table 4. Evaluation of germplasm in grain amaranth at Almora (IYear): Kharif 2019 (Hills)

S.No	Accession No	Days to flowering	Days to maturity	Plant height (cm)	Inflorescence Length (cm)	No of spikelets	Leaf Length (cm)	Width (cm)	Petiole Length (cm)	seed Yeld/ plant (g)
1	IC340823	52.00	77.00	130.33	47.33	73.00	10.53	5.70	5.87	5.40
2	IC340825	47.00	75.00	127.67	58.00	71.33	11.43	6.17	7.23	18.70
3	IC340878	52.00	100.00	131.33	53.67	56.67	12.10	7.03	6.87	4.50
4	IC340899	58.00	101.00	156.67	57.33	56.00	10.57	5.83	4.27	6.00
5	IC340971	47.00	102.00	144.33	58.00	44.00	9.93	4.80	4.93	17.60
6	IC383571	60.00	102.00	149.33	45.33	52.00	11.80	6.07	4.67	10.70
7	IC383578	56.00	79.00	132.00	49.33	67.67	12.40	6.80	5.63	17.60
8	IC391433	52.00	77.00	104.00	37.33	56.00	11.17	6.70	8.30	23.20
9	IC392498	58.00	101.00	131.33	51.33	36.33	11.80	5.80	5.70	12.90
10	IC406563	49.00	95.00	155.33	60.67	87.67	12.73	8.43	7.87	15.40
11	IC436948	52.00	80.00	114.00	49.67	62.67	13.67	6.27	7.10	14.30
12	IC444136	56.00	102.00	155.67	58.67	59.67	9.67	4.57	4.43	10.50
13	IC444141	47.00	90.00	135.00	49.00	68.67	11.27	5.67	5.27	11.20
14	IC444144	51.00	95.00	153.33	58.67	82.33	11.10	7.03	6.97	23.20
15	IC444146	52.00	80.00	162.33	58.67	78.33	11.73	6.17	6.33	21.60
16	IC444156	56.00	101.00	150.33	53.33	46.67	11.07	5.40	5.40	3.60
17	IC444162	52.00	102.00	134.00	42.33	70.67	10.07	6.00	4.93	12.30
18	IC444183	52.00	80.00	135.33	54.00	75.00	12.17	6.03	7.30	10.70
19	IC444188	58.00	101.00	158.67	57.67	41.00	12.73	5.97	6.27	7.80
20	IC444192	60.00	102.00	144.67	56.00	52.67	13.90	6.83	4.77	8.90
21	IC469791	56.00	102.00	119.00	53.33	37.67	10.53	5.03	4.20	19.80
22	IC469800	58.00	101.00	133.00	55.33	42.33	13.27	6.83	6.63	21.30
23	IC469805	56.00	102.00	121.00	52.67	45.67	13.33	5.00	6.07	10.80
24	IC469820	52.00	101.00	110.67	46.00	47.67	11.27	4.87	4.73	8.60
25	IC469829	58.00	102.00	125.67	55.00	56.00	12.83	5.30	5.43	10.60
	Annapurna (C)	60.00	111.00	162.80	57.80	66.20	7.78	5.56	7.60	13.16
	Durga (C)	55.20	108.80	159.20	61.53	58.27	9.89	5.73	6.19	22.32
	PRA 2 (C)	51.40	102.60	160.80	53.80	63.80	8.24	5.52	4.86	16.74
	PRA 3 (C)	49.60	100.40	137.60	50.87	55.40	9.03	4.92	5.64	17.98
	VL 44 (C)	52.00	104.00	157.20	49.67	59.87	8.87	5.79	4.61	21.86
	Minimum	47.00	75.00	104.00	37.33	36.33	7.78	4.57	4.20	3.60
	Maximum	60.00	111.00	162.80	61.53	87.67	13.90	8.43	8.30	23.20
	Mean	53.84	95.89	139.75	53.08	59.04	11.23	5.93	5.87	13.98
	CD(0.05)	8.51	12.28	39.07	24.38	11.91	2.93	3.66	2.48	8.58
	CV(%) Error	6.24	4.58	9.88	17.51	7.71	13.13	26.14	16.84	18.31

Table 5. Evaluation of germplasm in grain amaranth at Almora (II Year): Kharif 2019 (Hills)

S.No	Accession No	Days to 50% flowering	Days to maturity	Plant height (cm)	Inflorescence Length (cm)	No of spikelets	Leaf Length (cm)	Width (cm)	Petiole Length (cm)	Seed Yield /plant (g)
1	EC289386	47.00	95.00	109.33	36.67	73.67	13.70	7.80	9.73	16.50
2	IC038173	60.00	100.00	137.00	50.67	38.00	10.67	5.03	5.80	11.20
3	IC038301	47.00	98.00	105.00	35.33	68.00	12.50	6.17	7.67	9.80
4	IC038332	56.00	100.00	153.00	40.33	51.33	10.67	3.83	4.20	8.90
5	IC038339	56.00	102.00	131.33	38.00	57.67	10.27	6.07	4.07	12.40
6	IC204092	58.00	105.00	176.00	59.00	57.33	13.30	7.03	5.73	3.00
7	IC258252	46.00	90.00	133.67	61.67	46.33	10.83	6.03	4.73	18.00
8	IC396963	61.00	100.00	159.67	60.00	65.33	12.57	7.07	5.77	10.40
9	IC540832	56.00	95.00	117.33	37.00	39.33	8.47	5.47	5.57	15.30
10	IC551502	46.00	86.00	117.33	34.67	63.33	11.73	5.80	6.60	10.00
11	EC223672	56.00	100.00	158.67	65.00	81.33	11.50	5.20	5.27	10.90
12	EC289376	36.00	78.00	135.33	52.00	65.00	11.47	5.23	4.70	8.00
13	EC289378	61.00	105.00	137.00	64.33	48.33	12.07	5.70	4.97	11.30
14	IC037153	51.00	105.00	102.33	42.67	51.33	11.43	5.37	4.90	9.00
15	IC038171	46.00	100.00	106.67	42.33	44.00	9.33	5.97	5.43	12.90
16	IC038182	58.00	95.00	125.33	47.00	59.33	10.20	6.00	7.10	14.30
17	IC583610	36.00	79.00	116.00	48.33	74.00	12.10	6.27	6.67	3.40
18	IC583624	36.00	79.00	87.00	40.33	46.00	9.93	5.67	4.83	18.70
19	IC583625	-	-	-	-	-	-	-	-	-
20	IC583626	36.00	77.00	96.67	35.33	44.33	7.73	4.50	4.60	12.50
21	IC031101	46.00	100.00	92.33	36.33	46.00	9.40	6.17	5.13	12.40
22	IC038333	56.00	100.00	82.67	35.00	31.33	7.47	4.50	3.80	8.70
23	IC415314	49.00	90.00	136.00	47.00	69.00	11.10	5.80	6.77	9.80
24	IC467883	47.00	90.00	103.00	32.00	32.00	9.40	5.93	4.63	6.50
25	IC540860	56.00	105.00	102.00	39.00	57.67	8.63	4.43	3.97	16.50
	Annapurna (C)	60.00	111.00	162.80	57.80	66.20	7.78	5.56	7.60	13.16
	Durga (C)	55.20	108.80	159.20	61.53	58.27	9.89	5.73	6.19	22.32
	PRA 2 (C)	51.40	102.60	160.80	53.80	63.80	8.24	5.52	4.86	16.74
	PRA 3 (C)	49.60	100.40	137.60	50.87	55.40	9.03	4.92	5.64	17.98
	VL 44 (C)	52.00	104.00	157.20	49.67	59.87	8.87	5.79	4.61	21.86
	Minimum	36.00	77.00	82.67	32.00	31.33	7.47	3.83	3.80	3.00
	Maximum	61.00	111.00	176.00	65.00	81.33	13.70	7.80	9.73	22.32
	Mean	50.73	96.58	127.53	46.68	55.64	10.35	5.67	5.57	12.50
	CD(0.05)	8.51	12.28	39.07	24.38	11.91	2.93	3.66	2.48	8.58
	CV(%) Error	6.24	4.58	9.88	17.51	7.71	13.13	26.14	16.84	18.31
	CV (%) Phen.	15.27	9.70	20.46	22.08	22.72	16.53	14.51	23.65	38.38

Table 6. Evaluation of germplasm in grain amaranth at Bajaura (I Year): Kharif 2019 (Hills)

S. No.	Entry	Days to 50% flowering	Days to maturity	Plant height (cm)	Inflorescence length (cm)	No. of spikelets/plant	No. of plants at harvest	Grain yield/plant	Seed volume weight (g/10ml)
1	IC340823	39.00	144.00	174.00	31.00	27.00	21.00	3.20	7.00
2	IC340825	41.00	145.00	100.00	29.00	19.00	12.00	3.80	6.00
3	IC340878	43.00	148.00	162.00	39.00	26.00	20.00	3.00	5.00
4	IC340899	40.00	146.00	180.00	71.00	31.00	15.00	3.80	6.00
5	IC340971	39.00	145.00	173.00	60.00	32.00	26.00	3.60	4.00
6	IC383571	40.00	143.00	157.00	38.00	26.00	19.00	5.60	7.00
7	IC383578	42.00	145.00	183.00	36.00	30.00	14.00	4.40	7.00
8	IC391433	48.00	152.00	160.00	47.00	25.00	25.00	12.80	6.00
9	IC392498	46.00	151.00	205.00	61.00	27.00	27.00	7.20	7.00
10	IC406563	40.00	142.00	139.00	46.00	32.00	18.00	3.40	3.00
11	IC436948	44.00	144.00	230.00	110.00	48.00	23.00	4.80	7.00
12	IC444136	39.00	141.00	150.00	47.00	30.00	17.00	4.20	6.00
13	IC444141	42.00	145.00	142.00	37.00	36.00	16.00	3.00	5.00
14	IC444144	40.00	143.00	143.00	36.00	23.00	28.00	3.20	5.00
15	IC444146	41.00	145.00	190.00	59.00	32.00	20.00	3.00	4.00
16	IC444156	42.00	147.00	165.00	54.00	30.00	22.00	3.80	7.00
17	IC444162	39.00	142.00	160.00	52.00	32.00	21.00	5.80	5.00
18	IC444183	38.00	141.00	165.00	76.00	31.00	8.00	3.60	7.00
19	IC444188	40.00	143.00	187.00	57.00	35.00	18.00	6.60	6.00
20	IC444192	41.00	145.00	180.00	60.00	36.00	25.00	3.00	6.00
21	IC469791	50.00	143.00	210.00	75.00	50.00	23.00	3.00	5.00
22	IC469800	50.00	142.00	147.00	49.00	42.00	17.00	3.00	7.00
23	IC469805	52.00	144.00	193.00	66.00	38.00	20.00	9.60	8.00
24	IC469820	53.00	145.00	160.00	58.00	32.00	12.00	3.20	7.00
25	IC469829	51.00	144.00	155.00	50.00	36.00	28.00	3.20	6.00
	Annapurna (C)	51.67	149.83	157.00	56.17	36.50	22.00	3.67	5.83
	Durga (C)	50.83	146.00	196.50	63.00	47.67	25.33	20.87	7.33
	PRA 2 (C)	54.33	154.50	105.67	45.50	28.50	20.50	3.73	6.17
	PRA 3 (C)	61.00	156.50	149.33	53.17	33.67	22.50	3.83	6.00
	Minimum	38.00	141.00	100.00	29.00	19.00	8.00	3.00	3.00
	Maximum	61.00	156.50	230.00	110.00	50.00	28.00	20.87	8.00
	Mean	44.75	145.58	166.16	53.86	32.84	20.18	5.03	6.01
	CD(0.05)	2.72	7.55	13.07	7.96	5.99	5.36	4.59	1.09
	CV(%) Error	1.94	1.93	3.34	5.68	6.37	9.22	19.76	6.66
	CV (%) Phen.	13.53	2.64	16.93	30.59	22.05	24.79	74.73	19.08

Table 7. Evaluation of germplasm in grain amaranth at Bajaura (II Year): Kharif 2019 (Hills)

S. No.	Entry	Days to 50% flowering	Days to maturity	Plant height (cm)	Inflorescence length (cm)	No. of spikelets/plant	No. of plants at harvest	Grain yield/plant	Seed volume weight (g/10ml)
1	EC223672	51.00	155.00	234.00	88.00	32.00	16.00	15.20	7.00
2	EC289378	46.00	149.00	360.00	110.00	78.00	23.00	20.50	7.00
3	EC289386	55.00	146.00	187.00	48.00	44.00	23.00	21.00	7.00
4	IC037153	54.00	146.00	201.00	68.00	44.00	20.00	3.20	7.00
5	IC038171	56.00	147.00	190.00	67.00	39.00	18.00	3.40	6.00
6	IC038173	48.00	149.00	143.00	56.00	36.00	21.00	3.40	6.00
7	IC038182	46.00	148.00	139.00	43.00	31.00	18.00	3.20	4.00
8	IC038301	52.00	145.00	170.00	48.00	39.00	23.00	5.20	7.00
9	IC038332	54.00	145.00	165.00	33.00	32.00	23.00	4.40	6.00
10	IC038333	53.00	144.00	163.00	37.00	42.00	17.00	4.40	7.00
11	IC038339	55.00	145.00	138.00	42.00	21.00	13.00	3.80	6.00
12	IC204092	52.00	144.00	170.00	72.00	42.00	20.00	5.40	7.00
13	IC258252	49.00	157.00	190.00	64.00	30.00	20.00	5.00	7.00
14	IC289376	55.00	147.00	205.00	60.00	40.00	17.00	7.60	7.00
15	IC311101	55.00	162.00	175.00	60.00	36.00	20.00	5.60	7.00
16	IC396963	48.00	151.00	160.00	31.00	12.00	19.00	12.40	6.00
17	IC415314	50.00	154.00	185.00	65.00	42.00	11.00	3.00	7.00
18	IC467883	55.00	146.00	165.00	54.00	18.00	16.00	3.00	5.00
19	IC540832	56.00	147.00	167.00	41.00	36.00	20.00	3.20	6.00
20	IC540860	47.00	148.00	150.00	53.00	38.00	20.00	3.00	7.00
21	IC551502	55.00	146.00	205.00	66.00	46.00	22.00	20.00	7.00
22	IC583610	51.00	159.00	182.00	66.00	38.00	19.00	5.80	6.00
23	IC583624	51.00	144.00	174.00	60.00	42.00	20.00	9.40	6.00
24	IC583625	52.00	144.00	125.00	52.00	12.00	20.00	3.00	7.00
25	IC583626	55.00	147.00	210.00	73.00	48.00	19.00	6.40	8.00
	Annapurna (C)	51.67	149.83	157.00	56.17	36.50	22.00	3.67	5.83
	Durga (C)	50.83	146.00	196.50	63.00	47.67	25.33	20.87	7.33
	PRA 2 (C)	54.33	154.50	105.67	45.50	28.50	20.50	3.73	6.17
	PRA 3 (C)	61.00	156.50	149.33	53.17	33.67	22.50	3.83	6.00
	Minimum	46.00	144.00	105.67	31.00	12.00	11.00	3.00	4.00
	Maximum	61.00	162.00	360.00	110.00	78.00	25.33	21.00	8.00
	Mean	52.37	149.03	177.98	57.75	36.70	19.60	7.33	6.49
	CD(0.05)	2.72	7.55	13.07	7.96	5.99	5.36	4.59	1.09
	CV(%) Error	1.94	1.93	3.34	5.68	6.37	9.22	19.76	6.66
	CV (%) Phen.	6.58	3.35	25.05	28.31	33.76	15.73	83.19	12.26

Table 8. Evaluation of germplasm in grain amaranth at Ranichauri (I Year): Kharif 2019 (Hills)

S. No.	Genotypes	Days to 50% Flowering	Days to 80% Maturity	Plant Height (cm)	Seed Vol. Wt. (g/10ml)	Inflorescence Length (cm)	Seed Yield/Plant (g)
1	IC406563	73.00	152.00	218.40	10.37	62.40	62.00
2	IC444136	69.00	173.00	178.80	11.04	47.40	64.80
3	IC444141	65.00	132.00	215.20	11.05	56.60	57.40
4	IC444144	67.00	140.00	241.40	10.96	65.60	64.40
5	IC444146	66.00	139.00	200.80	10.97	69.00	58.50
6	IC444156	67.00	141.00	162.40	10.19	47.60	57.00
7	IC444162	66.00	137.00	151.80	11.17	36.20	52.10
8	IC444183	65.00	134.00	149.20	11.19	36.20	52.20
9	IC444188	69.00	144.00	152.40	11.13	43.60	54.10
10	IC444192	72.00	150.00	180.80	11.18	49.00	52.00
11	IC436948	73.00	153.00	157.60	10.93	55.60	62.10
12	IC383571	75.00	154.00	199.60	10.92	56.40	63.00
13	IC383578	72.00	151.00	181.00	10.89	57.60	49.80
14	IC340823	73.00	152.00	197.40	11.10	53.60	49.90
15	IC340825	70.00	149.00	177.00	10.18	55.60	52.00
16	IC340878	69.00	148.00	183.00	10.93	64.60	56.50
17	IC340899	67.00	142.00	153.40	10.50	53.40	55.40
18	IC340971	66.00	139.00	164.80	10.93	45.80	57.70
19	IC391433	69.00	147.00	187.20	10.99	59.00	50.90
20	IC392498	73.00	151.00	178.80	11.07	50.20	61.00
21	IC469791	72.00	150.00	150.60	10.49	53.80	52.50
22	IC469800	73.00	152.00	167.20	11.04	52.40	50.50
23	IC469805	67.00	140.00	166.60	10.49	40.80	54.80
24	IC469820	69.00	146.00	136.60	10.39	46.20	52.20
25	IC469829	72.00	150.00	153.80	11.12	46.00	60.20
	Annapurna (C)	78.40	160.80	178.12	10.98	49.32	67.86
	IC-35407 (C)	64.40	128.20	162.92	10.76	47.96	52.76
	PRA – 2 (C)	74.80	155.20	172.24	11.03	52.60	65.70
	PRA – 3 (C)	76.40	156.60	194.12	10.91	50.72	61.04
	Minimum	64.40	128.20	136.60	10.18	36.20	49.80
	Maximum	78.40	173.00	241.40	11.19	69.00	67.86
	Mean	70.10	147.13	176.32	10.86	51.90	56.91
	CD (0.05)	1.71	1.87	29.91	0.66	10.19	21.04
	CV (%) Error	0.87	0.47	6.34	2.28	7.61	12.75
	CV (%) Phen.	5.33	6.28	13.50	2.77	15.35	9.38

Table 9. Evaluation of germplasm in grain amaranth at Ranichauri (II Year): Kharif 2019 (Hills)

S. No.	Genotypes	Days to 50% Flowering	Days to 80% Maturity	Plant Height (cm)	Seed Vol. Wt. (g/10ml)	Inflorescence Length (cm)	Seed Yield/Plant (g)
1	EC223672	64.00	154.00	171.40	10.17	45.20	73.20
2	EC289376	71.00	141.00	161.20	11.07	50.80	54.60
3	EC289378	79.00	155.00	143.20	10.99	46.20	64.00
4	EC289386	63.00	155.00	142.20	11.04	41.80	48.40
5	IC031101	62.00	151.00	141.00	11.07	42.00	55.90
6	IC037153	78.00	153.00	143.00	10.98	39.00	62.00
7	IC038171	68.00	142.00	132.80	11.17	38.80	49.90
8	IC038173	75.00	152.00	195.80	11.17	45.80	62.40
9	IC038182	75.00	152.00	157.40	11.21	47.60	49.00
10	IC038301	60.00	154.00	177.60	11.04	51.20	54.20
11	IC038332	74.00	151.00	166.00	11.13	48.80	55.30
12	IC038333	72.00	143.00	158.40	11.08	46.40	45.80
13	IC038339	72.00	149.00	174.40	10.70	36.20	65.20
14	IC204092	74.00	150.00	141.20	11.09	47.40	65.40
15	IC258252	63.00	154.00	95.80	11.04	43.80	49.80
16	IC396963	76.00	153.00	141.60	10.49	48.60	68.70
17	IC415314	75.00	153.00	139.20	10.17	40.40	59.60
18	IC467883	70.00	141.00	167.00	11.10	45.40	56.60
19	IC540832	70.00	145.00	151.60	11.06	48.20	73.10
20	IC540860	75.00	154.00	174.00	11.00	53.20	75.40
21	IC551502	68.00	143.00	125.00	11.04	37.60	51.80
22	IC583610	61.00	149.00	103.20	11.01	34.20	55.50
23	IC583624	59.00	151.00	84.80	10.99	30.00	69.40
24	IC583625	63.00	153.00	29.80	11.04	5.60	43.60
25	IC583626	58.00	150.00	78.60	10.19	32.40	69.70
	Annapurna (C)	78.60	156.60	156.76	10.91	46.96	48.78
	Durga (C)	64.60	155.60	139.08	10.72	36.84	51.83
	PRA - 2 (C)	74.00	152.40	142.40	10.55	46.36	49.92
	PRA -3 (C)	75.80	153.80	150.76	10.49	45.68	62.12
	Minimum	58.00	141.00	29.80	10.17	5.60	43.60
	Maximum	79.00	156.60	195.80	11.21	53.20	75.40
	Mean	69.59	150.57	140.87	10.89	42.15	58.32
	CD (0.05)	1.14	0.97	47.96	1.00	17.45	23.20
	CV (%) Error	0.58	0.24	12.21	3.52	14.87	16.35
	CV (%) Phen.	9.29	3.07	24.53	2.87	21.65	15.45

Table 10. Evaluation of germplasm in Grain Amaranth at Shimla (I Year): Kharif 2019 (Hills)

S No	Acc	Leaf length (cm)	Petiole length (cm)	Days to 50% flowering	Stem thickness (mm)	Plant height (cm)	Lateral spikelet length (cm)	Infl length (cm)	Days to 80% maturity	Seed yield/plant (g)	1000 seed wt (g)	Seed vol. (g/10ml)
1	IC-406563	19.5	10.5	73	22.84	249.1	21.7	54.1	154	30.1	0.8	7.57
2	IC-444136	17.6	10.4	76	22.59	232.4	18.7	44.1	139	50.05	0.8	7.51
3	IC-444141	21.2	10.1	62	21.81	248.1	21.5	41.5	129	30.1	0.7	7.23
4	IC-444144	20.1	11.1	78	24.71	255.5	20.1	37.4	129	10.14	0.7	7.85
5	IC-444146	19.4	12.4	78	20.06	240.3	17.3	35.5	130	32	0.85	7.75
6	IC-444156	21.1	15.5	78	20.84	215.4	7.6	45.1	132	30.21	0.75	7.1
7	IC-444162	21.2	17.5	59	14.13	182.4	10.7	44.3	132	21.16	0.7	7.21
8	IC-444183	19.4	16.5	56	19.84	181.6	9.1	44.7	129	38.17	0.75	7.23
9	IC-444188	19.8	15.2	57	16.66	206.1	15.1	45.9	131	30.18	0.8	7.17
10	IC-444192	20.2	15.5	63	15.8	174.3	7.9	44.6	132	19.17	0.65	6.72
11	IC-392498	26.6	20.5	59	13.31	200.3	11.3	43.5	129	45.22	0.85	7.44
12	IC-391433	21.5	15.5	63	16.81	221.6	12.1	47.1	129	42.81	0.8	7.55
13	IC-340971	22.5	16.4	64	20.63	197.2	11.7	64.3	150	24.7	0.7	6.68
14	IC-340899	23.1	16.2	58	14.23	198.7	10.7	60.7	151	21.74	0.7	6.48
15	IC-340878	19.6	15.5	57	18.13	220	14.3	60.3	150	39.55	0.75	7.44
16	IC-340825	25.6	15.2	63	17.63	246.4	14.1	52.3	135	70.85	0.7	7.36
17	IC-340823	21.2	16.1	59	12.2	244.3	13.7	51.1	136	34.55	0.8	7.33
18	IC-383578	24.2	18.2	56	13.71	188.1	11.2	41.4	150	37.5	0.65	7.49
19	IC-383571	20.1	10.7	66	18.39	211.4	9.1	51.4	152	55.13	0.7	7.32
20	IC-436948	21.5	14.1	68	20.01	195.1	12.3	59.4	153	50.31	0.75	7.41
21	IC-469800	20.2	8.7	74	22.83	261.1	14.1	55.1	154	62.05	0.7	7.41
22	IC-469805	19.4	8.3	79	17.22	261.1	18.1	63.4	137	61.3	0.75	7.7
23	IC-469820	20.8	9.4	76	20.68	210.4	11.4	56.1	138	67.31	0.75	7.82
24	IC-469829	23.8	8.8	77	25.28	249.1	10.7	54.3	137	63.7	0.7	7.24
25	IC-469791	19.1	10.6	74	24.46	210.4	11.4	58.4	122	63.66	0.7	7.34
	Annapurna (C)	20.4	10.68	77.8	20.864	231.26	12.66	56.54	155.4	72.566	0.8	7.538
	Durga (C)	24.82	18.34	58.8	22.312	196.1	7.64	56.18	121.8	56.038	0.86	7.336
	PRA-2 (C)	19.1	10.1	95.8	21.54	246.26	12.96	55.8	157.8	65.462	0.77	7.908
	PRA-3 (C)	18.2	10.92	80.6	23.316	256.02	14.36	58.14	159.6	48.884	0.8	7.14
	Minimum	21.08	13.41	68.48	19.41	221.73	13.22	51.13	139.81	43.95	0.75	7.35
	Maximum	26.60	20.50	95.80	25.28	261.10	21.70	64.30	159.60	72.57	0.86	7.91
	Mean	21.08	13.41	68.48	19.41	221.73	13.22	51.13	139.81	43.95	0.75	7.35
	CD (0.05)	5.42	2.23	4.83	4.02	30.92	6.38	13.83	3.98	30.83	0.05	0.30
	CV (%) Error	10.87	7.83	2.32	8.16	5.13	23.02	9.36	0.96	19.75	2.35	1.44
	CV (%) Phen.	10.44	25.69	14.70	18.94	12.06	29.61	15.44	8.29	39.79	7.77	4.50

Table 11. Evaluation of germplasm in Grain Amaranth at Shimla (II Year): Kharif 2019 (Hills)

S No	Accession No.	Leaf length (cm)	Petiole length (cm)	Days to 50% flowering	Stem thickness (mm)	Plant height (cm)	Lateral spikelet length (cm)	Infl length (cm)	Days to 80% maturity	Seed yield/plant (g)	1000 seed wt (g)	Seed vol.(g/10ml)
1	EC223672	16.10	7.50	63.00	20.19	137.10	24.10	44.10	156.00	44.12	0.70	7.72
2	EC289376	18.50	9.20	71.00	19.78	230.40	7.90	48.40	136.00	45.20	0.65	8.11
3	EC289378	20.80	8.10	77.00	18.20	280.40	16.10	76.40	140.00	70.02	0.55	8.09
4	EC289386	26.50	18.50	53.00	13.40	167.40	7.30	54.30	135.00	78.55	0.70	7.79
5	IC037153	20.40	11.20	85.00	17.67	227.10	19.40	65.10	162.00	45.41	0.60	8.38
6	IC038171	16.90	9.50	73.00	14.35	215.50	20.30	75.10	159.00	69.08	0.70	8.22
7	IC038173	25.50	15.20	89.00	19.84	248.40	11.10	46.70	163.00	49.17	0.70	8.23
8	IC038182	18.50	9.80	83.00	21.42	210.30	13.40	60.30	163.00	70.24	0.60	8.18
9	IC038301	20.10	15.80	54.00	22.89	184.30	6.60	39.30	134.00	46.25	0.65	7.69
10	IC038332	24.70	15.20	91.00	20.20	268.10	16.30	70.10	162.00	79.65	0.70	7.84
11	IC038333	19.40	13.50	88.00	18.49	270.10	25.30	80.10	165.00	66.25	0.80	7.55
12	IC038339	19.60	10.80	85.00	18.75	215.40	14.30	58.10	163.00	79.10	0.75	7.10
13	IC204092	19.30	7.10	91.00	20.16	232.10	19.40	51.40	162.00	56.64	0.50	7.88
14	IC258252	19.20	9.40	52.00	19.52	170.10	14.20	59.10	136.00	31.70	0.55	7.50
15	IC311101	19.50	11.50	71.00	18.46	189.70	21.40	47.10	162.00	35.03	0.75	7.38
16	IC396963	17.80	8.10	85.00	18.80	230.30	17.10	70.10	164.00	74.02	0.80	8.10
17	IC415314	18.60	10.40	89.00	14.97	271.40	23.10	70.60	167.00	90.63	0.80	7.39
18	IC467883	16.40	9.50	85.00	19.21	240.60	20.40	64.10	167.00	70.25	0.80	7.62
19	IC540832	19.10	11.80	80.00	24.21	263.10	11.20	60.10	163.00	56.02	0.65	7.62
20	IC540860	23.80	12.50	82.00	19.47	209.70	14.30	72.30	166.00	74.63	0.65	7.59
21	IC551502	23.20	12.50	54.00	17.74	166.40	6.80	37.40	139.00	46.04	0.70	7.53
22	IC583610	20.80	10.50	57.00	19.41	156.30	11.10	49.10	144.00	36.05	0.60	7.59
23	IC583624	18.40	9.50	58.00	21.20	176.70	11.40	46.50	144.00	52.75	0.65	7.42
24	IC583625	9.60	4.10	38.00	19.11	113.10	19.50	39.10	132.00	11.03	0.50	7.75
25	IC583626	18.50	10.10	60.00	18.91	128.10	18.60	45.30	144.00	28.03	0.60	7.65
	Annapurna (C)	19.24	9.53	79.80	17.72	212.78	11.89	56.90	161.80	69.48	0.77	7.77
	Durga (C)	21.66	14.27	52.80	18.18	189.40	7.53	48.77	134.20	50.51	0.83	7.88
	PRA-2 (C)	16.70	9.62	97.60	19.58	258.04	9.86	58.32	161.20	61.97	0.80	7.59
	PRA-3 (C)	17.14	9.33	82.20	18.42	242.52	12.25	57.65	161.80	52.11	0.80	7.64
	Minimum	19.52	10.83	73.32	18.97	210.51	14.90	56.96	153.34	56.55	0.68	7.75
	Maximum	26.50	18.50	97.60	24.21	280.40	25.30	80.10	167.00	90.63	0.83	8.38
	Mean	19.52	10.83	73.32	18.97	210.51	14.90	56.96	153.34	56.55	0.68	7.75
	CD (0.05)	5.42	2.23	4.83	4.02	30.92	6.38	13.83	3.98	30.83	0.05	0.30
	CV (%) Error	10.87	7.83	2.32	8.16	5.13	23.02	9.36	0.96	19.75	2.35	1.44
	CV (%) Phen.	16.80	27.61	21.40	11.62	21.66	36.77	21.04	8.25	32.50	13.98	3.88

Table 12. Data Grain Amaranth averaged over the locations - Kharif 2019 (Hills)

S. No	Accession No	Days to 50% flowering			Days to maturity		
		Almora	Bajaura	Mean	Almora	Bajaura	Mean
1	EC223672	56.00	51.00	53.50	100.00	155.00	127.50
2	EC289376	36.00	55.00	45.50	78.00	147.00	112.50
3	EC289378	61.00	46.00	53.50	105.00	149.00	127.00
4	EC289386	47.00	55.00	51.00	95.00	146.00	120.50
5	IC037153	51.00	54.00	52.50	105.00	146.00	125.50
6	IC038171	46.00	56.00	51.00	100.00	147.00	123.50
7	IC038173	60.00	48.00	54.00	100.00	149.00	124.50
8	IC038182	58.00	46.00	52.00	95.00	148.00	121.50
9	IC038301	47.00	52.00	49.50	98.00	145.00	121.50
10	IC038332	56.00	54.00	55.00	100.00	145.00	122.50
11	IC038333	56.00	53.00	54.50	100.00	144.00	122.00
12	IC038339	56.00	55.00	55.50	102.00	145.00	123.50
13	IC204092	58.00	52.00	55.00	105.00	144.00	124.50
14	IC258252	46.00	49.00	47.50	90.00	157.00	123.50
15	IC340378	52.00	43.00	47.50	100.00	148.00	124.00
16	IC311101	46.00	55.00	50.50	100.00	162.00	131.00
17	IC340823	52.00	39.00	45.50	77.00	144.00	110.50
18	IC340825	47.00	41.00	44.00	75.00	145.00	110.00
19	IC340899	58.00	40.00	49.00	101.00	146.00	123.50
20	IC340971	47.00	39.00	43.00	102.00	145.00	123.50
21	IC383571	60.00	40.00	50.00	102.00	143.00	122.50
22	IC383578	56.00	42.00	49.00	79.00	145.00	112.00
23	IC391433	52.00	48.00	50.00	77.00	152.00	114.50
24	IC392498	58.00	46.00	52.00	101.00	151.00	126.00
25	IC396963	61.00	48.00	54.50	100.00	151.00	125.50
26	IC406563	49.00	40.00	44.50	95.00	142.00	118.50
27	IC415314	49.00	50.00	49.50	90.00	154.00	122.00
28	IC436948	52.00	44.00	48.00	80.00	144.00	112.00
29	IC444136	56.00	39.00	47.50	102.00	141.00	121.50
30	IC444141	47.00	42.00	44.50	90.00	145.00	117.50
31	IC444144	51.00	40.00	45.50	95.00	143.00	119.00
32	IC444146	52.00	41.00	46.50	80.00	145.00	112.50
33	IC444156	56.00	42.00	49.00	101.00	147.00	124.00
34	IC444162	52.00	39.00	45.50	102.00	142.00	122.00
35	IC444183	52.00	38.00	45.00	80.00	141.00	110.50

S. No	Accession No	Days to 50% flowering			Days to maturity		
		Almora	Palampur	Mean	Almora	Palampur	Mean
36	IC444188	58.00	40.00	49.00	101.00	143.00	122.00
37	IC444192	60.00	41.00	50.50	102.00	145.00	123.50
38	IC467883	47.00	55.00	51.00	90.00	146.00	118.00
39	IC469791	56.00	50.00	53.00	102.00	143.00	122.50
40	IC469800	58.00	50.00	54.00	101.00	142.00	121.50
41	IC469805	56.00	52.00	54.00	102.00	144.00	123.00
42	IC469820	52.00	53.00	52.50	101.00	145.00	123.00
43	IC469829	58.00	51.00	54.50	102.00	144.00	123.00
44	IC540832	56.00	56.00	56.00	95.00	147.00	121.00
45	IC540860	56.00	47.00	51.50	105.00	148.00	126.50
46	IC551502	46.00	55.00	50.50	86.00	146.00	116.00
47	IC583610	36.00	51.00	43.50	79.00	159.00	119.00
48	IC583624	36.00	51.00	43.50	79.00	144.00	111.50
49	IC583625	-	52.00	52.00	-	144.00	144.00
50	IC583626	36.00	55.00	45.50	77.00	147.00	112.00
51	Annapurna(C)	60.00	51.67	55.83	111.00	149.83	130.42
52	Durga(C)	55.20	50.83	53.02	108.80	146.00	127.40
53	PRA 2(C)	51.40	54.33	52.87	102.60	154.50	128.55
54	PRA 3(C)	49.60	61.00	55.30	100.40	156.50	128.45
55	VL 44(C)	52.00	-	52.00	104.00	-	104.00
	Minimum	36.00	38.00	37.00	75.00	141.00	108.00
	Maximum	61.00	61.00	61.00	111.00	162.00	136.50
	Mean	52.19	48.13	50.16	95.39	146.98	121.18
	CD(0.05)	8.51	2.72	5.62	12.28	7.55	9.91
	CV(%) Error	6.24	1.94	4.09	4.58	1.93	3.26
	CV (%) Phen.	12.34	12.73	12.53	10.34	3.15	6.74

Table 13. Data Grain Amaranth averaged over the locations - Kharif 2019 (Hills) Contd.

S.No	Accession No	Plant height (cm)			Inflorescence Length (cm)			No of spikelets/Plant		
		Almora	Bajaura	Mean	Almora	Bajaura	Mean	Almora	Bajaura	Mean
1	EC223672	158.67	234.00	196.33	65.00	88.00	76.50	81.33	32.00	56.67
2	EC289376	135.33	205.00	170.17	52.00	60.00	56.00	65.00	40.00	52.50
3	EC289378	137.00	360.00	248.50	64.33	110.00	87.17	48.33	78.00	63.17
4	EC289386	109.33	187.00	148.17	36.67	48.00	42.33	73.67	44.00	58.83
5	IC037153	102.33	201.00	151.67	42.67	68.00	55.33	51.33	44.00	47.67
6	IC038171	106.67	190.00	148.33	42.33	67.00	54.67	44.00	39.00	41.50
7	IC038173	137.00	143.00	140.00	50.67	56.00	53.33	38.00	36.00	37.00
8	IC038182	125.33	139.00	132.17	47.00	43.00	45.00	59.33	31.00	45.17
9	IC038301	105.00	170.00	137.50	35.33	48.00	41.67	68.00	39.00	53.50
10	IC038332	153.00	165.00	159.00	40.33	33.00	36.67	51.33	32.00	41.67
11	IC038333	82.67	163.00	122.83	35.00	37.00	36.00	31.33	42.00	36.67
12	IC038339	131.33	138.00	134.67	38.00	42.00	40.00	57.67	21.00	39.33
13	IC204092	176.00	170.00	173.00	59.00	72.00	65.50	57.33	42.00	49.67
14	IC258252	133.67	190.00	161.83	61.67	64.00	62.83	46.33	30.00	38.17
15	IC340378	131.33	162.00	146.67	53.67	39.00	46.33	56.67	26.00	41.33
16	IC31101	92.33	175.00	133.67	36.33	60.00	48.17	46.00	36.00	41.00
17	IC340823	130.33	174.00	152.17	47.33	31.00	39.17	73.00	27.00	50.00
18	IC340825	127.67	100.00	113.83	58.00	29.00	43.50	71.33	19.00	45.17
19	IC340899	156.67	180.00	168.33	57.33	71.00	64.17	56.00	31.00	43.50
20	IC340971	144.33	173.00	158.67	58.00	60.00	59.00	44.00	32.00	38.00
21	IC383571	149.33	157.00	153.17	45.33	38.00	41.67	52.00	26.00	39.00
22	IC383578	132.00	183.00	157.50	49.33	36.00	42.67	67.67	30.00	48.83
23	IC391433	104.00	160.00	132.00	37.33	47.00	42.17	56.00	25.00	40.50
24	IC392498	131.33	205.00	168.17	51.33	61.00	56.17	36.33	27.00	31.67
25	IC396963	159.67	160.00	159.83	60.00	31.00	45.50	65.33	12.00	38.67
26	IC406563	155.33	139.00	147.17	60.67	46.00	53.33	87.67	32.00	59.83
27	IC415314	136.00	185.00	160.50	47.00	65.00	56.00	69.00	42.00	55.50
28	IC436948	114.00	230.00	172.00	49.67	110.00	79.83	62.67	48.00	55.33
29	IC444136	155.67	150.00	152.83	58.67	47.00	52.83	59.67	30.00	44.83
30	IC444141	135.00	142.00	138.50	49.00	37.00	43.00	68.67	36.00	52.33
31	IC444144	153.33	143.00	148.17	58.67	36.00	47.33	82.33	23.00	52.67
32	IC444146	162.33	190.00	176.17	58.67	59.00	58.83	78.33	32.00	55.17
33	IC444156	150.33	165.00	157.67	53.33	54.00	53.67	46.67	30.00	38.33
34	IC444162	134.00	160.00	147.00	42.33	52.00	47.17	70.67	32.00	51.33
35	IC444183	135.33	165.00	150.17	54.00	76.00	65.00	75.00	31.00	53.00
36	IC444188	158.67	187.00	172.83	57.67	57.00	57.33	41.00	35.00	38.00

S.No	Accession No	Plant height (cm)			Inflorescence Length (cm)			No of spikelets/Plant		
		Almora	Bajaura	Mean	Almora	Bajaura	Mean	Almora	Bajaura	Mean
37	IC444192	144.67	180.00	162.33	56.00	60.00	58.00	52.67	36.00	44.33
38	IC467883	103.00	165.00	134.00	32.00	54.00	43.00	32.00	18.00	25.00
39	IC469791	119.00	210.00	164.50	53.33	75.00	64.17	37.67	50.00	43.83
40	IC469800	133.00	147.00	140.00	55.33	49.00	52.17	42.33	42.00	42.17
41	IC469805	121.00	193.00	157.00	52.67	66.00	59.33	45.67	38.00	41.83
42	IC469820	110.67	160.00	135.33	46.00	58.00	52.00	47.67	32.00	39.83
43	IC469829	125.67	155.00	140.33	55.00	50.00	52.50	56.00	36.00	46.00
44	IC540832	117.33	167.00	142.17	37.00	41.00	39.00	39.33	36.00	37.67
45	IC540860	102.00	150.00	126.00	39.00	53.00	46.00	57.67	38.00	47.83
46	IC551502	117.33	205.00	161.17	34.67	66.00	50.33	63.33	46.00	54.67
47	IC583610	116.00	182.00	149.00	48.33	66.00	57.17	74.00	38.00	56.00
48	IC583624	87.00	174.00	130.50	40.33	60.00	50.17	46.00	42.00	44.00
49	IC583625	-	125.00	125.00	-	52.00	52.00	-	12.00	12.00
50	IC583626	96.67	210.00	153.33	35.33	73.00	54.17	44.33	48.00	46.17
51	Annapurna(C)	162.80	157.00	159.90	57.80	56.17	56.98	66.20	36.50	51.35
52	Durga(C)	159.20	196.50	177.85	61.53	63.00	62.27	58.27	47.67	52.97
53	PRA 2(C)	160.80	105.67	133.23	53.80	45.50	49.65	63.80	28.50	46.15
54	PRA 3(C)	137.60	149.33	143.47	50.87	53.17	52.02	55.40	33.67	44.53
55	VL 44(C)	157.20	-	157.20	49.67	-	49.67	59.87	-	59.87
	Minimum	82.67	100.00	91.33	32.00	29.00	30.50	31.33	12.00	21.67
	Maximum	176.00	360.00	268.00	65.00	110.00	87.50	87.67	78.00	82.83
	Mean	131.73	173.55	152.64	49.49	55.90	52.70	57.06	34.64	45.85
	CD(0.05)	39.07	13.07	26.07	24.38	7.96	16.17	11.91	5.99	8.95
	CV(%) Error	9.88	3.34	6.61	17.51	5.68	11.59	7.71	6.37	7.04
	CV (%) Phen.	16.92	21.52	19.22	18.15	30.23	24.19	23.63	30.13	26.88

Table 14. Promising lines in Grain Amaranth germplasm during Kharif 2019 at different locations (Hills)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Almora (25 + 25 Genotypes), Grain Amaranth					
1	Days to 50% flowering	36.00	61.00	EC289376 (36.00), IC583610 (36.00), IC583624 (36.00), IC583626 (36.00), IC258252 (46.00), IC551502 (46.00), IC038171 (46.00)	PRA 3 (49.60)
2	Days to 80% maturity	75.00	111.00	IC340825 (75.00), IC583626 (77.00), IC340823 (77.00), IC391433 (77.00), EC289376 (78.00), IC583610 (79.00), IC583624 (79.00), IC383578 (79.00), IC444146 (80.00), IC436948 (80.00), IC444183 (80.00), IC551502 (86.00)	PRA 3 (100.40)
3	Plant height (cm) Dwarf	82.67	176.00	IC038333 (82.67), IC583624 (87.00), IC031101 (92.33), IC583626 (96.67), IC540860 (102.00), IC037153 (102.33)	PRA 3 (137.60)
4	Plant height (cm) Tall	82.67	176.00	IC204092 (176.00)	Annapurna (162.80)
5	Inflorescence length (cm)	32.00	65.00	EC223672 (65.00), EC289378 (64.33)	Durga (61.53)
6	No. of spikelet's/plant	31.33	87.67	IC406563 (87.67), IC444144 (82.33), EC223672 (81.33), IC444146 (78.33), IC444183 (75.00), IC583610 (74.00), EC289386 (73.67), IC340823 (73.00)	Annapurna (66.20)
7	Leaf length (cm)	7.47	13.90	IC444192 (13.90), EC289386 (13.70), IC436948 (13.67), IC469805 (13.33), IC204092 (13.30), IC469800 (13.27), IC469829 (12.83), IC406563 (12.73), IC444188 (12.73), IC396963 (12.57), IC038301 (12.50), IC383578 (12.40), IC444183 (12.17), IC583610 (12.10), IC340378 (12.10), EC289378 (12.07)	Durga (9.89)
8	Leaf width (cm)	3.83	8.43	IC406563 (8.43), EC289386 (7.80), IC396963 (7.07), IC204092 (7.03), IC340378 (7.03), IC444144 (7.03), IC444192 (6.83), IC469800 (6.83), IC383578 (6.80), IC391433 (6.70)	VL 44 (5.79)
9	Petiole length (cm)	3.80	9.73	EC289386 (9.73), IC391433 (8.30)	Annapurna (7.60)
10	Seed yield/plant (g)	3.00	29.50	IC391433 (29.50), IC444144 (23.20)	Durga (22.32)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Bajaura (25 + 25 Genotypes), Grain Amaranth					
1	Days to 50% flowering	38.00	61.00	IC444183 (38.00), IC340823 (39.00), IC340971 (39.00), IC444136 (39.00), IC444162 (39.00), IC340899 (40.00), IC383571 (40.00), IC406563 (40.00), IC444144 (40.00), IC444188 (40.00), IC340825 (41.00), IC444146 (41.00), IC444192 (41.00), IC383578 (42.00), IC441141 (42.00)	Durga (50.83)
2	Days to 80% maturity	141.00	162.00	-	Durga (146.00)
3	Plant height (cm) Dwarf	100.00	360.00	-	PRA 2 (105.67)
4	Plant height (cm) Tall	100.00	360.00	EC289378 (360.00), EC223672 (234.00), IC436948 (230.00)	Durga (196.50)
5	Inflorescence length (cm)	29.00	110.00	EC289378 (110.00), IC436948 (110.00), EC223672 (88.00), IC444183 (76.00), IC469791 (75.00), IC583626 (73.00), IC204092 (72.00), IC340899 (71.00)	Durga (63.00)
6	No. of spikelet's/plant	12.00	78.00	EC289378 (78.00), IC469791 (50.00)	Durga (47.67)
7	No. of plants at harvest	8.00	28.00	IC469829 (28.00), IC444144 (28.00)	Durga (25.33)
8	Seed yield/plant (g)	2.00	35.00	EC289386 (35.00), EC289378 (27.00)	Durga (26.87)
9	Seed vol. wt. (g/10ml)	3.00	8.00	IC469805 (8.00), IC583626 (8.00)	Durga (7.33)
Ranichauri - 1 (25 Genotypes), Grain Amaranth					
1	Days to 50% flowering	64.40	78.40	-	IC-35407 (64.40)
2	Days to 80% maturity	128.20	173.00	-	IC-35407 (128.20)
3	Plant height (cm) Dwarf	136.60	241.40	IC469820 (136.60), IC444183 (149.20), IC469791 (150.60), IC444162 (151.80), IC444188 (152.40)	IC-35407 (162.92)
4	Plant height (cm) Tall	136.60	241.40	IC444144 (241.40), IC406563 (218.40), IC444141 (215.20)	PRA -3 (194.12)
5	Seed vol. wt. (g/10ml)	10.18	11.19	-	PRA -2 (11.03)
6	Inflorescence length (cm)	36.20	69.00	IC444146 (69.00), IC444144 (65.60), IC340878 (64.60), IC406563 (62.40), IC391433 (59.00), IC383578 (57.60)	PRA -2 (52.60)
7	Seed yield/plant (g)	49.80	67.86	-	Annapurna (67.86)
Ranichauri - 2 (25 Genotypes), Grain Amaranth					
1	Days to 50% flowering	58.00	79.00	IC583626 (58.00), IC583624 (59.00), IC038301 (60.00)	Durga (64.60)
2	Days to 80% maturity	141.00	156.60	IC467883 (141.00), EC289376 (141.00), IC038171 (142.00), IC551502 (143.00), IC038333 (143.00)	PRA -2 (152.40)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
3	Plant height (cm) Dwarf	29.80	195.80	IC583625 (29.80), IC583626 (78.60), IC583624 (84.80), IC258252 (95.80), IC583610 (103.20)	Durga (139.08)
4	Plant height (cm) Tall	29.80	195.80	IC038173 (195.80), IC038301 (177.60), IC038339 (174.40), IC540860 (174.00), EC223672 (171.40)	Annapurna (156.76)
5	Seed vol. wt. (g/10ml)	10.17	11.21	IC038182 (11.21), IC038173 (11.17), IC038171 (11.17), IC038332 (11.13), IC467883 (11.10)	Annapurna (10.91)
6	Inflorescence length (cm)	5.60	53.20	IC540860 (53.20), IC038301 (51.20), EC289376 (50.80)	Annapurna (46.96)
7	Seed yield/plant (g)	43.60	75.40	IC540860 (75.40), EC223672 (73.20), IC540832 (73.10)	PRA -3 (62.12)
Shimla (25 + 25 Genotypes), Grain Amaranth					
1	Leaf length (cm)	19.52	26.50	EC289386 (26.50), IC038173 (25.50), IC038332 (24.70)	Durga (21.66)
2	Petiole length (cm)	10.83	18.50	EC289386 (18.50), IC038301 (15.80)	Durga (14.27)
3	Days to 50% flowering	73.32	97.60	IC583625 (38.00)	Durga (52.80)
4	Stem thickness (mm)	18.97	24.21	IC540832 (24.21), IC038301 (22.89), IC038182 (21.42)	PRA-2 (19.58)
5	Plant height (cm) Dwarf	113.10	280.40	IC583625 (113.10), IC583626 (128.10), EC223672 (137.10), IC583610 (156.30), IC551502 (166.40)	Durga (189.40)
6	Plant height (cm) Tall	113.10	280.40	EC289378 (280.40), IC415314 (271.40)	PRA-2 (258.04)
7	Lateral spikelet length (cm)	14.90	25.30	IC038333 (25.30), EC223672 (24.10), IC415314 (23.10), IC311101 (21.40), IC467883 (20.40), IC038171 (20.30), IC583625 (19.50), IC204092 (19.40), IC037153 (19.40), IC583626 (18.60), IC396963 (17.10), IC038332 (16.30), EC289378 (16.10)	PRA-3 (12.25)
8	Inflorescence length (cm)	56.96	80.10	IC038333 (80.10), EC289378 (76.40), IC038171 (75.10), IC540860 (72.30), IC415314 (70.60), IC396963 (70.10), IC038332 (70.10), IC037153 (65.10)	PRA-2 (58.32)
9	Days to 80% maturity	153.34	167.00	-	Durga (134.20)
10	Seed yield/plant (g)	56.55	90.63	IC415314 (90.63), IC038332 (79.65), IC038339 (79.10), EC289386 (78.55)	Annapurna (69.48)
11	Seed vol. wt. (g/10ml)	7.75	8.38	IC037153 (8.38), IC038173 (8.23), IC038171 (8.22)	Durga (7.88)

Table 15. Promising lines in Grain Amaranth germplasm during Kharif 2019 based on all locations (Hills)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Days to 50% flowering	37.00	61.00	IC340971 (43.00), IC583610 (43.50), IC583624 (43.50), IC340825 (44.00), IC406563 (44.50), IC444141 (44.50)	VL 44 (52.00)
2	Days to maturity	108.00	136.50	-	VL 44 (104.00)
3	Plant height (cm) Dwarf	91.33	268.00	IC340825 (113.83), IC038333 (122.83), IC583625 (125.00)	PRA 2 (133.23)
	Plant height (cm) Tall	91.33	268.00	EC289378 (248.50), EC223672 (196.33)	Durga (177.85)
4	Inflorescence Length (cm)	30.50	87.50	EC289378 (87.17), IC436948 (79.83), EC223672 (76.50),	Durga (62.27)
5	No of spikelets/Plant	21.67	82.83	EC289378 (63.17)	VL 44 (59.87)

2.4.1.2 Buckwheat (*Fagopyrum* spp.)

A set of 75 accessions having 50 in I and 25 in II year evaluation were planned for screening at five locations viz. VPKAS, Almora, UUHF Ranichauri, CSK HPKV, Sangla, NBPGR, RS, Shimla and Tadong along with four checks viz Himpriya, VL-7, PRB-1 and Shimla B-1. The experimental details are presented in Table 16. Data were received from all centers except Sangla and Tadong. The list of promising lines including range and mean at all centres for all the descriptors is presented in Tables 17 to 27.

At VPKAS Almora, a set of 75 genotypes were evaluated for twelve quantitative traits along with four checks. The statistical data and promising genotypes are presented in Tables 17, 18 and 23 to 27. The promising genotypes for early maturity are EC012552 (59.0 days), IC108501 and EC216630 (60.0 days) which were better than the best check VL 7 (65.4 days). More number of branches per plant were observed in genotypes IC016556, IC025999 and IC047929 (10.67) which were better than the check PRB 1 (7.73). The genotypes IC010728 (2.97 cm) followed by IC049661 (2.93 cm) and IC107966 (2.6 cm) sure significantly more petiole length as compared to best check VL 7 (2.09 cm), while more number of inflorescence per plant were observed in EC012552 (82.0) followed by IC016556 (76.3) and IC108501 (70.7) were better than the best check VL 7 (60.07). More number of nodes per plant were found in IC016556 (25.67) followed by IC108501 (19.33) and IC027295 (17.33) and were better than the check Shimla B1 (14.53). None of the genotypes found better than the best check VL-7 (27.2 days) for early flowering.

At UUHF Ranichauri, a set of 75 genotypes was evaluated for seven characters along with four checks. The statistical data and promising genotypes are presented in Tables 19, 20 and 23 to 27. In the 1st year evaluation of 50 genotypes the plant height ranged from 55.6 cm to 172.0 cm with maximum plant height in the genotype IC026600 (172.0 cm) followed by IC026597 (165.4 cm) and IC026552 (164.6 cm) which were better than the best check PRB-1 (151.28 cm). The bold seeded genotypes (100 seed weight) were IC026755 (3.17 g) followed by IC016552 (3.17 g) and IC278957 (3.14 g) better than the best Himpriya (3.09 g). The number of primary branches were found more in IC299059 (7.40) followed by IC037284 (7.20) and IC079238 (6.80) and were better than the best check PRB-1 (4.84). The seed yield per plant ranged from 2.5 g to 14.2 g. The high yielding genotypes were IC026600 (14.2 g), IC003704 and IC037284 (14.1) which were better than the best check PRB 1 (11.15 g). None of the genotypes found superior than the best check VL-7 (38.0 days) & Himpriya (144.6 days) for early flowering and early maturity, respectively. In the 2nd year evaluation of 25 genotypes IC049661 (3.19 g) followed by IC013140 and IC026590 (3.12 g) have bold

seededness and were better than the best check Shimla B-1 (3.09 g). Seed yield per plant ranged from 5.8 g to 17.4 g. The maximum seed yield per plant was recorded in IC013144 (17.4 g) followed by IC013412 (16.1 g) and IC047458 (16.0 g) having superiority over the best check PRB 1 (11.76 g). None of the genotypes were significantly superior than the best check VL 7 (38.0 days), Himpriya (144.6 days), PRB 1 (159.36 cm) and PRB 1 (4.96) for the parameters early flowering, early maturity, plant height and number of primary branches, respectively.

At NBPGR Shimla, a set of 75 genotypes was evaluated for fourteen quantitative characters along with four checks. The statistical data and promising genotypes are presented in Tables 21, 22 and 23 to 27. The genotypes IC016552 (32.0 days) followed by IC026755 and IC024301 (33.0 days) which were superior to the best check VL 7 (37.4 days), while IC024300 (76.0 days) followed by IC047929 (77.0 days) IC046160 (78.0 days) which were better over the best check Shimla B1 (82.0 days). The plant height ranged from 65.70 cm to 173.74 cm and none of the genotypes were superior than the best check PRB1 (173.74). More number of primary branches were observed in IC037295 (5.5) followed by IC026600 (5.0) and IC037282 (4.5) which were better than the best check Himpriya (3.5), whereas more number of inflorescences per plant were observed in IC024301 (33.0) followed by IC016552 (31.5) and IC026755 (30.0) which were statistically superior than the best check Shimla B-1 (26.0). EC125940 (5.01 g) and IC026755 (4.1 g) sure maximum seed yield per plant more than the best check Shimla B-1 (3.59). The bold seededness was observed in EC125940 (40.5 g) which was significantly higher than the best check VL7 (28.61 g).

Over the locations for all four centres viz., Almora, Ranichauri and Shimla the performance of entries and best genotypes in comparison to the checks have been summarized in Table 27. The best performing genotypes for early flowering were IC010728 (29.0 days) followed by IC258239 (31.0 days) and were better than the best check VL-7 (32.3 days). The maximum plant height was observed in genotypes IC079238 (174.37 cm), IC010728 (169.67 Cm) and IC107982 (157.25 cm) and were better than the best checks PRB-1 (149.27 cm). The number of inflorescences per plant ranged from 17.83 to 66.67 and the best performing genotypes was IC010728 (66.67) and was better than the local check (60.07). More number of branches were observed in IC010728 (8.67), IC049661 (7.25) and IC025999 (7.08), which were superior than the local check (7.05). None of the genotypes were found superior over the best checks for early maturity and more seed yield per plant.

Table 16. Experimental Details of Germplasm Evaluation in Buckwheat: Kharif 2019 (Hills)

S. No	Items	Almora	Ranichauri	Shimla
1	No. of Genotypes	50+25	50+25	50+25
2	No. of Checks	4	4	4
3	Design	ABD	ABD	ABD
4	No. of Block	5	5	5
5	Number of Rows	2	2	3
6	Row Length (m)	3	3	2
7	Row spacing (cm)	25	30	30
8	Plant spacing (cm)	10	10	10
9	NPKS (kg/ha)	40:20:20	40:20:20	40:20:20:20
10	Plot size (m ²)	1.8	1.8	1.8
11	Sowing Date	26/6/2019	15/6/2019	30/5/2019
12	Harvesting period	At maturity	10/9/2019 to 11/11/2019	14/8/2019 to 14/10/2019

Table 17. Evaluation of germplasm in buckwheat at Almora (I Year): Kharif 2019 (Hills)

S.No.	Accession No.	Days to flowering	Days to maturity	Plant height (cm)	No. of leaves	No of Branches	Leaf Length (cm)	Leaf Width (cm)	Petole length (cm)	Cyme length	No. of nodes	No of Inflorescence	Yield/plant (gm)
1	EC018173	42.00	77.00	81.00	58.67	6.67	2.93	2.77	1.83	1.63	11.00	52.33	4.50
2	EC216630	28.00	60.00	160.33	57.67	9.33	3.93	3.30	1.97	1.83	16.33	58.00	7.60
3	EC218739	50.00	85.00	107.33	47.67	7.67	3.03	2.63	1.70	1.50	9.33	47.00	7.60
4	EC286380	44.00	77.00	90.00	52.33	7.33	3.53	3.17	1.67	1.23	11.00	54.00	3.70
5	EC286382	42.00	76.00	85.00	25.00	7.67	3.00	2.90	1.83	0.97	13.33	42.00	3.50
6	EC321800	50.00	78.00	68.67	20.00	5.67	2.77	2.97	1.27	1.17	4.67	27.33	3.50
7	EC323724	33.00	81.00	152.33	54.33	6.67	3.33	2.83	1.93	1.37	12.67	42.00	4.20
8	IC016552	33.00	80.00	110.00	58.33	7.00	3.80	3.07	1.97	2.03	16.00	56.33	5.60
9	IC016580	40.00	77.00	123.00	100.67	8.33	4.07	4.53	0.83	0.83	17.33	63.33	4.00
10	IC018049	28.00	68.00	152.33	36.67	9.00	2.93	2.97	1.93	1.60	13.33	61.67	1.50
11	IC018757	44.00	77.00	115.00	56.67	6.00	3.77	2.83	1.93	1.53	15.33	49.67	2.80
12	IC022426	49.00	77.00	96.67	69.67	7.33	3.80	3.00	1.80	1.33	11.67	47.00	4.30
13	IC024301	46.00	80.00	112.33	18.33	5.67	1.90	1.17	0.83	0.97	6.67	47.00	2.60
14	IC025999	51.00	77.00	162.00	58.33	10.67	4.03	3.83	1.93	2.00	14.33	52.00	4.30
15	IC026552	42.00	77.00	97.33	51.33	8.33	3.70	3.73	2.20	0.77	13.33	43.00	3.00
16	IC026583	42.00	77.00	105.33	48.33	7.67	4.20	3.60	0.63	1.73	13.33	60.00	5.00
17	IC026597	43.00	77.00	71.33	37.00	4.33	2.93	2.13	0.97	1.10	11.00	26.67	7.60
18	IC026600	39.00	74.00	60.67	32.00	5.67	2.93	2.50	1.60	1.13	7.67	29.67	6.50
19	IC026755	45.00	78.00	90.67	33.33	6.00	3.07	2.77	1.77	1.03	12.67	52.33	4.40
20	IC037284	30.00	77.00	139.67	57.33	7.67	3.33	2.93	1.80	1.10	13.00	45.33	7.60
21	IC042458	43.00	80.00	137.67	45.67	7.33	2.93	2.63	1.80	1.67	13.00	40.33	3.00
22	IC046160	46.00	79.00	93.33	53.67	7.67	3.50	3.00	2.03	1.77	13.67	45.67	8.70
23	IC047929	42.00	76.00	115.33	36.67	10.67	4.60	4.67	1.43	1.77	13.33	62.00	3.70
24	IC049160	43.00	74.00	129.33	28.67	8.67	2.93	2.47	0.83	1.23	11.33	52.67	8.10
25	IC049655	44.00	77.00	83.00	29.00	6.33	3.70	2.77	1.57	0.93	13.67	34.00	1.70
26	IC049659	35.00	74.00	132.67	52.33	8.33	3.50	2.83	1.03	0.87	6.00	57.00	4.90
27	IC049663	46.00	80.00	81.33	61.67	7.67	3.63	3.03	1.87	1.03	13.33	48.67	1.70
28	IC079238	29.00	80.00	176.33	65.00	9.33	3.50	2.93	1.70	1.73	13.00	48.33	8.10
29	IC107966	28.00	78.00	152.33	60.67	9.67	3.40	3.03	2.60	1.60	13.00	54.67	4.00
30	IC107982	31.00	70.00	174.00	41.33	8.33	3.30	2.93	1.87	1.63	12.33	56.33	11.20
31	IC108501	26.00	60.00	148.00	40.33	8.33	3.40	2.73	1.90	1.60	19.33	70.67	9.80
32	IC188669	28.00	65.00	99.00	27.33	7.33	3.27	2.40	2.17	1.97	12.67	48.33	5.50
33	IC202266	42.00	81.00	83.00	49.00	9.00	3.03	2.67	1.83	1.47	11.67	44.33	6.00

S.No.	Accession No.	Days to flowering	Days to maturity	Plant height (cm)	No. of leaves	No of Branches	Leaf Length (cm)	Leaf Width (cm)	Petole length (cm)	Cyme length	No. of nodes	No of Inflorescence	Yield/plant (gm)
34	IC202293	42.00	74.00	116.33	27.67	5.67	2.93	2.57	0.77	1.03	7.00	47.33	7.80
35	IC202465	43.00	78.00	89.00	43.00	7.33	4.17	3.13	2.03	1.27	13.00	42.00	8.00
36	IC216622	30.00	64.00	131.00	54.33	7.33	4.20	3.83	1.73	1.93	13.00	44.67	7.80
37	IC266743	31.00	77.00	136.33	29.33	7.67	3.83	2.93	1.03	2.07	12.00	43.00	12.30
38	IC278957	31.00	74.00	102.00	40.00	7.67	3.70	2.93	1.23	0.97	13.00	28.67	7.60
39	IC299059	30.00	64.00	134.00	26.00	5.00	3.80	2.97	1.67	1.03	15.00	51.67	9.80
40	IC319581	28.00	78.00	141.00	49.67	9.67	4.10	2.87	1.97	1.80	12.67	53.67	2.50
41	IC319588	30.00	60.00	111.00	32.33	7.00	3.07	2.87	1.93	1.50	7.67	46.67	7.80
42	IC329950	26.00	77.00	161.00	56.67	8.33	3.77	3.27	1.87	1.90	13.67	59.67	4.30
43	IC340829	26.00	66.00	118.67	40.33	8.33	3.57	2.83	1.77	1.97	9.67	53.67	1.40
44	IC412849	26.00	61.00	143.67	42.67	6.67	3.90	2.93	1.87	1.77	16.00	59.00	4.00
45	IC421601	28.00	63.00	132.33	49.67	9.33	3.70	2.90	1.83	1.43	11.00	40.67	5.00
46	IC521297	28.00	61.00	121.67	49.33	7.33	3.03	2.80	1.73	1.20	12.67	44.33	5.40
	Himpriya(C)	41.40	73.20	112.47	41.80	7.40	3.20	2.77	1.70	1.53	11.87	47.33	11.92
	PRB-1(C)	34.20	77.00	124.80	32.53	7.73	3.46	2.59	1.54	1.65	12.40	45.33	8.76
	Shimla B-1(C)	41.00	71.60	127.07	38.20	6.90	3.20	2.77	1.98	1.42	12.57	42.03	9.72
	VL-7(C)	27.20	65.80	132.53	39.13	7.07	4.20	3.54	2.09	1.66	12.27	59.53	9.24
	Local check(C)	36.20	65.40	128.80	38.13	7.05	3.30	3.05	1.64	1.82	14.53	60.07	9.30
	Minimum	26.00	60.00	60.67	18.33	4.33	1.90	1.17	0.63	0.77	4.67	26.67	1.40
	Maximum	51.00	85.00	176.33	100.67	10.67	4.60	4.67	2.60	2.07	19.33	70.67	12.30
	Mean	36.92	73.61	118.63	45.02	7.58	3.47	2.97	1.67	1.45	12.36	48.80	5.94
	CD(0.05)	6.86	15.89	59.05	30.58	3.42	1.57	1.98	0.96	1.22	6.47	21.77	3.97
	CV(%) Error	7.49	8.85	18.55	31.67	18.59	17.79	26.47	21.18	29.79	19.99	16.83	15.96
	CV (%) Phen.	21.18	9.06	23.69	32.62	17.62	14.19	17.96	24.87	25.07	22.46	19.42	47.78

Table 18. Evaluation of germplasm in buckwheat at Almora (II Year): Kharif 2019 (Hills)

S.No.	Accession No.	Days to flowering	Days to maturity	Plant height (cm)	No. of leaves	No of Branches	Leaf Length (cm)	Leaf Width (cm)	Petole length (cm)	Cyme length	No. of nodes	No of Inflorescence	Yield/ plant (gm)
1	EC012552	28.00	59.00	138.00	25.67	6.00	6.53	5.73	1.03	1.70	12.67	82.00	4.20
2	IC009879	44.00	77.00	115.00	45.33	9.00	2.93	2.50	1.67	1.30	15.67	42.00	2.30
3	IC013140	41.00	80.00	104.67	34.00	9.33	2.17	1.87	0.60	1.13	14.33	45.67	8.70
4	IC013144	45.00	78.00	107.00	20.67	7.00	2.63	2.60	0.87	1.20	8.00	38.67	3.40
5	IC013196	45.00	74.00	61.00	46.33	6.67	2.80	1.90	1.03	1.03	10.67	35.00	2.80
6	IC013410	44.00	77.00	71.67	19.33	6.33	2.60	2.60	1.03	1.07	11.00	31.33	5.40
7	IC013411	40.00	77.00	95.00	50.33	7.33	3.47	2.93	1.83	1.60	10.33	41.00	4.30
8	IC013412	43.00	80.00	101.67	28.00	7.33	2.70	2.67	0.83	0.90	7.33	39.33	10.70
9	IC014253	45.00	78.00	90.67	33.33	6.00	3.07	2.77	1.77	1.03	12.67	52.33	6.50
10	IC016556	40.00	74.00	150.00	111.00	10.67	3.43	4.20	1.97	1.17	25.67	76.33	5.00
11	IC018751	44.00	81.00	127.00	30.67	6.33	2.37	1.83	0.93	0.83	5.33	41.00	12.30
12	IC024300	42.00	77.00	81.00	58.67	6.67	2.93	2.77	1.83	1.63	11.00	52.33	6.70
13	IC026589	40.00	74.00	108.33	74.33	9.67	3.80	3.53	1.47	1.53	16.33	60.00	6.00
14	IC026590	44.00	77.00	91.67	62.00	9.00	3.07	2.77	1.97	1.27	15.67	57.67	8.00
15	IC026594	42.00	78.00	98.67	31.33	6.67	3.23	2.93	1.90	0.93	17.00	43.00	9.80
16	IC037282	43.00	80.00	115.33	69.00	7.00	5.53	5.40	2.43	0.73	13.33	52.67	6.50
17	IC037296	42.00	78.00	98.67	31.33	6.67	3.23	2.93	1.90	0.93	17.00	43.00	6.80
18	IC037303	40.00	77.00	80.33	63.00	7.00	3.73	2.93	1.80	1.17	14.67	38.67	4.30
19	IC037304	30.00	77.00	160.67	54.33	6.67	3.77	2.80	1.97	1.70	13.33	56.00	4.00
20	IC042427	40.00	78.00	117.00	41.33	7.33	3.13	2.33	1.67	1.33	14.00	39.33	3.90
21	IC047458	45.00	77.00	86.33	54.33	9.67	3.27	2.93	2.00	1.60	10.33	56.67	4.30
22	IC049661	40.00	74.00	122.33	41.00	10.00	3.83	4.10	2.93	0.97	16.33	42.67	4.50
23	IC049663	45.00	77.00	109.33	45.00	8.33	3.70	2.80	1.87	1.20	9.33	33.33	7.60
24	IC049668	40.00	78.00	78.67	29.33	6.33	1.97	2.03	0.67	1.03	12.67	32.00	7.60
25	IC049671	46.00	80.00	70.67	24.67	6.33	1.73	1.43	1.13	0.80	10.33	30.67	4.30
	Himpriya (C)	41.40	73.20	112.47	41.80	7.40	3.20	2.77	1.70	1.53	11.87	47.33	11.92
	PRB-1 (C)	34.20	77.00	124.80	32.53	7.73	3.46	2.59	1.54	1.65	12.40	45.33	8.76
	Shimla B-1 (C)	41.00	71.60	127.07	38.20	6.90	3.20	2.77	1.98	1.42	12.57	42.03	9.72
	VL-7 (C)	27.20	65.80	132.53	39.13	7.07	4.20	3.54	2.09	1.66	12.27	59.53	9.24
	Local check (C)	36.20	65.40	128.80	38.13	7.05	3.30	3.05	1.64	1.82	14.53	60.07	9.30
	Minimum	27.20	59.00	61.00	19.33	6.00	1.73	1.43	0.60	0.73	5.33	30.67	2.30
	Maximum	46.00	81.00	160.67	111.00	10.67	6.53	5.73	2.93	1.82	25.67	82.00	12.30
	Mean	40.60	75.67	106.88	43.80	7.52	3.30	2.93	1.60	1.26	12.95	47.23	6.63
	CD(0.05)	6.86	15.89	59.05	30.58	3.42	1.57	1.98	0.96	1.22	6.47	21.77	3.97
	CV(%) Error	7.49	8.85	18.55	31.67	18.59	17.79	26.47	21.18	29.79	19.99	16.83	15.96
	CV (%) Phen.	12.14	6.34	22.36	43.41	17.34	28.58	31.80	33.83	25.01	28.80	26.25	41.35

Table 19. Evaluation of germplasm in buckwheat at Ranichauri (I year): Kharif 2019 (Hills)

S. No.	Genotypes	Days to 50% Flowering	Days to 80% Maturity	Plant Height (cm)	100 Seed Weight (g)	No. of Primary Branches/Plant	Plant Stand at Harvest	Seed Yield/Plant (g)
1	IC 016552	44.00	112.00	102.20	3.17	2.80	84.00	12.40
2	IC 016580	58.00	141.00	124.00	2.98	4.20	90.00	12.10
3	IC 018757	61.00	142.00	155.80	2.30	4.80	77.00	10.40
4	IC 022426	55.00	139.00	128.60	2.70	3.20	79.00	11.50
5	IC 024301	43.00	111.00	139.40	2.90	4.20	67.00	9.60
6	IC 025999	62.00	150.00	156.60	3.04	4.60	88.00	8.60
7	IC 026552	57.00	147.00	164.60	3.10	4.80	92.00	8.50
8	IC 026583	45.00	139.00	114.40	3.11	3.60	96.00	7.70
9	IC 026597	60.00	143.00	165.40	3.09	4.80	95.00	6.40
10	IC 026600	59.00	142.00	172.00	3.10	5.80	88.00	14.20
11	IC 026755	41.00	90.00	113.00	3.17	3.60	89.00	5.30
12	IC 042458	58.00	94.00	124.80	3.11	3.40	78.00	5.60
13	IC 046160	56.00	112.00	145.00	2.98	3.60	82.00	5.50
14	IC 047929	58.00	115.00	138.00	3.10	3.60	78.00	4.00
15	IC 049160	57.00	142.00	123.40	3.09	5.00	79.00	13.40
16	IC 049655	57.00	144.00	84.00	2.98	2.00	82.00	13.90
17	IC 049663	58.00	143.00	71.80	2.96	2.60	80.00	13.40
18	IC 202266	60.00	143.00	55.60	2.95	1.60	65.00	4.10
19	IC 202293	57.00	132.00	125.60	2.97	3.60	92.00	13.10
20	IC 202465	58.00	135.00	121.20	2.95	4.00	77.00	10.20
21	EC 018173	57.00	131.00	128.60	3.04	4.60	77.00	5.60
22	EC 218739	56.00	138.00	129.60	3.09	4.00	78.00	8.70
23	EC 286380	48.00	132.00	160.60	2.97	4.00	82.00	8.20
24	EC 286382	58.00	136.00	157.00	2.99	4.00	87.00	13.90
25	EC 321800	59.00	135.00	146.80	3.04	3.60	92.00	8.20
26	EC 323724	46.00	138.00	144.80	3.09	4.40	78.00	10.30
27	EC 216630	47.00	138.00	145.20	3.10	4.20	82.00	9.80
28	EC 125940	45.00	136.00	154.40	3.12	4.40	85.00	9.00
29	IC 003704	44.00	137.00	151.80	3.11	4.40	86.00	14.10
30	IC 278957	45.00	136.00	153.00	3.14	4.80	84.00	8.50

S. No.	Genotypes	Days to 50% Flowering	Days to 80% Maturity	Plant Height (cm)	100 Seed Weight (g)	No. of Primary Branches/Plant	Plant Stand at Harvest	Seed Yield/Plant (g)
31	IC 299059	39.00	142.00	139.00	3.00	7.40	79.00	14.00
32	IC 037284	40.00	143.00	153.60	3.11	7.20	82.00	14.10
33	IC 018049	42.00	142.00	152.00	3.10	6.60	77.00	13.78
34	IC 049659	44.00	141.00	128.80	3.05	6.40	80.00	13.50
35	IC 079238	42.00	140.00	150.00	3.11	6.80	78.00	9.60
36	IC 107285	46.00	140.00	157.80	2.98	5.80	85.00	13.90
37	IC 107966	47.00	141.00	144.00	2.91	4.60	87.00	12.20
38	IC 107982	48.00	139.00	145.40	3.04	4.00	89.00	13.10
39	IC 108501	41.00	114.00	151.20	3.09	3.60	88.00	5.60
40	IC 025239	39.00	115.00	132.40	3.11	4.00	85.00	2.50
41	IC 188669	38.00	139.00	152.60	2.97	3.20	87.00	8.20
42	IC 412849	37.00	128.00	140.20	2.99	3.60	55.00	4.40
43	IC 421601	38.00	127.00	161.20	3.00	4.60	52.00	3.60
44	IC 216622	39.00	130.00	152.20	3.01	3.60	57.00	4.40
45	IC 266743	40.00	140.00	158.00	3.11	4.60	93.00	12.50
46	IC 340829	45.00	122.00	130.60	3.14	3.40	82.00	3.50
47	IC 329950	44.00	108.00	155.60	3.11	3.20	79.00	5.60
48	IC 319588	39.00	107.00	149.00	3.10	3.80	75.00	4.50
49	IC 521297	41.00	92.00	122.40	3.12	3.40	87.00	4.10
50	IC 319581	42.00	91.00	126.40	3.08	3.00	89.00	4.30
	HIMPRIYA(C)	61.60	143.80	148.24	3.09	4.58	89.10	10.98
	PRB-1(C)	58.20	146.10	151.28	3.07	4.84	92.20	11.15
	SHIMLA B-1(C)	42.40	88.10	149.12	2.98	3.76	84.20	8.86
	VL-7(C)	38.40	85.20	132.12	3.08	3.62	81.60	8.46
	Minimum	37.00	85.20	55.60	2.30	1.60	52.00	2.50
	Maximum	62.00	150.00	172.00	3.17	7.40	96.00	14.20
	Mean	48.90	129.21	138.53	3.03	4.22	81.89	9.13
	CD (0.05)	2.30	13.26	34.61	0.40	1.66	18.79	4.11
	CV (%) Error	1.91	4.76	9.91	5.45	16.39	9.00	17.32
	CV (%) Phen.	16.87	13.66	16.26	4.31	27.61	11.20	39.76

Table 20. Evaluation of germplasm in buckwheat at Ranichauri (II year): Kharif 2019 (Hills)

S. No.	Genotypes	Days to 50% Flowering	Days to 80% Maturity	Plant Height (cm)	100 Seed Weight (g)	No. of Primary Branches/ Plant	Plant Stand at Harvest	Seed Yield/Plant (g)
1	IC009879	48.00	134.00	160.00	3.09	5.00	85.00	8.50
2	IC013140	50.00	132.00	150.00	3.12	5.00	87.00	5.80
3	IC013144	49.00	121.00	138.40	3.09	3.60	86.00	17.40
4	IC013191	52.00	131.00	142.80	3.10	4.20	92.00	12.10
5	IC013410	53.00	137.00	147.60	2.98	4.60	79.00	5.90
6	IC013411	56.00	100.00	85.40	3.09	4.20	94.00	9.00
7	IC013412	57.00	92.00	104.80	3.06	4.00	85.00	16.10
8	IC014253	58.00	92.00	104.60	3.05	3.60	87.00	9.70
9	IC016556	59.00	100.00	118.80	3.12	3.00	92.00	6.20
10	IC018751	57.00	135.00	151.20	2.98	4.40	79.00	7.30
11	IC024300	45.00	95.00	119.40	3.10	2.40	92.00	11.40
12	IC026589	48.00	96.00	128.40	3.09	1.80	94.00	10.40
13	IC026590	47.00	112.00	134.00	3.12	3.00	92.00	8.30
14	IC026594	59.00	139.00	158.40	3.10	4.60	77.00	11.40
15	IC037282	48.00	130.00	147.40	2.19	4.60	85.00	11.10
16	IC037295	57.00	130.00	158.60	2.98	4.60	92.00	10.20
17	IC037296	48.00	127.00	157.80	2.99	4.60	88.00	6.50
18	IC037303	56.00	128.00	125.40	2.19	4.00	82.00	8.00
19	IC042427	50.00	146.00	131.80	3.00	4.00	77.00	12.10
20	IC047458	55.00	143.00	141.40	3.05	4.00	79.00	16.00
21	EC104035	57.00	100.00	108.20	2.98	3.00	96.00	10.50
22	IC049661	57.00	137.00	135.60	3.19	5.00	87.00	8.30
23	IC049663	58.00	136.00	134.00	3.11	3.80	88.00	6.40
24	IC049668	46.00	101.00	126.20	3.12	3.80	93.00	5.80
25	IC049671	56.00	138.00	140.60	3.11	4.20	87.00	8.40
	HIMPRIYA (C)	62.20	144.60	124.00	2.99	3.16	92.00	10.58
	PRB-1 (C)	57.80	143.20	159.36	3.03	4.96	94.80	11.76
	SHIMLA B-1 (C)	42.40	91.20	141.00	3.09	4.36	89.20	10.92
	VL-7 (C)	38.00	96.40	128.04	2.90	3.76	83.60	8.70
	Minimum	38.00	91.20	85.40	2.19	1.80	77.00	5.80
	Maximum	62.20	146.00	160.00	3.19	5.00	96.00	17.40
	Mean	52.63	120.94	134.59	3.00	3.97	87.40	9.82
	CD (0.05)	1.63	21.76	31.25	0.57	1.69	12.56	1.69
	CV (%) Error	1.22	6.86	8.48	7.17	15.64	5.24	6.03
	CV (%) Phen.	11.11	16.10	13.85	7.77	19.99	6.38	31.16

Table 21. Evaluation of germplasm in buckwheat at ICAR-NBPGR RS, Shimla (I Year): Kharif 2019 (Hills)

S.No.	Accession	leaf length (cm)	leaf width (cm)	Days to 50% flowering	No of internodes	No of primary branches	No of infl/plant	length of cyme (cm)	Plant height (cm)	Days to 80% maturity	Seed yield/plant (g)	1000 seed wt (g)
1	EC018173	7.40	9.20	47.00	14.00	3.00	19.50	2.70	95.70	111.00	1.19	17.50
2	EC125940	9.90	10.10	46.00	16.00	2.50	22.50	5.50	170.40	109.00	4.25	40.50
3	EC216630	8.50	9.20	46.00	17.00	4.00	11.00	5.10	140.30	111.00	0.84	21.70
4	EC218739	7.50	9.80	54.00	17.00	4.50	18.00	2.10	106.10	116.00	0.88	19.60
5	EC286380	9.10	12.20	48.00	16.00	2.50	19.50	2.60	151.70	108.00	1.39	20.30
6	EC286382	8.20	9.70	57.00	16.00	1.50	16.50	2.40	160.70	114.00	0.81	19.70
7	EC321800	8.10	9.50	52.00	12.00	3.50	18.00	2.10	120.70	114.00	0.95	21.20
8	EC323724	9.90	9.80	46.00	14.00	3.50	19.50	9.10	150.70	109.00	1.60	23.50
9	IC016552	5.50	7.40	32.00	19.00	4.50	31.50	4.20	118.10	88.00	2.30	16.90
10	IC016580	4.80	7.50	46.00	18.00	3.50	15.50	4.10	127.60	95.00	1.28	19.10
11	IC018049	8.60	9.50	46.00	17.00	3.50	14.00	5.50	145.60	111.00	1.07	21.90
12	IC018757	7.10	7.50	47.00	17.00	4.50	19.50	3.90	120.30	96.00	1.40	18.00
13	IC022426	9.10	10.50	63.00	16.00	2.50	18.50	2.70	110.10	105.00	0.89	19.30
14	IC024301	4.50	5.50	33.00	16.00	2.50	33.00	4.20	90.70	82.00	2.48	15.00
15	IC025999	8.80	10.50	60.00	17.00	3.50	17.50	2.10	151.10	108.00	2.50	20.40
16	IC026552	10.20	11.50	58.00	17.00	4.00	16.50	4.10	152.70	110.00	0.83	20.20
17	IC026583	6.10	7.50	37.00	15.00	4.50	27.50	5.70	109.30	86.00	2.10	16.40
18	IC026597	6.80	8.50	48.00	16.00	1.50	18.00	3.50	110.40	84.00	1.14	18.10
19	IC026600	8.20	11.50	51.00	17.00	5.00	15.00	5.10	120.80	86.00	1.92	23.30
20	IC026755	7.10	8.80	33.00	17.00	4.50	30.00	5.10	118.10	82.00	4.10	15.80
21	IC037284	9.50	10.40	43.00	17.00	1.50	19.50	6.50	161.40	109.00	1.16	23.80
22	IC037304	6.80	7.50	45.00	17.00	3.50	20.00	8.50	150.10	107.00	1.19	23.70
23	IC042458	7.10	9.50	46.00	17.00	4.50	20.00	5.10	117.40	87.00	1.53	21.80
24	IC046160	7.40	10.10	48.00	17.00	1.50	20.50	5.40	115.10	78.00	1.50	20.90
25	IC047929	7.50	9.10	50.00	16.00	2.50	18.50	4.50	100.00	77.00	0.55	14.90
26	IC049160	8.10	10.20	49.00	17.00	3.00	19.00	2.60	120.70	80.00	1.16	20.30
27	IC049655	7.00	8.80	48.00	17.00	2.50	20.00	5.40	111.30	81.00	1.39	19.80
28	IC049659	6.20	6.40	37.00	16.00	3.50	18.50	5.20	141.30	111.00	1.29	23.20
29	IC049663	7.50	9.60	50.00	15.00	3.50	12.00	5.20	120.10	109.00	0.82	19.60
30	IC079238	8.50	9.40	42.00	14.00	4.00	19.50	8.80	172.40	111.00	1.72	22.00
31	IC107285	9.40	10.50	46.00	15.00	3.00	15.00	7.50	150.90	115.00	0.86	19.10
32	IC107966	8.50	9.50	45.00	16.00	2.50	22.00	5.70	100.60	111.00	1.14	20.80
33	IC107982	8.80	9.50	45.00	17.00	4.00	18.00	5.70	140.50	105.00	0.81	18.10

S.No.	Accession	leaf length (cm)	leaf width (cm)	Days to 50% flowering	No of internodes	No of primary branches	No of infl/plant	length of cyme (cm)	Plant height (cm)	Days to 80% maturity	Seed yield/plant (g)	1000 seed wt (g)
34	IC108501	9.50	10.50	44.00	17.00	4.00	19.50	4.40	166.30	108.00	1.40	24.00
35	IC188669	8.50	8.40	49.00	14.00	1.50	18.50	4.50	120.40	108.00	0.93	20.10
36	IC202266	4.60	5.50	48.00	16.00	3.00	20.00	2.20	65.70	98.00	0.95	19.00
37	IC202293	5.50	6.40	48.00	16.00	3.50	23.50	2.30	105.30	109.00	1.59	19.30
38	IC202465	7.50	10.10	55.00	16.00	3.00	21.00	2.70	120.10	107.00	1.06	20.10
39	IC216622	6.20	6.10	49.00	13.00	2.50	17.50	5.60	127.40	113.00	1.14	26.00
40	IC258239	8.80	9.10	36.00	14.00	1.50	21.00	8.20	136.10	105.00	1.00	19.10
41	IC266743	5.70	6.20	51.00	14.00	1.50	15.50	4.50	110.40	118.00	0.70	18.10
42	IC278957	8.50	8.20	38.00	14.00	2.50	12.50	6.60	155.70	109.00	1.05	23.90
43	IC299059	7.70	7.20	37.00	15.00	1.50	14.50	4.80	150.70	111.00	1.50	25.90
44	IC319581	9.40	9.50	50.00	14.00	2.00	17.50	5.40	124.50	108.00	1.21	23.10
45	IC319588	7.80	8.50	49.00	13.00	1.50	18.00	4.50	125.30	111.00	0.95	21.10
46	IC329950	4.80	4.20	43.00	13.00	1.50	19.50	5.50	125.90	111.00	1.03	21.10
47	IC340829	7.50	8.10	43.00	13.00	1.50	19.00	4.50	115.70	108.00	0.77	16.20
48	IC412489	7.40	8.50	49.00	12.00	1.50	18.50	2.50	151.60	114.00	1.21	26.10
49	IC421601	9.10	8.10	49.00	13.00	2.50	15.00	4.60	135.80	116.00	1.01	26.80
50	IC521297	8.20	8.70	50.00	14.00	1.50	18.00	6.40	131.70	113.00	1.16	25.80
	Himpriya (C)	10.20	12.10	63.60	16.60	3.50	15.80	3.04	139.10	135.40	1.21	20.64
	PRB-1 (C)	7.52	8.02	49.20	17.60	3.47	20.80	5.42	173.74	116.80	1.48	20.58
	SHIMLA B-1 (C)	8.64	11.50	39.60	17.20	3.30	26.00	7.32	161.04	82.00	3.59	16.58
	VL-7 (C)	8.78	8.56	37.40	15.20	2.60	19.90	4.34	152.02	94.00	3.13	28.64
	Minimum	4.50	4.20	32.00	12.00	1.00	9.00	2.10	65.70	76.00	0.55	13.20
	Maximum	11.30	14.50	63.60	19.00	5.50	33.00	9.10	173.74	135.40	4.25	40.50
	Mean	7.80	9.09	47.17	15.86	2.95	18.62	4.61	128.59	103.74	1.32	20.02
	CD (0.05)	2.27	3.02	3.24	4.85	1.77	10.21	2.04	14.22	4.10	2.92	1.44
	CV (%) Error	9.70	11.27	2.56	10.92	20.61	18.56	15.21	3.41	1.43	46.44	2.50
	CV (%) Phen.	18.30	19.03	13.17	10.67	37.24	22.92	34.41	17.03	11.40	54.66	20.01

Table 22. Evaluation of germplasm in buckwheat at ICAR-NBPGR RS, Shimla (II Year): Kharif 2019 (Hills)

S.No.	Accession	leaf length (cm)	leaf width (cm)	Days to 50% flowering	No of internodes	No of primary branches	No of infl/plant	length of cyme (cm)	Plant height (cm)	Days to 80% maturity	Seed yield/plant (g)	1000 seed wt (g)
1	EC104035	7.50	9.70	52.00	16.00	1.00	17.50	2.10	115.10	107.00	0.61	14.00
2	IC009879	7.50	9.20	49.00	15.00	3.50	19.00	4.20	122.10	105.00	1.40	21.00
3	IC013140	7.20	8.80	50.00	17.00	2.00	21.50	4.60	102.10	103.00	0.81	15.10
4	IC013144	7.50	9.20	49.00	16.00	4.50	22.50	5.70	110.60	102.00	1.28	16.20
5	IC013191	7.90	8.30	49.00	16.00	2.50	18.50	3.50	110.10	102.00	0.95	14.60
6	IC013410	7.70	8.50	48.00	15.00	2.50	19.00	3.10	111.70	103.00	0.75	15.80
7	IC013411	6.80	8.20	48.00	16.00	3.00	19.00	4.10	110.70	99.00	0.86	15.00
8	IC013412	6.60	8.10	48.00	16.00	3.00	16.00	3.20	105.40	103.00	0.85	15.10
9	IC014253	8.20	8.70	47.00	17.00	1.50	18.00	3.60	99.90	95.00	0.71	13.20
10	IC016556	7.10	10.10	50.00	15.00	3.50	18.50	6.20	131.10	109.00	0.77	16.70
11	IC018751	11.10	12.70	53.00	14.00	3.00	16.00	6.10	150.10	112.00	0.73	18.20
12	IC024300	5.60	7.70	35.00	14.00	4.50	29.50	3.60	95.70	76.00	2.64	16.30
13	IC026589	11.30	14.50	44.00	18.00	1.50	9.00	6.10	150.30	98.00	1.12	16.60
14	IC026590	8.10	9.20	46.00	19.00	2.50	11.50	4.10	130.70	100.00	1.12	17.70
15	IC026594	10.50	13.10	56.00	15.00	1.50	19.50	3.10	165.10	113.00	0.99	20.30
16	IC037282	8.50	10.50	49.00	18.00	4.50	13.50	5.50	145.90	105.00	1.26	20.80
17	IC037295	8.10	10.80	48.00	18.00	5.50	18.00	5.10	125.10	115.00	1.32	21.00
18	IC037296	6.60	7.80	47.00	12.00	1.50	16.50	4.10	110.10	107.00	0.71	17.20
19	IC037303	7.60	10.10	48.00	17.00	3.00	17.50	4.20	135.40	110.00	1.23	21.10
20	IC042427	7.20	8.40	48.00	19.00	1.50	15.00	3.60	125.70	105.00	1.22	20.40
21	IC047458	8.40	9.80	49.00	18.00	4.00	13.50	5.10	136.70	108.00	0.98	16.10
22	IC049661	8.60	9.50	50.00	18.00	4.50	12.50	4.10	144.30	111.00	1.13	20.10
23	IC049663	6.70	7.50	51.00	16.00	3.00	16.00	4.50	100.10	81.00	0.93	23.30
24	IC049668	6.10	8.50	38.00	18.00	4.50	22.50	3.50	132.40	106.00	2.24	18.10
25	IC049671	8.40	9.20	53.00	17.00	3.00	16.00	4.10	125.10	119.00	0.78	19.40
	Himpriya (C)	10.20	12.10	63.60	16.60	3.50	15.80	3.04	139.10	135.40	1.21	20.64
	PRB-1 (C)	7.52	8.02	49.20	17.60	3.47	20.80	5.42	173.74	116.80	1.48	20.58
	SHIMLA B-1 (C)	8.64	11.50	39.60	17.20	3.30	26.00	7.32	161.04	82.00	3.59	16.58
	VL-7 (C)	8.78	8.56	37.40	15.20	2.60	19.90	4.34	152.02	94.00	3.13	28.64
	Minimum	4.50	4.20	32.00	12.00	1.00	9.00	2.10	65.70	76.00	0.55	13.20
	Maximum	11.30	14.50	63.60	19.00	5.50	33.00	9.10	173.74	135.40	4.25	40.50
	Mean	7.80	9.09	47.17	15.86	2.95	18.62	4.61	128.59	103.74	1.32	20.02
	CD (0.05)	2.27	3.02	3.24	4.85	1.77	10.21	2.04	14.22	4.10	2.92	1.44
	CV (%) Error	9.70	11.27	2.56	10.92	20.61	18.56	15.21	3.41	1.43	46.44	2.50
	CV (%) Phen.	18.30	19.03	13.17	10.67	37.24	22.92	34.41	17.03	11.40	54.66	20.01

Table 23. Data Buckwheat averaged over the locations - Kharif 2019 (Hills)

S. No.	Accession No.	Days to 50% flowering			Plant height (cm)			No of Primary Branches		
		Almora	Shimla	Mean	Almora	Shimla	Mean	Almora	Shimla	Mean
1	EC012552	28.00	46.00	37.00	138.00	170.40	154.20	6.00	2.50	4.25
2	EC018173	42.00	47.00	44.50	81.00	95.70	88.35	6.67	3.00	4.83
3	EC104035	42.00	52.00	47.00	104.33	115.10	109.72	7.33	1.00	4.17
4	EC216630	28.00	46.00	37.00	160.33	140.30	150.32	9.33	4.00	6.67
5	EC218739	50.00	54.00	52.00	107.33	106.10	106.72	7.67	4.50	6.08
6	EC286380	44.00	48.00	46.00	90.00	151.70	120.85	7.33	2.50	4.92
7	EC286382	42.00	57.00	49.50	85.00	160.70	122.85	7.67	1.50	4.58
8	EC321800	50.00	52.00	51.00	68.67	120.70	94.68	5.67	3.50	4.58
9	EC323724	33.00	46.00	39.50	152.33	150.70	151.52	6.67	3.50	5.08
10	IC009879	44.00	49.00	46.50	115.00	122.10	118.55	9.00	3.50	6.25
11	IC010728	29.00	-	29.00	169.67	-	169.67	8.67	-	8.67
12	IC013140	41.00	50.00	45.50	104.67	102.10	103.38	9.33	2.00	5.67
13	IC013144	45.00	49.00	47.00	107.00	110.60	108.80	7.00	4.50	5.75
14	IC013196	45.00	-	45.00	61.00	-	61.00	6.67	-	6.67
15	IC013410	44.00	48.00	46.00	71.67	111.70	91.68	6.33	2.50	4.42
16	IC013411	40.00	48.00	44.00	95.00	110.70	102.85	7.33	3.00	5.17
17	IC013412	43.00	48.00	45.50	101.67	105.40	103.53	7.33	3.00	5.17
18	IC014253	45.00	47.00	46.00	90.67	99.90	95.28	6.00	1.50	3.75
19	IC016552	33.00	32.00	32.50	110.00	118.10	114.05	7.00	4.50	5.75
20	IC016556	40.00	50.00	45.00	150.00	131.10	140.55	10.67	3.50	7.08
21	IC016580	40.00	46.00	43.00	123.00	127.60	125.30	8.33	3.50	5.92
22	IC018049	28.00	46.00	37.00	152.33	145.60	148.97	9.00	3.50	6.25
23	IC018751	44.00	53.00	48.50	127.00	150.10	138.55	6.33	3.00	4.67
24	IC018757	44.00	47.00	45.50	115.00	120.30	117.65	6.00	4.50	5.25
25	IC022426	49.00	63.00	56.00	96.67	110.10	103.38	7.33	2.50	4.92
26	IC024300	42.00	35.00	38.50	81.00	95.70	88.35	6.67	4.50	5.58
27	IC024301	46.00	33.00	39.50	112.33	90.70	101.52	5.67	2.50	4.08
28	IC025999	51.00	60.00	55.50	162.00	151.10	156.55	10.67	3.50	7.08
29	IC026552	42.00	58.00	50.00	97.33	152.70	125.02	8.33	4.00	6.17
30	IC026583	42.00	37.00	39.50	105.33	109.30	107.32	7.67	4.50	6.08
31	IC026589	40.00	44.00	42.00	108.33	150.30	129.32	9.67	1.50	5.58
32	IC026590	44.00	46.00	45.00	91.67	130.70	111.18	9.00	2.50	5.75
33	IC026594	42.00	56.00	49.00	98.67	165.10	131.88	6.67	1.50	4.08
34	IC026597	43.00	48.00	45.50	71.33	110.40	90.87	4.33	1.50	2.92
35	IC026600	39.00	51.00	45.00	60.67	120.80	90.73	5.67	5.00	5.33
36	IC026755	45.00	33.00	39.00	90.67	118.10	104.38	6.00	4.50	5.25

S. No.	Accession No.	Days to 50% flowering			Plant height (cm)			No of Primary Branches		
		Almora	Shimla	Mean	Almora	Shimla	Mean	Almora	Shimla	Mean
37	IC027295	43.00	48.00	45.50	119.67	125.10	122.38	8.33	5.50	6.92
38	IC037282	43.00	49.00	46.00	115.33	145.90	130.62	7.00	4.50	5.75
39	IC037284	30.00	43.00	36.50	139.67	161.40	150.53	7.67	1.50	4.58
40	IC037296	42.00	47.00	44.50	98.67	110.10	104.38	6.67	1.50	4.08
41	IC037303	40.00	48.00	44.00	80.33	135.40	107.87	7.00	3.00	5.00
42	IC037304	30.00	45.00	37.50	160.67	150.10	155.38	6.67	3.50	5.08
43	IC042427	40.00	48.00	44.00	117.00	125.70	121.35	7.33	1.50	4.42
44	IC042458	43.00	46.00	44.50	137.67	117.40	127.53	7.33	4.50	5.92
45	IC046160	46.00	48.00	47.00	93.33	115.10	104.22	7.67	1.50	4.58
46	IC047458	45.00	49.00	47.00	86.33	136.70	111.52	9.67	4.00	6.83
47	IC047929	42.00	50.00	46.00	115.33	100.00	107.67	10.67	2.50	6.58
48	IC049160	43.00	49.00	46.00	129.33	120.70	125.02	8.67	3.00	5.83
49	IC049655	44.00	48.00	46.00	83.00	111.30	97.15	6.33	2.50	4.42
50	IC049659	35.00	37.00	36.00	132.67	141.30	136.98	8.33	3.50	5.92
51	IC049661	40.00	50.00	45.00	122.33	144.30	133.32	10.00	4.50	7.25
52	IC049663	46.00	51.00	48.50	81.33	100.10	90.72	7.67	3.00	5.33
53	IC049663	45.00	50.00	47.50	109.33	120.10	114.72	8.33	3.50	5.92
54	IC049668	40.00	38.00	39.00	78.67	132.40	105.53	6.33	4.50	5.42
55	IC049671	46.00	53.00	49.50	70.67	125.10	97.88	6.33	3.00	4.67
56	IC079238	29.00	42.00	35.50	176.33	172.40	174.37	9.33	4.00	6.67
57	IC107966	28.00	45.00	36.50	152.33	100.60	126.47	9.67	2.50	6.08
58	IC107982	31.00	45.00	38.00	174.00	140.50	157.25	8.33	4.00	6.17
59	IC108501	26.00	44.00	35.00	148.00	166.30	157.15	8.33	4.00	6.17
60	IC188669	28.00	49.00	38.50	99.00	120.40	109.70	7.33	1.50	4.42
61	IC202266	42.00	48.00	45.00	83.00	65.70	74.35	9.00	3.00	6.00
62	IC202293	42.00	48.00	45.00	116.33	105.30	110.82	5.67	3.50	4.58
63	IC202465	43.00	55.00	49.00	89.00	120.10	104.55	7.33	3.00	5.17
64	IC216622	30.00	49.00	39.50	131.00	127.40	129.20	7.33	2.50	4.92
65	IC258239	26.00	36.00	31.00	129.33	136.10	132.72	6.67	1.50	4.08
66	IC266743	31.00	51.00	41.00	136.33	110.40	123.37	7.67	1.50	4.58
67	IC278957	31.00	38.00	34.50	102.00	155.70	128.85	7.67	2.50	5.08
68	IC299059	30.00	37.00	33.50	134.00	150.70	142.35	5.00	1.50	3.25
69	IC319581	28.00	50.00	39.00	141.00	124.50	132.75	9.67	2.00	5.83
70	IC319588	30.00	49.00	39.50	111.00	125.30	118.15	7.00	1.50	4.25
71	IC329950	26.00	43.00	34.50	161.00	125.90	143.45	8.33	1.50	4.92
72	IC340829	26.00	43.00	34.50	118.67	115.70	117.18	8.33	1.50	4.92
73	IC412849	26.00	49.00	37.50	143.67	151.60	147.63	6.67	1.50	4.08
74	IC421601	28.00	49.00	38.50	132.33	135.80	134.07	9.33	2.50	5.92

S. No.	Accession No.	Days to 50% flowering			Plant height (cm)			No of Primary Branches		
		Almora	Shimla	Mean	Almora	Shimla	Mean	Almora	Shimla	Mean
75	IC521297	28.00	50.00	39.00	121.67	131.70	126.68	7.33	1.50	4.42
	Himpriya(C)	41.40	63.60	52.50	112.47	139.10	125.78	7.40	3.50	5.45
	PRB-1(C)	34.20	49.20	41.70	124.80	173.74	149.27	7.73	3.47	5.60
	Shimla B-1(C)	41.00	39.60	40.30	127.07	161.04	144.05	6.90	3.30	5.10
	VL-7(C)	27.20	37.40	32.30	132.53	152.02	142.28	7.07	2.60	4.83
	Local check	36.20	-	36.20	128.80	-	128.80	7.05	-	7.05
	Minimum	26.00	32.00	29.00	60.67	65.70	63.18	4.33	1.00	2.67
	Maximum	51.00	63.60	57.30	176.33	173.74	175.04	10.67	5.50	8.08
	Mean	38.26	47.18	42.72	114.42	127.99	121.21	7.59	2.96	5.27
	CD(0.05)	6.86	3.24	5.05	59.05	14.22	36.64	3.42	1.77	2.59
	CV(%) Error	7.49	2.56	5.03	18.55	3.41	10.98	18.59	20.61	19.60
	CV (%) Phen.	18.90	13.41	16.15	24.34	16.82	20.58	17.56	37.75	27.66

Table 24. Data Buckwheat averaged over the locations - Kharif 2019 (Hills) Contd.

S. No.	Accession No.	Leaf Length (cm)			Leaf Width (cm)			length of cyme (cm)		
		Almora	Shimla	Mean	Almora	Shimla	Mean	Almora	Shimla	Mean
1	EC012552	6.53	9.90	8.22	5.73	10.10	7.92	1.70	5.50	3.60
2	EC018173	2.93	7.40	5.17	2.77	9.20	5.98	1.63	2.70	2.17
3	EC104035	3.93	7.50	5.72	3.03	9.70	6.37	1.53	2.10	1.82
4	EC216630	3.93	8.50	6.22	3.30	9.20	6.25	1.83	5.10	3.47
5	EC218739	3.03	7.50	5.27	2.63	9.80	6.22	1.50	2.10	1.80
6	EC286380	3.53	9.10	6.32	3.17	12.20	7.68	1.23	2.60	1.92
7	EC286382	3.00	8.20	5.60	2.90	9.70	6.30	0.97	2.40	1.68
8	EC321800	2.77	8.10	5.43	2.97	9.50	6.23	1.17	2.10	1.63
9	EC323724	3.33	9.90	6.62	2.83	9.80	6.32	1.37	9.10	5.23
10	IC009879	2.93	7.50	5.22	2.50	9.20	5.85	1.30	4.20	2.75
11	IC010728	4.70	-	4.70	4.20	-	4.20	1.73	-	1.73
12	IC013140	2.17	7.20	4.68	1.87	8.80	5.33	1.13	4.60	2.87
13	IC013144	2.63	7.50	5.07	2.60	9.20	5.90	1.20	5.70	3.45
14	IC013196	2.80	-	2.80	1.90	-	1.90	1.03	-	1.03
15	IC013410	2.60	7.70	5.15	2.60	8.50	5.55	1.07	3.10	2.08
16	IC013411	3.47	6.80	5.13	2.93	8.20	5.57	1.60	4.10	2.85
17	IC013412	2.70	6.60	4.65	2.67	8.10	5.38	0.90	3.20	2.05
18	IC014253	3.07	8.20	5.63	2.77	8.70	5.73	1.03	3.60	2.32
19	IC016552	3.80	5.50	4.65	3.07	7.40	5.23	2.03	4.20	3.12
20	IC016556	3.43	7.10	5.27	4.20	10.10	7.15	1.17	6.20	3.68
21	IC016580	4.07	4.80	4.43	4.53	7.50	6.02	0.83	4.10	2.47
22	IC018049	2.93	8.60	5.77	2.97	9.50	6.23	1.60	5.50	3.55
23	IC018751	2.37	11.10	6.73	1.83	12.70	7.27	0.83	6.10	3.47
24	IC018757	3.77	7.10	5.43	2.83	7.50	5.17	1.53	3.90	2.72
25	IC022426	3.80	9.10	6.45	3.00	10.50	6.75	1.33	2.70	2.02
26	IC024300	2.93	5.60	4.27	2.77	7.70	5.23	1.63	3.60	2.62
27	IC024301	1.90	4.50	3.20	1.17	5.50	3.33	0.97	4.20	2.58
28	IC025999	4.03	8.80	6.42	3.83	10.50	7.17	2.00	2.10	2.05
29	IC026552	3.70	10.20	6.95	3.73	11.50	7.62	0.77	4.10	2.43
30	IC026583	4.20	6.10	5.15	3.60	7.50	5.55	1.73	5.70	3.72
31	IC026589	3.80	11.30	7.55	3.53	14.50	9.02	1.53	6.10	3.82
32	IC026590	3.07	8.10	5.58	2.77	9.20	5.98	1.27	4.10	2.68
33	IC026594	3.23	10.50	6.87	2.93	13.10	8.02	0.93	3.10	2.02
34	IC026597	2.93	6.80	4.87	2.13	8.50	5.32	1.10	3.50	2.30
35	IC026600	2.93	8.20	5.57	2.50	11.50	7.00	1.13	5.10	3.12
36	IC026755	3.07	7.10	5.08	2.77	8.80	5.78	1.03	5.10	3.07

S. No.	Accession No.	Leaf Length (cm)			Leaf Width (cm)			length of cyme (cm)		
		Almora	Shimla	Mean	Almora	Shimla	Mean	Almora	Shimla	Mean
37	IC027295	3.80	8.10	5.95	3.50	10.80	7.15	1.70	5.10	3.40
38	IC037282	5.53	8.50	7.02	5.40	10.50	7.95	0.73	5.50	3.12
39	IC037284	3.33	9.50	6.42	2.93	10.40	6.67	1.10	6.50	3.80
40	IC037296	3.23	6.60	4.92	2.93	7.80	5.37	0.93	4.10	2.52
41	IC037303	3.73	7.60	5.67	2.93	10.10	6.52	1.17	4.20	2.68
42	IC037304	3.77	6.80	5.28	2.80	7.50	5.15	1.70	8.50	5.10
43	IC042427	3.13	7.20	5.17	2.33	8.40	5.37	1.33	3.60	2.47
44	IC042458	2.93	7.10	5.02	2.63	9.50	6.07	1.67	5.10	3.38
45	IC046160	3.50	7.40	5.45	3.00	10.10	6.55	1.77	5.40	3.58
46	IC047458	3.27	8.40	5.83	2.93	9.80	6.37	1.60	5.10	3.35
47	IC047929	4.60	7.50	6.05	4.67	9.10	6.88	1.77	4.50	3.13
48	IC049160	2.93	8.10	5.52	2.47	10.20	6.33	1.23	2.60	1.92
49	IC049655	3.70	7.00	5.35	2.77	8.80	5.78	0.93	5.40	3.17
50	IC049659	3.50	6.20	4.85	2.83	6.40	4.62	0.87	5.20	3.03
51	IC049661	3.83	8.60	6.22	4.10	9.50	6.80	0.97	4.10	2.53
52	IC049663	3.63	6.70	5.17	3.03	7.50	5.27	1.03	4.50	2.77
53	IC049663	3.70	7.50	5.60	2.80	9.60	6.20	1.20	5.20	3.20
54	IC049668	1.97	6.10	4.03	2.03	8.50	5.27	1.03	3.50	2.27
55	IC049671	1.73	8.40	5.07	1.43	9.20	5.32	0.80	4.10	2.45
56	IC079238	3.50	8.50	6.00	2.93	9.40	6.17	1.73	8.80	5.27
57	IC107966	3.40	8.50	5.95	3.03	9.50	6.27	1.60	5.70	3.65
58	IC107982	3.30	8.80	6.05	2.93	9.50	6.22	1.63	5.70	3.67
59	IC108501	3.40	9.50	6.45	2.73	10.50	6.62	1.60	4.40	3.00
60	IC188669	3.27	8.50	5.88	2.40	8.40	5.40	1.97	4.50	3.23
61	IC202266	3.03	4.60	3.82	2.67	5.50	4.08	1.47	2.20	1.83
62	IC202293	2.93	5.50	4.22	2.57	6.40	4.48	1.03	2.30	1.67
63	IC202465	4.17	7.50	5.83	3.13	10.10	6.62	1.27	2.70	1.98
64	IC216622	4.20	6.20	5.20	3.83	6.10	4.97	1.93	5.60	3.77
65	IC258239	3.87	8.80	6.33	2.93	9.10	6.02	1.53	8.20	4.87
66	IC266743	3.83	5.70	4.77	2.93	6.20	4.57	2.07	4.50	3.28
67	IC278957	3.70	8.50	6.10	2.93	8.20	5.57	0.97	6.60	3.78
68	IC299059	3.80	7.70	5.75	2.97	7.20	5.08	1.03	4.80	2.92
69	IC319581	4.10	9.40	6.75	2.87	9.50	6.18	1.80	5.40	3.60
70	IC319588	3.07	7.80	5.43	2.87	8.50	5.68	1.50	4.50	3.00
71	IC329950	3.77	4.80	4.28	3.27	4.20	3.73	1.90	5.50	3.70
72	IC340829	3.57	7.50	5.53	2.83	8.10	5.47	1.97	4.50	3.23
73	IC412849	3.90	7.40	5.65	2.93	8.50	5.72	1.77	2.50	2.13
74	IC421601	3.70	9.10	6.40	2.90	8.10	5.50	1.43	4.60	3.02

S. No.	Accession No.	Leaf Length (cm)			Leaf Width (cm)			length of cyme (cm)		
		Almora	Shimla	Mean	Almora	Shimla	Mean	Almora	Shimla	Mean
75	IC521297	3.03	8.20	5.62	2.80	8.70	5.75	1.20	6.40	3.80
	Himpriya(C)	3.20	10.20	6.70	2.77	12.10	7.43	1.53	3.04	2.28
	PRB-1(C)	3.46	7.52	5.49	2.59	8.02	5.30	1.65	5.42	3.53
	Shimla B-1(C)	3.20	8.64	5.92	2.77	11.50	7.14	1.42	7.32	4.37
	VL-7(C)	4.20	8.78	6.49	3.54	8.56	6.05	1.66	4.34	3.00
	Local check	3.30	-	3.30	3.05	-	3.05	1.82	-	1.82
	Minimum	1.73	4.50	3.12	1.17	4.20	2.68	0.73	2.10	1.42
	Maximum	6.53	11.30	8.92	5.73	14.50	10.12	2.07	9.10	5.58
	Mean	3.43	7.75	5.59	2.98	9.06	6.02	1.38	4.58	2.98
	CD(0.05)	1.57	2.27	1.92	1.98	3.02	2.50	1.22	2.04	1.63
	CV(%) Error	17.79	9.70	13.75	26.47	11.27	18.87	29.79	15.21	22.50
	CV (%) Phen.	20.71	18.35	19.53	24.10	19.30	21.70	25.93	34.40	30.17

Table 25. Data Buckwheat averaged over the locations - Kharif 2019 (Hills) contd.

S.No.	Accession No.	No. of nodes			No. of Inflorescence/plant			Yield/plant (gm)		
		Almora	Shimla	Mean	Almora	Shimla	Mean	Almora	Shimla	Mean
1	EC012552	12.67	16.00	14.33	82.00	22.50	52.25	4.20	4.25	4.23
2	EC018173	11.00	14.00	12.50	52.33	19.50	35.92	4.50	1.19	2.85
3	EC104035	11.33	16.00	13.67	37.67	17.50	27.58	7.80	0.61	4.21
4	EC216630	16.33	17.00	16.67	58.00	11.00	34.50	7.60	0.84	4.22
5	EC218739	9.33	17.00	13.17	47.00	18.00	32.50	7.60	0.88	4.24
6	EC286380	11.00	16.00	13.50	54.00	19.50	36.75	3.70	1.39	2.54
7	EC286382	13.33	16.00	14.67	42.00	16.50	29.25	3.50	0.81	2.16
8	EC321800	4.67	12.00	8.33	27.33	18.00	22.67	3.50	0.95	2.23
9	EC323724	12.67	14.00	13.33	42.00	19.50	30.75	4.20	1.60	2.90
10	IC009879	15.67	15.00	15.33	42.00	19.00	30.50	2.30	1.40	1.85
11	IC010728	16.67	-	16.67	66.67	-	66.67	5.70	-	5.70
12	IC013140	14.33	17.00	15.67	45.67	21.50	33.58	8.70	0.81	4.76
13	IC013144	8.00	16.00	12.00	38.67	22.50	30.58	3.40	1.28	2.34
14	IC013196	10.67	-	10.67	35.00	-	35.00	2.80	-	2.80
15	IC013410	11.00	15.00	13.00	31.33	19.00	25.17	5.40	0.75	3.08
16	IC013411	10.33	16.00	13.17	41.00	19.00	30.00	4.30	0.86	2.58
17	IC013412	7.33	16.00	11.67	39.33	16.00	27.67	10.70	0.85	5.77
18	IC014253	12.67	17.00	14.83	52.33	18.00	35.17	6.50	0.71	3.61
19	IC016552	16.00	19.00	17.50	56.33	31.50	43.92	5.60	2.30	3.95
20	IC016556	25.67	15.00	20.33	76.33	18.50	47.42	5.00	0.77	2.89
21	IC016580	17.33	18.00	17.67	63.33	15.50	39.42	4.00	1.28	2.64
22	IC018049	13.33	17.00	15.17	61.67	14.00	37.83	1.50	1.07	1.29
23	IC018751	5.33	14.00	9.67	41.00	16.00	28.50	12.30	0.73	6.51
24	IC018757	15.33	17.00	16.17	49.67	19.50	34.58	2.80	1.40	2.10
25	IC022426	11.67	16.00	13.83	47.00	18.50	32.75	4.30	0.89	2.60
26	IC024300	11.00	14.00	12.50	52.33	29.50	40.92	6.70	2.64	4.67
27	IC024301	6.67	16.00	11.33	47.00	33.00	40.00	2.60	2.48	2.54
28	IC025999	14.33	17.00	15.67	52.00	17.50	34.75	4.30	2.50	3.40
29	IC026552	13.33	17.00	15.17	43.00	16.50	29.75	3.00	0.83	1.92
30	IC026583	13.33	15.00	14.17	60.00	27.50	43.75	5.00	2.10	3.55
31	IC026589	16.33	18.00	17.17	60.00	9.00	34.50	6.00	1.12	3.56
32	IC026590	15.67	19.00	17.33	57.67	11.50	34.58	8.00	1.12	4.56
33	IC026594	17.00	15.00	16.00	43.00	19.50	31.25	9.80	0.99	5.39
34	IC026597	11.00	16.00	13.50	26.67	18.00	22.33	7.60	1.14	4.37
35	IC026600	7.67	17.00	12.33	29.67	15.00	22.33	6.50	1.92	4.21
36	IC026755	12.67	17.00	14.83	52.33	30.00	41.17	4.40	4.10	4.25

S.No.	Accession No.	No. of nodes			No. of Inflorescence/plant			Yield/plant (gm)		
		Almora	Shimla	Mean	Almora	Shimla	Mean	Almora	Shimla	Mean
37	IC027295	17.33	18.00	17.67	62.00	18.00	40.00	4.30	1.32	2.81
38	IC037282	13.33	18.00	15.67	52.67	13.50	33.08	6.50	1.26	3.88
39	IC037284	13.00	17.00	15.00	45.33	19.50	32.42	7.60	1.16	4.38
40	IC037296	17.00	12.00	14.50	43.00	16.50	29.75	6.80	0.71	3.76
41	IC037303	14.67	17.00	15.83	38.67	17.50	28.08	4.30	1.23	2.76
42	IC037304	13.33	17.00	15.17	56.00	20.00	38.00	4.00	1.19	2.59
43	IC042427	14.00	19.00	16.50	39.33	15.00	27.17	3.90	1.22	2.56
44	IC042458	13.00	17.00	15.00	40.33	20.00	30.17	3.00	1.53	2.26
45	IC046160	13.67	17.00	15.33	45.67	20.50	33.08	8.70	1.50	5.10
46	IC047458	10.33	18.00	14.17	56.67	13.50	35.08	4.30	0.98	2.64
47	IC047929	13.33	16.00	14.67	62.00	18.50	40.25	3.70	0.55	2.13
48	IC049160	11.33	17.00	14.17	52.67	19.00	35.83	8.10	1.16	4.63
49	IC049655	13.67	17.00	15.33	34.00	20.00	27.00	1.70	1.39	1.54
50	IC049659	6.00	16.00	11.00	57.00	18.50	37.75	4.90	1.29	3.09
51	IC049661	16.33	18.00	17.17	42.67	12.50	27.58	4.50	1.13	2.82
52	IC049663	13.33	16.00	14.67	48.67	16.00	32.33	1.70	0.93	1.32
53	IC049663	9.33	15.00	12.17	33.33	12.00	22.67	7.60	0.82	4.21
54	IC049668	12.67	18.00	15.33	32.00	22.50	27.25	7.60	2.24	4.92
55	IC049671	10.33	17.00	13.67	30.67	16.00	23.33	4.30	0.78	2.54
56	IC079238	13.00	14.00	13.50	48.33	19.50	33.92	8.10	1.72	4.91
57	IC107966	13.00	16.00	14.50	54.67	22.00	38.33	4.00	1.14	2.57
58	IC107982	12.33	17.00	14.67	56.33	18.00	37.17	11.20	0.81	6.01
59	IC108501	19.33	17.00	18.17	70.67	19.50	45.08	9.80	1.40	5.60
60	IC188669	12.67	14.00	13.33	48.33	18.50	33.42	5.50	0.93	3.22
61	IC202266	11.67	16.00	13.83	44.33	20.00	32.17	6.00	0.95	3.48
62	IC202293	7.00	16.00	11.50	47.33	23.50	35.42	7.80	1.59	4.69
63	IC202465	13.00	16.00	14.50	42.00	21.00	31.50	8.00	1.06	4.53
64	IC216622	13.00	13.00	13.00	44.67	17.50	31.08	7.80	1.14	4.47
65	IC258239	10.67	14.00	12.33	38.67	21.00	29.83	9.50	1.00	5.25
66	IC266743	12.00	14.00	13.00	43.00	15.50	29.25	12.30	0.70	6.50
67	IC278957	13.00	14.00	13.50	28.67	12.50	20.58	7.60	1.05	4.32
68	IC299059	15.00	15.00	15.00	51.67	14.50	33.08	9.80	1.50	5.65
69	IC319581	12.67	14.00	13.33	53.67	17.50	35.58	2.50	1.21	1.86
70	IC319588	7.67	13.00	10.33	46.67	18.00	32.33	7.80	0.95	4.37
71	IC329950	13.67	13.00	13.33	59.67	19.50	39.58	4.30	1.03	2.66
72	IC340829	9.67	13.00	11.33	53.67	19.00	36.33	1.40	0.77	1.08
73	IC412849	16.00	12.00	14.00	59.00	18.50	38.75	4.00	1.21	2.60
74	IC421601	11.00	13.00	12.00	40.67	15.00	27.83	5.00	1.01	3.00

S.No.	Accession No.	No. of nodes			No of Inflorescence/plant			Yield/plant (gm)		
		Almora	Shimla	Mean	Almora	Shimla	Mean	Almora	Shimla	Mean
75	IC521297	12.67	14.00	13.33	44.33	18.00	31.17	5.40	1.16	3.28
	Himpriya(C)	11.87	16.60	14.23	47.33	15.80	31.57	11.92	1.21	6.56
	PRB-1(C)	12.40	17.60	15.00	45.33	20.80	33.07	8.76	1.48	5.12
	Shimla B-1(C)	12.57	17.20	14.89	42.03	26.00	34.01	9.72	3.59	6.66
	VL-7(C)	12.27	15.20	13.73	59.53	19.90	39.72	9.24	3.13	6.19
	Local check(C)	14.53	-	14.53	60.07	-	60.07	9.30	-	9.30
	Minimum	4.67	12.00	8.33	26.67	9.00	17.83	1.40	0.55	0.98
	Maximum	25.67	19.00	22.33	82.00	33.00	57.50	12.30	4.10	8.20
	Mean	12.64	15.86	14.25	48.21	18.62	33.41	6.00	1.30	3.65
	CD(0.05)	6.47	4.85	5.66	21.77	10.21	15.99	3.97	2.92	3.44
	CV(%) Error	19.99	10.92	15.46	16.83	18.56	17.69	15.96	46.44	31.20
	CV (%) Phen.	25.73	10.86	18.29	22.65	23.14	22.89	44.88	50.26	47.57

Table 26. Promising lines in Buckwheat germplasm during Kharif 2019 at different locations (Hills)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Almora (50 + 25) Genotypes), Buckwheat					
1	Days to 50% flowering	26.00	51.00	-	VL-7 (27.20)
2	Days to 80% maturity	59.00	85.00	EC012552 (59.00), IC108501 (60.00), EC216630 (60.00), IC319588 (60.00)	VL-7 (65.40)
3	Plant height (cm)	60.67	176.33	IC079238 (176.33), IC107982 (174.00), IC010728 (169.67), IC025999 (162.00), IC329950 (161.00), IC037304 (160.67), EC216630 (160.33), IC018049 (152.33), IC107966 (152.33), EC323724 (152.33), IC016556 (150.00), IC108501 (148.00)	VL-7 (132.53)
4	No. of leaves	18.33	111.00	IC016556 (111.00), IC016580 (100.67), IC026589 (74.33), IC022426 (69.67), IC037282 (69.00), IC079238 (65.00), IC037303 (63.00), IC026590 (62.00), IC049663 (61.67), IC107966 (60.67), EC018173 (58.67), IC024300 (58.67), IC025999 (58.33), IC016552 (58.33), EC216630 (57.67), IC037284 (57.33), IC010728 (57.00)	Himpriya (41.80)
5	No. of branches/plant	4.33	10.67	IC016556 (10.67), IC025999 (10.67), IC047929 (10.67), IC049661 (10.00), IC026589 (9.67), IC107966 (9.67), IC047458 (9.67), IC319581 (9.67), IC079238 (9.33), EC216630 (9.33), IC421601 (9.33), IC013140 (9.33), IC026590 (9.00), IC202266 (9.00), IC009879 (9.00), IC018049 (9.00)	PRB-1 (7.73)
6	Leaf length (cm)	1.73	6.53	EC012552 (6.53), IC037282 (5.53)	VL-7 (4.20)
7	Leaf width (cm)	1.17	5.73	EC012552 (5.73), IC037282 (5.40), IC047929 (4.67), IC016580 (4.53), IC010728 (4.20), IC016556 (4.20), IC049661 (4.10)	VL-7 (3.54)
8	Petiole length (cm)	0.60	2.97	IC010728 (2.97), IC049661 (2.93), IC107966 (2.60), IC037282 (2.43), IC027295 (2.27)	VL-7 (2.09)
9	Cyme length	0.73	2.07	IC266743 (2.07), IC016552 (2.03), IC025999 (2.00)	VL-7 (1.82)
10	No. of nodes/plant	4.67	25.67	IC016556 (25.67), IC108501 (19.33), IC027295 (17.33), IC016580 (17.33), IC026594 (17.00), IC037296 (17.00), IC010728 (16.67)	Shimla B-1 (14.53)
11	No. of Inflorescence/plant	26.67	82.00	EC012552 (82.00), IC016556 (76.33), IC108501 (70.67), IC010728 (66.67)	VL-7 (60.07)
12	Seed yield/plant (g)	1.40	12.30	-	Himpriya (11.92)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Ranichauri-1 (50 Genotypes), Buckwheat					
1	Days to 50% flowering	37.00	62.00	-	VL-7 (38.40)
2	Days to 80% Maturity	85.20	150.00	-	VL-7 (85.20)
3	Plant height (cm)	55.60	172.00	IC 026600 (172.00), IC 026597 (165.40), IC 026552 (164.60), IC 421601 (161.20), EC 286380 (160.60)	PRB-1 (151.28)
4	100 seed weight (g)	2.30	3.17	IC 026755 (3.17), IC 016552 (3.17), IC 278957 (3.14), IC 340829 (3.14)	Himpriya (3.09)
5	No. of Primary branch/plant	1.60	7.40	IC 299059 (7.40), IC 037284 (7.20), IC 079238 (6.80), IC 018049 (6.60), IC 049659 (6.40), IC 026600 (5.80), IC 107285 (5.80)	PRB-1 (4.84)
6	Plant stand at harvest	52.00	96.00	IC 026583 (96.00), IC 026597 (95.00), IC 266743 (93.00)	PRB-1 (92.20)
7	Seed yield/plant (g)	2.50	14.20	IC 026600 (14.20), IC 003704 (14.10), IC 037284 (14.10), IC 299059 (14.00), EC 286382 (13.90), IC 107285 (13.90), IC 049655 (13.90), IC 018049 (13.78)	PRB-1 (11.15)
Ranichauri-2 (25 Genotypes), Buckwheat					
1	Days to 50% Flowering	38.00	62.20	-	VL-7 (38.00)
2	Days to 80% Maturity	91.20	146.00	-	Himpriya (144.60)
3	Plant height (cm)	85.40	160.00	-	PRB-1 (159.36)
4	100 seed weight (g)	2.19	3.19	IC049661 (3.19), IC013140 (3.12), IC026590 (3.12), IC049668 (3.12), IC016556 (3.12)	Shimla B-1 (3.09)
5	No. of primary branches/plant	1.80	5.00	-	PRB-1 (4.96)
6	Plant stand at harvest	77.00	96.00	-	Shimla B-1 (89.20)
7	Seed yield/plant (g)	5.80	17.40	IC013144 (17.40), IC013412 (16.10), IC047458 (16.00),	PRB-1 (11.76)
Shimla (50 + 25 Genotypes), Buckwheat					
1	leaf length (cm)	4.50	11.30	IC026589 (11.30), IC018751 (11.10)	Himpriya (10.20)
2	leaf width (cm)	4.20	14.50	IC026589 (14.50), IC026594 (13.10)	Himpriya (12.10)
3	No. of leaves	10.00	18.00	IC026600 (18.00), IC026590 (18.00), IC042427 (18.00), IC026589 (17.00), IC037295 (17.00), IC108501 (17.00), IC037284 (17.00), IC047458 (17.00), IC049668 (17.00), IC016580 (17.00), IC016552 (17.00)	Shimla B-1 (15.80)
4	Days to 50% flowering	32.00	63.60	IC016552 (32.00), IC026755 (33.00), IC024301 (33.00), IC024300 (35.00)	VL-7 (37.40)
5	No. of internodes/plant	12.00	19.00	IC016552 (19.00), IC026590 (19.00), IC042427 (19.00)	PRB-1 (17.60)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
6	Petiole length (cm)	2.00	13.40	IC107982 (13.40), IC026552 (12.10), EC216630 (11.50), IC025999 (11.50), EC125940 (11.50), IC079238 (11.50), IC319581 (11.50)	Shimla B-1 (10.78)
7	No. of primary branches	1.00	5.50	IC037295 (5.50), IC026600 (5.00), IC037282 (4.50), EC218739 (4.50), IC024300 (4.50), IC049661 (4.50), IC049668 (4.50), IC026755 (4.50), IC013144 (4.50), IC026583 (4.50), IC016552 (4.50), IC042458 (4.50), IC018757 (4.50)	Himpriya (3.50)
8	No. of inflorescence/plant	9.00	33.00	IC024301 (33.00), IC016552 (31.50), IC026755 (30.00), IC024300 (29.50)	Shimla B-1 (26.00)
9	length of cyme (cm)	2.10	9.10	EC323724 (9.10), IC079238 (8.80), IC037304 (8.50), IC258239 (8.20)	Shimla B-1 (7.32)
10	Plant height (cm)	65.70	173.74	-	PRB-1 (173.74)
11	Days to 80% maturity	76.00	135.40	IC024300 (76.00), IC047929 (77.00), IC046160 (78.00)	Shimla B-1 (82.00)
12	No. of seed/inflorescence	2.00	8.66	-	Shimla B-1 (8.23)
13	Seed yield/plant (g)	0.55	5.01	EC125940 (5.01), IC026755 (4.10)	Shimla B-1 (3.59)
14	1000 seed wt. (g)	13.20	40.50	EC125940 (40.50)	VL-7 (28.64)

Table 27. Promising lines in Buckwheat germplasm during Kharif 2019 based on all locations (Hills)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Days to 50% flowering	29.00	57.30	IC010728 (29.00), IC258239 (31.00)	VL-7 (32.30)
2	Plant height (cm)	63.18	174.37	IC079238 (174.37), IC010728 (169.67), IC107982 (157.25), IC108501 (157.15), IC025999 (156.55)	PRB-1 (149.27)
3	No of Primary Branches	2.67	8.67	IC010728 (8.67), IC049661 (7.25), IC025999 (7.08)	Local check (7.05)
4	Leaf Length (cm)	3.12	8.22	EC012552 (8.22), IC026589 (7.55), IC037282 (7.02)	Himpriya (6.70)
5	Leaf Width (cm)	2.68	9.02	IC026589 (9.02), IC026594 (8.02)	Himpriya (7.43)
6	length of cyme (cm)	1.42	5.27	IC079238 (5.27), EC323724 (5.23), IC037304 (5.10)	Shimla B-1 (4.37)
7	No. of nodes	8.33	20.33	IC016556 (20.33), IC108501 (18.17), IC027295 (17.67), IC016580 (17.67), IC016552 (17.50)	PRB-1 (15.00)
8	No. of Inflorescence/plant	17.83	66.67	IC010728 (66.67)	Local check (60.07)
9	Yield/plant (gm)	0.98	9.30	-	Local check (9.30)

2.4.1.3 Chenopods (*Chenopodium* spp.)

A set of 50 accessions (25 of *C. quinoa* for 1st year evaluation and 25 of *C. album* for 2nd year evaluation) was planned for screening at three locations viz. NBPGR Shimla and CSK HPKV Bajaura and UUHF Ranichauri along with four checks PRC9801, Himbathua, EC507741 and NIC22503. The experimental details are presented in Table 28. Data were received from all the three centers. The list of promising lines including range and mean at all centres for all the descriptors is presented in Tables 28 to 41.

At CSK HPKV Bajaura, a set of 25 genotypes of *C. album* was evaluated for II year having eight quantitative characters. The statistical data and promising genotypes are presented in Table 30 and 35 to 41. The genotypes IC107854 and IC582937 (37.0 days) were the earliest in flowering over the best check NIC22503 (40.6 days), while IC582937 and IC582936 (99.0 days) were early in maturity than the best check NIC22503 (116.0 days). The maximum plant height was observed in IC109732 (206.0 cm), IC415494 (203.0 cm) and IC582942 (201.0 cm) and were significantly superior than the best check NIC22503 (177.8 cm). The inflorescence length ranged from 27.6 cm to 88.0 cm in the given set of germplasm. The genotypes IC108088 (88.0 cm) followed by IC109732 (82.07 cm) and IC341695 (82.0 cm) recorded maximum inflorescence length and were better than the best check NIC22503 (61.8 cm), while genotypes IC415494 (42.0) followed by IC108088 (41.0) and IC582942 (39.0) showed maximum number of spikelet's per plant and were superior than the best check EC507741 (35.4). The genotypes IC540837 (30.0 g) followed by IC382223 (28.8 g) and IC109732 (27.8 g) has shown maximum seed yield (g) per plant in the set and were better than the best check NIC22503 (17.72 g), while genotype IC328877 and IC582942 (5.0 g) show better results over the best check PRC 9801 (4.8 g) for 10ml seed volume weight. A set of 25 genotypes of *C. quinoa* was evaluated for I year having eight quantitative characters. The statistical data and promising genotypes are presented in Table 29 and 35 to 41. The genotypes EC896233 (32.0 days) followed by EC896201 (33.0 days) and EC896213 (34.0 days) were the earliest in flowering over the best check EC557741 (40.8 days), while none of the genotypes were better than the best check Him Bathua (101.80 days) for days to maturity. The maximum plant height was observed in EC896239 (232.0 cm) and was significantly superior than the best check PRC 9801 (205.4 cm). Genotype EC891239 (37.0) showed maximum number of spikelet's per plant and was superior than the best check Himbathua (31.8). None of the genotypes were superior than the best check PRC9801 (19.88 g) and Himbathua (5.60 g) for seed yield per plant and 10ml seed volume weight.

At UUHF Ranichauri, a set of 25 genotypes of *C. album* was evaluated for II year having eight quantitative characters. The details are presented in Tables 32 and 35 to 41. The plant height in germplasm varied from 21.30 cm to 156.40 cm. The promising genotypes for inflorescence length are IC109732 (27.80 cm) followed by IC328877 (23.6 cm) and NIC22516 (23.2 cm) and for more number of fingers per plant IC109732 (29.6) and IC258331 (26.0) which were statistically better than the best checks NIC22503 (21.24 cm) and PRC9801 (24.90 cm), respectively. The seed yield per plant was found maximum in genotype IC109732 (48.3 g) and was better than the best check NIC22503 (39.08 g), whereas genotypes IC109732 (10.70) followed by IC582937 (10.50) and NIC22488 (9.8) were significantly superior than the best check NIC22503 (6.72) for number of branches per plant. None of the genotypes were found superior than the best check IC415477 (68.33 days) for early flowering. A set of 25 genotypes of *C. quinoa* was evaluated for I year having eight quantitative characters. The details are presented in Table 31 and 35 to 41. The early maturing genotypes were EC896074 (89.0 days), EC896092 (98.0 days) and EC896233 (100.0 days) which were significantly superior than the best check IC415477 (118.5 days). The seed yield per plant was found maximum in genotype EC896211 (29.72 g) followed by EC896213 (28.6 g) and EC896073 (28.4 g) were better than the best check EC507741 (23.51 g), whereas genotypes EC896238 (6.09 g) followed by EC896240 (6.02 g) were significantly superior than the best check IC415477 (6.01 g) for 10ml seed volume weight. None of the genotypes were found superior than the best check IC415477 (66.25 days) for early flowering and PRC9801 (121.10 cm) for plant height.

At NBPGR Shimla, a set of 25 genotypes of *C. album* was evaluated for II year and a set of 34 and 35 to 41 genotypes of *C. quinoa* was evaluated for I year along with four checks for eight quantitative characters. The statistical data and promising genotypes are presented in Table 33 and 35 to 41. The range in genotypes for inflorescence length was 33.40 cm to 47.30 cm. The early flowering genotype better than the best check EC507741 (50.40 days) is IC415494 (38.0 days). The genotype IC382223 (47.30 cm) followed by IC341695 (47.10 cm) showed the maximum inflorescence length and is better than the best check IC415477 (43.64 cm). The maximum leaf length was recorded in IC540837 (15.10 cm) and IC469275, NIC22516 (14.10 cm), whereas maximum leaf width was recorded in NIC22516 and IC582942 (12.50 cm) followed by NIC22488 (12.20 cm) and were superior over the best check IC415477 (11.74 cm) and NIC22503 (9.0 cm), respectively. The genotypes IC582937 (85.73 g) and IC382223 (70.24 g) showed maximum seed yield and were superior than the best check IC415477 (30.34 g). The promising genotypes for 10ml seed volume weight were IC583587

(7.51 g) followed by IC582936 (7.38 g) and IC582942 (7.33 g) and were better than the best check NIC22503 (6.87 g).

Over the locations for all three centers viz., Palampur, Ranichauri and Shimla the performance of entries and best genotypes in comparison to the checks for *chenopodium album* have been summarized in Tables 40. The flowering time ranged from 46.33 days to 71.33 days. The best performing genotypes for early flowering over the best check Him Bathua (55.64 days) were IC415494 (51.33 days), IC341695 (52.33 days) and IC583623 (54.5 days). None of the genotypes were found superior over the best checks for early maturity and more seed yield. The maximum plant height was observed in genotypes IC469275 (219.05 cm) and IC582937 (207.4 cm) and were better than the best check NIC-22503 (191.75 cm). The maximum length of inflorescence was observed in IC469275 (57.85 cm) followed by IC583623 (51.55 cm) and IC109732 (50.97 cm) which were superior than the best NIC22503 (39.92 cm). The seed volume weight (g/10ml) varied from 4.13 g to 6.49 g. The best performing genotypes were IC582942 (6.10 g) followed by NIC22488 (5.99 g) and IC3288775 (5.98 g) and were better than the best check PRC-9801 (5.83 g).

Over the locations for all three centers viz., Bajaura, Ranichauri and Shimla the performance of entries and best genotypes in comparison to the checks for *chenopodium quinoa* have been summarized in Table 41. The flowering time ranged from 47.02 days to 60.23 days. The best performing genotypes for early flowering over the best check Him Bathua (53.63 days) were EC896201, EC896209 and EC896276 (<40.00 days). The early maturing genotypes were EC896074 (98.0 days) followed by EC896092 (100.50 days) and EC896271 (102.0 days) and were better than the best check Him Bathua (110.15 days). The maximum length of inflorescence was observed in EC896229 (63.0 cm) followed by EC896267 (61.0 cm) which were superior than the best PRC9801 (51.81 cm). None of the genotypes were found superior over the best checks for plant height and seed volume weight (g/10ml).

Table 28. Experimental Details of Germplasm Evaluation in Chenopodium: Kharif 2019 (Hills)

S. No	Items	Ranichauri	Palampur/Sangla	Shimla
1	No. of Genotypes	25 (Quinoa)	25 (Quinoa)	25 (Quinoa)
		25 (Album)	25 (Album)	25 (Album)
2	No. of Checks	4	4	4
3	Design	ABD	ABD	ABD
4	No. of Block	5	5	5
5	Number of Rows	2	1	3
6	Row Length (m)	3	2.5	2
7	Row spacing (cm)	30	30	45
8	Plant spacing (cm)	15	10	15
9	NPKS (kg/ha)	40:20:20:20	40:20:20:20	40:20:20:20
10	Plot size (m ²)	1.8	1.8	1.8
11	Sowing Date	11/6/2019	22/6/2019	27/5/2019 & 4/6/2019
12	Harvesting period	21/9/2019 to 6/11/2019	10/10/2019	28/8/2019 to 28/10/2019

Table 29. Evaluation of germplasm in *Chenopodium quinoa* (I year) at Bajaura: Kharif 2019 (Hills)

S. No.	Genotypes	Days to 50% Flowering	Days to 80% Maturity	Plant Height (cm)	Inflorescence Length (cm)	No. of Spikelet's/plant	No. of Plants at Harvest	Grain Yield/plant	Seed Volume Weight (g/10ml)
1	EC896229	41.00	112.00	120.00	63.00	21.00	15.00	2.80	3.00
2	EC896243	40.00	111.00	103.00	59.00	27.00	12.00	2.70	2.00
3	EC896275	39.00	109.00	102.00	56.00	26.00	10.00	2.40	4.00
4	EC896238	45.00	108.00	118.00	60.00	25.00	13.00	2.80	3.00
5	EC896239	38.00	113.00	232.00	62.00	37.00	14.00	2.60	3.00
6	EC896240	38.00	109.00	113.00	55.00	25.00	18.00	3.00	3.00
7	EC896083	40.00	110.00	86.00	45.00	20.00	10.00	2.20	4.00
8	EC896062	39.00	102.00	116.00	45.00	25.00	15.00	3.20	2.00
9	EC896267	41.00	104.00	117.00	61.00	18.00	24.00	2.40	3.00
10	EC896227	40.00	105.00	146.00	67.00	23.00	25.00	4.80	3.00
11	EC896039	42.00	104.00	73.00	33.00	19.00	13.00	2.40	3.00
12	EC896271	40.00	102.00	54.00	26.00	11.00	15.00	2.20	2.00
13	EC896237	41.00	101.00	104.00	38.00	19.00	17.00	2.60	1.00
14	EC896209	38.00	105.00	81.00	24.00	12.00	11.00	8.00	5.00
15	EC896271	44.00	105.00	75.00	18.00	11.00	12.00	2.80	4.00
16	EC896093	36.00	108.00	46.00	22.00	8.00	10.00	3.20	3.00
17	EC896213	34.00	106.00	54.00	24.00	13.00	12.00	2.80	3.00
18	EC896070	35.00	108.00	81.00	25.00	14.00	18.00	3.00	3.00
19	EC896201	33.00	106.00	62.00	23.00	15.00	10.00	3.40	3.00
20	EC896233	32.00	104.00	88.00	35.00	11.00	21.00	3.80	3.00
21	EC896211	38.00	105.00	73.00	28.00	16.00	12.00	2.80	3.00
22	EC896092	36.00	103.00	95.00	34.00	18.00	15.00	3.20	4.00
23	EC896073	38.00	106.00	60.00	18.00	16.00	13.00	3.00	2.00
24	EC896276	38.00	106.00	88.00	41.00	20.00	16.00	2.40	3.00
25	EC896074	36.00	107.00	151.00	31.00	31.00	12.00	2.80	4.00
	EC507741 (C)	40.80	104.00	109.20	41.20	22.00	23.40	15.00	5.00
	Him Bathua (C)	41.00	101.80	145.20	67.20	31.80	22.80	11.72	5.60
	NIC 22503 (C)	42.00	103.80	154.20	73.60	29.60	23.20	13.24	5.20
	PRC 9801 (C)	45.20	106.60	205.40	70.20	31.40	23.00	16.88	3.80
	Minimum	32.00	101.00	46.00	18.00	8.00	10.00	2.20	1.00
	Maximum	45.20	113.00	232.00	73.60	37.00	25.00	16.88	5.60
	Mean	39.00	106.04	105.24	42.94	20.54	15.70	4.63	3.30
	CD(0.05)	3.74	2.45	18.12	8.24	3.49	6.83	15.30	2.11
	CV(%) Error	3.32	0.88	4.42	4.90	4.76	11.07	38.33	16.13
	CV (%) Phen.	8.39	2.91	41.14	41.43	36.09	30.97	88.90	31.76

Table 30. Evaluation of germplasm in *Chenopodium album* (II year) at Bajaura: Kharif 2019 (Hills)

S. No.	Genotypes	Days to 50% Flowering	Days to Maturity	Plant Height (cm)	Inflorescence Length (cm)	No. of Spikelet's/plant	No. of Plants at Harvest	Seed Yield/Plant (g)	Seed Vol. Wt. (g/10ml)
1	EC359451	38.00	103.00	174.00	49.00	34.00	23.00	11.20	3.00
2	IC107185	43.00	101.00	177.00	65.00	33.00	25.00	16.80	3.00
3	IC107854	37.00	102.00	147.00	52.00	19.00	24.00	8.80	4.00
4	IC108087	39.00	116.00	115.00	45.00	21.00	23.00	3.60	4.00
5	IC108088	39.00	116.00	191.00	88.00	41.00	26.00	11.00	4.00
6	IC108818	41.00	105.00	160.00	48.00	21.00	32.00	5.20	4.00
7	IC109732	47.00	116.00	206.00	82.00	33.00	32.00	21.80	3.00
8	IC258331	39.00	112.00	117.00	44.00	23.00	23.00	4.40	4.00
9	IC328877	47.00	113.00	155.00	62.00	31.00	22.00	9.00	5.00
10	IC341695	38.00	114.00	164.00	82.00	32.00	24.00	17.60	3.00
11	IC341710	41.00	105.00	172.00	57.00	28.00	33.00	12.40	4.00
12	IC382223	46.00	114.00	184.00	75.00	29.00	28.00	22.80	3.00
13	IC415494	38.00	101.00	203.00	52.00	42.00	28.00	18.60	4.00
14	IC469275	39.00	102.00	197.00	73.00	35.00	24.00	12.40	3.00
15	IC540837	42.00	106.00	192.00	80.00	30.00	23.00	22.00	4.00
16	IC582936	41.00	99.00	145.00	60.00	27.00	31.00	12.40	3.00
17	IC582937	37.00	99.00	195.00	69.00	32.00	32.00	11.00	3.00
18	IC582940	42.00	105.00	132.00	55.00	22.00	14.00	6.20	5.00
19	IC582942	46.00	111.00	201.00	73.00	39.00	23.00	7.60	5.00
20	IC583587	40.00	102.00	85.00	50.00	18.00	21.00	7.80	4.00
21	IC583623	40.00	109.00	170.00	60.00	30.00	25.00	6.40	3.00
22	IC588382	38.00	101.00	190.00	61.00	35.00	29.00	8.20	4.00
23	NIC22488	41.00	104.00	177.00	63.00	32.00	30.00	5.80	4.00
24	NIC22516	41.00	103.00	179.00	74.00	27.00	9.00	9.00	3.00
25	NIC22530	43.00	117.00	170.00	65.00	33.00	26.00	17.40	4.00
	EC507741 (C)	44.20	116.60	156.20	52.60	35.40	31.20	13.36	4.60
	Him Bathua (C)	40.80	116.20	97.40	27.60	20.40	22.40	6.96	4.00
	NIC 22503 (C)	40.60	116.00	177.80	61.80	30.20	31.60	17.72	4.00
	PRC 9801 (C)	44.80	116.80	145.80	57.80	29.40	30.80	14.04	4.80
	Minimum	37.00	99.00	85.00	27.60	18.00	9.00	3.60	3.00
	Maximum	47.00	117.00	206.00	88.00	42.00	33.00	22.80	5.00
	Mean	41.15	108.33	164.66	61.51	29.74	25.72	11.78	3.81
	CD(0.05)	2.08	1.96	14.74	7.87	5.67	13.11	6.36	1.00
	CV(%) Error	1.83	0.63	3.83	5.90	7.36	16.94	18.30	8.65
	CV (%) Phen.	7.15	6.02	19.11	21.96	21.41	21.29	47.15	17.84

Table 31. Evaluation of germplasm in *Chenopodium quinoa* (IYear) at Ranichauri: Kharif 2019 (Hills)

S. No.	Genotypes	Days to 50% Flowering	Days to 80% Maturity	Plant Height (cm)	Seed Vol. wt. (g/10ml)	Inflorescence Length (cm)	No. of Finger/Plant	No. of Pr. Branches	Seed Yield/Plant (g)
1	EC896213	66.00	118.00	61.60	6.00	18.20	10.80	6.00	28.60
2	EC896276	--	--	--	--	--	--	--	--
3	EC896073	66.00	142.00	60.80	5.98	13.10	12.40	5.00	28.40
4	EC896092	67.00	98.00	62.80	5.91	18.40	13.60	3.40	22.20
5	EC896083	65.00	116.00	95.40	5.99	21.80	18.80	6.80	19.80
6	EC896074	64.00	89.00	76.80	5.99	18.20	14.80	4.80	7.60
7	EC896070	62.00	102.00	42.20	5.89	12.00	10.00	-	9.20
8	EC896233	65.00	100.00	47.20	5.60	13.60	8.20	-	8.76
9	EC896069	63.00	103.00	43.60	5.50	17.40	9.20	-	9.38
10	EC896093	64.00	104.00	38.00	5.81	14.60	7.60	-	6.52
11	EC896211	66.00	142.00	58.00	5.97	15.40	8.80	1.40	29.72
12	EC896227	64.00	141.00	88.60	5.65	26.00	16.00	4.60	28.40
13	EC896243	63.00	141.00	76.40	5.60	28.20	17.80	3.80	22.20
14	EC896237	68.00	142.00	20.80	6.01	10.00	11.20	1.40	27.40
15	EC896238	67.00	143.00	63.00	6.09	17.00	12.00	4.00	22.40
16	EC896267	67.00	141.00	33.00	-	-	-	-	-
17	EC896062	66.00	142.00	56.40	6.00	21.00	19.80	3.00	3.70
18	EC896240	64.00	144.00	50.20	6.02	16.30	15.30	5.50	2.90
19	EC896271	-	-	-	-	-	-	-	-
20	EC896239	67.00	142.00	46.00	5.99	14.00	18.00	4.00	2.28
21	EC896275	69.00	142.00	66.00	5.62	21.00	27.00	4.00	4.68
22	EC896274	-	-	-	-	-	-	-	-
23	EC896201	-	-	-	-	-	-	-	-
24	EC896209	-	-	-	-	-	-	-	-
25	EC896229	-	-	-	-	-	-	-	-
	EC-507741(C)	68.33	144.00	73.30	5.76	21.47	12.00	3.90	23.51
	IC-415477(C)	66.25	118.50	77.58	6.01	19.63	14.65	6.18	20.60
	NIC-22503(C)	72.33	142.67	118.67	5.96	26.57	17.90	5.20	21.90
	PRC-9801(C)	75.25	144.50	128.10	6.00	33.43	22.45	7.73	22.10
	Minimum	62.00	89.00	20.80	5.50	10.00	7.60	1.40	2.28
	Maximum	75.25	144.50	128.10	6.09	33.43	27.00	7.73	29.72
	Mean	66.31	127.90	64.54	5.88	18.97	14.47	4.48	16.92
	CV (%) Phen.	4.52	15.21	39.88	2.98	30.18	34.20	37.03	57.53

Table 32. Evaluation of germplasm in *Chenopodium album* (II Year) at Ranichauri: Kharif 2019 (Hills)

S. No.	Genotypes	Days to 50% Flowering	Days to 80% Maturity	Plant Height (cm)	Seed Vol. wt. (g/10ml)	Inflorescence Length (cm)	No. of Finger/Plant	No. of Pr. Branches	Seed Yield/Plant (g)
1	IC109732	75.00	144.00	156.40	6.00	27.80	29.60	10.70	48.30
2	IC258331	66.00	142.00	118.60	5.70	17.80	26.00	6.00	20.70
3	IC258382	65.00	141.00	125.40	5.19	19.00	24.00	2.40	15.50
4	IC328877	72.00	143.00	127.00	6.04	23.60	22.00	4.60	17.50
5	IC341695	64.00	106.00	99.00	4.89	15.80	23.20	4.40	15.18
6	IC107185	68.00	144.00	117.20	5.46	19.80	20.80	3.80	14.40
7	IC107854	67.00	144.00	131.80	5.50	22.80	21.60	3.60	16.60
8	IC108087	68.00	142.00	110.20	5.70	21.00	22.20	9.00	3.30
9	IC108818	74.00	144.00	136.80	6.00	20.00	17.20	6.40	8.70
10	IC108088	67.00	144.00	138.40	6.10	22.60	21.60	4.80	8.50
11	IC341710	78.00	145.00	85.40	5.98	12.60	20.20	3.50	3.30
12	IC382223	77.00	146.00	89.00	5.99	12.20	20.40	3.20	6.80
13	IC415494	78.00	145.00	126.20	6.10	15.60	20.40	6.60	12.50
14	IC469275	-	-	-	-	-	-	-	-
15	IC540837	76.00	144.00	112.00	6.00	14.60	22.40	4.40	13.10
16	IC582936	78.00	146.00	135.00	5.70	15.30	22.30	7.30	8.90
17	IC582937	77.00	145.00	129.00	5.60	16.50	14.00	10.50	7.60
18	IC582940	76.00	146.00	21.30	3.89	10.30	7.30	4.30	6.94
19	IC582942	78.00	146.00	60.00	5.98	8.50	21.00	5.00	4.50
20	IC583587	79.00	-	28.50	-	-	-	-	-
21	IC583623	-	-	-	-	-	-	-	-
22	NIC22488	75.00	145.00	129.00	6.97	22.20	23.40	9.80	13.00
23	NIC22516	73.00	143.00	120.80	5.99	23.20	23.60	5.00	9.40
24	NIC22530	70.00	142.00	102.80	5.91	22.00	22.00	9.60	10.20
25	EC359451	69.00	141.00	85.40	5.98	21.00	19.80	8.00	4.10
	EC-507741 (C)	70.25	138.00	102.08	6.12	15.00	22.73	5.50	25.13
	IC-415477(C)	68.33	134.33	96.17	6.06	13.50	18.30	5.50	17.87
	NIC-22503 (C)	75.20	143.80	119.80	5.85	21.24	23.56	6.72	27.08
	PRC-9801 (C)	75.25	144.50	130.05	5.99	21.20	24.90	5.15	24.50
	Minimum	64.00	106.00	21.30	3.89	8.50	7.30	2.40	3.30
	Maximum	79.00	146.00	156.40	6.97	27.80	29.60	10.70	30.30
	Mean	72.56	141.87	108.64	5.80	18.27	21.33	5.99	13.98
	CV (%) Phen.	6.46	5.47	29.15	9.29	25.68	19.14	39.18	69.30

Table 33. Evaluation of germplasm in *Chenopodium quinoa* at Shimla (I Year): Kharif 2019 (Hills)

S.N	Accessions No	Days to 50% flowering	Infl length (cm)	leaf length (cm)	Leaf width (cm)	Plant height (cm)	Days to 80% maturity	Seed yield/ plant (g)	1000 Seed wt (g)	Seed vol. (g/10ml)
1	EC-896213	42	34.1	4.7	2.4	115.1	89	15.03	2	5.51
2	EC-896073	47	39.4	5.1	3.7	127.1	91	24.52	1.65	6.56
3	EC-896276	41	32.3	7.5	4.4	120.1	86	14.07	2.07	6.53
4	EC-896069	40	32.6	6.1	4.8	110.3	99	12.42	1.75	5.97
5	EC-896083	45	33.4	6.7	3.5	108.3	94	12.53	2.2	5.89
6	EC-896092	45	36.1	6.1	3.8	128.1	88	11.04	2	6.64
7	EC-806074	44	42.3	6.2	3.5	134.6	100	20.53	2.4	6.31
8	EC-896093	40	38.7	7.1	5.1	120.3	85	12.3	1.75	5.71
9	EC-896070	42	34.4	6.6	3.5	120.1	86	8.45	2	5.86
10	EC-896233	42	37.4	6.6	4.1	160.1	102	10.2	2.5	6.41
11	EC-896227	45	40.1	7.5	3.1	153.1	103	20.33	2.1	6.46
12	EC-896211	47	35.7	6.8	5.1	150.7	94	15.04	1.85	6.3
13	EC-896238	42	37.3	8.2	5.3	126.1	102	18.1	2.4	6.51
14	EC-896243	42	30.3	6.5	5.1	124.1	85	12	1.74	5.72
15	EC-896267	50	35.1	6.6	4.5	136.4	108	14.1	1.55	6.54
16	EC-896237	43	42.1	5.3	4.5	167.1	100	22.75	2.15	6.56
17	EC-896062	42	35.1	6.5	3.5	150.1	100	13.08	1.9	6.47
18	EC-896240	40	44.3	8.8	4.5	181.7	99	19.8	2.1	6.26
19	EC-896271	43	33.1	8.5	4.6	134.4	98	14.22	2.05	6.45
20	EC-896239	43	37.4	8.1	4.5	170.1	100	16.02	2.25	6.31
21	EC-896275	44	37.1	6.2	3.5	163.1	86	11.3	1.7	6.14
22	EC-896274	43	36.4	9.1	3.7	156.4	86	17.54	2.35	6.35
23	EC-896201	40	33.3	7.6	5.1	123.7	85	12.05	2.05	6.36
24	EC-896209	46	34.1	7.5	5.5	143.6	87	9.65	2.2	5.66
25	EC-896229	44	41.8	7.4	4.5	180.7	103	12.54	2.25	6.37
	EC507741 (C)	52.4	33.8	6.92	4.44	136.992	100.4	26.478	1.46	6.244
	IC415477 (C)	55.8	41.08	11.44	7.3	198.694	101.8	21.416	1.42	6.416
	NIC22503 (C)	79	38.06	10.76	8.48	261.124	123.6	29.762	0.794	6.88
	PRC9801 (C)	70.4	36.8	10.74	7.66	241.068	130.4	31.366	0.78	6.728
	Minimum	40.00	30.30	4.70	2.40	108.30	85.00	8.45	0.78	5.51
	Maximum	79.00	44.30	11.44	8.48	261.12	130.40	31.37	2.50	6.88
	Mean	46.19	36.68	7.35	4.61	149.77	96.97	16.50	1.91	6.28
	CD (0.05)	10.34	8.32	2.58	3.30	20.73	11.23	10.27	0.21	0.28
	CV (%) Error	5.81	8.05	9.14	16.98	3.54	3.39	13.58	7.25	1.58
	CV%Phen	18.99	9.44	22.10	28.93	24.27	11.30	36.51	21.96	5.42

Table 34. Evaluation of germplasm in *Chenopodium album* at Shimla (II Year): Kharif 2019 (Hills)

S. No	Acc.	Days to 50% flowering	Infl length (cm)	Leaf length (cm)	Leaf width (cm)	Plant height (cm)	Days to 80% maturity	Seed yield/plant (g)	1000 Seed wt (g)	Seed vol. (g/10ml)
1	IC109732	60.00	43.10	13.20	8.50	191.40	141.00	51.61	1.00	7.03
2	IC258331	62.00	42.70	9.20	5.40	210.10	129.00	22.85	0.90	6.69
3	IC258382	70.00	37.10	11.70	7.40	195.40	141.00	39.31	0.80	7.02
4	IC328877	73.00	38.10	10.80	9.10	234.20	151.00	60.01	0.80	6.9
5	IC341695	55.00	47.10	11.80	7.20	180.40	112.00	33.00	1.10	5.49
6	IC107185	76.00	42.10	9.40	7.20	242.10	149.00	49.70	0.90	6.7
7	IC107854	73.00	37.10	12.20	7.80	149.10	129.00	23.80	0.60	7.1
8	IC108087	81.00	39.10	10.10	8.50	240.10	143.00	27.89	1.00	6.9
9	IC108818	85.00	45.30	12.10	8.40	290.30	154.00	40.58	0.90	7.1
10	IC108088	80.00	42.10	13.80	10.10	260.40	142.00	29.59	0.70	6.86
11	IC341710	70.00	33.40	10.50	7.50	230.10	119.00	20.15	0.70	6.58
12	IC382223	82.00	47.30	13.10	11.20	272.10	148.00	70.24	0.90	6.98
13	IC415494	38.00	39.40	3.80	2.70	95.10	156.00	11.01	0.70	6.32
14	IC469275	78.00	42.70	14.10	11.50	241.10	149.00	70.02	0.65	6.8
15	IC540837	84.00	37.50	15.10	10.80	248.10	150.00	44.32	1.10	7.17
16	IC582936	80.00	43.10	10.80	9.40	260.30	150.00	41.26	1.40	7.38
17	IC582937	84.00	45.10	12.10	10.40	298.20	153.00	85.73	1.30	7.1
18	IC582940	87.00	42.40	11.20	7.40	255.10	148.00	38.60	1.10	6.81
19	IC582942	84.00	39.70	13.20	12.50	298.60	149.00	55.02	1.10	7.33
20	IC583587	88.00	43.10	12.50	10.50	285.70	147.00	66.68	1.40	7.51
21	IC583623	69.00	43.10	10.50	5.10	174.10	117.00	17.16	0.10	7.16
22	NIC22488	76.00	46.10	12.50	12.20	265.40	150.00	61.69	0.85	7.01
23	NIC22516	80.00	42.10	14.10	12.50	270.30	146.00	44.20	0.75	6.73
24	NIC22530	76.00	42.60	10.50	6.50	235.70	144.00	55.18	0.90	6.8
25	EC359451	57.00	40.60	11.40	8.80	171.10	107.00	21.44	1.35	6.68
	EC507741 (C)	50.40	38.82	7.98	4.82	142.52	96.40	28.81	1.48	6.24
	IC415477 (C)	57.80	43.64	11.74	7.60	205.58	105.60	30.34	1.39	6.51
	NIC22503 (C)	85.00	36.72	11.58	9.00	277.64	147.00	27.42	0.76	6.87
	PRC-9801 (C)	73.60	35.82	10.98	7.74	252.26	148.20	26.72	0.75	6.70
	Minimum	38.00	33.40	3.80	2.70	95.10	96.40	11.01	0.10	5.49
	Maximum	88.00	47.30	15.10	12.50	298.60	156.00	85.73	1.48	7.51
	Mean	72.92	41.28	11.45	8.54	230.09	138.66	41.18	0.94	6.84
	CD (0.05)	10.34	8.32	2.58	3.30	20.73	11.23	10.27	0.21	0.28
	CV (%) Error	5.81	8.05	9.14	16.98	3.54	3.39	13.58	7.25	1.58
	CV (%) Phen.	16.97	8.46	18.90	27.97	22.02	12.01	45.17	32.05	5.70

Table 35. Data *Chenopodium album* averaged over the locations - Kharif 2019 (Hills)

S. No.	Entry	Days to 50% flowering				Plant height (cm)			
		Bajaura	Ranichahuri	Shimla	Mean	Bajaura	Ranichahuri	Shimla	Mean
1	EC359451	38.00	69.00	57.00	54.67	174.00	85.40	171.10	143.50
2	IC107185	43.00	68.00	76.00	62.33	177.00	117.20	242.10	178.77
3	IC107854	37.00	67.00	73.00	59.00	147.00	131.80	149.10	142.63
4	IC108087	39.00	68.00	81.00	62.67	115.00	110.20	240.10	155.10
5	IC108088	39.00	67.00	80.00	62.00	191.00	138.40	260.40	196.60
6	IC108818	41.00	74.00	85.00	66.67	160.00	136.80	290.30	195.70
7	IC109732	47.00	75.00	60.00	60.67	206.00	156.40	191.40	184.60
8	IC258331	39.00	66.00	62.00	55.67	117.00	118.60	210.10	148.57
22	IC588382	38.00	65.00	70.00	57.67	190.00	125.40	195.40	170.27
9	IC328877	47.00	72.00	73.00	64.00	155.00	127.00	234.20	172.07
10	IC341695	38.00	64.00	55.00	52.33	164.00	99.00	180.40	147.80
11	IC341710	41.00	78.00	70.00	63.00	172.00	85.40	230.10	162.50
12	IC382223	46.00	77.00	82.00	68.33	184.00	89.00	272.10	181.70
13	IC415494	38.00	78.00	38.00	51.33	203.00	126.20	95.10	141.43
14	IC469275	39.00	-	78.00	58.50	197.00	-	241.10	219.05
15	IC540837	42.00	76.00	84.00	67.33	192.00	112.00	248.10	184.03
16	IC582936	41.00	78.00	80.00	66.33	145.00	135.00	260.30	180.10
17	IC582937	37.00	77.00	84.00	66.00	195.00	129.00	298.20	207.40
18	IC582940	42.00	76.00	87.00	68.33	132.00	21.30	255.10	136.13
19	IC582942	46.00	78.00	84.00	69.33	201.00	60.00	298.60	186.53
20	IC583587	40.00	79.00	88.00	69.00	85.00	28.50	285.70	133.07
21	IC583623	40.00	-	69.00	54.50	170.00	-	174.10	172.05
23	NIC22488	41.00	75.00	76.00	64.00	177.00	129.00	265.40	190.47
24	NIC22516	41.00	73.00	80.00	64.67	179.00	120.80	270.30	190.03
25	NIC22530	43.00	70.00	76.00	63.00	170.00	102.80	235.70	169.50
	EC507741(C)	44.20	70.25	50.40	54.95	156.20	102.08	142.52	133.60
	Him Bathua (C)	40.80	68.33	57.80	55.64	97.40	96.17	205.58	133.05
	NIC 22503 (C)	40.60	75.20	85.00	66.93	177.80	119.80	277.64	191.75
	PRC 9801 (C)	44.80	75.25	73.60	64.55	145.80	130.05	252.26	176.04
	Minimum	37.00	64.00	38.00	46.33	85.00	21.30	95.10	67.13
	Maximum	47.00	79.00	88.00	71.33	206.00	156.40	298.60	220.33
	Mean	41.15	72.56	72.92	62.21	164.66	108.64	230.09	167.80
	CD (0.05)	2.08	-	10.34	6.21	14.74	-	20.73	17.73
	CV (%) Error	1.83	-	5.81	3.82	3.83	-	3.54	3.68
	CV (%) Phen.	7.15	6.46	16.97	10.19	19.11	29.15	22.02	23.42

Table 36. Data *Chenopodium album* averaged over the locations - Kharif 2019 (Hills) contd.

S. No.	Entry	Inflorescence length (cm)				Seed volume weight (g/10ml)			
		Bajaura	Ranichahuri	Shimla	Mean	Bajaura	Ranichahuri	Shimla	Mean
1	EC359451	49.00	21.00	40.60	36.87	3.00	5.98	6.68	5.22
2	IC107185	65.00	19.80	42.10	42.30	3.00	5.46	6.7	5.05
3	IC107854	52.00	22.80	37.10	37.30	4.00	5.50	7.1	5.53
4	IC108087	45.00	21.00	39.10	35.03	4.00	5.70	6.9	5.53
5	IC108088	88.00	22.60	42.10	50.90	4.00	6.10	6.86	5.65
6	IC108818	48.00	20.00	45.30	37.77	4.00	6.00	7.1	5.70
7	IC109732	82.00	27.80	43.10	50.97	3.00	6.00	7.03	5.34
8	IC258331	44.00	17.80	42.70	34.83	4.00	5.70	6.69	5.46
9	IC588382	61.00	19.00	37.10	39.03	4.00	5.19	7.02	5.40
10	IC328877	62.00	23.60	38.10	41.23	5.00	6.04	6.9	5.98
11	IC341695	82.00	15.80	47.10	48.30	3.00	4.89	5.49	4.46
12	IC341710	57.00	12.60	33.40	34.33	4.00	5.98	6.58	5.52
13	IC382223	75.00	12.20	47.30	44.83	3.00	5.99	6.98	5.32
14	IC415494	52.00	15.60	39.40	35.67	4.00	6.10	6.32	5.47
15	IC469275	73.00	-	42.70	57.85	3.00	-	6.8	4.90
16	IC540837	80.00	14.60	37.50	44.03	4.00	6.00	7.17	5.72
17	IC582936	60.00	15.30	43.10	39.47	3.00	5.70	7.38	5.36
18	IC582937	69.00	16.50	45.10	43.53	3.00	5.60	7.1	5.23
19	IC582940	55.00	10.30	42.40	35.90	5.00	3.89	6.81	5.23
20	IC582942	73.00	8.50	39.70	40.40	5.00	5.98	7.33	6.10
21	IC583587	50.00	-	43.10	46.55	4.00	-	7.51	5.76
22	IC583623	60.00	-	43.10	51.55	3.00	-	7.16	5.08
23	NIC22488	63.00	22.20	46.10	43.77	4.00	6.97	7.01	5.99
24	NIC22516	74.00	23.20	42.10	46.43	3.00	5.99	6.73	5.24
25	NIC22530	65.00	22.00	42.60	43.20	4.00	5.91	6.8	5.57
	EC507741(C)	52.60	15.00	38.82	35.47	4.60	6.12	6.24	5.65
	Him Bathua (C)	27.60	13.50	43.64	28.25	4.00	6.06	6.51	5.52
	NIC 22503 (C)	61.80	21.24	36.72	39.92	4.00	5.85	6.87	5.57
	PRC 9801 (C)	57.80	21.20	35.82	38.27	4.80	5.99	6.70	5.83
	Minimum	27.60	8.50	33.40	23.17	3.00	3.89	5.49	4.13
	Maximum	88.00	27.80	47.30	54.37	5.00	6.97	7.51	6.49
	Mean	61.51	18.27	41.28	40.35	3.81	5.80	6.84	5.48
	CD(0.05)	7.87	-	8.32	8.10	1.00	-	0.28	0.64
	CV(%) Error	5.90	-	8.05	6.98	8.65	-	1.58	5.12
	CV (%) Phen.	21.96	25.68	8.46	18.70	17.84	9.29	5.70	10.94

Table 37. Data *Chenopodium quinoa* averaged over the locations - Kharif 2019 (Hills)

S. No.	Entry	Days to 50% flowering			Days to maturity			Plant height (cm)		
		Bajaura	Ranichauri	Mean	Bajaura	Ranichauri	Mean	Bajaura	Ranichauri	Mean
1	EC896039	42.00	63.00	52.50	104.00	103.00	103.50	73.00	43.60	58.30
2	EC896062	39.00	66.00	52.50	102.00	142.00	122.00	116.00	56.40	86.20
3	EC896070	35.00	62.00	48.50	108.00	102.00	105.00	81.00	42.20	61.60
4	EC896073	38.00	66.00	52.00	106.00	142.00	124.00	60.00	60.80	60.40
5	EC896074	36.00	64.00	50.00	107.00	89.00	98.00	151.00	76.80	113.90
6	EC896083	40.00	65.00	52.50	110.00	116.00	113.00	86.00	95.40	90.70
7	EC896092	36.00	67.00	51.50	103.00	98.00	100.50	95.00	62.80	78.90
8	EC896093	36.00	64.00	50.00	108.00	104.00	106.00	46.00	38.00	42.00
9	EC896201	33.00	-	33.00	106.00	-	106.00	62.00	-	62.00
10	EC896209	38.00	-	38.00	105.00	-	105.00	81.00	-	81.00
11	EC896211	38.00	66.00	52.00	105.00	142.00	123.50	73.00	58.00	65.50
12	EC896213	34.00	66.00	50.00	106.00	118.00	112.00	54.00	61.60	57.80
13	EC896227	40.00	64.00	52.00	105.00	141.00	123.00	146.00	88.60	117.30
14	EC896229	41.00	-	41.00	112.00	-	112.00	120.00	-	120.00
15	EC896233	32.00	65.00	48.50	104.00	100.00	102.00	88.00	47.20	67.60
16	EC896237	41.00	68.00	54.50	101.00	142.00	121.50	104.00	20.80	62.40
17	EC896238	45.00	67.00	56.00	108.00	143.00	125.50	118.00	63.00	90.50
18	EC896239	38.00	67.00	52.50	113.00	142.00	127.50	232.00	46.00	139.00
19	EC896240	38.00	64.00	51.00	109.00	144.00	126.50	113.00	50.20	81.60
20	EC896243	40.00	63.00	51.50	111.00	141.00	126.00	103.00	76.40	89.70
21	EC896267	41.00	67.00	54.00	104.00	141.00	122.50	117.00	33.00	75.00
22	EC896271	40.00	-	40.00	102.00	-	102.00	54.00	-	54.00
23	EC896271	44.00	-	44.00	105.00	-	105.00	75.00	-	75.00
24	EC896275	39.00	69.00	54.00	109.00	142.00	125.50	102.00	66.00	84.00

S. No.	Entry	Days to 50% flowering			Days to maturity			Plant height (cm)		
		Bajaura	Ranichauri	Mean	Bajaura	Ranichauri	Mean	Bajaura	Ranichauri	Mean
25	EC896276	38.00	-	38.00	106.00	-	106.00	88.00	-	88.00
	EC507741(C)	40.80	68.33	54.57	104.00	144.00	124.00	109.20	73.30	91.25
	Him Bathua (C)	41.00	66.25	53.63	101.80	118.50	110.15	145.20	77.58	111.39
	NIC 22503 (C)	42.00	72.33	57.17	103.80	142.67	123.23	154.20	118.67	136.43
	PRC 9801 (C)	45.20	75.25	60.23	106.60	144.50	125.55	205.40	128.10	166.75
	Minimum	32.00	62.00	47.00	101.00	89.00	95.00	46.00	20.80	33.40
	Maximum	45.20	75.25	60.23	113.00	144.50	128.75	232.00	128.10	180.05
	Mean	39.00	66.31	52.66	106.04	127.90	116.97	105.24	64.54	84.89
	CD(0.05)	3.74	-	3.74	2.45	-	2.45	18.12	-	18.12
	CV(%) Error	3.32	-	3.32	0.88	-	0.88	4.42	-	4.42
	CV (%) Phen.	8.39	4.52	6.46	2.91	15.21	9.06	41.14	39.88	40.51

Table 38. Data *Chenopodium quinoa* averaged over the locations - Kharif 2019 (Hills) contd.

S. No.	Entry	Inflorescence length (cm)			Seed volume weight (g/10ml)		
		Bajaura	Ranichauri	Mean	Bajaura	Ranichauri	Mean
1	EC896039	33.00	17.40	25.20	3.00	5.50	4.25
2	EC896062	45.00	21.00	33.00	2.00	6.00	4.00
3	EC896070	25.00	12.00	18.50	3.00	5.89	4.45
4	EC896073	18.00	13.10	15.55	2.00	5.98	3.99
5	EC896074	31.00	18.20	24.60	4.00	5.99	5.00
6	EC896083	45.00	21.80	33.40	4.00	5.99	5.00
7	EC896092	34.00	18.40	26.20	4.00	5.91	4.96
8	EC896093	22.00	14.60	18.30	3.00	5.81	4.41
9	EC896201	23.00	-	23.00	3.00	-	3.00
10	EC896209	24.00	-	24.00	5.00	-	5.00
11	EC896211	28.00	15.40	21.70	3.00	5.97	4.49
12	EC896213	24.00	18.20	21.10	3.00	6.00	4.50
13	EC896227	67.00	26.00	46.50	3.00	5.65	4.33
14	EC896229	63.00	-	63.00	3.00	-	3.00
15	EC896233	35.00	13.60	24.30	3.00	5.60	4.30
16	EC896237	38.00	10.00	24.00	1.00	6.01	3.51
17	EC896238	60.00	17.00	38.50	3.00	6.09	4.55
18	EC896239	62.00	14.00	38.00	3.00	5.99	4.50
19	EC896240	55.00	16.30	35.65	3.00	6.02	4.51
20	EC896243	59.00	28.20	43.60	2.00	5.60	3.80
21	EC896267	61.00	-	61.00	3.00	-	3.00
22	EC896271	26.00	-	26.00	2.00	-	2.00
23	EC896271	18.00	-	18.00	4.00	-	4.00
24	EC896275	56.00	21.00	38.50	4.00	5.62	4.81
25	EC896276	41.00	-	41.00	3.00	-	3.00
	EC507741(C)	41.20	21.47	31.33	5.00	5.76	5.38
	Him Bathua (C)	67.20	19.63	43.41	5.60	6.01	5.80
	NIC 22503 (C)	73.60	26.57	50.08	5.20	5.96	5.58
	PRC 9801 (C)	70.20	33.43	51.81	3.80	6.00	4.90
	Minimum	18.00	10.00	14.00	1.00	5.50	3.25
	Maximum	73.60	33.43	53.51	5.60	6.09	5.85
	Mean	42.94	18.97	30.95	3.30	5.88	4.59
	CD(0.05)	8.24	-	8.24	2.11	-	2.11
	CV(%) Error	4.90	-	4.90	16.13	-	16.13
	CV (%) Phen.	41.43	30.18	35.80	31.76	2.98	17.37

Table 39. Promising lines in *Chenopodium album* & *C. quinoa* germplasm during Kharif 2019 at different locations (Hills)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
Bajaura (25 Genotypes), <i>Chenopodium album</i>					
1	Days to 50% flowering	37.00	47.00	IC107854 (37.00), IC582937 (37.00), EC359451 (38.00), IC341695 (38.00),	NIC 22503 (40.60)
2	Days to 80% maturity	99.00	117.00	IC582937 (99.00), IC582936 (99.00), IC415494 (101.00), IC588382 (101.00), IC107185 (101.00), IC107854 (102.00), IC469275 (102.00), IC583587 (102.00), EC359451 (103.00), NIC22516 (103.00), NIC22488 (104.00), IC108818 (105.00), IC341710 (105.00), IC582940 (105.00)	NIC 22503 (116.00)
3	Plant height (cm)	85.00	206.00	IC109732 (206.00), IC415494 (203.00), IC582942 (201.00), IC469275 (197.00), IC582937 (195.00), IC540837 (192.00), IC108088 (191.00), IC588382 (190.00)	NIC 22503 (177.80)
4	Inflorescence length (cm)	27.60	88.00	IC108088 (88.00), IC109732 (82.00), IC341695 (82.00), IC540837 (80.00), IC382223 (75.00), NIC22516 (74.00), IC582942 (73.00), IC469275 (73.00), IC582937 (69.00)	NIC 22503 (61.80)
5	No. of spikelet/ plant	18.00	42.00	IC415494 (42.00), IC108088 (41.00), IC582942 (39.00)	EC507741 (35.40)
6	No. of plants at harvest	9.00	33.00	IC341710 (33.00)	NIC 22503 (31.60)
7	Grain yield/plant	3.60	30.00	IC540837 (30.00), IC382223 (28.80), IC109732 (27.80)	NIC 22503 (17.72)
8	Seed volume weight (g/10ml)	3.00	5.00	IC328877 (5.00), IC582942 (5.00), IC582940 (5.00)	PRC 9801 (4.80)
Ranichauri (25 Genotypes), <i>Chenopodium album</i>					
1	Days to 50% Flowering	64.00	79.00	-	IC-415477 (68.33)
2	Days to 80% Maturity	106.00	146.00	IC341695 (106.00)	IC-415477 (134.33)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
3	Plant height (cm)	21.30	156.40	NIC22488 (6.97)	EC-507741 (6.12)
4	Seed volume weight (g/10ml)	3.89	6.97	IC109732 (27.80), IC328877 (23.60), NIC22516 (23.20)	NIC-22503 (21.24)
5	Inflorescence length (cm)	8.50	27.80	IC109732 (27.80), IC328877 (23.60), NIC22516 (23.20)	NIC-22503 (21.24)
6	No of Finger/ Plant	7.30	29.60	IC109732 (29.60), IC258331 (26.00)	PRC-9801 (24.90)
7	No of branches/ Plant	2.40	10.70	IC109732 (10.70), IC582937 (10.50), NIC22488 (9.80), NIC22530 (9.60), IC108087 (9.00), EC359451 (8.00)	NIC-22503 (6.72)
8	Seed Yield (g/plant)	3.30	48.30	IC109732 (48.30)	NIC-22503 (39.08)
Shimla (25 Genotypes), <i>Chenopodium album</i>					
1	Days to 50% flowering	38.00	88.00	IC415494 (38.00)	EC507741 (50.40)
2	Infl length (cm)	33.40	47.30	IC382223 (47.30), IC341695 (47.10), NIC22488 (46.10)	IC415477 (43.64)
3	leaf length (cm)	3.80	15.10	IC540837 (15.10), IC469275 (14.10), NIC22516 (14.10), IC108088 (13.80), IC109732 (13.20), IC582942 (13.20), IC382223 (13.10)	IC415477 (11.74)
4	Leaf width (cm)	2.70	12.50	NIC22516 (12.50), IC582942 (12.50), NIC22488 (12.20), IC469275 (11.50), IC382223 (11.20), IC540837 (10.80), IC583587 (10.50), IC582937 (10.40), IC108088 (10.10)	NIC22503 (9.00)
5	Plant height (cm)	95.10	298.60	IC582942 (298.60), IC582937 (298.20), IC108818 (290.30)	NIC22503 (277.64)
6	Days to 80% maturity	96.40	156.00	-	EC507741(96.40)
7	Seed yield/plant (g)	11.01	85.73	IC582937 (85.73), IC382223 (70.24), IC469275 (70.02), IC583587 (66.68), NIC22488 (61.69), IC328877 (60.01), NIC22530 (55.180), IC582942 (55.02), IC109732 (51.61), IC107185 (49.700), IC540837 (44.32), NIC22516 (44.20), IC582936 (41.26), IC108818 (40.58)	IC415477 (30.34)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
8	Seed volume weight (g/10ml)	5.49	7.51	IC583587 (7.51), IC582936 (7.38), IC582942 (7.33), IC540837 (7.17), IC583623 (7.16), IC582937 (7.10), IC108818 (7.10), IC107854 (7.10)	NIC22503 (6.87)
Bajaura (25 Genotypes), <i>Chenopodium quinoa</i>					
1	Days to 50% flowering	32.00	45.20	EC896233 (32.00), EC896201 (33.00), EC896213 (34.00), EC896070 (35.00), EC896093 (36.00), EC896092 (36.00), EC896074 (36.00),	EC507741 (40.80)
2	Days to 80% maturity	101.00	113.00	-	Him Bathua (101.80)
3	Plant height (cm)	46.00	232.00	EC896239 (232.00)	PRC 9801 (205.40)
4	Inflorescence length (cm)	18.00	73.60	-	NIC 22503 (73.60)
5	No. of spikelet/plant	8.00	37.00	EC896239 (37.00)	Him Bathua (31.80)
6	No. of plants at harvest	10.00	25.00	EC896227 (25.00), EC896267 (24.00)	EC507741 (23.40)
7	Seed yield/plant (g)	2.00	19.88	-	PRC 9801 (19.88)
8	Seed volume weight (g/10ml)	1.00	5.60	-	Him Bathua (5.60)
Ranichauri (25 Genotypes), <i>Chenopodium quinoa</i>					
1	Days to 50% Flowering	62.00	75.25	-	IC415477 (66.25)
2	Days to Maturity	89.00	144.50	EC896074 (89.00), EC896092 (98.00), EC896233 (100.00), EC896070 (102.00), EC896069 (103.00), EC896093 (104.00)	IC415477 (118.50)
3	Plant height (cm)	20.80	128.10	-	PRC9801 (128.10)
4	Seed volume weight (g/10ml)	5.50	6.09	EC896238 (6.09), EC896240 (6.02)	IC415477 (6.01)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
5	Inflorescence length (cm)	10.00	33.43	-	PRC9801 (33.43)
6	No of Finger/ Plant	7.60	27.00	EC896275 (27.00)	PRC9801 (22.45)
7	No of branches/ Plant	1.40	7.73	-	PRC9801 (7.73)
8	Seed Yield (g/plant)	2.28	29.72	EC896211 (29.72), EC896213 (28.60), EC896073 (28.40), EC896227 (28.40), EC896237 (27.40)	EC507741 (23.51)
Shimla (25 Genotypes), <i>Chenopodium quinoa</i>					
1	Days to 50% flowering	40.00	79.00	-	EC507741 (52.4)
2	Infl length (cm)	30.30	44.30	EC896240 (44.3)	IC415477 (41.08)
3	leaf length (cm)	4.70	11.44	-	IC415477 (11.44)
4	Leaf width (cm)	2.40	8.48	-	NIC22503 (8.48)
5	Plant height (cm)	108.30	261.12	-	NIC22503 (261.12)
6	Days to 80% maturity	85.00	130.40	-	PRC9801 (130.4)
7	Seed yield/plant (g)	8.45	31.37	-	PRC9801 (31.37)
8	1000 Seed wt (g)	0.78	2.50	EC896233 (2.50), EC806074 (2.40), EC896238 (2.40), EC896274 (2.35), EC896239 (2.25), EC896229 (2.25), EC896083 (2.20), EC896209 (2.20)	EC507741 (1.46)
9	Seed vol. (g/10ml)	5.51	6.88	-	NIC22503 (6.88)

Table 40. Promising lines in *Chenopodium album* germplasm during Kharif 2019 based on all locations (Hills)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Days to 50% flowering	46.33	71.33	IC415494 (51.33), IC341695 (52.33), IC583623 (54.50)	Him Bathua (55.64)
2	Plant height (cm)	67.13	220.33	IC469275 (219.05), IC582937 (207.40)	NIC 22503 (191.75)
3	Inflorescence length (cm)	23.17	54.37	IC469275 (57.85), IC583623 (51.55), IC109732 (50.97), IC108088 (50.90), IC341695 (48.30), IC583587 (46.55), NIC22516 (46.43)	NIC 22503 (39.92)
4	Seed volume weight (g/10ml)	4.13	6.49	IC582942 (6.10), NIC22488 (5.99), IC328877 (5.98)	PRC 9801 (5.83)

Table 41. Promising lines in *Chenopodium quinoa* germplasm during Kharif 2019 based on all locations (Hills)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Days to 50% flowering	47.0	60.23	EC896201 (33.00), EC896209 (38.00), EC896276 (38.00), EC896271 (40.00), EC896229 (41.00), EC896271 (44.00), EC896070 (48.50)	Him Bathua (53.63)
2	Days to maturity	95.0	128.75	EC896074 (98.00), EC896092 (100.50), EC896271 (102.00), EC896233 (102.00), EC896039 (103.50)	Him Bathua (110.15)
3	Plant height (cm)	33.0	180.05	-	PRC 9801 (166.75)
4	Inflorescence length (cm)	14.0	53.51	EC896229 (63.00), EC896267 (61.00)	PRC 9801 (51.81)
5	Seed volume weight (g/10ml)	3.25	5.85	-	Him Bathua (5.80)

2.4.1.4 Adzuki Bean (*Vigna angularis*)

A set of 50 accessions having 25 each in I and II year supplied by NBPGR, RS, Shimla was planned to be evaluated at five locations viz. CSKHPKV Palampur, NBPGR, RS, Shimla; UUHF, Ranichauri, VPKAS Almora and CAU Pasighat along with two checks HPU 51 and Totru Local. The experimental details are presented in Table 42. Results have been received from three locations i.e. Palampur, Pasighat and Shimla. The list of promising lines including range and mean at all centres for all the descriptors is presented in Tables 43 to 53.

At CSK HPKV Palampur, 50 genotypes along with two checks i.e. HPU-51 and Totru Local were evaluated for eleven quantitative traits. The statistical data and promising genotypes are presented in Tables 43, 44 and 49 to 53. The early flowering genotypes were EC057459 and IC455396 (47.0 days) followed by IC108855 (48.0 days), while early maturing genotypes were EC057459, EC000254 and EC340272 (101.0 days) which were statistically superior than the best check Totru local (58.25 days, 106.67 days, respectively). The genotypes EC057959 (101.0 cm) followed by EC000263 (98.9 cm) and IC340285 (96.4 cm) showed maximum plant height and were better than the best check HPU-51 (84.61 cm). The best performing genotypes for pods/plant were EC059489 (48.8), IC341954 (48.4) and IC485385 (48.0) and were better than the best check Totru Local (37.54), while higher pod length was observed in IC000293 (11.30 cm), EC057459 (10.4 cm) and IC341954 (10.30 cm) and were better than the check HPU-51 (8.28 cm). The yield contributing character number of seeds per pod were observed maximum in genotypes IC024105 (9.8) followed by IC485385 (9.4) and EC000264 (9.2) and were better than the best check HPU 51 (8.03). The genotypes IC469175 (24.0 g) followed by EC340246 and EC034025 (20.0 g) had maximum seed yield per plant and were better than the best check HPU-51 (18.17 g). The genotypes IC241041 (12.13 g) followed by EC340267 (11.61 g) and EC340273 (11.53 g) were promising for 100 seed weight as compared to the best check HPU-51 (10.54 g).

At CAU Pasighat, 50 genotypes along with two checks i.e. HPU-51 and Totru Local were evaluated for thirteen quantitative traits. The statistical data and promising genotypes are presented in Tables 45, 46 and 49 to 53. The genotypes EC340284 (66.7 cm) followed by EC340272 (65.0 cm) and IC485388 (63.3 cm) showed maximum plant height and were better than the best check HPU-51 (54.66 cm). The best performing genotypes for number of pods/plant were IC024522 (83.7), EC000264 (78.0) and EC059489 (75.7) and were better than the best check HPU-51 (50.20), while more pod length was observed in EC340240 (10.10 cm) and was better than the check HPU-51 (9.2 cm). The yield contributing character number of seeds per pod were observed maximum in genotypes EC340266

(10.3) followed by EC120466, IC485396 (10.0) and were better than the best check HPU-51 (8.80). The genotypes IC024522 (61.9 g) followed by IC455396 (55.98 g) and EC008707 (52.67 g) had maximum seed yield per plant and were better than the best check HPU-51 (40.72 g). The bold seeded genotypes were EC340276 (16.6 g) followed by EC340250 and EC340271 (14.3 g) and were better than the best check HPU-51 (8.98 g) for 100 seed weight. None of the genotypes were found superior than the best check Totru Local (41.8 days) for early flowering.

At NBPGR Shimla, 50 genotypes along with two checks i.e. HPU-51 and Totru Local were evaluated for eleven quantitative characters. The statistical data and promising genotypes are presented in Tables 47, 48 and 49 to 53. The genotypes EC340266 (142.5 cm) followed by EC340285 (141.65 cm) and EC008707 (140.45 cm) showed maximum plant height and were better than the best check HPU-51 (94.47 cm). The best performing genotypes for more clusters per plant were IC341962 and IC340246 (19.0) followed by EC108080 (17.5) and were better than the best check Totru Local (14.8), while more number of seeds per pod was observed in EC340251, EC340280 and IC000293 (10.5) and were better than the check HPU-51 (8.0). The genotypes EC340250 (49.47 g) followed by EC108080 (49.21 g) and EC340251 (48.69 g) had maximum seed yield per plant and were better than the best check HPU-51 (35.72 g). The bold seeded genotypes were IC485382 (16.85 g), EC340250 (15.46 g) and EC340271 (14.46 g) and were better than the best check HPU-51 (11.75 g) for 100 seed weight. None of the genotypes were found superior than the best check Totru Local (63.0 days and 108.8 days) for early flowering and early maturity, respectively.

Over the locations for all three centres viz., Palampur, Pasighat and Shimla the performance of entries and best genotypes in comparison to the checks have been summarized in Table 53. Significant differences were observed among the genotypes for days to 50% flowering, plant height (cm), pod length (cm), seeds per pod and 100 seed weight (g). The range for days to flowering varied from 50.00 days to 67.00 days and the best performing check for early flowering was Totru Local (54.35 days). The best performing genotypes for early flowering were EC340281 (51.67 days) followed by EC015257, EC057459 (52.33 days). The maximum plant height was observed in genotypes EC340285 (98.78 cm), EC340266 (98.5 cm) and EC008707 (96.78 cm) and were better than the best check HPU-51 (77.91 cm). The number of branches per plant ranged from 1.92 to 3.77 and the best performing genotypes were EC340246 (3.3) and IC485385 (3.17) and were better than the best check HPU-51 (2.7). The superior genotypes for pod length were IC000293 (10.55 cm) followed by EC000264 (10.17 cm) and were better than the check HPU-51 (9.61 cm), while more number of seeds per pod were observed in IC000293 (9.77), IC341959 (9.27) and IC000271 (9.23) which were better than the best check HPU-51 (8.28). The range for 100 seed weight (g) was 7.24 g to 12.4 g with the best performing check HPU-51

(10.42g). The superior genotypes for 100 seed weight were IC469174(12.0 g) followed by EC4340271 (11.89 g) and EC000262 (11.14 g).

Table 42. Experimental Details of Germplasm Evaluation in Adzuki bean: Kharif 2019 (Hills)

S. No	Items	Palampur	Passihat	Shimla
1	No. of genotypes	25+25	25+25	25+25
2	No. of Checks	2	2	2
3	Design	ABD	ABD	ABD
4	No. of Block	12	5	5
5	Number of Rows	2	3	3
6	Row Length (m)	3	2	2
7	Row spacing (cm)	30	30	30
8	Plant spacing (cm)	10	10	10
9	NPKS (kg/ha)	20:40:20	20:40:20	20: 40: 20
10	Plot size (m ²)	2.4	3	2.7
11	Sowing Date	10/6/2019	8/7/2019	27/5/2019
12	Harvesting period	20/10/2019	10/10/2019 to 25/10/2019	11/9/2019 to 24/9/2019

Table 43. Evaluation of germplasm in Adzuki bean at Palampur (I Year): Kharif 2019 (Hills)

S.No.	Accession No.	Days to 50% flowering	Days to 75% maturity	Plant height (cm)	No. of branches/plant	Number of clusters/plant	No. of pods/cluster	Pod length (cm)	Seeds /pod	Yield/ plant (g)	100-seed weight (g)
1	EC000254	49.00	101.00	86.70	2.60	21.60	2.20	8.30	7.60	6.00	10.39
2	EC000262	60.00	103.00	87.10	2.80	17.60	2.20	8.20	8.20	3.00	10.02
3	EC000263	51.00	101.00	98.90	2.60	17.00	2.00	7.90	7.80	8.00	10.90
4	EC000264	57.00	120.00	72.20	3.00	16.20	2.60	9.60	9.20	6.00	10.42
5	EC000271	57.00	106.00	62.30	3.00	6.60	1.60	6.60	9.00	12.00	10.91
6	EC000272	50.00	109.00	85.90	2.40	13.00	2.20	8.50	8.00	19.00	10.48
7	EC008707	53.00	104.00	91.60	2.20	9.60	2.40	7.50	7.60	12.00	10.22
8	EC015257	49.00	107.00	91.70	2.80	16.80	3.00	8.40	7.60	3.00	9.26
9	EC034025	58.00	111.00	87.80	2.40	12.60	2.60	8.10	8.00	20.00	11.12
10	EC057459	47.00	101.00	88.20	2.40	16.40	2.00	10.40	8.00	6.00	10.49
11	EC057959	51.00	105.00	101.00	3.00	12.70	2.20	8.80	8.00	12.00	8.65
12	EC059489	54.00	105.00	88.80	3.60	18.00	2.80	8.50	8.00	10.00	9.86
13	EC108080	53.00	105.00	85.50	2.60	17.60	2.00	7.70	7.00	4.00	8.73
14	EC120466	50.00	104.00	92.80	2.80	17.80	2.60	7.30	6.60	8.00	8.34
15	EC340240	50.00	114.00	75.40	2.80	12.40	2.60	8.80	8.60	6.00	10.64
16	EC340246	52.00	105.00	91.30	3.20	12.20	3.00	8.10	8.20	20.00	9.46
17	EC340251	55.00	104.00	72.70	2.60	13.80	3.00	7.20	7.20	4.00	8.78
18	EC340253	54.00	112.00	81.40	2.20	14.00	2.80	6.90	6.80	6.00	9.80
19	EC340256	56.00	111.00	62.40	2.40	13.40	2.80	8.70	9.00	8.00	9.51
20	EC340263	53.00	113.00	85.60	2.60	15.80	2.60	9.70	8.20	18.00	9.70
21	EC340265	50.00	105.00	77.80	2.80	17.60	2.20	9.10	8.00	6.00	9.70
22	EC340266	61.00	108.00	96.30	2.20	17.20	2.40	8.50	8.00	10.00	10.81
23	EC340267	58.00	113.00	81.30	2.60	19.20	1.80	8.90	8.40	8.00	11.61
24	EC340271	59.00	109.00	80.00	3.20	22.40	2.00	9.50	9.20	4.00	10.92
25	EC340272	49.00	101.00	83.40	2.00	8.60	2.00	7.80	7.40	20.00	10.81
	HPU-51 (C)	61.42	113.25	84.61	2.55	14.75	2.47	8.28	8.03	18.17	10.54
	TotruLocal (C)	58.25	106.67	76.62	2.73	15.05	2.37	6.90	7.17	7.08	7.00
	Minimum	47.00	101.00	62.30	2.00	6.60	1.60	6.60	6.60	3.00	7.00
	Maximum	61.42	120.00	101.00	3.60	22.40	3.00	10.40	9.20	20.00	11.61
	Mean	53.91	107.29	84.05	2.67	15.18	2.39	8.30	7.96	9.79	9.97
	CV% Phen	7.72	4.48	11.41	13.32	23.95	15.94	11.03	8.57	58.39	10.26

Table 44. Evaluation of germplasm in Adzuki bean at Palampur (II Year): Kharif 2019 (Hills)

S.No.	Accession No.	Days to 50% flowering	Days to 75% maturity	Plant height (cm)	No. of branches/plant	Number of clusters/plant	No. of pods/cluster	Pod length (cm)	Seeds/pod	Yield/plant (g)	100-seed weight (g)
1	EC340273	70.00	103.00	66.30	2.00	8.40	2.00	6.70	6.00	3.00	11.53
2	EC340276	61.00	114.00	91.30	2.40	13.20	2.80	8.30	7.80	4.00	10.14
3	EC340280	56.00	104.00	58.10	2.40	19.20	2.40	7.20	7.60	18.00	9.87
4	EC340281	49.00	113.00	84.70	3.20	16.80	2.40	10.00	8.80	8.00	9.80
5	EC340284	57.00	105.00	47.40	2.00	13.20	2.60	7.50	7.60	18.00	10.02
6	EC340285	53.00	104.00	96.40	3.00	9.80	2.00	8.50	8.20	8.00	9.68
7	IC000293	49.00	104.00	82.80	2.60	17.80	2.20	11.30	8.80	6.00	11.33
8	IC024105	61.00	110.00	95.70	3.60	18.80	1.60	9.70	9.80	10.00	11.09
9	IC024522	54.00	108.00	89.40	2.20	12.60	2.80	8.70	8.60	4.00	9.81
10	IC108854	51.00	111.00	81.10	2.40	11.60	2.00	9.80	9.00	3.00	9.75
11	IC108855	48.00	103.00	76.90	2.40	14.20	2.00	7.00	7.60	8.00	9.57
12	IC241041	53.00	106.00	94.10	3.20	9.80	2.20	8.30	8.20	6.00	12.13
13	IC341941	49.00	105.00	79.40	2.20	13.60	2.20	8.90	8.20	3.00	9.81
14	IC341954	52.00	104.00	91.40	3.00	22.60	1.80	10.30	8.00	12.00	11.31
15	IC341955	57.00	112.00	74.10	2.40	13.80	2.80	8.70	9.00	5.00	11.02
16	IC341959	50.00	103.00	87.10	2.80	13.80	1.80	9.50	8.80	6.00	11.21
17	IC341962	55.00	104.00	82.80	3.00	21.60	2.20	8.70	8.20	4.00	9.37
18	IC455396	47.00	106.00	85.00	2.60	14.50	1.60	9.10	7.00	8.00	10.84
19	IC469174	54.00	106.00	88.30	2.20	15.20	2.40	7.10	7.20	14.00	11.40
20	IC469175	56.00	106.00	90.80	2.00	19.40	2.20	9.30	9.00	24.00	9.64
21	IC485381	53.00	108.00	74.60	3.00	19.40	3.00	8.50	7.60	15.00	11.51
22	IC485385	52.00	106.00	84.50	3.20	14.20	2.80	9.60	9.40	13.00	10.76
23	IC485385	61.00	113.00	78.80	2.60	9.40	2.00	7.00	7.80	12.00	8.70
24	IC485388	53.00	108.00	95.70	3.00	14.00	2.40	7.80	7.50	12.00	9.10
25	IC485396	56.00	107.00	63.30	2.00	10.00	2.80	7.70	7.60	12.00	11.17
	HPU-51 (C)	61.42	113.25	84.61	2.55	14.75	2.47	8.28	8.03	18.17	10.54
	Totru Local (C)	58.25	106.67	76.62	2.73	15.05	2.37	6.90	7.17	7.08	7.00
	Minimum	47.00	103.00	47.40	2.00	8.40	1.60	6.70	6.00	3.00	7.00
	Maximum	70.00	114.00	96.40	3.60	22.60	3.00	11.30	9.80	24.00	12.13
	Mean	54.69	107.15	81.53	2.62	14.69	2.29	8.53	8.09	9.68	10.30
	CV% Phen	9.43	3.27	14.59	16.84	25.53	16.87	13.82	10.25	57.56	10.66

Table 45. Evaluation of germplasm in Adzuki bean at Pasighat (I Year): Kharif 2019 (Hills)

Sl. No.	Entry	Days of 50% flowering	Height of plants (in cm)	No. Of branches per plant	No. Of plants per plot	No. Of pods per plant	Length of pod (cm)	No. Of seeds/ pod	100 seed weight (gm)	Weight of pods per plot(kg)	Weight of seed per plot(kg)	Seed yield per plant (g)
1	EC000254	45.00	50.00	3.70	25.00	56.30	9.20	9.30	8.40	375.20	227.30	43.98
2	EC000262	42.00	53.30	3.70	23.00	43.00	9.10	7.30	10.80	164.80	96.70	33.90
3	EC000263	42.00	56.70	3.00	27.00	36.70	9.30	7.70	10.30	461.00	260.30	29.11
4	EC000264	43.00	61.70	3.00	22.00	78.00	9.30	7.70	8.40	484.00	281.20	50.45
5	EC000271	42.00	61.70	2.70	21.00	56.00	9.20	9.70	7.40	483.70	301.90	40.20
6	EC000276	45.00	60.00	3.00	31.00	44.30	8.90	8.70	7.20	408.20	234.50	27.75
7	EC008707	42.00	58.30	2.70	31.00	62.70	9.50	8.00	10.50	501.10	289.50	52.67
8	EC015257	42.00	46.70	2.70	19.00	71.00	7.00	7.70	7.60	271.10	155.90	30.62
9	EC057459	42.00	55.00	3.30	30.00	48.00	9.40	8.70	9.60	521.80	268.20	40.09
10	EC057959	43.00	55.00	3.00	32.00	56.70	8.30	8.00	7.50	437.20	265.90	29.48
11	EC059489	44.00	58.30	3.00	32.00	75.70	8.10	10.00	7.60	378.40	225.40	42.39
12	EC108080	42.00	61.70	2.70	27.00	54.70	8.80	6.30	8.50	370.60	217.50	29.29
13	EC120466	44.00	58.30	3.00	25.00	50.00	9.00	10.00	7.60	107.20	220.60	38.00
14	EC340240	42.00	53.30	2.70	27.00	62.30	10.10	8.70	9.60	347.40	203.20	52.03
15	EC340246	42.00	58.30	3.00	39.00	22.00	8.70	8.00	10.60	173.00	95.40	18.66
16	EC340250	43.00	55.00	3.70	33.00	18.00	7.20	5.70	10.30	125.60	78.60	14.67
17	EC340251	44.00	63.30	2.30	38.00	44.30	9.00	8.00	7.50	338.80	218.30	23.04
18	EC340253	43.00	51.70	2.00	30.00	54.30	9.10	9.00	7.70	165.40	108.10	37.63
19	EC340256	43.00	43.30	1.70	15.00	19.00	7.10	8.30	7.20	83.50	42.40	11.35
20	EC340263	43.00	55.00	3.00	28.00	47.00	8.90	9.30	7.40	269.80	163.10	32.35
21	EC340265	43.00	56.70	2.70	38.00	41.30	8.80	8.30	8.60	358.50	201.40	29.48
22	EC340266	43.00	56.70	2.70	35.00	45.00	9.60	10.30	7.60	454.70	251.60	35.23
23	EC340267	42.00	63.30	2.30	36.00	32.30	8.30	8.70	8.40	284.20	153.10	23.60
24	EC340271	42.00	58.30	3.70	19.00	23.00	8.30	5.30	10.30	178.80	104.60	17.43
25	EC340272	42.00	65.00	3.00	32.00	30.70	9.20	8.00	7.40	440.20	341.30	18.17
	HPU-51(C)	43.60	54.66	2.92	25.00	50.20	9.28	8.80	8.98	341.62	154.66	40.72
	Totru Local (C)	41.80	53.60	2.52	31.40	44.98	6.36	8.02	7.66	166.64	85.76	13.20
	Minimum	41.80	43.30	1.70	15.00	18.00	6.36	5.30	7.20	83.50	42.40	11.35
	Maximum	45.00	65.00	3.70	39.00	78.00	10.10	10.30	10.80	521.80	341.30	52.67
	Mean	42.79	56.48	2.88	28.57	46.94	8.71	8.28	8.54	321.94	194.31	31.68
	CV (%) Phen.	2.23	8.86	16.95	21.78	34.25	10.16	14.50	14.46	41.83	40.67	36.98

Table 46. Evaluation of germplasm in Adzuki bean at Pasighat (II Year): Kharif 2019 (Hills)

Sl. No.	Entry	Days of 50% flowering	Height of plants (in cm)	No. Of branches per plant	No. Of plants per plot	No. Of pods per plant	Length of pod (cm)	No. Of seeds/ pod	100 seed weight (gm)	Weight of pods per plot(kg)	Weight of seed per plot(kg)	Seed yield per plant (g)
1	EC340273	43.00	48.30	1.30	25.00	50.70	9.00	8.30	9.40	269.20	155.30	39.56
2	EC340276	43.00	61.70	2.70	37.00	17.70	7.90	7.30	10.60	288.00	145.70	21.45
3	EC340280	43.00	61.70	3.00	23.70	54.70	8.90	8.70	7.40	524.40	328.20	35.22
4	EC340281	40.00	58.30	3.00	27.00	49.70	9.10	8.70	7.40	361.30	211.00	27.67
5	EC340284	43.00	66.70	2.70	36.00	42.30	8.50	7.30	10.70	370.20	207.60	33.04
6	EC340285	42.00	58.30	3.00	27.00	36.00	7.40	8.00	7.60	293.80	151.20	21.89
7	IC000293	41.00	58.30	3.00	28.00	60.70	8.30	10.00	7.60	388.10	211.90	46.13
8	IC024105	43.00	60.00	2.70	30.00	33.30	7.10	6.70	7.40	234.10	139.30	16.51
9	IC024522	40.00	60.00	2.30	30.00	83.70	9.80	8.70	8.50	299.20	166.10	52.05
10	IC108854	43.00	61.70	3.00	47.00	63.00	8.90	8.00	8.40	417.10	247.20	42.34
11	IC108855	44.00	61.70	2.70	33.00	40.70	9.40	8.30	10.50	118.00	66.40	37.16
12	IC241041	42.00	58.30	2.30	23.00	31.70	8.90	8.30	7.70	282.50	186.20	20.26
13	IC341941	43.00	56.70	2.70	32.00	59.70	8.70	9.30	7.80	262.10	157.30	43.31
14	IC341954	42.00	56.70	3.30	26.70	75.00	7.90	8.00	7.80	234.50	138.20	46.80
15	IC341955	43.00	58.30	2.70	40.00	53.00	8.80	9.30	7.60	153.40	92.40	37.46
16	IC341959	42.00	60.00	2.30	36.00	67.00	8.50	9.00	7.00	370.70	206.30	42.21
17	IC341962	44.00	51.70	2.00	31.30	54.00	9.00	8.70	7.20	368.00	236.50	33.83
18	IC455396	40.00	58.30	3.00	26.00	68.70	8.70	9.70	8.40	323.40	180.90	51.98
19	IC469174	44.00	55.00	3.30	46.00	56.70	8.50	7.70	10.40	159.90	86.70	45.41
20	IC469175	42.00	56.70	3.00	23.00	26.30	8.40	8.00	10.80	167.90	84.40	26.51
21	IC485382	42.00	51.70	2.30	27.00	13.70	7.20	5.30	7.30	62.30	20.30	12.57
22	IC485385	43.00	53.30	3.30	36.00	53.70	8.50	8.00	8.30	245.30	196.50	35.66
23	IC485386	44.00	53.30	3.00	28.00	41.70	8.50	8.00	7.60	399.60	228.50	25.35
24	IC485388	44.00	63.30	3.70	30.00	47.00	8.90	9.00	7.00	413.20	247.90	29.61
25	IC485396	41.00	63.30	2.70	51.00	32.30	9.00	10.00	8.30	543.50	324.70	26.81
	HPU-51	43.60	54.66	2.92	25.00	50.20	9.28	8.80	8.98	341.62	154.66	40.72
	Totru Local (C)	41.80	53.60	2.52	31.40	44.98	6.36	8.02	7.66	166.64	85.76	13.20
	Minimum	40.00	48.30	1.30	23.00	13.70	6.36	5.30	7.00	62.30	20.30	12.57
	Maximum	44.00	66.70	3.70	51.00	83.70	9.80	10.00	10.80	543.50	328.20	52.05
	Mean	42.46	57.84	2.76	31.71	48.45	8.50	8.34	8.35	298.44	172.49	33.51
	CV (%) Phen.	2.92	7.28	17.25	23.39	34.14	9.01	12.02	14.76	39.15	42.54	33.84

Table 47. Evaluation of germplasm in Adzuki bean at Shimla (I Year): Kharif 2019 (Hills)

S.No.	Accs.	Day to 50% Flowering	No. of Primary Branches	No. of Cluster/Plant	No. of Pod/Cluster	No. of Pod/Plant	Plant Height (cm)	Days to 80% Maturity	Pod Length (cm)	100 Seed wt.(g)	No. of Seed/Pod	Seed Yield/Plant (g)
1	EC000254	66.00	3.00	14.66	3.00	35.00	89.45	108.00	11.20	9.26	9.50	30.79
2	EC000262	84.00	2.50	11.00	2.00	38.00	82.50	112.00	10.20	12.60	7.00	33.52
3	EC000263	67.00	2.50	13.00	1.66	30.00	96.35	110.00	10.90	10.96	9.00	29.59
4	EC000264	68.00	2.50	10.00	2.66	30.00	95.70	110.00	11.60	11.76	9.00	31.75
5	EC000271	77.00	2.50	12.66	2.00	34.00	92.30	111.00	11.75	12.30	9.00	37.64
6	EC000276	72.00	2.50	12.33	2.00	40.00	99.75	114.00	10.85	11.10	3.00	13.32
7	EC008707	73.00	2.50	11.00	2.00	30.00	140.45	106.00	11.10	12.26	10.00	36.78
8	EC015257	66.00	2.50	12.00	2.00	35.00	112.65	115.00	12.60	8.46	9.00	26.65
9	EC057459	66.00	2.50	15.00	2.00	38.00	103.05	112.00	10.75	10.92	8.00	33.20
10	EC057959	67.00	2.50	13.50	2.66	42.00	94.20	110.00	11.15	9.63	9.33	37.74
11	EC059489	71.00	3.00	16.33	2.66	42.00	97.05	107.00	11.60	8.74	9.50	26.89
12	EC108080	73.00	2.50	17.50	2.00	46.00	92.25	111.00	11.85	11.26	9.50	49.21
13	EC120466	64.00	2.50	14.50	2.50	26.00	112.75	112.00	8.70	11.58	9.00	27.10
14	EC340240	65.00	3.00	11.00	2.00	37.00	89.60	109.00	10.50	11.94	7.50	33.13
15	EC340246	72.00	2.50	19.00	2.66	18.00	122.80	114.00	11.95	10.24	9.50	17.51
16	EC340250	81.00	3.00	13.50	2.00	40.00	75.30	112.00	9.60	11.46	8.00	49.47
17	EC340251	76.00	2.50	10.33	2.00	44.00	88.75	108.00	12.10	10.54	10.50	48.69
18	EC340253	68.00	3.00	15.00	2.66	40.00	97.65	108.00	11.30	10.14	10.00	40.56
19	EC340256	73.00	2.50	5.50	3.25	28.00	89.10	116.00	9.90	8.72	9.00	21.97
20	EC340263	73.00	2.50	9.00	2.00	29.00	110.15	106.00	11.25	9.16	9.50	25.24
21	EC340265	65.00	2.50	12.00	2.50	28.00	101.45	113.00	11.15	11.84	7.66	25.39
22	EC340266	77.00	3.00	13.50	2.00	36.00	142.50	114.00	10.75	11.06	9.00	35.83
23	EC340267	72.00	3.00	12.00	2.66	40.00	89.10	107.00	11.05	10.01	9.00	36.04
24	EC340271	77.00	2.50	16.50	2.66	28.00	85.05	114.00	10.60	14.46	8.50	34.41
25	EC340272	69.00	2.50	9.66	2.00	32.00	115.25	107.00	11.05	9.44	9.00	27.19
	HPU-51(C)	64.40	2.90	12.26	2.20	38.00	94.47	110.20	11.26	11.75	8.00	35.72
	Totru Local (C)	63.00	2.46	14.80	3.07	39.60	85.36	108.80	7.67	8.13	8.00	16.25
	Minimum	63.00	2.46	5.50	1.66	18.00	75.30	106.00	7.67	8.13	3.00	13.32
	Maximum	84.00	3.00	19.00	3.25	46.00	142.50	116.00	12.60	14.46	10.50	49.47
	Mean	70.72	2.64	12.87	2.33	34.95	99.81	110.56	10.90	10.73	8.67	31.91
	CV (%) Phen.	7.73	8.65	22.17	17.96	18.54	16.20	2.61	9.43	13.85	16.14	28.84

Table 48. Evaluation of germplasm in Adzuki bean at Shimla (II Year): Kharif 2019 (Hills)

S.No.	Accs.	Day to 50% Flowering	No. of Primary Branches	No. of Cluster/Plant	No. of Pod/Cluster	No. of Pod/Plant	Plant Height (cm)	Days to 80% Maturity	Pod Length (cm)	100 Seed wt.(g)	No. of Seed/Pod	Seed Yield/Plant (g)
1	EC340273	74.00	2.50	14.00	2.00	32.00	121.25	116.00	10.70	12.24	8.50	33.29
2	EC340276	81.00	2.50	11.00	2.00	22.00	105.05	115.00	8.25	7.72	8.00	8.31
3	EC340280	69.00	3.00	16.50	3.25	40.00	122.65	114.00	12.60	10.20	10.50	42.84
4	EC340281	66.00	2.50	11.00	2.00	33.00	122.80	113.00	10.80	10.14	9.00	30.12
5	EC340284	73.00	2.50	13.00	2.00	30.00	89.80	113.00	10.85	11.18	8.00	26.83
6	EC340285	71.00	2.50	9.00	1.50	17.00	141.65	109.00	9.55	8.98	8.00	12.21
7	IC000293	72.00	2.50	12.00	3.00	34.00	102.35	109.00	12.05	9.24	10.50	32.99
8	IC024105	81.00	2.50	13.00	3.00	39.00	132.35	111.00	11.50	7.74	9.50	24.97
9	IC024522	65.00	2.50	13.00	2.00	22.00	86.00	109.00	11.00	11.40	7.50	18.81
10	IC108854	68.00	3.00	16.00	2.00	18.00	84.25	111.00	10.95	9.36	9.50	16.01
11	IC108855	72.00	2.50	10.50	3.00	42.00	96.50	108.00	10.35	10.02	9.00	37.88
12	IC241041	72.00	3.00	11.50	2.66	35.00	114.45	107.00	10.30	10.92	9.00	34.40
13	IC341941	73.00	2.50	12.00	2.00	33.00	93.20	111.00	11.95	8.72	10.00	28.78
14	IC341954	72.00	2.66	11.66	2.40	18.00	81.50	110.00	10.75	10.16	8.00	14.63
15	IC341955	68.00	3.00	11.00	3.33	40.00	96.55	109.00	9.85	11.50	8.00	36.80
16	IC341959	72.00	2.66	10.33	3.00	24.00	100.60	109.00	10.06	10.50	10.00	25.20
17	IC341962	66.00	3.66	19.00	2.33	24.00	87.40	110.00	11.60	8.48	9.00	18.32
18	IC455396	84.00	2.66	10.33	2.33	22.00	114.20	120.00	10.45	9.98	8.00	17.56
19	IC469174	82.00	2.50	9.00	2.00	18.00	109.05	116.00	10.45	14.19	7.00	17.88
20	IC469175	74.00	2.50	7.50	1.66	14.00	131.55	116.00	9.45	9.49	7.00	9.30
21	IC485382	86.00	4.00	12.33	2.00	16.00	96.30	114.00	8.90	12.85	7.00	18.87
22	IC485385	81.00	3.00	13.50	2.66	44.00	64.30	110.00	10.25	10.60	9.00	41.98
23	IC485386	67.00	2.66	10.00	2.66	32.00	105.65	109.00	11.20	10.45	8.33	27.86
24	IC485388	69.00	2.50	9.00	2.66	40.00	71.60	107.00	9.85	10.75	9.00	38.70
25	IC485396	68.00	2.50	9.00	2.66	28.00	73.55	107.00	9.55	10.13	8.50	24.11
	HPU-51(C)	64.40	2.90	12.26	2.20	38.00	94.47	110.20	11.26	11.75	8.00	35.72
	Totru Local (C)	63.00	2.46	14.80	3.07	39.60	85.36	108.80	7.67	8.13	8.00	16.25
	Minimum	63.00	2.46	7.50	1.50	14.00	64.30	107.00	7.67	7.72	7.00	8.31
	Maximum	86.00	4.00	19.00	3.33	44.00	141.65	120.00	12.60	14.19	10.50	42.84
	Mean	72.35	2.73	11.93	2.42	29.43	100.90	111.19	10.45	10.25	8.59	25.58
	CV (%) Phen.	8.75	13.83	21.67	20.88	31.65	19.39	2.99	10.72	14.82	11.55	39.54

Table 49. Data Adzuki bean averaged over the locations - Kharif 2019 (Hills)

S. No.	Accession No.	Days to 50% flowering				Plant height (cm)				No. of branches/plant			
		Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean
1	EC340240	50.00	42.00	72.00	54.67	75.40	58.30	122.80	85.50	2.80	3.00	2.50	2.77
2	EC340256	56.00	43.00	73.00	57.33	62.40	43.30	89.10	64.93	2.40	1.70	2.50	2.20
3	EC340281	49.00	40.00	66.00	51.67	84.70	58.30	122.80	88.60	3.20	3.00	2.50	2.90
4	IC341955	57.00	43.00	68.00	56.00	74.10	58.30	96.55	76.32	2.40	2.70	3.00	2.70
5	EC340253	54.00	43.00	68.00	55.00	81.40	51.70	97.65	76.92	2.20	2.00	3.00	2.40
6	EC340263	53.00	43.00	73.00	56.33	85.60	55.00	110.15	83.58	2.60	3.00	2.50	2.70
7	EC340267	58.00	42.00	72.00	57.33	81.30	63.30	89.10	77.90	2.60	2.30	3.00	2.63
8	EC340276	61.00	43.00	81.00	61.67	91.30	61.70	105.05	86.02	2.40	2.70	2.50	2.53
9	EC059489	54.00	42.00	73.00	56.33	88.80	61.70	92.25	80.92	3.60	2.70	2.50	2.93
10	EC340271	59.00	42.00	77.00	59.33	80.00	58.30	85.05	74.45	3.20	3.70	2.50	3.13
11	IC485381	53.00	42.00	86.00	60.33	74.60	51.70	96.30	74.20	3.00	2.30	4.00	3.10
12	IC485385	52.00	43.00	81.00	58.67	84.50	53.30	64.30	67.37	3.20	3.30	3.00	3.17
13	EC000272	50.00	45.00	72.00	55.67	85.90	60.00	99.75	81.88	2.40	3.00	2.50	2.63
14	EC034025	58.00	42.00	66.00	55.33	87.80	55.00	103.05	81.95	2.40	3.30	2.50	2.73
15	IC024522	54.00	40.00	65.00	53.00	89.40	60.00	86.00	78.47	2.20	2.30	2.50	2.33
16	IC108854	51.00	43.00	68.00	54.00	81.10	61.70	84.25	75.68	2.40	3.00	3.00	2.80
17	EC015257	49.00	42.00	66.00	52.33	91.70	46.70	112.65	83.68	2.80	2.70	2.50	2.67
18	EC340246	52.00	43.00	81.00	58.67	91.30	55.00	75.30	73.87	3.20	3.70	3.00	3.30
19	EC340251	55.00	44.00	76.00	58.33	72.70	63.30	88.75	74.92	2.60	2.30	2.50	2.47
20	IC024105	61.00	43.00	81.00	61.67	95.70	60.00	132.35	96.02	3.60	2.70	2.50	2.93
21	EC000264	57.00	43.00	68.00	56.00	72.20	61.70	95.70	76.53	3.00	3.00	2.50	2.83
22	EC340280	56.00	43.00	69.00	56.00	58.10	61.70	122.65	80.82	2.40	3.00	3.00	2.80
23	EC340284	57.00	43.00	73.00	57.67	47.40	66.70	89.80	67.97	2.00	2.70	2.50	2.40
24	IC485396	56.00	41.00	68.00	55.00	63.30	63.30	73.55	66.72	2.00	2.70	2.50	2.40
25	EC000262	60.00	42.00	84.00	62.00	87.10	53.30	82.50	74.30	2.80	3.70	2.50	3.00

S.No.	Accession No.	Days to 50% flowering				Plant height (cm)				No. of branches/plant			
		Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean
26	EC340266	61.00	43.00	77.00	60.33	96.30	56.70	142.50	98.50	2.20	2.70	3.00	2.63
27	IC341962	55.00	44.00	66.00	55.00	82.80	51.70	87.40	73.97	3.00	2.00	3.66	2.89
28	IC469174	54.00	44.00	82.00	60.00	88.30	55.00	109.05	84.12	2.20	3.30	2.50	2.67
29	EC000254	49.00	45.00	66.00	53.33	86.70	50.00	89.45	75.38	2.60	3.70	3.00	3.10
30	EC108080	53.00	44.00	64.00	53.67	85.50	58.30	112.75	85.52	2.60	3.00	2.50	2.70
31	IC341954	52.00	42.00	72.00	55.33	91.40	56.70	81.50	76.53	3.00	3.30	2.66	2.99
32	IC469175	56.00	42.00	74.00	57.33	90.80	56.70	131.55	93.02	2.00	3.00	2.50	2.50
33	EC057459	47.00	43.00	67.00	52.33	88.20	55.00	94.20	79.13	2.40	3.00	2.50	2.63
34	EC340265	50.00	43.00	65.00	52.67	77.80	56.70	101.45	78.65	2.80	2.70	2.50	2.67
35	IC000293	49.00	41.00	72.00	54.00	82.80	58.30	102.35	81.15	2.60	3.00	2.50	2.70
36	IC455396	47.00	40.00	84.00	57.00	85.00	58.30	114.20	85.83	2.60	3.00	2.66	2.75
37	EC000263	51.00	42.00	67.00	53.33	98.90	56.70	96.35	83.98	2.60	3.00	2.50	2.70
38	EC120466	50.00	42.00	65.00	52.33	92.80	53.30	89.60	78.57	2.80	2.70	3.00	2.83
39	IC108855	48.00	44.00	72.00	54.67	76.90	61.70	96.50	78.37	2.40	2.70	2.50	2.53
40	IC341941	49.00	43.00	73.00	55.00	79.40	56.70	93.20	76.43	2.20	2.70	2.50	2.47
41	EC340272	49.00	42.00	69.00	53.33	83.40	65.00	115.25	87.88	2.00	3.00	2.50	2.50
42	EC340285	53.00	42.00	71.00	55.33	96.40	58.30	141.65	98.78	3.00	3.00	2.50	2.83
43	IC341959	50.00	42.00	72.00	54.67	87.10	60.00	100.60	82.57	2.80	2.30	2.66	2.59
44	IC485385	61.00	44.00	67.00	57.33	78.80	53.30	105.65	79.25	2.60	3.00	2.66	2.75
45	EC000271	57.00	42.00	77.00	58.67	62.30	61.70	92.30	72.10	3.00	2.70	2.50	2.73
46	EC008707	53.00	42.00	73.00	56.00	91.60	58.30	140.45	96.78	2.20	2.70	2.50	2.47
47	EC057959	51.00	44.00	71.00	55.33	101.00	58.30	97.05	85.45	3.00	3.00	3.00	3.00

S.No.	Accession No.	Days to 50% flowering				Plant height (cm)				No. of branches/plant			
		Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean
48	EC340273	70.00	43.00	74.00	62.33	66.30	48.30	121.25	78.62	2.00	1.30	2.50	1.93
49	IC241041	53.00	42.00	72.00	55.67	94.10	58.30	114.45	88.95	3.20	2.30	3.00	2.83
50	IC485388	53.00	44.00	69.00	55.33	95.70	63.30	71.60	76.87	3.00	3.70	2.50	3.07
	HPU-51(C)	61.42	43.60	64.40	56.47	84.61	54.66	94.47	77.91	2.55	2.92	2.90	2.79
	Totru Local (C)	58.25	41.80	63.00	54.35	76.62	53.60	85.36	71.86	2.73	2.52	2.46	2.57
	Minimum	47.00	40.00	63.00	50.00	47.40	43.30	64.30	51.67	2.00	1.30	2.46	1.92
	Maximum	70.00	45.00	86.00	67.00	101.00	66.70	142.50	103.40	3.60	3.70	4.00	3.77
	Mean	54.09	42.62	71.83	56.18	82.87	57.27	100.76	80.30	2.64	2.82	2.69	2.72
	CV (%) Phen.	8.51	2.62	8.10	6.41	13.22	8.17	17.85	13.08	15.31	17.32	11.73	14.79

Table 50. Data Adzuki bean averaged over the locations - Kharif 2019 (Hills) contd.

S. No.	Accession No.	Pod length (cm)				Seeds/pod			
		Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean
1	EC340240	8.80	8.70	11.95	9.82	8.60	8.00	9.50	8.70
2	EC340256	8.70	7.10	9.90	8.57	9.00	8.30	9.00	8.77
3	EC340281	10.00	9.10	10.80	9.97	8.80	8.70	9.00	8.83
4	IC341955	8.70	8.80	9.85	9.12	9.00	9.30	8.00	8.77
5	EC340253	6.90	9.10	11.30	9.10	6.80	9.00	10.00	8.60
6	EC340263	9.70	8.90	11.25	9.95	8.20	9.30	9.50	9.00
7	EC340267	8.90	8.30	11.05	9.42	8.40	8.70	9.00	8.70
8	EC340276	8.30	7.90	8.25	8.15	7.80	7.30	8.00	7.70
9	EC059489	8.50	8.80	11.85	9.72	8.00	6.30	9.50	7.93
10	EC340271	9.50	8.30	10.60	9.47	9.20	5.30	8.50	7.67
11	IC485381	8.50	7.20	8.90	8.20	7.60	5.30	7.00	6.63
12	IC485385	9.60	8.50	10.25	9.45	9.40	8.00	9.00	8.80
13	EC000272	8.50	8.90	10.85	9.42	8.00	8.70	3.00	6.57
14	EC034025	8.10	9.40	10.75	9.42	8.00	8.70	8.00	8.23
15	IC024522	8.70	9.80	11.00	9.83	8.60	8.70	7.50	8.27
16	IC108854	9.80	8.90	10.95	9.88	9.00	8.00	9.50	8.83
17	EC015257	8.40	7.00	12.60	9.33	7.60	7.70	9.00	8.10
18	EC340246	8.10	7.20	9.60	8.30	8.20	5.70	8.00	7.30
19	EC340251	7.20	9.00	12.10	9.43	7.20	8.00	10.50	8.57
20	IC024105	9.70	7.10	11.50	9.43	9.80	6.70	9.50	8.67
21	EC000264	9.60	9.30	11.60	10.17	9.20	7.70	9.00	8.63
22	EC340280	7.20	8.90	12.60	9.57	7.60	8.70	10.50	8.93
23	EC340284	7.50	8.50	10.85	8.95	7.60	7.30	8.00	7.63
24	IC485396	7.70	9.00	9.55	8.75	7.60	10.00	8.50	8.70
25	EC000262	8.20	9.10	10.20	9.17	8.20	7.30	7.00	7.50
26	EC340266	8.50	9.60	10.75	9.62	8.00	10.30	9.00	9.10
27	IC341962	8.70	9.00	11.60	9.77	8.20	8.70	9.00	8.63
28	IC469174	7.10	8.50	10.45	8.68	7.20	7.70	7.00	7.30
29	EC000254	8.30	9.20	11.20	9.57	7.60	9.30	9.50	8.80
30	EC108080	7.70	9.00	8.70	8.47	7.00	10.00	9.00	8.67
31	IC341954	10.30	7.90	10.75	9.65	8.00	8.00	8.00	8.00
32	IC469175	9.30	8.40	9.45	9.05	9.00	8.00	7.00	8.00
33	EC057459	10.40	8.30	11.15	9.95	8.00	8.00	9.33	8.44
34	EC340265	9.10	8.80	11.15	9.68	8.00	8.30	7.66	7.99
35	IC000293	11.30	8.30	12.05	10.55	8.80	10.00	10.50	9.77
36	IC455396	9.10	8.70	10.45	9.42	7.00	9.70	8.00	8.23

S.No.	Accession No.	Pod length (cm)				Seeds/pod			
		Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean
37	EC000263	7.90	9.30	10.90	9.37	7.80	7.70	9.00	8.17
38	EC120466	7.30	10.10	10.50	9.30	6.60	8.70	7.50	7.60
39	IC108855	7.00	9.40	10.35	8.92	7.60	8.30	9.00	8.30
40	IC341941	8.90	8.70	11.95	9.85	8.20	9.30	10.00	9.17
41	EC340272	7.80	9.20	11.05	9.35	7.40	8.00	9.00	8.13
42	EC340285	8.50	7.40	9.55	8.48	8.20	8.00	8.00	8.07
43	IC341959	9.50	8.50	10.06	9.35	8.80	9.00	10.00	9.27
44	IC485385	7.00	8.50	11.20	8.90	7.80	8.00	8.33	8.04
45	EC000271	6.60	9.20	11.75	9.18	9.00	9.70	9.00	9.23
46	EC008707	7.50	9.50	11.10	9.37	7.60	8.00	10.00	8.53
47	EC057959	8.80	8.10	11.60	9.50	8.00	10.00	9.50	9.17
48	EC340273	6.70	9.00	10.70	8.80	6.00	8.30	8.50	7.60
49	IC241041	8.30	8.90	10.30	9.17	8.20	8.30	9.00	8.50
50	IC485388	7.80	8.90	9.85	8.85	7.50	9.00	9.00	8.50
	HPU-51(C)	8.28	9.28	11.26	9.61	8.03	8.80	8.00	8.28
	Totru Local (C)	6.90	6.36	7.67	6.98	7.17	8.02	8.00	7.73
	Minimum	6.60	6.36	7.67	6.88	6.00	5.30	3.00	4.77
	Maximum	11.30	10.10	12.60	11.33	9.80	10.30	10.50	10.20
	Mean	8.45	8.63	10.72	9.27	8.04	8.30	8.65	8.33
	CV (%) Phen.	12.43	8.98	9.54	10.32	9.45	13.42	14.09	12.32

Table 51. Data Adzuki bean averaged over the locations - Kharif 2019 (Hills) contd.

S. No.	Accession No.	Yield/plant (g)				100-seed weight (g)			
		Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean
1	EC340240	6.00	18.66	17.51	14.06	10.64	10.60	10.24	10.49
2	EC340256	8.00	11.35	21.97	13.78	9.51	7.20	8.72	8.48
3	EC340281	8.00	27.67	30.12	21.93	9.80	7.40	10.14	9.11
4	IC341955	5.00	37.46	36.80	26.42	11.02	7.60	11.50	10.04
5	EC340253	6.00	37.63	40.56	28.06	9.80	7.70	10.14	9.21
6	EC340263	18.00	32.35	25.24	25.19	9.70	7.40	9.16	8.75
7	EC340267	8.00	23.60	36.04	22.55	11.61	8.40	10.01	10.01
8	EC340276	4.00	21.45	8.31	11.25	10.14	10.60	7.72	9.49
9	EC059489	10.00	29.29	49.21	29.50	9.86	8.50	11.26	9.87
10	EC340271	4.00	17.43	34.41	18.62	10.92	10.30	14.46	11.89
11	IC485381	15.00	12.57	18.87	15.48	11.51	7.30	12.85	10.55
12	IC485385	13.00	35.66	41.98	30.21	10.76	8.30	10.60	9.89
13	EC000272	19.00	27.75	13.32	20.02	10.48	7.20	11.10	9.59
14	EC034025	20.00	40.09	33.20	31.10	11.12	9.60	10.92	10.55
15	IC024522	4.00	52.05	18.81	24.95	9.81	8.50	11.40	9.90
16	IC108854	3.00	42.34	16.01	20.45	9.75	8.40	9.36	9.17
17	EC015257	3.00	30.62	26.65	20.09	9.26	7.60	8.46	8.44
18	EC340246	20.00	14.67	49.47	28.05	9.46	10.30	11.46	10.41
19	EC340251	4.00	23.04	48.69	25.24	8.78	7.50	10.54	8.94
20	IC024105	10.00	16.51	24.97	17.16	11.09	7.40	7.74	8.74
21	EC000264	6.00	50.45	31.75	29.40	10.42	8.40	11.76	10.19
22	EC340280	18.00	35.22	42.84	32.02	9.87	7.40	10.20	9.16
23	EC340284	18.00	33.04	26.83	25.96	10.02	10.70	11.18	10.63
24	IC485396	12.00	26.81	24.11	20.97	11.17	8.30	10.13	9.87
25	EC000262	3.00	33.90	33.52	23.47	10.02	10.80	12.60	11.14
26	EC340266	10.00	35.23	35.83	27.02	10.81	7.60	11.06	9.82
27	IC341962	4.00	33.83	18.32	18.71	9.37	7.20	8.48	8.35
28	IC469174	14.00	45.41	17.88	25.76	11.40	10.40	14.19	12.00
29	EC000254	6.00	43.98	30.79	26.92	10.39	8.40	9.26	9.35
30	EC108080	4.00	38.00	27.10	23.03	8.73	7.60	11.58	9.30
31	IC341954	12.00	46.80	14.63	24.48	11.31	7.80	10.16	9.76
32	IC469175	24.00	26.51	9.30	19.94	9.64	10.80	9.49	9.98
33	EC057459	6.00	29.48	37.74	24.41	10.49	7.50	9.63	9.21
34	EC340265	6.00	29.48	25.39	20.29	9.70	8.60	11.84	10.05
35	IC000293	6.00	46.13	32.99	28.37	11.33	7.60	9.24	9.39
36	IC455396	8.00	51.98	17.56	25.85	10.84	8.40	9.98	9.74

S.No.	Accession No.	Yield/plant (g)				100-seed weight (g)			
		Palampur	Pashighat	Shimla	Mean	Palampur	Pashighat	Shimla	Mean
37	EC000263	8.00	29.11	29.59	22.23	10.90	10.30	10.96	10.72
38	EC120466	8.00	52.03	33.13	31.06	8.34	9.60	11.94	9.96
39	IC108855	8.00	37.16	37.88	27.68	9.57	10.50	10.02	10.03
40	IC341941	3.00	43.31	28.78	25.03	9.81	7.80	8.72	8.78
41	EC340272	20.00	18.17	27.19	21.79	10.81	7.40	9.44	9.22
42	EC340285	8.00	21.89	12.21	14.03	9.68	7.60	8.98	8.75
43	IC341959	6.00	42.21	25.20	24.47	11.21	7.00	10.50	9.57
44	IC485385	12.00	25.35	27.86	21.74	8.70	7.60	10.45	8.92
45	EC000271	12.00	40.20	37.64	29.94	10.91	7.40	12.30	10.20
46	EC008707	12.00	52.67	36.78	33.82	10.22	10.50	12.26	10.99
47	EC057959	12.00	42.39	26.89	27.09	8.65	7.60	8.74	8.33
48	EC340273	3.00	39.56	33.29	25.28	11.53	9.40	12.24	11.06
49	IC241041	6.00	20.26	34.40	20.22	12.13	7.70	10.92	10.25
50	IC485388	12.00	29.61	38.70	26.77	9.10	7.00	10.75	8.95
	HPU-51(C)	18.17	40.72	35.72	31.54	10.54	8.98	11.75	10.42
	Totru Local (C)	7.08	13.20	16.25	12.18	7.00	7.66	8.13	7.60
	Minimum	3.00	11.35	8.31	7.55	7.00	7.00	7.72	7.24
	Maximum	24.00	52.67	49.47	42.05	12.13	10.80	14.46	12.46
	Mean	9.62	32.81	28.85	23.76	10.19	8.45	10.53	9.72
	CV (%) Phen.	57.80	34.44	34.99	42.41	9.71	14.71	20.60	15.01

Table:52. Promising lines in Adzuki bean germplasm during Kharif 2019 at different locations (Hills)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Palampur (25 + 25 Genotypes) Adzuki bean					
1	Days to 50% flowering	47.00	70.00	EC057459 (47.00), IC455396 (47.00), IC108855 (48.00), EC340281 (49.00), EC015257 (49.00), EC000254 (49.00), IC000293 (49.00), IC341941 (49.00), EC340272 (49.00)	Totru Local (58.25)
2	Days to 80% maturity	101.00	120.00	EC057459 (101.00), EC000254 (101.00), EC340272 (101.00), EC000263 (101.00)	Totru Local (106.67)
3	Plant height (cm)	47.40	101.00	EC057959 (101.00), EC000263 (98.90), EC340285 (96.40), EC340266 (96.30), IC485388 (95.70), IC024105 (95.70), IC241041 (94.10)	HPU-51(84.61)
4	No. of branches/plant	2.00	3.60	IC024105 (3.60), EC059489 (3.60), IC241041 (3.20), EC340246 (3.20), EC340281 (3.20), IC485385 (3.20), EC340271 (3.20)	Totru Local (2.73)
5	Number of clusters/plant	6.60	22.60	IC341954 (22.60), EC340271 (22.40), IC341962 (21.60), EC000254 (21.60), IC485381 (19.40), IC469175 (19.40), EC340267 (19.20), EC340280 (19.20), IC024105 (18.80), EC059489 (18.00)	Totru Local (15.05)
6	No. of pods/cluster	1.60	3.00	IC485381 (3.00), EC015257 (3.00), EC340251 (3.00), EC340246 (3.00), EC059489 (2.80), IC485385 (2.80), EC340253 (2.80), IC341955 (2.80), EC340256 (2.80), EC340276 (2.80), IC024522 (2.80), IC485396 (2.80)	HPU-51 (2.47)
7	No. of pods/plant	14.00	48.80	EC059489 (48.80), IC341954 (48.40), IC485385 (48.00), EC000254 (47.40), EC340271 (47.20), IC341962 (46.20), EC340281 (46.00), IC485381 (45.60), EC340267 (45.60)	Totru Local (37.54)
8	Pod length (cm)	6.60	11.30	IC000293 (11.30), EC057459 (10.40), IC341954 (10.30), EC340281 (10.00), IC108854 (9.80), IC024105 (9.70), EC340263 (9.70), IC485385 (9.60), EC000264 (9.60)	HPU-51 (8.28)
9	Seeds/pod	6.00	9.80	IC024105 (9.80), IC485385 (9.40), EC000264 (9.20), EC340271 (9.20), IC108854 (9.00), IC469175 (9.00), EC340256 (9.00), IC341955 (9.00), EC000271 (9.00)	HPU-51 (8.03)
10	Seed yield/plant (g)	3.00	24.00	IC469175 (24.00), EC340246 (20.00), EC034025 (20.00), EC340272 (20.00)	HPU-51 (18.17)
11	100 seed weight (g)	7.00	12.13	IC241041 (12.13), EC340267 (11.61), EC340273 (11.53), IC485381 (11.51)	HPU-51 (10.54)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Passighat (25 + 25 Genotypes) Adzuki bean					
1	Days to 50% flowering	40.00	45.00	-	Totru Local (41.80)
2	Height of plants (cm)	43.30	66.70	EC340284 (66.70), EC340272 (65.00), IC485388 (63.30), IC485396 (63.30), EC340251 (63.30), EC340267 (63.30), IC108855 (61.70), EC000264 (61.70), EC108080 (61.70), EC000271 (61.70), IC108854 (61.70), EC340276 (61.70), EC340280 (61.70)	HPU-51 (54.66)
3	No. of branches per plant	1.30	3.70	EC000262 (3.70), EC340271 (3.70), EC340250 (3.70), IC485388 (3.70), EC000254 (3.70), EC057459 (3.30), IC341954 (3.30), IC485385 (3.30), IC469174 (3.30)	HPU-51 (2.92)
4	No. of plants per plot	15.00	51.00	IC485396 (51.00), IC108854 (47.00), IC469174 (46.00), IC341955 (40.00), EC340246 (39.00), EC340265 (38.00), EC340251 (38.00), EC340276 (37.00), IC485385 (36.00), EC340284 (36.00), EC340267 (36.00), IC341959 (36.00)	Totru Local (31.40)
5	No. of pods per plant	13.70	83.70	IC024522 (83.70), EC000264 (78.00), EC059489 (75.70), IC341954 (75.00), EC015257 (71.00), IC455396 (68.70), IC341959 (67.00), IC108854 (63.00)	HPU-51 (50.20)
6	Length of pod (cm)	6.36	10.10	EC340240 (10.10)	HPU-51 (9.28)
7	No. of seeds/pod	5.30	10.30	EC340266 (10.30), EC120466 (10.00), IC485396 (10.00), IC000293 (10.00), EC059489 (10.00), EC000271 (9.70), IC455396 (9.70)	HPU-51 (8.80)
8	100 seed weight (g)	3.66	16.60	EC340276 (16.60), EC340250 (14.30), EC340271 (14.30), IC469175 (12.60), IC108855 (11.00), EC000262 (10.80), EC340284 (10.70), EC340246 (10.60), EC008707 (10.50), IC469174 (10.40), EC000263 (10.30)	HPU-51 (8.98)
9	Weight of pods per plot (kg)	62.30	543.50	IC485396 (543.50), EC340280 (524.40), EC057459 (521.80), EC008707 (501.10), EC000264 (484.00), EC000271 (483.70), EC000263 (461.00), EC340266 (454.70), EC340272 (440.20), EC057959 (437.20), IC108854 (417.10), IC485388 (413.20), EC000276 (408.20), IC485386 (399.60)	HPU-51 (341.62)
10	Weight of pods(q/ha)	2.10	18.10	IC485396 (18.10), EC340280 (17.40), EC057459 (17.40), EC008707 (16.70), EC000264 (16.10), EC000271 (16.10), EC000263 (15.40), EC340266 (15.10), EC340272 (14.70), EC057959 (14.60), IC108854 (13.90), IC485388 (13.80), EC000276 (13.60)	HPU-51 (11.38)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
11	Weight of seed per plot (kg)	20.30	341.30	EC340272 (341.30), EC340280 (328.20), IC485396 (324.70), EC000271 (301.90), EC008707 (289.50), EC000264 (281.20), EC057459 (268.20), EC057959 (265.90), EC000263 (260.30), EC340266 (251.60), IC485388 (247.90), IC108854 (247.20), IC341962 (236.50), EC000276 (234.50), IC485386 (228.50), EC000254 (227.30), EC059489 (225.40), EC120466 (220.60), EC340251 (218.30), EC108080 (217.50), IC000293 (211.90), EC340281 (211.00), EC340284 (207.60), IC341959 (206.30), EC340240 (203.20), EC340265 (201.40)	HPU-51 (154.66)
12	Weight of seed (q/ha)	0.70	11.30	EC340272 (11.30), EC340280 (10.90), IC485396 (10.80), EC000271 (10.00), EC008707 (9.60), EC000264 (9.40), EC057459 (8.90), EC057959 (8.80), EC000263 (8.70), EC340266 (8.30), IC485388 (8.20), IC108854 (8.20), IC341962 (7.90), EC000276 (7.80), IC485386 (7.60), EC000254 (7.60), EC059489 (7.50), EC120466 (7.30), EC340251 (7.30), EC108080 (7.20), IC000293 (7.00), EC340281 (7.00), EC340284 (6.90), IC341959 (6.90), EC340240 (6.70), EC340265 (6.70)	HPU-51 (5.14)
13	Seed yield per plant (g)	4.57	61.90	IC024522 (61.90), IC455396 (55.98), EC008707 (52.67), EC340240 (52.03), EC000264 (50.45), IC341954 (46.80), IC000293 (46.13)	HPU-51 (40.72)
Shimla (25 + 25 Genotypes) Adzuki bean					
1	Day to 50% flowering	63.00	86.00	-	Totru local (63.00)
2	No. of primary branches	2.46	4.00	IC485382 (4.00), IC341962 (3.66), EC340240 (3.00), EC000254 (3.00), EC340253 (3.00)	HPU-51 (2.90)
3	No. of Cluster/Plant	5.50	19.00	IC341962 (19.00), EC340246 (19.00), EC108080 (17.50), EC340280 (16.50), EC340271 (16.50), EC059489 (16.33)	Totru Local (14.80)
4	No. of Pod/Cluster	1.50	3.33	IC341955 (3.33), EC340280 (3.25), EC340256 (3.25)	Totru Local (3.07)
5	No. of Pod/Plant	14.00	46.00	EC108080 (46.00), IC485385 (44.00), EC340251 (44.00), IC108855 (42.00)	Totru Local (39.60)
6	Plant Height (cm)	64.30	142.50	EC340266 (142.50), EC340285 (141.65), EC008707 (140.45), IC024105 (132.35), IC469175 (131.55), EC340281 (122.80), EC340246 (122.80), EC340280 (122.65), EC340273 (121.25), EC340272 (115.25), IC241041	HPU-51 (94.47)

				(114.45), IC455396 (114.20), EC120466 (112.75), EC015257 (112.65), EC340263 (110.15)	
7	Days to 80% Maturity	106.00	120.00	-	Totru Local (108.80)
S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
8	Pod Length (cm)	7.67	12.60	EC340280 (12.60), EC015257 (12.60)	HPU-51 (11.26)
9	100 Seed wt. (g)	4.72	16.85	IC485382 (16.85), EC340250 (15.46), EC340271 (14.46), IC469174 (14.19)	HPU-51 (11.75)
10	No. of Seed/Pod	3.00	10.50	EC340251 (10.50), EC340280 (10.50), IC000293 (10.50), EC008707 (10.00), IC341959 (10.00), EC340253 (10.00), IC341941 (10.00), EC108080 (9.50), EC340246 (9.50), IC108854 (9.50), EC000254 (9.50), EC340263 (9.50), EC059489 (9.50), IC024105 (9.50)	HPU-51 (8.00)
11	Seed Yield/ Plant (g)	8.31	49.47	EC340250 (49.47), EC108080 (49.21), EC340251 (48.69), EC340280 (42.84), IC485385 (41.98), EC340253 (40.56)	HPU-51 (35.72)

Table 53. Promising lines in Adzuki bean germplasm during Kharif 2019 based on all locations (Hills)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Days to 50% flowering	50.00	67.00	EC340281 (51.67), EC015257 (52.33), EC057459 (52.33), EC120466 (52.33), EC340265 (52.67)	Totru local (54.35)
2	Plant height (cm)	51.67	103.40	EC340285 (98.78), EC340266 (98.50), EC008707 (96.78), IC024105 (96.02), IC469175 (93.02), IC241041 (88.95), EC340281 (88.60), EC340272 (87.88) EC340276 (86.02), IC455396 (85.83), EC108080 (85.52), EC340240 (85.50)	HPU-51 (77.91)
3	No. of branches/plant	1.92	3.77	EC340246 (3.30), IC485385 (3.17), EC340271 (3.13), EC000254 (3.10), IC485381 (3.10), IC485388 (3.07)	HPU-51 (2.79)
4	Pod length (cm)	6.88	11.33	IC000293 (10.55), EC000264 (10.17)	HPU-51 (9.61)
5	Seeds/pod	4.77	10.20	IC000293 (9.77), IC341959 (9.27), EC000271 (9.23), IC341941 (9.17), EC057959 (9.17), EC340266 (9.10), EC340263 (9.00)	HPU-51 (8.28)
6	Yield/plant (g)	7.55	42.05	-	HPU-51 (31.54)
7	100-seed weight (g)	7.24	12.46	IC469174 (12.00), EC340271 (11.89), EC000262 (11.14), EC340273 (11.06)	HPU-51 (10.42)

2.4.1.5 Jobs Tear (*Coix lacryma-jobi*)

A set of 50 genotypes was planned to be evaluated along with two local checks at four locations viz. ICAR-NEH, Lamphalpat, CAU Pasighat, UUHF, Ranichauri and ICAR-NEH, Shillong along with two checks Pollin Local and Mayeum Local. The experimental details are presented in Table 54. Results have been received from all locations. The list of promising lines including range and mean at all centres for all the descriptors is presented in Tables 55 to 64.

At ICAR-NEH, Lamphalpat, 58 genotypes were evaluated for ten quantitative traits. The statistical data and promising genotypes are presented in Tables 55, 56 and 60 to 64. The early flowering genotypes were RJTGP13, RJTGP9 and RJTGP5 (93.0 Days). The genotypes RJTGP13 (252.7 cm) followed by RJTGP9 (252.3 cm) and RJTGP22 (248.7 cm) showed maximum plant height. The genotypes RJTGP15 (181.3 g) followed by RJTGP20 (174.0 g) and RJTGP23 (156.0 g) had maximum seed yield per plant. The genotypes RJTGP13 (32.3 g) followed by RJTGP7 (31.15 g) and RJTGP24 (31.1 g) were promising for 100 seed weight.

At CAU Pasighat, 50 genotypes were evaluated for eight quantitative traits. The statistical data and promising genotypes are presented in Tables 57 and 60 to 64. The genotypes IC540256 (251.7 cm) followed by IC540222 (213.3 cm) and IC893383 (200.0 cm) showed maximum plant height. The early flowering genotypes were IC600638 (71.0 days), IC12703 (73.0 days) and IC540173 (74.0 days). The genotypes IC540222 (364.0) followed by IC89384 (324.7) and IC334314 (313.0) had maximum number of seeds per plant. The genotypes IC540222 (19.5 g) followed by IC419466 (19.3 g) and IC12703 (17.4 g) were promising for 100 seed weight.

At UUHF, Ranichauri, 50 genotypes were evaluated for six quantitative traits. The statistical data and promising genotypes are presented in Tables 58 and 60 to 64. The genotypes RJTGP16 (40.0 cm) followed by RJTGP15 (37.0 cm) and RJTGP22 (34.6 cm) showed maximum plant height. More number of tillers per plant were observed in RJTGP17 (4.6), RJTGP24 and RJTGP20 (4.0). The genotypes RJTGP16 (7.0) followed by RJTGP20 (6.4) and RJTGP11 (6.4) showed maximum number of leaves per plant.

At ICAR-NEH, Shillong, 50 genotypes were evaluated for ten quantitative traits. The statistical data and promising genotypes are presented in Tables 59 and 60 to 64. The genotypes IC540256 (294.7 cm) followed by IC089383 (258.3 cm) and IC022156 (253.3 cm) showed maximum plant height and were better than the best check IC89384 (237.7 cm). The early flowering genotype was IC540173

(89.0 days) and better than the best check IC12703 (99.0 days). The number of grains per panicle ranged from 43.7 to 88.8 and the promising genotypes were IC540222 (88.8) followed by IC419466 (88.2) and IC416831 (88.1) and were better than the best check IC12703 (75.3). The More panicle weight was recorded in IC540279 (19.4), IC540256 (19.2) and IC540181 (18.7) and were better than the check IC486143 (16.9). The 100 seed weight ranged from 8.9 g to 18.4 g and the best check value IC89384 (16.8 g) and the genotypes IC540256 (18.4 g) followed by IC416897 (17.8 g) and IC540279 (17.6 g) were found promising. The genotype IC540279 (70.5 g) was found better than the check IC89384 (66.8 g) for seed yield per plant.

Over the locations for all four centres viz., Lamphalpat, Pasighat, Ranichauri and Shillong, the performance of entries and best genotypes in comparison to the checks have been summarized in Table 64. Significant differences were observed among the genotypes for days to 50% flowering, plant height (cm), 100 seed weight (g), seed yield per plant (g) and number of seeds per panicle. The range for days to 50% flowering varied from 85.67 days to 104.33 days. The best performing genotypes for early flowering were IC540173 (91.0 days) followed by IC127003 (94.0 days). The maximum plant height was observed in genotypes IC540256 (230.1 cm) followed by IC089392 (206.3 cm) and IC540222 (206.1 cm). The number of productive tillers per plant ranged from 1.84 to 6.90 and the best performing genotypes were IC416897 (5.5) followed by IC089392 and IC089390 (4.9). The superior genotypes for panicle length were IC540256 (58.5 cm) followed by IC089392 (54.5 cm) and IC060038 (52.2 cm), while more number of seeds per panicle were observed in IC540222 (112.1), IC089392 (1047.7) and IC4165831 (92.4). The range for 100 seed weight (g) was 6.42 g to 13.77 g with the best performing genotypes were IC089390 (12.2 g) followed by IC540222 (12.0 g). The best performing genotypes for seed yield per plant (g) were IC521338 (158.5 g) followed by IC89392 (109.0 g) and IC416897 (108.6 g).

Table 54. Experimental Details of Germplasm Evaluation in Job's Tear: Kharif 2019 (Hills)

S. No.	Items	Lamphalpat	Passighat	Ranichuri	Shillong
1	No. of genotypes	25	25	25	25
2	No. of Checks	-	-	2	3
3	Design	RBD	ABD	ABD	RBD
4	No. of Block	3	5	5	3
5	Number of Rows	2	3	2	3
6	Row Length (m)	3	3	3	3
7	Row spacing (cm)	45	45	45	50
8	Plant spacing (cm)	15	15	10	15
9	NPKS (kg/ha)	60:20:20	40:20:20	60:20:20	40:20:20
10	Plot size (m ²)	4	2.7	2.7	3 X 1.5
11	Sowing Date	20/6/2019	27/6/2019	18/6/2019	24/6/2019
12	Harvesting period	At Maturity	At Maturity	At Maturity	At Maturity

Table55. Evaluation of germplasm in Job's Tear (Set 1) at Lamphalpat: Kharif 2019 (Hills)

S. No.	Genotypes	Plant Height (cm)	Days to 50% Flowering	No. of productive Tillers/Plant	Panicle Length (cm)	Leaf Length (cm)	No. of Grains / Panicle	No. of Internode s/ Plant	Panicle Wt. (g)	100 Seed Wt. (g)	Seed Yield/ Plant (g)
1	B-4 IC540173	164.7	110.0	3.3	50.7	40.7	110.7	13.3	14.3	14.7	54.8
2	B-4 IC540181	162.3	110.0	2.0	48.3	42.9	56.7	8.7	9.7	13.6	42.3
3	B-3 IC521338	186.7	110.0	7.0	56.7	38.1	74.7	32.0	17.0	18.2	250.7
4	B-3 IC416868	177.3	102.0	4.3	46.3	43.5	86.7	17.0	18.7	19.1	99.7
5	B-3 IC417053	173.3	107.0	2.7	40.3	41.1	49.7	13.3	15.3	18.0	52.3
6	B-3 IC416831	168.7	109.0	4.7	44.0	40.3	96.7	18.7	14.0	15.6	36.7
7	B-4 IC540279	182.7	107.0	1.3	44.0	38.8	73.3	7.7	14.0	16.4	74.0
8	B-3 IC419466	179.7	111.0	2.0	39.7	51.4	82.7	8.3	21.3	18.1	73.0
9	B-3 IC416897	163.0	102.0	8.0	48.0	43.4	62.3	29.0	18.3	17.6	177.3
10	B-1 IC540256	174.0	109.0	2.7	61.3	38.6	87.3	13.3	13.3	15.3	58.0
11	B-4 IC540222	172.0	102.0	5.0	46.7	45.2	135.3	20.0	21.0	22.0	76.7
12	B-1 IC89390	150.0	116.0	4.0	55.0	26.4	38.0	13.0	18.0	19.0	17.0
13	B-1 IC89383	153.3	107.0	3.7	41.3	34.4	48.0	16.7	12.3	15.8	32.3
14	B-1 IC89392	173.3	107.0	7.0	69.3	39.8	164.7	22.3	33.7	19.1	178.7
15	B-1 IC600638	180.3	109.0	4.0	51.7	38.1	122.0	16.0	21.7	16.2	61.0
16	B-1 IC604098	115.3	116.0	3.0	38.0	41.4	43.5	9.7	13.0	15.3	38.0
17	B-1 IC601106	172.7	97.0	2.0	55.0	40.0	87.0	9.7	15.0	16.1	43.0
18	B-1 IC22156	160.7	111.0	2.7	45.3	38.0	61.3	11.0	21.7	16.6	54.6
19	B-1 IC334314	119.7	116.0	3.3	36.7	39.5	61.3	12.3	11.0	10.2	27.7
20	B-6 IC486143	167.0	107.0	2.3	46.7	39.6	63.0	7.3	15.7	14.4	39.0
21	B-1 IC89384	157.0	111.0	3.3	45.0	35.0	42.0	13.0	11.0	13.3	44.7
22	B-1 IC12703	156.3	110.0	2.7	41.7	43.9	64.3	13.3	16.3	19.2	41.0
	Minimum	115.33	97.00	1.33	36.67	26.37	38.00	7.33	9.67	10.22	17.00
	Maximum	186.67	116.00	8.00	69.33	51.37	164.67	32.00	33.67	21.97	250.67
	Mean	164.09	108.45	3.68	47.80	40.00	77.78	14.80	16.65	16.54	71.47
	CV (%) Phen.	10.94	4.35	47.70	16.59	11.75	41.52	43.74	31.29	15.40	80.76

Table56. Evaluation of germplasm in Job's Tear (Set 2) at Lamphalpat: Kharif 2019 (Hills)

S. No.	Genotypes	Plant Height (cm)	Days to 50% Flowering	No. of Productive Tillers/Plant	Panicle Length (cm)	Leaf Length (cm)	No. of Grains / Panicle	No. of Internodes / plant	Panicle Wt. (g)	100 Seed Wt. (g)	Seed Yield/ Plant (g)
1	RJTGP-1	210.7	95.0	4.3	56.3	38.0	36.0	25.0	14.7	29.6	79.0
2	RJTGP-2	183.7	109.0	9.3	50.7	37.3	27.0	43.7	11.7	27.3	130.0
3	RJTGP-3	242.0	95.0	6.7	59.7	41.4	27.7	40.0	12.3	29.2	93.3
4	RJTGP-4	210.7	107.0	9.3	64.0	41.2	48.0	45.0	15.0	27.8	153.7
5	RJTGP-5	248.0	93.0	7.7	53.7	42.3	30.0	44.0	13.0	28.3	100.7
6	RJTGP-6	213.3	96.0	8.7	57.0	41.7	36.3	40.7	13.0	26.7	74.7
7	RJTGP-7	225.3	109.0	8.0	51.7	38.9	30.7	39.0	17.3	31.1	138.3
8	RJTGP-8	176.3	93.0	11.3	56.7	42.9	38.7	54.0	12.0	27.9	120.7
9	RJTGP-9	252.3	93.0	4.3	57.0	42.3	28.7	21.3	10.3	26.9	63.3
10	RJTGP-10	196.0	96.0	9.7	51.3	42.2	27.7	48.7	9.3	28.5	81.3
11	RJTGP-11	240.7	107.0	7.0	59.3	41.6	33.0	27.0	11.7	27.5	100.3
12	RJTGP-12	174.3	110.0	9.7	51.3	40.6	22.7	44.3	11.7	26.3	106.7
13	RJTGP-13	252.7	93.0	6.0	61.3	37.8	34.0	33.3	13.3	32.3	80.7
14	RJTGP-14	228.3	109.0	5.3	54.0	38.2	33.3	26.0	11.3	30.9	73.7
15	RJTGP-15	203.0	107.0	11.0	50.3	42.5	27.0	42.3	12.7	25.7	181.3
16	RJTGP-16	243.0	110.0	7.3	59.0	40.1	37.3	34.7	13.0	27.3	72.0
17	RJTGP-17	212.3	95.0	6.0	63.3	41.7	31.0	34.0	14.3	28.9	90.7
18	RJTGP-18	179.3	97.0	9.7	40.3	41.1	26.0	38.3	10.7	25.9	94.0
19	RJTGP-19	195.3	96.0	11.3	59.7	37.7	30.7	47.0	13.3	25.1	94.3
20	RJTGP-20	222.7	107.0	8.7	70.0	39.3	42.3	44.3	21.7	27.8	174.0
21	RJTGP-21	216.7	93.0	8.0	60.3	36.4	30.3	49.7	12.0	27.7	105.3
22	RJTGP-22	248.7	96.0	5.3	68.3	36.2	41.3	33.0	17.0	28.9	78.0
23	RJTGP-23	214.3	96.0	6.0	60.3	40.4	28.3	28.7	14.3	31.0	156.0
24	RJTGP-24	221.3	93.0	5.7	50.7	40.5	42.0	32.7	14.7	31.1	67.0
25	RJTGP-25	241.3	110.0	9.0	56.7	41.6	31.7	34.7	11.0	26.7	115.3
	Minimum	174.33	93.00	4.33	40.33	36.20	22.67	21.33	9.33	25.07	63.33
	Maximum	252.67	110.00	11.33	70.00	42.90	48.00	54.00	21.67	32.27	181.33
	Mean	218.09	100.20	7.81	56.92	40.15	32.87	38.05	13.25	28.26	104.97
	CV (%) Phen.	11.23	7.05	26.90	11.15	5.08	18.55	22.30	19.62	6.73	31.95

Table 57. Evaluation of germplasm in Job's Tear at Pasighat: Kharif 2019 (Hills)

S. No.	Genotypes	Days Of 50% Flowering	Height of Plants (cm)	No. of Tillers/Plant	No. of Plants/Plot	100 Seed Wt. (g)	No. of Seeds/Plant	Seed Weight/Plot (kg)	Seed Weight (q/ha)
1	B-4 IC-540173	74.00	183.30	3.30	9.00	10.50	111.30	0.95	4.20
2	B-4 IC-540181	74.00	161.70	3.00	17.00	13.50	134.70	0.32	14.00
3	B-3 IC-521338	77.00	165.00	4.30	16.00	7.50	174.00	0.22	9.50
4	B-3 IC-416868	81.00	171.70	4.70	12.00	11.30	273.30	0.37	16.50
5	B-3 IC-417053	84.00	165.00	5.30	17.00	13.40	133.30	0.29	13.00
6	B-3 IC-416831	75.00	153.30	5.00	12.00	7.50	224.70	0.19	8.50
7	B-4 IC-540279	74.00	165.00	2.70	16.00	12.50	94.00	0.18	8.00
8	B-3 IC-419466	80.00	176.70	5.70	15.00	19.30	126.00	0.37	16.20
9	B-3 IC-416897	84.00	191.70	5.70	14.00	13.50	206.70	0.39	17.20
10	B-4 IC-540256	79.00	221.70	5.30	14.00	8.60	303.00	0.36	16.10
11	B-4 IC-540222	78.00	213.30	7.00	6.00	19.50	364.00	0.42	18.80
12	B-1 IC-89390	79.00	196.70	6.00	4.00	5.20	304.70	0.22	9.60
13	B-1 IC-89383	76.00	200.00	6.30	16.00	12.30	182.30	0.36	15.70
14	B-1 IC-89392	75.00	193.30	5.00	13.00	11.30	212.00	0.31	13.40
15	B-1 IC-600638	71.00	181.70	4.00	11.00	11.40	201.70	0.25	11.20
16	B-1 IC-604098	76.00	171.70	5.30	15.00	11.40	213.30	0.36	16.10
17	B-1 IC-601106	82.00	193.30	3.30	12.00	9.70	265.70	0.32	14.00
18	B-1 IC-22156	79.00	181.70	4.70	16.00	12.80	155.00	0.30	13.30
19	B-1 IC-334314	77.00	166.70	3.00	12.00	6.60	313.00	0.25	11.10
20	B-6 IC-486143	81.00	150.00	2.30	14.00	7.40	237.00	0.24	10.70
21	B-1 IC-89384	79.00	163.30	4.00	16.00	8.20	324.70	0.46	20.50
22	B-1 IC-12703	73.00	161.70	2.30	7.00	17.40	123.70	0.15	6.70
	Minimum	71.00	150.00	2.30	4.00	5.20	94.00	0.15	4.20
	Maximum	84.00	221.70	7.00	17.00	19.50	364.00	0.95	20.50
	Mean	77.64	178.57	4.46	12.91	11.40	212.64	0.33	12.92
	CV (%) Phen.	4.54	10.62	30.11	28.18	33.73	36.63	48.31	31.90

Table 58. Evaluation of germplasm in Job's Tear at Ranichauri: Kharif 2019 (Hills)

S. No	Entry	Plant Height (cm)	No. of Tiller/Plant	No. of Leaves/Plant
1	RJTGP-1	22.4	1.4	3.4
2	RJTGP-2	22.0	1.6	3.2
3	RJTGP-3	30.0	1.4	4.4
4	RJTGP-4	19.0	1.2	3.8
5	RJTGP-5	33.0	1.8	3.0
6	RJTGP-6	21.5	1.2	1.2
7	RJTGP-7	20.8	1.6	4.4
8	RJTGP-8	32.4	2.0	4.8
9	RJTGP-9	22.0	2.4	4.0
10	RJTGP-10	29.3	1.8	4.6
11	RJTGP-11	33.4	1.8	6.4
12	RJTGP-12	23.8	2.0	5.0
13	RJTGP-13	30.6	2.0	5.0
14	RJTGP-14	28.2	2.8	5.0
15	RJTGP-15	37.0	3.6	6.2
16	RJTGP-16	40.0	3.0	7.0
17	RJTGP-17	31.4	4.6	5.8
18	RJTGP-18	22.0	0.8	2.8
19	RJTGP-19	32.2	2.4	5.0
20	RJTGP-20	26.8	4.0	6.4
21	RJTGP-21	24.6	2.8	4.2
22	RJTGP-22	34.6	3.0	5.2
23	RJTGP-23	28.4	3.6	5.6
24	RJTGP-24	33.0	4.0	5.4
25	RJTGP-25	26.2	3.8	4.8
	Minimum	19.00	0.80	1.20
	Maximum	40.00	4.60	7.00
	Mean	28.18	2.42	4.66
	CV (%) Phen.	19.92	43.03	27.98

Table 59. Evaluation of germplasm in Job's Tear at Shillong: Kharif 2019 (Hills)

S. No.	Genotypes	Plant Height (cm)	Days to 50% Flowering	No. of productive Tillers/Plant	Panicle Length (cm)	Leaf Length (cm)	No. of Grains/Panicle	No. of Internodes / Plant	Panicle Wt. (g)	100 Seed Wt. (g)	Seed Yield/Plant (g)
1	IC0540173	230.0	89.0	3.6	43.3	37.2	47.5	11.0	15.0	9.4	39.8
2	IC0540181	240.3	99.0	2.8	42.3	39.4	55.8	13.0	18.7	13.4	51.2
3	IC521338	224.0	100.0	1.9	40.7	44.5	68.5	8.5	16.4	16.4	66.4
4	IC416868	233.7	105.0	2.3	44.2	41.6	58.4	8.6	10.7	11.7	44.7
5	IC417053	208.3	99.0	2.9	4.5	41.3	65.2	11.5	14.3	8.9	52.7
6	IC416831	161.7	106.0	3.9	41.8	44.2	88.1	12.6	13.8	14.7	40.2
7	IC540279	226.3	102.0	4.5	44.5	43.7	87.3	13.5	19.4	17.6	70.5
8	IC419466	238.7	109.0	3.9	50.7	40.3	88.2	13.4	17.7	14.8	55.8
9	IC416897	246.0	110.0	2.9	39.5	45.7	66.2	12.2	14.6	17.8	39.8
10	IC540256	294.7	107.0	5.7	55.7	42.3	87.6	16.4	19.2	18.4	65.2
11	IC540222	233.0	109.0	2.3	48.5	39.9	88.8	11.3	14.2	13.7	55.4
12	IC089390	234.7	110.0	4.7	49.2	41.8	66.8	14.3	16.2	17.5	52.7
13	IC089383	258.3	107.0	2.1	42.8	39.7	70.5	8.9	13.7	10.5	66.9
14	IC089392	252.3	107.0	2.8	39.7	37.8	50.8	14.3	11.7	15.8	39.4
15	IC600638	237.7	111.0	3.4	52.8	38.4	43.7	12.4	16.2	10.9	66.6
16	IC604098	225.0	112.0	2.9	38.7	42.2	55.4	12.3	13.4	10.2	32.8
17	IC601106	243.0	113.0	2.4	36.7	43.4	45.8	10.5	14.5	15.7	39.2
18	IC022156	253.3	102.0	3.2	44.4	44.8	67.8	13.4	16.7	16.8	46.7
19	IC334314	240.7	107.0	2.4	41.2	43.2	52.5	12.8	14.9	14.3	50.5
	IC486143 (C)	214.7	107.0	2.8	43.2	40.5	60.4	9.8	16.9	12.5	40.6
	IC89384 (C)	237.7	102.0	5.2	44.3	45.6	57.5	15.7	16.8	16.8	66.8
	IC12703 (C)	191.3	99.0	1.9	45.2	41.7	75.3	10.5	13.5	15.2	41.2
	Minimum	161.67	89.00	1.90	4.50	37.20	43.70	8.50	10.70	8.90	32.80
	Maximum	294.67	113.00	5.70	55.70	45.70	88.80	16.40	19.40	18.40	70.50
	Mean	232.97	105.09	3.20	42.45	41.78	65.82	12.13	15.39	14.23	51.14
	CV (%) Phen.	10.95	5.37	33.09	22.79	5.89	22.43	17.64	14.74	20.54	22.77

Table 60. Data Job's tear averaged over the locations - Kharif 2019 (Hills)

S. No	Accession No.	Plant height(cm)				Days to 50% flowering				No. of productive tillers/plant			
		Lamphelpat	Pasighat	Shillong	Mean	Lamphelpat	Pasighat	Shillong	Mean	Lamphelpat	Pasighat	Shillong	Mean
1	IC-22156	160.7	181.70	253.3	198.6	111.0	79.00	102.0	97.3	2.7	4.70	3.2	3.5
2	IC-334314	119.7	166.70	240.7	175.7	116.0	77.00	107.0	100.0	3.3	3.00	2.4	2.9
3	IC-416831	168.7	153.30	161.7	161.2	109.0	75.00	106.0	96.7	4.7	5.00	3.9	4.5
4	IC-416868	177.3	171.70	233.7	194.2	102.0	81.00	105.0	96.0	4.3	4.70	2.3	3.8
5	IC-416897	163.0	191.70	246.0	200.2	102.0	84.00	110.0	98.7	8.0	5.70	2.9	5.5
6	IC-417053	173.3	165.00	208.3	182.2	107.0	84.00	99.0	96.7	2.7	5.30	2.9	3.6
7	IC-419466	179.7	176.70	238.7	198.3	111.0	80.00	109.0	100.0	2.0	5.70	3.9	3.9
8	IC-521338	186.7	165.00	224.0	191.9	110.0	77.00	100.0	95.7	7.0	4.30	1.9	4.4
9	IC-540173	164.7	183.30	230.0	192.7	110.0	74.00	89.0	91.0	3.3	3.30	3.6	3.4
10	IC-540181	162.3	161.70	240.3	188.1	110.0	74.00	99.0	94.3	2.0	3.00	2.8	2.6
11	IC-540222	172.0	213.30	233.0	206.1	102.0	78.00	109.0	96.3	5.0	7.00	2.3	4.8
12	IC-540256	174.0	221.70	294.7	230.1	109.0	79.00	107.0	98.3	2.7	5.30	5.7	4.6
13	IC-540279	182.7	165.00	226.3	191.3	107.0	74.00	102.0	94.3	1.3	2.70	4.5	2.8
14	IC-600638	180.3	181.70	237.7	199.9	109.0	71.00	111.0	97.0	4.0	4.00	3.4	3.8
15	IC-601106	172.7	193.30	243.0	203.0	97.0	82.00	113.0	97.3	2.0	3.30	2.4	2.6
16	IC-604098	115.3	171.70	225.0	170.7	116.0	76.00	112.0	101.3	3.0	5.30	2.9	3.7
17	IC-89383	153.3	200.00	258.3	203.9	107.0	76.00	107.0	96.7	3.7	6.30	2.1	4.0
18	IC-89390	150.0	196.70	234.7	193.8	116.0	79.00	110.0	101.7	4.0	6.00	4.7	4.9
19	IC-89392	173.3	193.30	252.3	206.3	107.0	75.00	107.0	96.3	7.0	5.00	2.8	4.9
20	IC-486143	167.0	150.00	214.7	177.2	107.0	81.00	107.0	98.3	2.3	2.30	2.8	2.5
21	IC-89384	157.0	163.30	237.7	186.0	111.0	79.00	102.0	97.3	3.3	4.00	5.2	4.2
22	IC-12703	156.3	161.70	191.3	169.8	110.0	73.00	99.0	94.0	2.7	2.30	1.9	2.3
	Minimum	115.33	150.00	161.67	142.3	97.00	71.00	89.00	85.7	1.33	2.30	1.90	1.8
	Maximum	186.67	221.70	294.67	234.3	116.00	84.00	113.00	104.3	8.00	7.00	5.70	6.9
	Mean	164.09	178.57	232.97	191.9	108.45	77.64	105.09	97.1	3.68	4.46	3.20	3.8
	CD(0.05)	-	10.62	10.95	10.8	-	4.54	5.37	5.0	-	30.11	33.09	31.6

Table 61. Data Job's tear averaged over the locations - Kharif 2019 (Hills) contd.

S. No	Accession No.	Panicle length (cm)			Leaf length (cm)			No.of grains / panicle			No. of internodes / plant		
		Lamphelpat	Shillong	Mean	Lamphelpat	Shillong	Mean	Lamphelpat	Shillong	Mean	Lamphelpat	Shillong	Mean
1	IC-22156	45.3	44.4	44.9	38.0	44.8	41.4	61.3	67.8	64.6	11.0	13.4	12.2
2	IC-334314	36.7	41.2	38.9	39.5	43.2	41.4	61.3	52.5	56.9	12.3	12.8	12.6
3	IC-416831	44.0	41.8	42.9	40.3	44.2	42.3	96.7	88.1	92.4	18.7	12.6	15.6
4	IC-416868	46.3	44.2	45.3	43.5	41.6	42.5	86.7	58.4	72.5	17.0	8.6	12.8
5	IC-416897	48.0	39.5	43.8	43.4	45.7	44.6	62.3	66.2	64.3	29.0	12.2	20.6
6	IC-417053	40.3	4.5	22.4	41.1	41.3	41.2	49.7	65.2	57.4	13.3	11.5	12.4
7	IC-419466	39.7	50.7	45.2	51.4	40.3	45.8	82.7	88.2	85.4	8.3	13.4	10.9
8	IC-521338	56.7	40.7	48.7	38.1	44.5	41.3	74.7	68.5	71.6	32.0	8.5	20.3
9	IC-540173	50.7	43.3	47.0	40.7	37.2	38.9	110.7	47.5	79.1	13.3	11.0	12.2
10	IC-540181	48.3	42.3	45.3	42.9	39.4	41.2	56.7	55.8	56.2	8.7	13.0	10.8
11	IC-540222	46.7	48.5	47.6	45.2	39.9	42.5	135.3	88.8	112.1	20.0	11.3	15.7
12	IC-540256	61.3	55.7	58.5	38.6	42.3	40.5	87.3	87.6	87.5	13.3	16.4	14.9
13	IC-540279	44.0	44.5	44.3	38.8	43.7	41.3	73.3	87.3	80.3	7.7	13.5	10.6
14	IC-600638	51.7	52.8	52.2	38.1	38.4	38.3	122.0	43.7	82.9	16.0	12.4	14.2
15	IC-601106	55.0	36.7	45.9	40.0	43.4	41.7	87.0	45.8	66.4	9.7	10.5	10.1
16	IC-604098	38.0	38.7	38.4	41.4	42.2	41.8	43.5	55.4	49.5	9.7	12.3	11.0
17	IC-89383	41.3	42.8	42.1	34.4	39.7	37.1	48.0	70.5	59.3	16.7	8.9	12.8
18	IC-89390	55.0	49.2	52.1	26.4	41.8	34.1	38.0	66.8	52.4	13.0	14.3	13.7
19	IC-89392	69.3	39.7	54.5	39.8	37.8	38.8	164.7	50.8	107.7	22.3	14.3	18.3
20	IC-486143	46.7	43.2	44.9	39.6	40.5	40.1	63.0	60.4	61.7	7.3	9.8	8.6
21	IC-89384	45.0	44.3	44.7	35.0	45.6	40.3	42.0	57.5	49.8	13.0	15.7	14.4
22	IC-12703	41.7	45.2	43.4	43.9	41.7	42.8	64.3	75.3	69.8	13.3	10.5	11.9
	Minimum	36.67	4.50	20.6	26.37	37.20	31.8	38.00	43.70	40.9	7.33	8.50	7.9
	Maximum	69.33	55.70	62.5	51.37	45.70	48.5	164.67	88.80	126.7	32.00	16.40	24.2
	Mean	47.80	42.45	45.1	40.00	41.78	40.9	77.78	65.82	71.8	14.80	12.13	13.5
	CD(0.05)	-	22.79	22.8	-	5.89	5.9	-	22.43	22.4	-	17.64	17.6

Table 62. Data Job's tear averaged over the locations - Kharif 2019 (Hills) contd.

S. No	Accession No.	Panicle weight (gm)			100 seed weight (gm)				Grain yield (gm) / plant		
		Lamphelpat	Shillong	Mean	Lamphelpat	Pasighat	Shillong	Mean	Lamphelpat	Shillong	Mean
1	IC-22156	21.7	16.7	19.2	16.6	0.30	16.8	11.2	54.6	46.7	50.7
2	IC-334314	11.0	14.9	13.0	10.2	0.25	14.3	8.3	27.7	50.5	39.1
3	IC-416831	14.0	13.8	13.9	15.6	0.19	14.7	10.2	36.7	40.2	38.4
4	IC-416868	18.7	10.7	14.7	19.1	0.37	11.7	10.4	99.7	44.7	72.2
5	IC-416897	18.3	14.6	16.5	17.6	0.39	17.8	11.9	177.3	39.8	108.6
6	IC-417053	15.3	14.3	14.8	18.0	0.29	8.9	9.1	52.3	52.7	52.5
7	IC-419466	21.3	17.7	19.5	18.1	0.37	14.8	11.1	73.0	55.8	64.4
8	IC-521338	17.0	16.4	16.7	18.2	0.22	16.4	11.6	250.7	66.4	158.5
9	IC-540173	14.3	15.0	14.7	14.7	0.95	9.4	8.3	54.8	39.8	47.3
10	IC-540181	9.7	18.7	14.2	13.6	0.32	13.4	9.1	42.3	51.2	46.8
11	IC-540222	21.0	14.2	17.6	22.0	0.42	13.7	12.0	76.7	55.4	66.0
12	IC-540256	13.3	19.2	16.3	15.3	0.36	18.4	11.4	58.0	65.2	61.6
13	IC-540279	14.0	19.4	16.7	16.4	0.18	17.6	11.4	74.0	70.5	72.3
14	IC-600638	21.7	16.2	18.9	16.2	0.25	10.9	9.1	61.0	66.6	63.8
15	IC-601106	15.0	14.5	14.8	16.1	0.32	15.7	10.7	43.0	39.2	41.1
16	IC-604098	13.0	13.4	13.2	15.3	0.36	10.2	8.6	38.0	32.8	35.4
17	IC-89383	12.3	13.7	13.0	15.8	0.36	10.5	8.9	32.3	66.9	49.6
18	IC-89390	18.0	16.2	17.1	19.0	0.22	17.5	12.2	17.0	52.7	34.9
19	IC-89392	33.7	11.7	22.7	19.1	0.31	15.8	11.7	178.7	39.4	109.0
20	IC-486143	15.7	16.9	16.3	14.4	0.24	12.5	9.0	39.0	40.6	39.8
21	IC-89384	11.0	16.8	13.9	13.3	0.46	16.8	10.2	44.7	66.8	55.7
22	IC-12703	16.3	13.5	14.9	19.2	0.15	15.2	11.5	41.0	41.2	41.1
	Minimum	9.67	10.70	10.2	10.22	0.15	8.90	6.4	17.00	32.80	24.9
	Maximum	33.67	19.40	26.5	21.97	0.95	18.40	13.8	250.67	70.50	160.6
	Mean	16.65	15.39	16.0	16.54	0.33	14.23	10.4	71.47	51.14	61.3
	CD(0.05)	-	14.74	14.7	-	48.31	20.54	34.4	-	22.77	22.8

Table63. Promising lines in Jobs tear germplasm during Kharif 2019 at different locations (Hills)

S. No.	Descriptions	Range		Promising Accessions	Mean
		Min.	Max.		
Lamphelpat (50 Genotypes), Jobs tear					
1	Plant height (cm)	174.33	252.67	RJTGP-13 (252.7), RJTGP-9 (252.3), RJTGP-22 (248.7), RJTGP-5 (248.0), RJTrGP-16 (243.0), RJTGP-3 (242.0), RJTGP-25 (241.3)	218.09
2	Days to 50% flowering	93.00	110.00	RJTGP-13 (93.0), RJTGP-9 (93.0), RJTGP-5 (93.0), RJTGP-24 (93.00, RJTGP-21 (93.0), RJTGP-8 (93.00)	100.2
3	No. of productive tillers/plant	4.33	11.33	RJTGP-8 (11.3), RJTGP-19 (11.3), RJTGP-15 (11.0), RJTGP-10 (9.7), RJTGP-18 (9.7), RJTGP-12 (9.7)	7.81
4	Panicle length (cm)	40.33	70.00	RJTGP-20 (70.0), RJTGP-22 (68.3), RJTGP-4 (64.0), RJTGP-17 (63.3), RJTGP-13 (61.3), RJTGP-21 (60.3), RJTGP-23 (60.3)	56.92
5	Leaf length (cm)	36.20	42.90	RJTGP-8 (42.9), RJTGP-15 (42.5), RJTGP-9 (42.30, RJTGP-5 (42.3), RJTGP-10 (42.2)	40.15
6	No. of grains/panicle	22.67	48.00	RJTGP-4 (48.0), RJTGP-20 (42.3), RJTGP-24 (42.0), RJTGP-22 (41.3), RJTGP-8 (38.7)	32.87
7	No. of internodes/plant	21.33	54.00	RJTGP-8 (54.0), RJTGP-21 (49.7), RJTGP-10 (48.7), RJTGP-19 (47.00, RJTGP-4 (45.00, RJTGP-20 (44.30, RJTGP-12 (44.30, RJTGP-5 (44.0)	38.05
8	Panicle weight (g)	9.33	21.67	RJTGP-20 (21.7), RJTGP-7 (17.3), RJTGP-22 (17.0), RJTGP-4 (15.0)	13.25
9	100 seed weight (g)	20.87	32.27	RJTGP-13 (32.3), RJTGP-7 (31.1), RJTGP-24 (31.1), RJTGP-23 (31.0), RJTGP-14 (30.9)	26.65
10	Seed yield/plant (g)	63.33	181.33	RJTGP-15 (181.3), RJTGP-20 (174.0), RJTGP-23 (156.0), RJTGP-4 (153.7), RJTGP-7 (138.3), RJTGP-2 (130.0)	104.97
Pasighat (50 Genotypes), Jobs tear					
1	Days of 50% flowering	71.00	84.00	IC600638 (71.00), IC12703 (73.00), IC540173 (74.00), IC540181 (74.00)	77.64
2	Plant height (cm)	150.00	221.70	IC540256 (221.70), IC540222 (213.30), IC89383 (200.00), IC89390 (196.70), IC89392 (193.30), IC601106 (193.30)	178.57
3	No. of tillers/plant	2.30	7.00	IC540222 (7.00), IC89383 (6.30), IC89390 (6.00), IC416897 (5.70), IC419466 (5.70), IC540256 (5.30)	4.46

S. No.	Descriptions	Range		Promising Accessions	Mean
		Min.	Max.		
4	No. of plants/plot	4.00	17.00	IC417053 (17.00), IC540181 (17.00), IC89383 (16.00), IC22156 (16.00), IC521338 (16.00), IC89384 (16.00), IC540279 (16.00)	12.91
5	100 seed weight (g)	5.20	19.50	IC540222 (19.50), IC419466 (19.30), IC12703 (17.40)	11.4
6	No. of seeds/plant	94.00	364.00	IC540222 (364.00), IC89384 (324.70), IC334314 (313.0), IC89390 (304.70), IC540256 (303.00)	212.64
7	Seed weight per plot (kg)	0.15	0.95	IC540173 (0.95), IC89384 (0.46), IC540222 (0.42)	0.33
8	Seed weight (q/ha)	4.20	20.50	IC89384 (20.50), IC540222 (18.80), IC416897 (17.20), IC416868 (16.50), IC419466 (16.20), IC540256 (16.10), IC604098 (16.10)	12.92
Ranichauri (50 Genotypes), Jobs tear					
1	Plant height (cm)	19.00	40.00	RJTGP-16 (40.0), RJTGP-15 (37.0), RJTGP-22 (34.6), RJTGP-11 (33.4), RJTGP-5 (33.0)	28.18
2	No. of tiller/plant	0.80	4.60	RJTGP-17 (4.6), RJTGP-24 (4.0), RJTGP-20 (4.0), RJTGP-25 (3.8), RJTGP-15 (3.6)	2.42
3	No. of leaves/plant	1.20	7.00	RJTGP-16 (7.0), RJTGP-20 (6.4), RJTGP-11 (6.4), RJTGP-15 (6.2)	4.66
Shillong (50 Genotypes), Jobs tear					
1	Plant height (cm)	161.67	294.67	IC540256 (294.7), IC089383 (258.3), IC022156 (253.3), IC089392 (252.3), IC416897 (246.0),	IC89384 (237.7)
2	Days to 50% flowering	89.00	113.00	IC0540173 (89.0)	IC12703 (99.0)
3	No. of productive tillers/plant	1.90	5.70	IC540256 (5.7)	IC89384 (5.2)
4	Panicle length (cm)	4.50	55.70	IC540256 (55.7), IC600638 (52.8), IC419466 (50.7)	IC12703 (45.2)
5	Leaf length (cm)	37.20	45.70	-	IC89384 (45.6)
6	No. of grains/panicle	43.70	88.80	IC540222 (88.8), IC419466 (88.2), IC416831 (88.1), IC540256 (87.6), IC540279 (87.3)	IC12703 (75.3)
7	No. of internodes/plant	8.50	16.40	IC540256 (16.4)	IC89384 (15.7)
8	Panicle weight (g)	10.70	19.40	IC540279 (19.4), IC540256 (19.2), IC0540181 (18.7), IC419466 (17.7)	IC486143 (16.9)
9	100 seed weight (g)	8.90	18.40	IC540256 (18.4), IC416897 (17.8), IC540279 (17.6), IC089390 (17.5)	IC89384 (16.8)
10	Seed yield/plant (g)	32.80	70.50	IC540279 (70.5)	IC89384 (66.8)

Table 64. Promising lines in Jobs tear germplasm during Kharif 2019 based on all locations (Hills)

S. No	Descriptions	Range		Promising Accessions	Mean
		Min	Max		
1	Plant height(cm)	142.33	234.34	IC-540256 (230.1), IC-89392 (206.3), IC-540222 (206.1), IC-89383 (203.9), IC-601106 (203.0), IC-416897 (200.2)	169.79
2	Days to 50% flowering	85.67	104.33	IC-540173 (91.0) IC-12703 (94.0)	94.00
3	No. of productive tillers/plant	1.84	6.90	IC-416897 (5.5), IC-89392 (4.9), IC-89390 (4.9), IC-540222 (4.8), IC-540256 (4.6)	2.29
4	Panicle length (cm)	20.58	62.52	IC-540256 (58.5), IC-89392 (54.5), IC-600638 (52.2), IC-89390 (52.1), IC-521338 (48.7)	43.43
5	Leaf length (cm)	31.78	48.53	IC-419466 (45.8) IC-416897 (44.6)	42.78
6	No. of seeds / panicle	40.85	126.73	IC-540222 (112.1), IC-89392 (107.7), IC-416831 (92.4), IC-540256 (87.5), IC-419466 (85.4)	69.82
7	No. of internodes / plant	7.92	24.20	IC-416897 (20.6), IC-521338 (20.3), IC-89392 (18.3), IC-540222 (15.7), IC-416831 (15.6)	11.92
8	Panicle weight (g)	10.18	26.53	IC-89392 (22.7), IC-419466 (19.5), IC-22156 (19.2), IC-600638 (18.9), IC-540222 (17.6)	14.92
9	100 seed weight (g)	6.42	13.77	IC-89390 (12.2), IC-540222 (12.0)	11.52
10	Grain yield (g) / plant	24.90	160.58	IC-521338 (158.5), IC-89392 (109.0), IC-416897 (108.6), IC-540279, (72.3), IC-416868 (72.2)	41.10

2.4.1.6 *Perilla (Perilla fruitiscence)*

A set of 21 accessions was planned to be evaluated at five locations viz. NBPGR, RS, Bhowali; ICAR-NEH, Lamphalpat, UUHF, Ranichauri and ICAR-NEH, Shillong, Basar, Kolasiv and Madziphema along with one check. The experimental details are presented in Table 65. Results have been received from three locations i.e. Lamphalpat, Ranichauri and Shillong. The list of promising lines including range and mean at all centres for all the descriptors is presented in Tables 66 to 75.

At ICAR-NEH, Lamphalpat, 21 genotypes along with one check i.e. Thoiding Local evaluated for fourteen quantitative traits. The statistical data and promising genotypes are presented in Tables 66, 67 and 71 to 75. The early flowering genotypes were IC615384, IC615385 and IC615387 (112.0 days), while early maturing genotypes were IC615383 (150.0 days) followed by IC615384 and IC615387 (152.0 days) which were statistically superior than the best check Thoiding Local (146.30 days and 184.6 days, respectively). The genotypes IC615371 (212.6 cm) followed by IC615370 (207.8 cm) and IC615386 (205.4 cm) showed maximum plant height and were better than the check Thoiding Local (161.3 cm). The best performing genotypes for inflorescence length were IC615383 (13.98 cm) followed by IC615387 (13.46 cm) and IC615384 (12.72 cm) and were better than the check Thoiding Local (6.95 cm), while more number of inflorescence per plant was observed in IC615386 (324.4), IC615371 (280.0) and IC615379 (279.88) and were better than the check Thoiding Local (223.4). The yield contributing character number of seeds per inflorescence were observed maximum in genotypes IC615387 (220.0) followed by IC615367 (211.0) and IC615364 (209.8) and were better than the check Thoiding Local (157.3). The genotypes IC615384 (45.39 g) followed by IC615385 (43.80 g) and IC615387 (43.67 g) had maximum seed yield per plant and were better than the check Thoiding Local (18.5 g). The genotypes IC615386 (1.76 g) followed by IC615381 (1.66 g) and IC615375 (1.61 g) were promising for 1000 seed weight as compared to the check Thoiding Local (1.23 g).

At UUHF, Ranichauri, 21 genotypes along with one check i.e. Thoiding evaluated for nine quantitative traits. The statistical data and promising genotypes are presented in Tables 68 and 71 to 75. The early flowering genotypes were IC615384 (116.0 days), IC615385 (117.0 days) and IC615381 (119.0 days), while early maturing genotypes were IC615384 (173.0

days) followed by IC615385 (174.0 days) which were statistically superior than the best check Thoiding (125.5 days and 181.33 days, respectively). The genotypes IC615390 (101.2 cm) followed by IC615386 and IC615392 (95.8 cm) showed maximum plant height and were better than the check Thoiding (85.60 cm). The best performing genotypes for inflorescence length were IC615381 (8.2 cm) followed by IC615379 (7.6 cm) and IC615367 (7.2 cm) and were better than the check Thoiding Local (6.47 cm), while more number of inflorescence per plant was observed in IC615379 (36.2), IC615392 (33.6) and IC615386 (29.2) and were better than the check Thoiding Local (24.5). The genotypes IC615385 (9.1 g) followed by IC615384 and IC615362 (6.3 g) had maximum seed yield per plant and were better than the check Thoiding (5.23 g). The genotypes IC615386, IC615392 and IC615381 (0.26 g) were promising for 1000 seed weight as compared to the check Thoiding (0.25 g).

At ICAR-NEH, Shillong, 21 genotypes along with one check i.e. Thoiding Local evaluated for eleven quantitative traits. The statistical data and promising genotypes are presented in Tables 69, 70 and 71 to 75. The early flowering genotypes were IC615385 and IC615387 (113.0 days) followed by IC615383 (114.0 days), while early maturing genotypes were IC615383 (147.0 days) followed by IC615385 (155.0 days) and IC615384 (156.0 days) which were statistically superior than the best check IC615391 (122.0 days and 164.0 days, respectively). The genotypes IC615370 (220.11 cm) followed by IC615367 (215.14 cm) showed maximum plant height and were better than the check IC615392 (206.37 cm). The best performing genotypes for inflorescence length were IC615387 (12.31 cm) followed by IC615384 (11.78 cm) and IC615383 (11.59 cm) and were better than the best check IC615391 (9.45 cm), while more number of inflorescence per plant was observed in IC615386 (273.65), IC615371 (273.45) and were better than the check IC615392 (260.87). The yield contributing characters seed yield per inflorescence was observed maximum in genotypes IC615383 (0.55 g) followed by IC615373 and IC615369 (0.49 g) and were better than the check IC615392 (0.37 g). The genotypes IC615384 (43.84 g) followed by IC615383 (42.62 g) and IC615385 (41.63 g) had maximum seed yield per plant and were better than the check IC615392 (31.55 g).

Over the locations for all three centres viz., Lamphalpat, Ranichauri and Shillong, the performance of entries and best genotypes in comparison to the checks have been summarized in Table 75. Significant differences were observed among the genotypes for days to 50% flowering,

days to 80% maturity, plant height (cm), 1000 seed weight (g), seed yield per plant (g) and number of seeds per inflorescence. The range for days to flowering and maturity varied from 113.67 days to 147.0 days and 156.67 days to 190.67 days, respectively. The best performing genotypes for early flowering were IC615385 (114.0 days) followed by IC615384 (115.0 days) and IC615383 (115.33 days) and were better than the best check IC615391 (127.67 days), while early maturing genotypes were IC615384 (107.33 days) followed by IC615385 (160.67 days) and IC615383 (161.0 days) and were better than the best check IC615391 (170.67 days). The number of inflorescences per plant ranged from 54.54 to 211.42 and the best performing check was IC615392 (183.82). The superior genotypes for inflorescence length were IC615387 (10.32 cm) followed by IC615383 (10.06 cm) and IC615384 (9.83 cm) and were better than the best check IC615391 (7.52), while more number of seeds per inflorescence were observed in IC615387 (212.61) followed by IC615367 (208.19) and IC615383 (206.89) and were better than the best check IC615392 (178.06). The range for 1000 seed weight (g) was 1.56 g to 2.01 g with the best performing genotypes were IC615386 (1.93 g) followed by IC615387 and IC615362 (1.88 g) and were better than the best check IC615392 (1.83 g). The best performing genotypes for seed yield per plant (g) were IC615369 (34.93 g) followed by IC615384 (31.84 g) and IC615385 (31.51 g) and were better than the best check IC615391 (24.42 g).

Table 65. Experimental Details of Germplasm Evaluation in Perilla: Kharif 2019 (Hills)

S. No.	Items	Lamphalpat	Ranichuri	Shillong
1	No. of genotypes	21	21	21
2	No. of Checks	3	2	2
3	Design	ABD	ABD	ABD
4	No. of Block	6	6	6
5	Number of Rows	2	2	2
6	Row Length (m)	3	3	3
7	Row spacing (cm)	50	45	50
8	Plant spacing (cm)	30	15	30
9	NPKS (kg/ha)	60:40:40	60:40:40	60:40:40
10	Plot size(m ²)	4.5	2.7	4.5
11	Sowing Date	22/6/209	10/6/209	24/6/209
12	Harvesting period	At Maturity	At Maturity	At Maturity

Table 66. Evaluation of germplasm in Perilla at Lamphalpat: Kharif 2019 (Hills)

Sl. No.	Genotypes	Leaf length (cm)	Leaf width (cm)	No. of productive branches	Days to 50% flowering	Inflorescence length (cm)	No. of inflorescence/plant
1	IC615362	13.34	10.02	14.40	136.00	6.04	147.20
2	IC615364	14.80	11.78	20.40	145.00	9.62	138.00
3	IC615365	13.52	11.16	20.40	145.00	8.72	186.40
4	IC615367	13.20	10.06	25.60	144.00	9.36	169.80
5	IC615368	10.70	8.16	8.00	147.00	7.70	37.80
6	IC615370	13.88	10.22	24.20	137.00	8.62	258.20
7	IC615371	14.80	9.88	24.00	147.00	8.98	280.00
8	IC615373	12.32	9.50	14.20	136.00	9.22	118.00
9	IC615374	14.68	11.62	17.80	134.00	8.96	237.40
10	IC615375	15.64	11.86	17.00	132.00	10.20	175.60
11	IC615378	15.24	11.46	19.80	136.00	7.38	238.80
12	IC615379	14.56	11.66	24.20	131.00	8.50	279.80
13	IC615381	14.68	11.96	23.00	147.00	8.08	263.80
14	IC615383	13.18	10.88	22.80	112.00	13.98	174.00
15	IC615384	14.42	11.74	24.80	112.00	12.72	171.80
16	IC615385	14.52	11.88	22.60	112.00	12.28	196.20
17	IC615386	16.06	11.70	27.80	132.00	10.22	324.40
18	IC615387	13.86	11.10	23.40	112.00	13.46	182.40
19	IC615389	12.14	9.42	18.20	150.00	7.88	225.40
20	IC615390	12.46	9.70	19.00	132.00	7.86	266.00
21	IC615369	15.14	11.20	21.60	130.00	7.74	246.00
	IC615391 (C)	13.10	9.76	20.60	132.00	9.12	234.20
	IC615392 (C)	12.56	9.94	23.20	152.00	7.74	257.00
	Thoiding local (C)	10.55	9.10	21.67	146.30	6.95	223.40
	Minimum	10.55	8.16	8.00	112.00	6.04	37.80
	Maximum	16.06	11.96	27.80	152.00	13.98	324.40
	Mean	13.72	10.66	20.78	134.97	9.22	209.65
	CV (%) Phen.	10.44	10.14	20.82	9.21	22.15	30.10

Table 67. Evaluation of germplasm in Perilla at Lamphalpat: Kharif 2019 (Hills)Contd.

Sl. No.	Genotypes	Plant height (cm)	Days to 80% maturity	No. of seeds/ inflorescence	1000 seed weight (g)	Seed yield/plant (g)	Maturity duration (days)
1	IC615362	110.20	172.00	161.00	1.48	20.29	178.00
2	IC615364	161.40	184.00	209.80	1.42	21.01	189.00
3	IC615365	170.00	185.00	191.60	1.47	23.25	189.00
4	IC615367	202.40	184.00	211.00	1.37	43.50	188.00
5	IC615368	64.00	184.00	103.40	1.48	22.23	189.00
6	IC615370	207.80	177.00	166.80	1.47	29.60	182.00
7	IC615371	212.60	183.00	180.60	1.48	41.98	189.00
8	IC615373	104.00	170.00	205.40	1.47	22.88	175.00
9	IC615374	158.40	161.00	147.60	1.56	27.67	166.00
10	IC615375	122.80	161.00	186.80	1.61	20.87	166.00
11	IC615378	145.40	177.00	188.60	1.19	37.78	182.00
12	IC615379	174.60	163.00	142.20	1.51	38.43	167.00
13	IC615381	201.00	188.00	191.00	1.66	24.90	192.00
14	IC615383	166.80	150.00	204.00	1.34	41.79	149.00
15	IC615384	175.00	152.00	179.20	1.40	45.39	150.00
16	IC615385	150.60	153.00	147.80	1.31	43.80	150.00
17	IC615386	205.40	163.00	183.40	1.76	36.53	168.00
18	IC615387	140.60	152.00	220.00	1.47	43.67	150.00
19	IC615389	176.80	188.00	203.20	1.28	30.79	192.00
20	IC615390	171.80	161.00	188.00	1.37	37.87	192.00
21	IC615369	205.20	169.00	190.60	1.44	34.89	182.00
	IC615391 (C)	173.80	162.00	173.40	1.54	36.89	166.00
	IC615392 (C)	193.80	178.00	176.60	1.21	35.12	166.00
	Thoiding local (C)	161.30	184.60	157.30	1.23	18.50	195.00
	Minimum	64.00	150.00	103.40	1.19	18.50	149.00
	Maximum	212.60	188.00	220.00	1.76	45.39	195.00
	Mean	164.82	170.90	179.55	1.44	32.48	175.50
	CV (%) Phen.	22.39	7.45	14.81	9.63	27.56	8.70

Table 68. Evaluation of germplasm in Perilla at Ranichauri: Kharif 2019 (Hills)

S. No.	Genotype	Days to 50% Flowering	Days to 80% Maturity	Plant height (cm)	100 seed weight (g)	No of inflorescence/plant	No of Pr. Branch	Inflorescence Length (cm)	Plant stand at harvest	Seed Yield/plant (g)
1	IC615362	130.00	185.00	35.00	0.25	11.00	-	7.00	1.00	6.30
2	IC615364	-	-	-	-	-	-	-	-	-
3	IC615365	-	-	-	-	-	-	-	-	-
4	IC615367	132.00	182.00	54.40	0.26	8.60	3.20	7.20	96.00	5.70
5	IC615368	129.00	186.00	59.40	0.26	12.80	6.00	5.00	44.00	5.40
6	IC615370	130.00	190.00	69.60	0.23	10.40	5.80	6.60	47.00	5.00
7	IC615371	132.00	193.00	35.50	0.25	4.50	-	3.50	2.00	4.80
8	IC615373	130.00	187.00	64.60	0.26	15.00	6.40	5.00	95.00	5.40
9	IC615374	136.00	190.00	59.60	0.25	12.60	4.60	4.60	43.00	4.80
10	IC615375	140.00	193.00	58.80	0.24	14.20	8.00	5.20	12.00	5.00
11	IC615378	128.00	185.00	57.40	0.23	12.60	4.80	6.00	95.00	5.20
12	IC615379	135.00	184.00	83.80	0.24	36.20	15.00	7.60	94.00	5.30
13	IC615381	119.00	192.00	75.60	0.26	22.00	12.00	8.20	87.00	5.50
14	IC615383	120.00	186.00	77.80	0.25	21.00	3.80	4.60	96.00	5.80
15	IC615384	116.00	173.00	66.60	0.26	22.60	8.80	5.00	95.00	6.30
16	IC615385	117.00	174.00	69.60	0.24	25.60	10.00	4.80	97.00	9.10
17	IC615386	126.00	190.00	95.80	0.26	29.20	10.40	5.00	95.00	4.60
18	IC615387	124.00	193.00	74.00	0.26	20.40	9.60	5.20	96.00	3.90
19	IC615390	127.00	197.00	101.20	0.24	27.60	8.00	6.20	97.00	5.40
20	IC615391	129.00	186.00	86.40	0.23	22.60	4.40	4.00	96.00	5.90
21	IC615392	134.00	193.00	95.80	0.26	33.60	10.00	4.60	97.00	5.00
	Thowding (C)	125.50	181.33	85.60	0.25	24.50	8.97	6.47	91.17	5.23
	Minimum	116.00	173.00	35.00	0.23	4.50	3.20	3.50	1.00	3.90
	Maximum	140.00	197.00	101.20	0.26	36.20	15.00	8.20	97.00	9.10
	Mean	127.98	187.02	70.33	0.25	19.35	7.76	5.59	73.81	5.48
	CV (%) Phen.	4.99	3.33	25.93	4.51	44.60	40.57	22.45	47.24	18.65

Table 69. Evaluation of germplasm in Perilla at Shillong: Kharif 2019 (Hills)

S. No.	Genotypes	Leaf length (cm)	Leaf width (cm)	No. of productive branches	Petiole length (cm)	Days to 50% flowering	Inflorescence length (cm)
1	IC615362	12.30	11.09	15.12	6.12	137.00	8.08
2	IC615364	13.25	10.98	20.45	7.05	144.00	9.33
3	IC615365	12.69	12.02	18.65	6.33	144.00	9.72
4	IC615367	11.89	11.07	25.14	6.55	145.00	10.03
5	IC615368	12.11	9.44	8.56	5.88	148.00	9.09
6	IC615370	12.29	11.23	25.01	7.05	138.00	9.67
7	IC615371	13.33	9.44	24.45	6.06	149.00	9.11
8	IC615373	11.79	9.43	13.59	5.98	138.00	8.98
9	IC615374	13.78	12.06	18.42	6.12	139.00	9.92
10	IC615375	14.12	11.50	17.96	7.07	133.00	10.20
11	IC615378	13.98	10.89	19.12	6.12	133.70	8.97
12	IC615379	12.11	10.97	24.89	6.44	138.00	9.88
13	IC615381	13.87	11.66	24.56	7.11	147.00	9.87
14	IC615383	12.78	10.87	23.09	6.34	114.00	11.59
15	IC615384	13.55	11.33	25.06	7.09	117.00	11.78
16	IC615385	13.99	11.89	23.12	7.13	113.00	11.29
17	IC615386	15.12	11.50	25.45	6.18	118.00	10.33
18	IC615387	13.33	11.37	21.56	7.19	113.00	12.31
19	IC615389	11.23	9.44	18.96	6.09	138.00	9.29
20	IC615390	11.89	9.65	19.86	6.77	131.00	8.56
21	IC615369	11.78	12.02	22.12	6.78	137.00	8.99
	IC-0615391 (C)	13.33	9.22	21.65	6.87	122.00	9.45
	IC-0615392 (C)	11.39	9.11	24.56	6.33	141.00	9.12
	Thoiding local (C)	10.98	9.31	21.05	6.23	134.00	8.09
	Minimum	10.98	9.11	8.56	5.88	113.00	8.08
	Maximum	15.12	12.06	25.45	7.19	149.00	12.31
	Mean	12.79	10.73	20.93	6.54	133.82	9.74
	CV (%) Phenol.	8.41	9.66	20.11	6.76	8.60	11.25

Table 70. Evaluation of germplasm in Perilla at Shillong: Kharif 2019 (Hills)Contd.

Sl. No.	Genotypes	No. of inflorescence/ plant	Plant height (cm)	Days to 80% maturity	No. of Seeds/Inflorescence	1000 seed weight (g)	Seed yield/plant (g)
1	IC615362	156.03	146.12	168.00	167.23	1.66	21.06
2	IC615364	146.22	161.40	180.00	198.12	1.54	20.16
3	IC615365	189.15	170.00	187.00	189.34	1.42	24.58
4	IC615367	175.25	215.14	183.00	205.37	1.32	34.52
5	IC615368	139.78	127.22	185.00	109.99	1.46	20.36
6	IC615370	245.14	220.11	179.00	165.78	1.67	24.08
7	IC615371	273.45	189.23	186.00	187.21	1.25	38.46
8	IC615373	121.33	121.45	179.00	197.22	1.36	21.65
9	IC615374	233.78	187.12	180.00	150.54	1.46	27.46
10	IC615375	165.89	123.88	165.00	180.23	1.39	23.40
11	IC615378	222.37	147.12	166.00	167.35	1.19	37.69
12	IC615379	268.14	177.67	167.00	147.39	1.65	31.84
13	IC615381	260.58	199.13	185.00	201.37	1.24	24.50
14	IC615383	165.66	168.32	147.00	209.77	1.45	42.62
15	IC615384	178.66	179.55	156.00	170.50	1.47	43.84
16	IC615385	211.12	155.67	155.00	152.37	1.39	41.63
17	IC615386	273.65	209.41	170.00	188.57	1.43	30.25
18	IC615387	189.14	156.38	157.00	205.22	1.57	36.76
19	IC615389	220.25	189.87	180.00	189.78	1.64	27.50
20	IC615390	267.54	189.35	162.00	180.88	1.43	35.49
21	IC615369	240.77	209.32	167.00	187.99	1.44	34.96
	IC-0615391 (C)	235.69	198.39	164.00	169.44	1.57	30.48
	IC-0615392 (C)	260.87	206.37	175.00	179.51	1.68	31.55
	Thoiding local (C)	220.70	170.33	184.00	155.21	1.32	19.23
	Minimum	121.33	121.45	147.00	109.99	1.19	19.23
	Maximum	273.65	220.11	187.00	209.77	1.68	43.84
	Mean	210.88	175.77	171.96	177.35	1.46	30.17
	CV (%) Phen.	22.20	16.47	6.68	13.09	9.70	25.39

Table 71. Data Perilla averaged over the locations - Kharif 2019 (Hills)

Sl. No.	Accession no.	Leaf length (cm)			Leaf width (cm)			Days to 50% flowering				Plant height (cm)			
		Lamphelpat	Shillong	Mean	Lamphelpat	Shillong	Mean	Lamphelpat	Ranichuari	Shillong	Mean	Lamphelpat	Ranichuari	Shillong	Mean
1	IC615362	13.34	12.30	12.82	10.02	11.09	10.56	136.00	130.00	137.00	134.33	110.20	35.00	146.12	97.11
2	IC615364	14.80	13.25	14.03	11.78	10.98	11.38	145.00	-	144.00	144.50	161.40	-	161.40	161.40
3	IC615365	13.52	12.69	13.11	11.16	12.02	11.59	145.00	-	144.00	144.50	170.00	-	170.00	170.00
4	IC615367	13.20	11.89	12.55	10.06	11.07	10.57	144.00	132.00	145.00	140.33	202.40	54.40	215.14	157.31
5	IC615368	10.70	12.11	11.41	8.16	9.44	8.80	147.00	129.00	148.00	141.33	64.00	59.40	127.22	83.54
6	IC615369	15.14	11.78	13.46	11.20	12.02	11.61	130.00	-	137.00	133.50	205.20	-	209.32	207.26
7	IC615370	13.88	12.29	13.09	10.22	11.23	10.73	137.00	130.00	138.00	135.00	207.80	69.60	220.11	165.84
8	IC615371	14.80	13.33	14.07	9.88	9.44	9.66	147.00	132.00	149.00	142.67	212.60	35.50	189.23	145.78
9	IC615373	12.32	11.79	12.06	9.50	9.43	9.47	136.00	130.00	138.00	134.67	104.00	64.60	121.45	96.68
10	IC615374	14.68	13.78	14.23	11.62	12.06	11.84	134.00	136.00	139.00	136.33	158.40	59.60	187.12	135.04
11	IC615375	15.64	14.12	14.88	11.86	11.50	11.68	132.00	140.00	133.00	135.00	122.80	58.80	123.88	101.83
12	IC615378	15.24	13.98	14.61	11.46	10.89	11.18	136.00	128.00	133.70	132.57	145.40	57.40	147.12	116.64
13	IC615379	14.56	12.11	13.34	11.66	10.97	11.32	131.00	135.00	138.00	134.67	174.60	83.80	177.67	145.36
14	IC615381	14.68	13.87	14.28	11.96	11.66	11.81	147.00	119.00	147.00	137.67	201.00	75.60	199.13	158.58
15	IC615383	13.18	12.78	12.98	10.88	10.87	10.88	112.00	120.00	114.00	115.33	166.80	77.80	168.32	137.64
16	IC615384	14.42	13.55	13.99	11.74	11.33	11.54	112.00	116.00	117.00	115.00	175.00	66.60	179.55	140.38
17	IC615385	14.52	13.99	14.26	11.88	11.89	11.89	112.00	117.00	113.00	114.00	150.60	69.60	155.67	125.29
18	IC615386	16.06	15.12	15.59	11.70	11.50	11.60	132.00	126.00	118.00	125.33	205.40	95.80	209.41	170.20
19	IC615387	13.86	13.33	13.60	11.10	11.37	11.24	112.00	124.00	113.00	116.33	140.60	74.00	156.38	123.66
20	IC615389	12.14	11.23	11.69	9.42	9.44	9.43	150.00	-	138.00	144.00	176.80	-	189.87	183.34

Sl. No.	Accession no.	Leaf length (cm)			Leaf width (cm)			Days to 50% flowering				Plant height (cm)			
		Lamphelpat	Shillong	Mean	Lamphelpat	Shillong	Mean	Lamphelpat	Ranichuari	Shillong	Mean	Lamphelpat	Ranichuari	Shillong	Mean
21	IC615390	12.46	11.89	12.18	9.70	9.65	9.68	132.00	127.00	131.00	130.00	171.80	101.20	189.35	154.12
	IC615391	13.10	13.33	13.22	9.76	9.22	9.49	132.00	129.00	122.00	127.67	173.80	86.40	198.39	152.86
	IC615392	12.56	11.39	11.98	9.94	9.11	9.53	152.00	134.00	141.00	142.33	193.80	95.80	206.37	165.32
	Thoiding local(C)	10.55	10.98	10.77	9.10	9.31	9.21	146.30	125.50	134.00	135.27	161.30	85.60	170.33	139.08
	Minimum	10.55	10.98	10.77	8.16	9.11	8.64	112.00	116.00	113.00	113.67	64.00	35.00	121.45	73.48
	Maximum	16.06	15.12	15.59	11.96	12.06	12.01	152.00	140.00	149.00	147.00	212.60	101.20	220.11	177.97
	Mean	13.72	12.79	13.25	10.66	10.73	10.69	134.97	127.98	133.82	132.26	164.82	70.33	175.77	136.97
	CV (%) Phen.	10.44	8.41	9.43	10.14	9.66	9.90	9.21	4.99	8.60	7.60	22.39	25.93	16.47	21.60

Table 72. Data Perilla averaged over the locations - Kharif 2019 (Hills) contd.

Sl. No.	Accession no.	Days to 80% maturity				No. of productive branches				No. of inflorescence per plant			
		Lamphelpat	Ranichuari	Shillong	Mean	Lamphelpat	Ranichuari	Shillong	Mean	Lamphelpat	Ranichuari	Shillong	Mean
1	IC615362	172.00	185.00	168.00	175.00	14.40	-	15.12	14.76	147.20	11.00	156.03	104.74
2	IC615364	184.00	-	180.00	182.00	20.40	-	20.45	20.43	138.00	-	146.22	142.11
3	IC615365	185.00	-	187.00	186.00	20.40	-	18.65	19.53	186.40	-	189.15	187.78
4	IC615367	184.00	182.00	183.00	183.00	25.60	3.20	25.14	17.98	169.80	8.60	175.25	117.88
5	IC615368	184.00	186.00	185.00	185.00	8.00	6.00	8.56	7.52	37.80	12.80	139.78	63.46
6	IC615369	169.00	-	167.00	168.00	21.60	-	22.12	21.86	246.00	-	240.77	243.39
7	IC615370	177.00	190.00	179.00	182.00	24.20	5.80	25.01	18.34	258.20	10.40	245.14	171.25
8	IC615371	183.00	193.00	186.00	187.33	24.00	-	24.45	24.23	280.00	4.50	273.45	185.98
9	IC615373	170.00	187.00	179.00	178.67	14.20	6.40	13.59	11.40	118.00	15.00	121.33	84.78
10	IC615374	161.00	190.00	180.00	177.00	17.80	4.60	18.42	13.61	237.40	12.60	233.78	161.26
11	IC615375	161.00	193.00	165.00	173.00	17.00	8.00	17.96	14.32	175.60	14.20	165.89	118.56
12	IC615378	177.00	185.00	166.00	176.00	19.80	4.80	19.12	14.57	238.80	12.60	222.37	157.92
13	IC615379	163.00	184.00	167.00	171.33	24.20	15.00	24.89	21.36	279.80	36.20	268.14	194.71
14	IC615381	188.00	192.00	185.00	188.33	23.00	12.00	24.56	19.85	263.80	22.00	260.58	182.13
15	IC615383	150.00	186.00	147.00	161.00	22.80	3.80	23.09	16.56	174.00	21.00	165.66	120.22
16	IC615384	152.00	173.00	156.00	160.33	24.80	8.80	25.06	19.55	171.80	22.60	178.66	124.35
17	IC615385	153.00	174.00	155.00	160.67	22.60	10.00	23.12	18.57	196.20	25.60	211.12	144.31
18	IC615386	163.00	190.00	170.00	174.33	27.80	10.40	25.45	21.22	324.40	29.20	273.65	209.08
19	IC615387	152.00	193.00	157.00	167.33	23.40	9.60	21.56	18.19	182.40	20.40	189.14	130.65
20	IC615389	188.00	-	180.00	184.00	18.20	-	18.96	18.58	225.40	-	220.25	222.83
21	IC615390	161.00	197.00	162.00	173.33	19.00	8.00	19.86	15.62	266.00	27.60	267.54	187.05
	IC615391(C)	162.00	186.00	164.00	170.67	20.60	4.40	21.65	15.55	234.20	22.60	235.69	164.16
	IC615392(C)	178.00	193.00	175.00	182.00	23.20	10.00	24.56	19.25	257.00	33.60	260.87	183.82
	Thoiding local(C)	184.60	181.33	184.00	183.31	21.67	8.97	21.05	17.23	223.40	24.50	220.70	156.20
	Minimum	150.00	173.00	147.00	156.67	8.00	3.20	8.56	6.59	37.80	4.50	121.33	54.54
	Maximum	188.00	197.00	187.00	190.67	27.80	15.00	25.45	22.75	324.40	36.20	273.65	211.42
	Mean	170.90	187.02	171.96	176.63	20.78	7.76	20.93	16.49	209.65	19.35	210.88	146.63
	CV (%) Phen.	7.45	3.33	6.68	5.82	20.82	40.57	20.11	27.17	30.10	44.60	22.20	32.30

Table 73. Data Perilla averaged over the locations - Kharif 2019 (Hills) contd.

Sl. No.	Accession no.	Inflorescence length (cm)				1000 seed weight (g)				Seed yield/plant (g)				No. of seeds/inflorescence		
		Lamphelpat	Ranichuari	Shillong	Mean	Lamphelpat	Ranichuari	Shillong	Mean	Lamphelpat	Ranichuari	Shillong	Mean	Lamphelpat	Shillong	Mean
1	IC615362	6.04	7.00	8.08	7.04	1.48	2.50	1.66	1.88	20.29	6.30	21.06	15.88	161.00	167.23	164.12
2	IC615364	9.62	-	9.33	9.48	1.42	-	1.54	1.48	21.01	-	20.16	20.59	209.80	198.12	203.96
3	IC615365	8.72	-	9.72	9.22	1.47	-	1.42	1.45	23.25	-	24.58	23.92	191.60	189.34	190.47
4	IC615367	9.36	7.20	10.03	8.86	1.37	2.60	1.32	1.76	43.50	5.70	34.52	27.91	211.00	205.37	208.19
5	IC615368	7.70	5.00	9.09	7.26	1.48	2.60	1.46	1.85	22.23	5.40	20.36	16.00	103.40	109.99	106.70
6	IC615369	7.74	-	8.99	8.37	1.44	-	1.44	1.44	34.89	-	34.96	34.93	190.60	187.99	189.30
7	IC615370	8.62	6.60	9.67	8.30	1.47	2.30	1.67	1.81	29.60	5.00	24.08	19.56	166.80	165.78	166.29
8	IC615371	8.98	3.50	9.11	7.20	1.48	2.50	1.25	1.74	41.98	4.80	38.46	28.41	180.60	187.21	183.91
9	IC615373	9.22	5.00	8.98	7.73	1.47	2.60	1.36	1.81	22.88	5.40	21.65	16.64	205.40	197.22	201.31
10	IC615374	8.96	4.60	9.92	7.83	1.56	2.50	1.46	1.84	27.67	4.80	27.46	19.98	147.60	150.54	149.07
11	IC615375	10.20	5.20	10.20	8.53	1.61	2.40	1.39	1.80	20.87	5.00	23.40	16.42	186.80	180.23	183.52
12	IC615378	7.38	6.00	8.97	7.45	1.19	2.30	1.19	1.56	37.78	5.20	37.69	26.89	188.60	167.35	177.98
13	IC615379	8.50	7.60	9.88	8.66	1.51	2.40	1.65	1.85	38.43	5.30	31.84	25.19	142.20	147.39	144.80
14	IC615381	8.08	8.20	9.87	8.72	1.66	2.60	1.24	1.83	24.90	5.50	24.50	18.30	191.00	201.37	196.19
15	IC615383	13.98	4.60	11.59	10.06	1.34	2.50	1.45	1.76	41.79	5.80	42.62	30.07	204.00	209.77	206.89
16	IC615384	12.72	5.00	11.78	9.83	1.40	2.60	1.47	1.82	45.39	6.30	43.84	31.84	179.20	170.50	174.85
17	IC615385	12.28	4.80	11.29	9.46	1.31	2.40	1.39	1.70	43.80	9.10	41.63	31.51	147.80	152.37	150.09
18	IC615386	10.22	5.00	10.33	8.52	1.76	2.60	1.43	1.93	36.53	4.60	30.25	23.79	183.40	188.57	185.99
19	IC615387	13.46	5.20	12.31	10.32	1.47	2.60	1.57	1.88	43.67	3.90	36.76	28.11	220.00	205.22	212.61
20	IC615389	7.88	-	9.29	8.59	1.28	0.00	1.64	0.97	30.79	-	27.50	29.15	203.20	189.78	196.49
21	IC615390	7.86	6.20	8.56	7.54	1.37	2.40	1.43	1.73	37.87	5.40	35.49	26.25	188.00	180.88	184.44
	IC615391(C)	9.12	4.00	9.45	7.52	1.54	2.30	1.57	1.80	36.89	5.90	30.48	24.42	173.40	169.44	171.42
	IC615392(C)	7.74	4.60	9.12	7.15	1.21	2.60	1.68	1.83	35.12	5.00	31.55	23.89	176.60	179.51	178.06
	Thoiding (C)	6.95	6.47	8.09	7.17	1.23	2.45	1.32	1.67	18.50	5.23	19.23	14.32	157.30	155.21	156.26
	Minimum	6.04	3.50	8.08	5.87	1.19	2.30	1.19	1.56	18.50	3.90	19.23	13.88	103.40	109.99	106.70
	Maximum	13.98	8.20	12.31	11.50	1.76	2.60	1.68	2.01	45.39	9.10	43.84	32.78	220.00	209.77	214.89
	Mean	9.22	5.59	9.74	8.18	1.44	2.49	1.46	1.79	32.48	5.48	30.17	22.71	179.55	177.35	178.45
	CV (%) Phen.	22.15	22.45	11.25	18.62	9.63	4.51	9.70	7.95	27.56	18.65	25.39	23.87	14.81	13.09	13.95

Table 74. Promising lines in Perilla germplasm during Kharif 2019 at different locations (Hills)

S. No.	Descriptions	Range		Promising Accessions	Mean
		Min.	Max.		
Lamphalpat (21 Genotypes), Perilla					
1	Leaf length (cm)	10.55	16.06	IC615386 (16.06), IC615375 (15.64), IC615378 (15.24), IC615369 (15.14), IC615364 (14.80), IC615371 (14.80), IC615374 (14.68), IC615381 (14.68), IC615379 (14.56), IC615385 (14.52), IC615384 (14.42)	Thoiding local (10.55)
2	Leaf width (cm)	8.16	11.96	IC615381 (11.96), IC615385 (11.88), IC615375 (11.86), IC615364 (11.78), IC615384 (11.74), IC615386 (11.70), IC615379 (11.66), IC615374 (11.62), IC615378 (11.46), IC615369 (11.20), IC615365 (11.16), IC615387 (11.10)	Thoiding local (9.10)
3	No. of productive branches	8.00	27.80	IC615386 (27.80), IC615367 (25.60), IC615384 (24.80), IC615379 (24.20), IC615370 (24.20), IC615371 (24.00)	Thoiding local (21.67)
4	Petiole length (cm)	4.70	7.26	IC615384 (7.26), IC615385 (7.26), IC615364 (7.12), IC615369 (6.80), IC615387 (6.78), IC615381 (6.56), IC615370 (6.52), IC615365 (6.38), IC615383 (6.28), IC615386 (6.14)	Thoiding local (4.87)
5	Days to 50% flowering	112.00	152.00	IC615384 (112.00), IC615385 (112.00), IC615387 (112.00), IC615383 (112.00), IC615369 (130.00), IC615379 (131.00), IC615391 (132.00), IC615390 (132.00), IC615386 (132.00), IC615375 (132.00)	Thoiding local (146.30)
6	Inflorescence length (cm)	6.04	13.98	IC615383 (13.98), IC615387 (13.46), IC615384 (12.72), IC615385 (12.28), IC615386 (10.22), IC615375 (10.20), IC615364 (9.62), IC615367 (9.36), IC615373 (9.22), IC615391 (9.12), IC615371 (8.98), IC615374 (8.96), IC615365 (8.72), IC615370 (8.62), IC615379 (8.50)	Thoiding local (6.95)
7	No. of inflorescence/plant	37.80	324.40	IC615386 (324.40), IC615371 (280.00), IC615379 (279.80), IC615390 (266.00), IC615381 (263.80), IC615370 (258.20), IC615392 (257.00), IC615369 (246.00)	Thoiding local (223.40)
8	Plant height (cm)	64.00	212.60	IC615371 (212.60), IC615370 (207.80), IC615386 (205.40), IC615369 (205.20), IC615367 (202.40), IC615381 (201.00), IC615392 (193.80)	Thoiding local (161.30)
9	Days to 80% maturity	150.00	188.00	IC615383 (150.00), IC615384 (152.00), IC615387 (152.00), IC615385 (153.00), IC615390 (161.00), IC615374 (161.00), IC615375 (161.00), IC615391 (162.00), IC615386 (163.00), IC615379 (163.00)	Thoiding local (184.60)
10	No. of inflorescence/branch	6.00	19.80	IC615387 (19.80), IC615391 (18.80), IC615381 (17.20), IC615374 (17.00), IC615390 (16.80), IC615371 (16.80), IC615369 (16.60), IC615386 (16.40), IC615384 (16.20), IC615392 (16.00),	Thoiding local (13.20)

S. No.	Descriptions	Range		Promising Accessions	Mean
		Min.	Max.		
				IC615367 (15.40), IC615385 (15.20), IC615365 (15.20)	
11	No. of seeds/inflorescence	103.40	220.00	IC615387 (220.00), IC615367 (211.00), IC615364 (209.80), IC615373 (205.40), IC615383 (204.00), IC615389 (203.20), IC615365 (191.60), IC615381 (191.00), IC615369 (190.60), IC615378 (188.60), IC615390 (188.00), IC615375 (186.80), IC615386 (183.40), IC615371 (180.60)	Thoiding local (157.30)
12	Seed yield/inflorescence	0.20	0.57	IC615383 (0.57), IC615387 (0.51), IC615390 (0.49), IC615369 (0.45), IC615384 (0.44), IC615364 (0.44), IC615373 (0.42), IC615367 (0.41), IC615378 (0.38), IC615375 (0.38)	Thoiding local (0.24)
13	1000 seed weight (g)	1.19	1.76	IC615386 (1.76), IC615381 (1.66), IC615375 (1.61), IC615374 (1.56), IC615391 (1.54), IC615379 (1.51), IC615362 (1.48), IC615371 (1.48), IC615368 (1.48), IC615387 (1.47), IC615373 (1.47), IC615370 (1.47), IC615365 (1.47)	Thoiding local (1.23)
14	Seed yield/plant (g)	18.5	45.38	IC615384 (45.39), IC615385 (43.80), IC615387 (43.67), IC615367 (43.50), IC615371 (41.98), IC615383 (41.79), IC615379 (38.43), IC615390 (37.87), IC615378 (37.78), IC615391 (36.89), IC615386 (36.53), IC615392 (35.12)	Thoiding local (18.50)
Ranichauri (21 Genotypes), Perilla					
1	Days to 50% flowering	116.00	140.00	IC615384 (116.00), IC615385 (117.00), IC615381 (119.00), IC615383 (120.00)	Thoiding Local (125.50)
2	Days to 80% maturity	173.00	197.00	IC615384 (173.00), IC615385 (174.00)	Thoiding Local (181.33)
3	Plant height (cm)	35.00	101.20	IC615390 (101.20), IC615386 (95.80), IC615392 (95.80)	Thoiding Local (85.60)
4	100 seed weight (g)	0.23	0.26	IC615386 (0.26), IC615392 (0.26), IC615381 (0.26), IC615387 (0.26), IC615384 (0.26), IC615373 (0.26), IC615368 (0.26), IC615367 (0.26)	Thoiding Local (0.25)
5	No. of inflorescence/plant	4.50	36.20	IC615379 (36.20), IC615392 (33.60), IC615386 (29.20), IC615390 (27.60)	Thoiding Local (24.50)
6	No. of branch/plant	3.20	15.00	IC615379 (15.00), IC615381 (12.00), IC615386 (10.40), IC615392 (10.00), IC615385 (10.00)	Thoiding Local (8.97)
7	Inflorescence Length (cm)	3.50	8.20	IC615381 (8.20), IC615379 (7.60), IC615367 (7.20), IC615362 (7.00)	Thoiding Local (6.47)
8	Plant stand at harvest	1.00	97.00	IC615390 (97.00), IC615385 (97.00), IC615392 (97.00), IC615367 (96.00)	Thoiding Local (91.17)

S. No.	Descriptions	Range		Promising Accessions	Mean
		Min.	Max.		
9	Seed yield/plant (g)	3.90	9.10	IC615385 (9.10), IC615384 (6.30), IC615362 (6.30), IC615391 (5.90)	Thoiding Local (5.23)
Shillong (21 Genotypes), Perilla					
1	Leaf length (cm)	10.98	15.12	IC615386 (15.12), IC615375 (14.12), IC615385 (13.99), IC615378 (13.98), IC615381 (13.87)	IC-0615391 (13.33)
2	Leaf width (cm)	9.11	12.06	IC615374 (12.06), IC615365 (12.02), IC615369 (12.02), IC615385 (11.89), IC615381 (11.66), IC615386 (11.50), IC615375 (11.50), IC615387 (11.37), IC615384 (11.33), IC615370 (11.23), IC615362 (11.09), IC615367 (11.07)	Thoiding local (9.31)
3	Petiole length (cm)	5.88	7.19	IC615387 (7.19), IC615385 (7.13), IC615381 (7.11)	IC-0615391 (6.87)
4	Days to 50% flowering	113.00	149.00	IC615385 (113.00), IC615387 (113.00), IC615383 (114.00)	IC-0615391 (122.00)
5	Inflorescence length (cm)	8.08	12.31	IC615387 (12.31), IC615384 (11.78), IC615383 (11.59), IC615385 (11.29), IC615386 (10.33)	IC-0615391 (9.45)
6	No. of inflorescence/plant	121.33	273.65	IC615386 (273.65), IC615371 (273.45)	IC-0615392 (260.87)
7	Plant height (cm)	121.45	220.11	IC615370 (220.11), IC615367 (215.14)	IC-0615392 (206.37)
8	Days to 80% maturity	147.00	187.00	IC615383 (147.00), IC615385 (155.00), IC615384 (156.00)	IC-0615391 (164.00)
9	No. of seeds/inflorescence	109.99	209.77	IC615383 (209.77), IC615367 (205.37), IC615387 (205.22), IC615381 (201.37), IC615364 (198.12), IC615373 (197.22)	IC-0615392 (179.51)
10	Seed yield/inflorescence	0.28	0.55	IC615383 (0.55), IC615373 (0.49), IC615369 (0.49), IC615387 (0.47), IC615384 (0.47), IC615364 (0.46), IC615390 (0.45)	IC-0615392 (0.37)
11	Seed yield/plant (g)	19.23	43.84	IC615384 (43.84), IC615383 (42.62), IC615385 (41.63), IC615371 (38.46), IC615378 (37.69), IC615387 (36.76)	IC-0615392 (31.55)

Table 75. Promising lines in Perilla germplasm during Kharif 2019 based on all locations (Hills)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Leaf length (cm)	10.77	15.59	IC615386 (15.59), IC615375 (14.88), IC615378 (14.61), IC615381 (14.28), IC615385 (14.26)	IC615391 (13.22)
2	Leaf width (cm)	8.64	12.01	IC615385 (11.89), IC615374 (11.84), IC615381 (11.81), IC615375 (11.68), IC615369 (11.61), IC615386 (11.60)	IC615392 (9.53)
3	Days to 50% flowering	113.67	147.00	IC615385 (114.00), IC615384 (115.00), IC615383 (115.33), IC615387 (116.33)	IC615391 (127.67)
4	Plant height (cm)	73.48	177.97	IC615369 (207.26), IC615389 (183.34), IC615386 (170.20)	IC615392 (165.32)
5	Days to 80% maturity	156.67	190.67	IC615384 (160.33), IC615385 (160.67), IC615383 (161.00)	IC615391 (170.67)
6	No. of productive branches	6.59	22.75	IC615371 (24.23), IC615369 (21.86), IC615379 (21.36), IC615386 (21.22)	IC615392 (19.25)
7	No. of inflorescence per plant	54.54	211.42	IC615369 (243.39), IC615389 (222.83), IC615386 (209.08), IC615379 (94.71)	IC615392 (183.82)
8	Inflorescence length (cm)	5.87	11.50	IC615387 (10.32), IC615383 (10.06), IC615384 (9.83), IC615364 (9.48), IC615385 (9.46), IC615365 (9.22)	IC615391 (7.52)
9	1000 seed weight (g)	1.56	2.01	IC615386 (1.93), IC615387 (1.88), IC615362 (1.88)	IC615392 (1.83)
10	Seed yield/plant (g)	13.88	32.78	IC615369 (34.93), IC615384 (31.84), IC615385 (31.51), IC615383 (30.07), IC615389 (29.15)	IC615391 (24.42)
11	No. of seeds/inflorescence	106.70	214.89	IC615387 (212.61), IC615367 (208.19), IC615383 (206.89), IC615364 (203.96), IC615373 (201.31), IC615389 (196.49)	IC615392 (178.06)

2.4.2 Plains

A total of 475 accessions for multilocation germplasm evaluations to be conducted in Plains comprising Grain Amaranth (120) having 50 in 1st year and 70 in 2nd year, Winged bean (100) having 50 each in 1st and 2nd year, Pillipasera (60) 35 in 1st year and 25 in 2nd year, Sahjan (25), Tumba (20), Kalingada (50), Adzuki bean (50) and Jobs Tear (50) were planned for evaluation during Kharif 2019. The germplasm evaluation experiments were conducted in augmented block design with standard check cultivars.

2.4.2.1 Grain Amaranth (*Amaranthus* spp.)

Germplasm screening nursery consisting of 120 genotypes having 50 in 1st year and 70 in 2nd year was planned to be evaluated at two locations namely, UAS, Bengaluru and TNAU, Mettupalayam. The experimental details are presented in Table 76. The data were received from both the centre's. The list of promising lines including range and mean at all centres for all the descriptors is presented in Tables 77 to 87.

At UAS Bengaluru during I Year a set of 50 genotypes along with five checks viz. BGA-2, GA-2, KBGA-1, KBGA-4 and Suvarna were evaluated for nine quantitative characters. The promising lines and statistical parameter are given in Table 77 and 81 to 87. The genotype IC35496 (88.0 g) was observed as highest yielder (Seed yield per plant) and better than the best check KBGA-4 (82.5 g). The plant height ranged from 82.4 cm to 159.6 cm. The dwarfing genotypes for plant height were IC35491 (82.4 cm) followed by IC35482 (89.25 cm) and IC35503 (92.0) which were better than the best check KBGA-4 (141.4 cm), while maximum plant height was observed in IC35554 (159.6 cm) followed by IC35486 (157.8 cm) and were better than the best check KBGA-15 (143.4 cm). The maximum panicle length was observed in the genotypes IC35495, IC35505 and IC35496 (>61.0 cm) and were better than the best check KBGA-4 (49.8 cm). None of the genotypes were superior than the best check KBGA-4 (44.0 days) for early flowering and KBGA-15 (93.0 days) for early maturity.

At UAS Bengaluru during II Year a set of 70 genotypes along with five checks viz. BGA-2, GA-2, KBGA-1, KBGA-4 and Suvarna were evaluated for nine quantitative characters. The promising lines and statistical parameter are given in Table 78 and 81 to 87. The genotype SKGPA-157 (70.0g) followed by SKGPA-152 (66.0 g) and were better than the best check

KBGA-15 (60.0 g). The plant height ranged from 74.7 cm to 161.4 cm. The dwarfing genotypes for plant height were IC21793 (74.7 cm) followed by IC21970 (81.3 cm) and IC21943 (84.8) which were better than the best check KBGA-4 (132.2 cm), while maximum plant height was observed in SKGPA-148 (161.4 cm) followed by SKGPA-153 (159.2 cm) and SKGPA-154 (151.2) and were better than the best check KBGA-15 (138.2 cm). The maximum panicle length was observed in the genotype IC5527 (57.4 cm) followed by IC21803 (56.8 cm) and IC5994 (54.8 cm) and were better than the best check KBGA-4 (49.8 cm). None of the genotypes were found superior than the best check KBGA-4 (88.0 days) for early maturity. The promising genotypes for petiole length was SKGPA-154 (13.17 cm) and was better than the best check KBGA-15 (12.0 cm).

At TNAU Mettupalayam, during I year a set of 50 genotypes along with four checks viz. BGA-2, GA-2, BGA-4-9 and Suvarna were evaluated for eight quantitative characters. The promising lines and statistical parameter are given in Tables 79 and 81 to 87. The early flowering trait was observed in genotype IC035521 (46.0 days) followed by IC035536 and IC035498 (47.0 days) which were superior than the best check Suvarna (51.0 days). The plant height ranged from 150.0 cm to 252.0 cm. The maximum plant height was observed in IC035490 (252.0 cm) followed by IC035497 (241.0 cm) and IC035504 (232.0 cm) and were better than the best check Suvarna (216.6 cm). The maximum inflorescence length was observed in the genotype IC035523 (85.0 cm) followed by IC035490 (81.0 cm) and IC035539 (79.0 cm) and were better than the best check BGA-4-9 (73.0 cm). The high yielding genotypes (seed yield/plant) were IC035490 (9.6 g) followed by IC035483 (9.4 g) and IC035488 (9.2 g) which were significantly superior over the best check Suvarna (8.5 g), while the 10ml volume seed weight was found highest in the genotypes IC035488 (8.6 g) followed by IC035545 and IC035489 (8.5 g) and were better than the best check BGA 2 (8.2 g). None of the genotypes were superior over the best check GA 2 (90.0 days) for early maturity.

At TNAU Mettupalayam, during II year a set of 70 genotypes along with four checks viz. BGA-2, GA-2, BGA-4-9 and Suvarna were evaluated for eight quantitative characters. The promising lines and statistical parameter are given in Tables 80 and 81 to 87. The early flowering trait was observed in genotype IC032192, IC035362 and SKGPA151 (47.0 days) which were superior than the best check BGA 2 (51.0 days), while early maturing genotype was SKGPA146

(75.0 days) which was better than the best check GA2 (90.0 days). The plant height ranged from 109.0 cm to 248.0 cm. The maximum plant height was observed in SKGPA146 (248.0 cm) followed by SKGPA145 (247.0 cm) and SKGPA152 (246.0 cm) and were better than the best check GA 2 (217.20 cm). The maximum inflorescence length was observed in the genotype SKGPA146 (107.0 cm) followed by IC035365 (97.0 cm) and IC021789 (87.0 cm) and were better than the best check BGA-4-9 (73.0 cm). The high yielding genotypes (seed yield/plant) were IC021965 (9.4 g) followed by SKGPA154 and SKGPA145 (9.2 g) which were significantly superior over the best check Suvarna (8.3 g), while the 10ml volume seed weight was found highest in the genotypes IC021943 (9.1 g) followed by IC021800 (9.0 g) and SKGPA154 (8.6 g) and were better than the best check BGA-4-9 (8.1 g). Plant stand at harvest was found maximum in IC032191 and SKGPA146 (78.0) followed by IC021799 (77.0) which were better than the best check BGA-4-9 (74.0).

Over the locations for both the centres viz., Bengaluru and Mettupalayam the performance of entries and best genotypes in comparison to the checks during I year have been summarized in Table 86. Significant differences sown crop were observed among the genotypes for days to 50% flowering, Days to maturity, Plant height (cm) and Seed yield per plant (g). The range for days to flowering and maturity varied from 44.0 days to 54.50 days and 85.0 days to 94.50 days, while the best performing checks were BGA-2 (51.0 days) and GA-2 (90.0 days), respectively. The best performing genotypes for early flowering were KBGA-4 (44.00 days), IC35542 (46.00 days) and IC35529 (47.00 days), while for early maturity were KBGA-4 (85.00 days), IC35529 and IC35542 (88.00 days) and were better than the best checks, respectively. The maximum plant height over the locations was observed in genotypes IC35528 (226.00 cm) and IC35520 (222.00 cm), while dwarfing genotypes were IC35482 (89.25 cm), IC35531 (107.20 cm), IC35491 (119.70 cm) and were better than the best checks Suvarna (216.60 cm) and BGA-2 (200.00 cm), respectively. The high yielding genotype (seed yield per plant) were IC35496 (88.00 g), KBGA-4 (82.50 g), KBGA-15 (80.00 g), and were better than the best check Suvarna (11.56 g).

During II year sown crop the promising genotypes based on all locations are summarized in Table 87. Significant differences were observed for days to 50% flowering, Days to maturity, Plant height (cm) and Seed yield per plant (g). The range for days to flowering and maturity

varied from 45.0 days to 54.50 days and 80.50 days to 94.00 days, while the best performing checks were BGA-2 (51.0 days) and GA-2 (90.0 days), respectively. The best performing genotypes for early flowering were IC21793 (45.00 days), SKGPA145 (46.00 days) and IC001491 (46.50 days), while for early maturity were SKGPA146 (80.50 days), IC21799 (88.00 days) and IC001491 (88.00 days), and were better than the best checks, respectively. The maximum plant height over the locations was observed in genotype IC32197 (220.00 cm), while dwarfing genotypes were IC21793 (74.67 cm), IC35363 (107.80 cm) and IC001493 (109.67 cm) and were better than the best checks GA-2 (217.2 cm) and BGA-2 (201.6 cm), respectively. The high yielding genotype (seed yield per plant) were IC21792 (65.00 g), KBGA-15 (60.00 g) and KBGA-4 (58.00 g) and were better than the best check Suvarna (8.30 g).

Table 76. Experimental Details of Germplasm Evaluation in Grain amaranth: Kharif 2019 (Plains)

S. No	Items	Bengaluru (I Year)	Bengaluru (II Year)	Mettupalayam (I Year)	Mettupalayam (II Year)
1	No. of Accessions	50	70	50	70
2	No. of Checks	5	5	4	4
3	Design	ABD	ABD	ABD	ABD
4	No. of Block	4	4	5	5
5	Number of Rows	2	2	3	3
6	Row Length (m)	3	3	4	4
7	Row spacing (cm)	45	45	50	50
8	Plant spacing (cm)	15	15	15	15
9	NPKS (kg/ha)	60:40:40:20	60:40:40:20	60:40:40:20	60:40:40:20
10	Plot size (m ²)	2.70	2.70	3.6	6.0
11	Sowing Date	24/07/2019	24/07/2019	4/07/2019	4/07/2019
12	Harvesting period	16/11/2019	25/11/2019	18/10/2019	12/10/2019

Table 77. Evaluation of germplasm in Grain Amaranth (I Year) at Bengaluru: Kharif 2019 (Plains)

S. No.	Genotypes	Days to 50% flowering	Plant height (cm)	panicle length (cm)	Grain yield/Plant (g)	days to 80% maturity	leaf length (cm)	leaf width (cm)	petiole length (cm)
1	IC35481	51.00	105.60	32.20	26.00	92.00	15.33	8.17	6.00
2	IC35482	51.00	89.25	27.20	20.67	91.00	17.00	9.33	9.33
3	IC35483	51.00	140.20	35.80	70.00	92.00	21.33	10.00	11.33
4	IC35484	50.00	143.40	36.00	50.00	93.00	19.00	8.33	11.33
5	IC35485	51.00	152.80	49.60	70.00	92.00	17.00	7.83	10.33
6	IC35486	50.00	157.80	48.20	80.00	94.00	19.17	8.17	12.00
7	IC35488	47.00	150.60	26.20	80.00	86.00	20.00	10.33	14.33
8	IC35489	48.00	99.20	29.40	25.00	87.00	22.67	15.33	14.67
9	IC35490	48.00	123.40	50.80	30.00	86.00	15.00	6.50	7.50
10	IC35491	46.00	82.40	34.20	30.00	86.00	18.00	8.00	9.00
11	IC35493	54.00	131.60	52.00	40.00	94.00	19.83	7.67	8.33
12	IC35495	51.00	128.00	62.00	42.00	91.00	19.67	10.17	11.67
13	IC35496	53.00	138.60	61.20	88.00	93.00	18.33	8.50	10.33
14	IC35497	50.00	111.00	49.80	70.00	91.00	15.33	7.83	8.33
15	IC35498	49.00	126.40	51.00	22.00	90.00	14.33	6.83	6.00
16	IC35501	49.00	115.00	51.00	38.00	89.00	17.00	7.33	7.67
17	IC35502	49.00	128.20	47.60	35.00	90.00	16.33	7.67	8.67
18	IC35503	49.00	92.00	46.50	22.10	90.00	15.67	6.67	5.67
19	IC35504	50.00	147.00	46.40	85.00	92.00	20.83	10.00	9.00
20	IC35505	48.00	137.40	61.20	50.00	88.00	18.33	8.67	7.67
21	IC35511	48.00	117.00	49.00	48.00	86.00	20.00	9.17	8.33
22	IC35514	-	-	-	-	-	-	-	-
23	IC35517	-	-	-	-	-	-	-	-
24	IC35518	47.00	125.00	51.40	42.00	86.00	19.17	8.50	10.67
25	IC35519	50.00	119.50	54.00	20.00	89.00	15.83	6.50	6.67
26	IC35520	-	-	-	-	-	15.83	6.50	6.67
27	IC35521	49.00	125.20	43.40	50.00	89.00	9.83	7.23	7.50
28	IC35523	49.00	95.00	36.50	50.00	91.00	15.83	6.80	7.83
29	IC35524	48.00	133.00	59.60	60.00	90.00	16.97	8.27	9.57

S. No.	Genotypes	Days to 50% flowering	Plant height (cm)	panicle length (cm)	Grain yield/Plant (g)	days to 80% maturity	leaf length (cm)	leaf width (cm)	petiole length (cm)
30	IC35525	-	-	-	-	-	-	-	-
31	IC35527	50.00	141.00	49.60	53.33	92.00	19.10	8.23	6.67
32	IC35528	-	-	-	-	-	-	-	-
33	IC35529	47.00	138.60	42.00	75.00	88.00	15.50	12.50	11.67
34	IC35530	50.00	120.00	53.00	50.00	91.00	13.33	8.23	5.50
35	IC35531	51.00	107.20	28.50	37.50	92.00	17.17	11.33	14.33
36	IC35533	48.00	134.00	51.50	34.80	90.00	17.00	7.07	8.33
37	IC35536	-	-	-	-	-	-	-	-
38	IC35537	48.00	122.20	54.80	32.00	88.00	14.33	7.40	8.03
39	IC35538	49.00	115.00	44.60	23.00	89.00	19.50	9.17	10.37
40	IC35539	50.00	121.80	50.40	30.00	90.00	17.67	6.83	6.67
41	IC35541	51.00	103.00	56.40	48.00	92.00	15.83	5.50	5.67
42	IC35542	46.00	126.80	56.20	62.50	88.00	16.67	7.33	9.00
43	IC35545	50.00	123.00	45.80	60.00	90.00	14.17	6.83	7.33
44	IC35548	48.00	115.80	36.20	64.00	89.00	15.17	6.17	6.67
45	IC35549	49.00	135.60	49.00	62.00	90.00	18.33	7.50	9.33
46	IC35550	-	-	-	-	-	-	-	-
47	IC35551	48.00	139.60	42.40	50.00	88.00	15.83	7.00	9.67
48	IC35552	47.00	141.00	51.25	60.00	86.00	15.00	6.17	9.00
49	IC35554	47.00	159.60	57.20	47.00	87.00	16.00	7.33	6.67
50	IC35560	51.00	151.00	60.50	70.00	92.00	18.00	7.83	7.67
	KBGA-4 (C)	44.00	141.40	49.80	82.50	85.00	16.00	7.00	4.33
	KBGA-15 (C)	52.00	143.40	35.00	80.00	93.00	23.00	11.50	14.67
	Minimum	44.00	82.40	26.20	20.00	85.00	9.83	5.50	4.33
	Maximum	54.00	159.60	62.00	88.00	94.00	23.00	15.33	14.67
	Mean	49.16	126.55	46.81	50.34	89.73	17.20	8.20	8.87
	CV (%) Phen.	3.90	14.62	20.66	39.31	2.69	14.56	22.43	28.49

Table 78. Evaluation of germplasm in Grain Amaranth (II Year) at Bengaluru: Kharif 2019 (Plains)

S. No	Genotypes	Days to 50% flowering	Plant height (cm)	Panicle length (cm)	Seed yield per plant (g)	days to 80% maturity	leaf length (cm)	leaf width (cm)	petiole length (cm)
1	IC001491	45	97.4	50.0	24	86.00	13.00	6.00	5.33
2	IC001493	45	110.3	49.3	30	85.00	12.67	6.00	10.00
3	IC5527	45	123.4	57.4	36	92.00	13.33	7.00	7.00
4	IC5564	46	118.4	52.6	22	90.00	16.67	8.00	8.67
5	IC5994	46	134.0	54.8	17	91.00	14.67	6.67	7.00
6	IC6646	50	135.6	54.2	32	92.00	15.67	6.67	5.67
7	IC21789	50	121.4	47.8	22	92.00	17.50	8.33	8.67
8	IC21790	44	134.4	50.0	28	87.00	14.00	6.67	6.67
9	IC21790A	44	140.2	52.4	64	85.00	21.17	12.67	11.67
10	IC21792	50	132.0	43.0	65	93.00	15.00	7.33	9.67
11	IC21793	45	74.67	38.3	25	92.00	8.67	5.67	5.00
19	IC21802	45	145.8	51.2	52	88.00	16.67	8.00	7.67
20	IC21802A	51	125.2	48.6	54	90.00	18.00	7.67	8.33
21	IC21803	51	123.6	56.8	40	93.00	17.00	7.33	7.67
22	IC21804	47	145.2	40.0	30	88.00	16.33	8.33	7.33
23	IC21805	51	132.0	32.0	35.2	92.00	19.67	9.67	9.33
24	IC21806	52	120.2	38.0	48	93.00	17.33	9.00	6.67
27	IC21940	49	121	33.0	30	90.00	16.67	8.17	6.33
28	IC21941	52	115.2	36.0	56	95.00	17.67	8.00	9.00
29	IC21943	46	84.8	30.4	57	88.00	17.00	8.00	8.33
S. No	Genotypes	Days to 50%	Plant height (cm)	Panicle length (cm)	Seed yield per plant (g)	days to 80%	leaf length (cm)	leaf width (cm)	petiole length (cm)

		flowering				maturity			
30	IC21965	47	105.2	32.8	54	89.00	15.00	7.67	6.33
31	IC21970	48	81.33	35.0	52	90.00	9.33	4.67	4.33
32	IC32179	47	124.0	38.2	65	88.00	18.67	9.50	7.33
33	IC32189	47	119.8	52.2	56	88.00	15.67	6.83	7.00
34	IC32191	50		32.5	51	90.00	19.00	10.17	9.33
35	IC32192	51	116.2	31.4	52	92.00	14.50	6.67	5.00
36	IC32196	51	128	49.4	48	93.00	19.50	8.33	9.00
39	IC33861	47	139.6	35.8	65	88.00	25.00	11.17	11.27
40	IC35196	50	107.6	34.8	50	90.00	18.33	11.83	10.17
41	IC35361	47	103.33	38.0	20	86.00	6.83	5.17	10.50
42	IC35362	47	95.8	42.2	34	87.00	18.67	9.33	8.00
43	IC35363	50	107.8	38.6	22	90.00	13.33	7.00	5.83
44	IC35364	50	125.0	36.0	48	92.00	19.50	9.00	10.67
45	IC35365	51	136.4	42.2	50	92.00	21.00	5.00	11.16
50	IC35371	44	142.0	38.0	40	86.00	18.67	10.30	8.03
51	SKGPA144	44	121.0	35.2	58	85.00	17.33	6.93	8.63
52	SKGPA145	43	135.8	37.8	40	85.00	16.33	7.00	7.67
53	SKGPA146	44	112.2	36.0	28	86.00	12.83	7.00	10.17
54	SKGPA147	49	147.6	42.6	35	90.00	20.67	8.63	9.83
55	SKGPA148	52	161.4	52.8	26	92.00	17.17	8.17	12.17
56	SKGPA149	52	131.2	39.6	52	93.00	19.50	10.67	10.17
57	SKGPA150	50	133.0	46.8	56	90.00	19.00	7.83	7.67
58	SKGPA151	52	143.8	37.8	44	92.00	16.83	8.50	10.33
S. No	Genotypes	Days to 50% flowering	Plant height (cm)	Panicle length (cm)	Seed yield per plant (g)	days to 80% maturity	leaf length (cm)	leaf width (cm)	petiole length (cm)

59	SKGPA152	53	147.0	39.8	66	92.00	20.67	8.83	10.17
60	SKGPA153	53	159.2	46.6	58	93.00	21.33	9.33	11.83
61	SKGPA154	54	151.2	47.0	62	94.00	23.00	10.17	13.17
62	SKGPA155	49	133.2	48.2	48	90.00	20.83	9.00	10.33
63	SKGPA156	53	120.6	41.2	17	90.00	21.00	8.33	11.00
64	SKGPA157	50	124.8	41.4	70	90.00	20.33	9.33	9.83
65	SKGPA158	51	121.2	38.2	50	91.00	17.17	8.83	8.33
66	SKGPA159	53	146.6	42.6	59	92.00	19.67	10.00	8.67
67	SKGPA160	54	135.6	42.8	46	90.00	17.83	9.83	11.00
68	SKGPA161	50.0	131.0	45.6	45	90.00	18.00	8.00	4.57
69	SKGPA162	47.0	111.8	37.2	22	88.00	18.33	10.50	8.33
70	SKGPA163	47.0	124.6	39.4	52	86.00	18.00	7.50	10.50
	KBGA-4 (C)	48.0	132.2	49.8	58	88.00	17.67	9.33	9.00
	KBGA-15 (C)	54.0	138.2	35.0	60	92.00	22.67	8.17	12.00
	Minimum	43.00	74.67	30.40	17.00	85.00	6.83	4.67	4.33
	Maximum	54.00	161.40	57.40	70.00	95.00	25.00	12.67	13.17
	Mean	48.82	125.54	42.39	44.32	89.86	17.33	8.24	8.69
	CV (%) Phen.	6.28	14.32	17.01	33.42	2.89	19.64	20.05	24.08

Table 79. Evaluation of germplasm in Grain Amaranth (I Year) at Mettupalayam: Kharif 2019 (Plains)

S. No	Genotypes	Plant Height (Cm)	Days to 50% Flowering	Days to 80% Maturity	Ear head height (Cm)	Yield/ Plant(g)	Grain yield(q/ha)	Seed Volume weight (g/ 10 ml)	Plant stand at harvest
1	IC35481	179.00	58.00	90.00	72.00	7.30	9.18	8.40	75.00
2	IC35482	-	-	-	-	-	-	-	-
3	IC35483	196.00	51.00	94.00	63.00	9.40	11.70	7.90	70.00
4	IC35484	185.00	50.00	95.00	61.00	8.10	10.10	7.70	73.00
5	IC35485	157.00	51.00	93.00	65.00	7.20	9.00	7.70	69.00
6	IC35486	169.00	57.00	94.00	62.00	7.20	9.00	8.30	71.00
7	IC35488	160.00	52.00	94.00	67.00	9.20	11.50	8.60	65.00
8	IC35489	188.00	50.00	95.00	69.00	7.60	9.60	8.50	72.00
9	IC35490	252.00	54.00	94.00	81.00	9.60	12.00	8.30	66.00
10	IC35491	157.00	53.00	92.00	44.00	8.00	10.00	8.00	70.00
11	IC35493	151.00	49.00	95.00	40.00	8.80	11.00	8.40	68.00
12	IC35495	-	-	-	-	-	-	-	-
13	IC35496	-	-	-	-	-	-	-	-
14	IC35497	241.00	52.00	96.00	67.00	8.80	11.00	8.00	71.00
15	IC35498	150.00	47.00	93.00	45.00	7.80	9.80	8.20	71.00
16	IC35501	169.00	50.00	94.00	59.00	8.00	10.10	7.80	70.00
17	IC35502	196.00	50.00	95.00	66.00	9.20	11.50	8.40	68.00
18	IC35503	202.00	52.00	93.00	68.00	7.70	9.60	8.00	69.00
19	IC35504	232.00	51.00	93.00	78.00	8.80	11.00	8.30	67.00
20	IC35505	187.00	52.00	96.00	69.00	8.80	11.00	8.00	70.00
21	IC35511	163.00	50.00	93.00	56.00	8.50	10.60	7.90	70.00
22	IC35514	165.00	52.00	94.00	70.00	8.60	10.80	8.10	69.00
23	IC35518	164.00	54.00	94.00	54.00	8.50	10.60	8.10	70.00
24	IC35519	173.00	53.00	94.00	63.00	8.40	10.50	8.00	70.00
25	IC35520	222.00	50.00	93.00	77.00	8.80	11.00	7.50	68.00
26	IC35521	225.00	46.00	95.00	76.00	7.70	9.70	7.70	69.00
27	IC35523	216.00	52.00	90.00	85.00	7.90	9.90	8.40	68.00
28	IC35524	185.00	51.00	90.00	62.00	8.80	11.00	8.00	71.00
29	IC35525	190.00	52.00	92.00	63.00	7.60	9.50	8.30	67.00
30	IC35527	168.00	50.00	93.00	58.00	8.00	10.00	7.60	65.00
31	IC35528	226.00	51.00	93.00	74.00	8.20	10.20	8.00	66.00
32	IC35529	-	-	-	-	-	-	-	-
33	IC35536	179.00	47.00	93.00	70.00	7.80	9.80	7.80	70.00

S. No	Genotypes	Plant Height (Cm)	Days to 50% Flowering	Days to 80% Maturity	Ear head height (Cm)	Yield/ Plant(g)	Grain yield(q/ha)	Seed Volume weight (g/ 10 ml)	Plant stand at harvest
34	IC35537	161.00	49.00	95.00	57.00	8.00	10.00	7.90	72.00
35	IC35538	177.00	48.00	95.00	67.00	7.80	9.75	7.80	71.00
36	IC35539	185.00	50.00	92.00	79.00	8.40	10.50	8.00	75.00
37	IC35541	162.00	51.00	90.00	58.00	8.60	10.80	8.20	70.00
38	IC35545	205.00	53.00	96.00	65.00	7.90	9.90	8.50	70.00
39	IC35548	202.00	51.00	93.00	60.00	8.40	10.50	8.10	70.00
40	IC35549	177.00	51.00	95.00	67.00	7.70	9.60	7.90	69.00
41	IC35550	179.00	49.00	94.00	70.00	8.00	10.00	7.70	65.00
42	IC35551	223.00	48.00	96.00	66.00	8.20	10.20	7.90	71.00
43	IC35552	212.00	52.00	93.00	73.00	7.60	9.60	8.00	72.00
44	IC35554	180.00	51.00	96.00	68.00	7.90	9.90	7.20	75.00
45	IC35560	227.00	49.00	95.00	73.00	8.40	10.50	7.80	69.00
	BGA-2 (C)	200.00	51.00	94.00	51.00	7.98	9.71	8.20	72.20
	BGA-4-9 (C)	211.00	53.00	93.00	73.00	7.98	10.92	8.10	71.60
	GA-2 (C)	214.20	54.00	90.00	54.00	5.64	9.92	8.00	70.00
	Suvarna (C)	216.60	51.00	94.00	63.00	8.50	11.56	7.50	70.40
	Minimum	150.00	46.00	90.00	40.00	5.64	9.00	7.20	65.00
	Maximum	252.00	58.00	96.00	85.00	9.60	12.00	8.60	75.00
	Mean	190.64	51.07	93.58	65.07	8.16	10.31	8.02	69.80
	CD(0.05)	6.20	-	-	-	0.49	0.66	0.00	6.69
	CV(%) Error	1.10	-	-	-	2.44	2.34	0.00	3.53
	CV (%) Phen.	13.74	4.52	1.80	14.67	8.36	7.06	3.70	3.45

Table 80. Evaluation of germplasm in Grain Amaranth (II Year) at Mettupalayam: Kharif 2019 (Plains)

S. No	Genotypes	Plant Height (Cm)	Days to 50% Flowering	Days to 80% Maturity	Ear head height (Cm)	Seed Yield/Plant(g)	Grain yield(q/ha)	Seed Volume weight (g/ 10 ml)	Plant stand at harvest
1	IC001491	201.00	48.00	90.00	63.00	8.60	10.80	8.10	75.00
2	IC001493	109.00	50.00	93.00	65.00	7.60	9.55	7.90	73.00
3	IC21789	206.00	53.00	90.00	87.00	7.80	9.80	7.80	76.00
4	IC21790	153.00	52.00	92.00	56.00	6.40	8.00	7.90	74.00
5	IC21790-A	190.00	49.00	92.00	54.00	7.60	9.50	8.30	72.00
6	IC21799	181.00	50.00	88.00	50.00	7.80	9.75	8.50	77.00
7	IC21800	161.00	51.00	90.00	58.00	7.20	9.00	9.00	72.00
8	IC21800-A	170.00	52.00	89.00	64.00	7.00	8.75	8.20	73.00
9	IC21802	157.00	48.00	92.00	52.00	7.10	8.90	7.90	69.00
10	IC21802-A	197.00	49.00	91.00	58.00	8.00	10.00	8.50	75.00
11	IC21803	212.00	52.00	93.00	60.00	7.40	9.30	7.70	75.00
12	IC21804	171.00	51.00	93.00	61.00	7.60	9.50	8.10	71.00
13	IC21805	201.00	52.00	90.00	59.00	8.00	10.00	8.00	71.00
14	IC21806	180.00	50.00	89.00	53.00	7.10	8.90	7.40	67.00
15	IC21808	212.00	51.00	89.00	58.00	7.90	9.90	8.20	71.00
16	IC21810	168.00	52.00	92.00	70.00	8.00	10.10	8.00	75.00
17	IC21940	165.00	48.00	91.00	53.00	6.70	8.70	7.50	74.00
18	IC21941	167.00	47.00	92.00	53.00	7.10	8.90	8.50	69.00
19	IC21943	202.00	50.00	90.00	72.00	7.70	9.70	9.10	67.00
20	IC21965	222.00	49.00	93.00	82.00	9.40	11.75	8.30	69.00
21	IC21970	223.00	53.00	96.00	67.00	8.00	10.00	7.80	75.00
22	IC32179	209.00	51.00	89.00	81.00	7.80	9.75	8.00	71.00
S.	Genotypes	Plant	Days to 50%	Days to	Ear head	Seed Yield/	Grain	Seed Volume	Plant stand

No		Height (Cm)	Flowering	80% Maturity	height (Cm)	Plant(g)	yield(q/ha)	weight (g/ 10 ml)	at harvest
23	IC32189	206.00	50.00	90.00	65.00	7.70	9.60	7.90	76.00
24	IC32191	211.00	51.00	93.00	71.00	8.00	10.00	8.10	78.00
25	IC32192	213.00	47.00	92.00	77.00	7.60	9.50	7.70	67.00
26	IC32196	164.00	52.00	92.00	68.00	7.80	9.70	7.60	69.00
27	IC32197	220.00	50.00	91.00	81.00	8.00	10.00	7.60	71.00
28	IC32336	214.00	49.00	94.00	79.00	8.80	11.00	7.90	75.00
29	IC33861	216.00	48.00	95.00	81.00	8.40	10.50	8.00	71.00
30	IC35196	206.00	49.00	92.00	69.00	8.50	10.60	8.30	70.00
31	IC35361	204.00	48.00	93.00	54.00	9.20	11.50	8.00	70.00
32	IC35362	200.00	47.00	89.00	80.00	8.90	11.20	7.90	77.00
33	IC35364	187.00	50.00	90.00	67.00	8.00	10.10	8.40	70.00
34	IC35365	194.00	52.00	91.00	97.00	8.40	10.50	8.20	74.00
35	IC35366	179.00	49.00	93.00	62.00	7.80	9.80	7.70	75.00
36	IC35370	203.00	50.00	91.00	77.00	8.30	10.40	7.80	74.00
37	IC35371	207.00	49.00	92.00	66.00	8.20	10.30	7.80	71.00
38	IC5527	196.00	52.00	92.00	62.00	7.50	9.40	8.00	73.00
39	IC5564	207.00	51.00	89.00	63.00	8.00	10.00	8.00	68.00
40	IC5994	172.00	52.00	91.00	60.00	8.40	10.50	8.20	72.00
41	IC6646	206.00	50.00	90.00	65.00	7.70	9.65	7.90	70.00
42	SKGPA 144	240.00	52.00	92.00	65.00	9.20	11.50	8.00	73.00
43	SKGPA 145	247.00	49.00	93.00	71.00	9.20	11.50	8.20	69.00
44	SKGPA 146	248.00	53.00	75.00	107.00	7.90	9.90	8.00	78.00
45	SKGPA 147	221.00	55.00	92.00	74.00	8.60	10.70	7.90	70.00
46	SKGPA 148	214.00	51.00	94.00	61.00	8.50	10.60	7.90	69.00
S.	Genotypes	Plant	Days to 50%	Days to	Ear head	Seed Yield/	Grain	Seed Volume	Plant stand

No		Height (Cm)	Flowering	80% Maturity	height (Cm)	Plant(g)	yield(q/ha)	weight (g/ 10 ml)	at harvest
47	SKGPA 149	243.00	50.00	91.00	76.00	7.80	9.80	8.00	72.00
48	SKGPA 150	221.00	49.00	89.00	66.00	8.90	11.20	8.40	68.00
49	SKGPA 151	190.00	47.00	92.00	57.00	8.80	11.00	8.30	75.00
50	SKGPA 152	246.00	49.00	87.00	84.00	7.60	9.50	8.30	75.00
51	SKGPA 153	224.00	48.00	90.00	68.00	7.70	9.60	8.50	71.00
52	SKGPA 154	219.00	50.00	91.00	80.00	9.20	11.50	8.60	73.00
53	SKGPA 155	190.00	54.00	90.00	52.00	8.60	10.80	8.30	76.00
54	SKGPA 156	179.00	52.00	89.00	67.00	8.60	10.80	7.90	69.00
55	SKGPA 157	179.00	52.00	89.00	67.00	8.40	10.50	7.90	67.00
56	SKGPA 158	181.00	49.00	90.00	63.00	7.80	9.75	7.70	77.00
57	SKGPA 159	195.00	53.00	92.00	71.00	8.00	10.00	7.90	77.00
58	SKGPA 160	186.00	48.00	91.00	65.00	7.80	9.80	8.00	75.00
59	SKGPA 162	160.00	50.00	92.00	56.00	7.40	9.30	8.00	69.00
60	SKGPA 163	180.00	49.00	93.00	60.00	7.70	9.60	8.50	72.00
	BGA-2 ©	201.60	51.00	94.00	51.00	8.06	10.48	8.04	73.20
	BGA-4-9 ©	214.00	52.20	93.00	73.00	7.98	9.94	8.10	74.00
	GA-2 ©	217.20	53.60	90.00	54.00	6.06	10.88	8.04	73.20
	Suvarna ©	215.80	52.00	94.00	63.00	8.30	11.14	7.84	73.60
	Minimum	109.00	47.00	75.00	50.00	6.06	8.00	7.40	67.00
	Maximum	248.00	55.00	96.00	107.00	9.40	11.75	9.10	78.00
	Mean	198.03	50.36	91.05	66.73	7.99	10.07	8.06	72.36
	CD(0.05)	3.93	2.53	0.00	1.81	0.60	0.87	0.34	5.49
	CV(%) Error	0.69	1.82	0.00	1.12	2.95	3.08	1.61	2.80
	CV (%) Phen.	12.98	3.73	2.97	16.92	8.36	7.80	3.91	4.14

Table 81. Data Grain amaranth (I Year) averaged over the locations - Kharif 2019 (Plains)

S. No.	Genotypes	Days to 50% flowering			Plant height (cm)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
1	IC35481	51.00	58.00	54.50	105.60	179.00	142.30
2	IC35482	51.00	-	51.00	89.25	-	89.25
3	IC35483	51.00	51.00	51.00	140.20	196.00	168.10
4	IC35484	50.00	50.00	50.00	143.40	185.00	164.20
5	IC35485	51.00	51.00	51.00	152.80	157.00	154.90
6	IC35486	50.00	57.00	53.50	157.80	169.00	163.40
7	IC35488	47.00	52.00	49.50	150.60	160.00	155.30
8	IC35489	48.00	50.00	49.00	99.20	188.00	143.60
9	IC35490	48.00	54.00	51.00	123.40	252.00	187.70
10	IC35491	46.00	53.00	49.50	82.40	157.00	119.70
11	IC35493	54.00	49.00	51.50	131.60	151.00	141.30
12	IC35495	51.00	-	51.00	128.00	-	128.00
13	IC35496	53.00	-	53.00	138.60	-	138.60
14	IC35497	50.00	52.00	51.00	111.00	241.00	176.00
15	IC35498	49.00	47.00	48.00	126.40	150.00	138.20
16	IC35501	49.00	50.00	49.50	115.00	169.00	142.00
17	IC35502	49.00	50.00	49.50	128.20	196.00	162.10
18	IC35503	49.00	52.00	50.50	92.00	202.00	147.00
19	IC35504	50.00	51.00	50.50	147.00	232.00	189.50
20	IC35505	48.00	52.00	50.00	137.40	187.00	162.20
21	IC35511	48.00	50.00	49.00	117.00	163.00	140.00
22	IC35514	-	52.00	52.00	-	165.00	165.00
23	IC35517	-	-	#DIV/0!	-	-	#DIV/0!
24	IC35518	47.00	54.00	50.50	125.00	164.00	144.50
25	IC35519	50.00	53.00	51.50	119.50	173.00	146.25
26	IC35520	-	50.00	50.00	-	222.00	222.00
27	IC35521	49.00	46.00	47.50	125.20	225.00	175.10
28	IC35523	49.00	52.00	50.50	95.00	216.00	155.50
29	IC35524	48.00	51.00	49.50	133.00	185.00	159.00
30	IC35525	-	52.00	52.00	-	190.00	190.00
31	IC35527	50.00	50.00	50.00	141.00	168.00	154.50
32	IC35528	-	51.00	51.00	-	226.00	226.00
33	IC35529	47.00	-	47.00	138.60	-	138.60
S No.	Genotypes	Days to 50% flowering			Plant height (cm)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
34	IC35530	50.00	-	50.00	120.00	-	120.00

35	IC35531	51.00	-	51.00	107.20	-	107.20
36	IC35533	48.00	-	48.00	134.00	-	134.00
37	IC35536	-	47.00	47.00	-	179.00	179.00
38	IC35537	48.00	49.00	48.50	122.20	161.00	141.60
39	IC35538	49.00	48.00	48.50	115.00	177.00	146.00
40	IC35539	50.00	50.00	50.00	121.80	185.00	153.40
41	IC35541	51.00	51.00	51.00	103.00	162.00	132.50
42	IC35542	46.00	-	46.00	126.80	-	126.80
43	IC35545	50.00	53.00	51.50	123.00	205.00	164.00
44	IC35548	48.00	51.00	49.50	115.80	202.00	158.90
45	IC35549	49.00	51.00	50.00	135.60	177.00	156.30
46	IC35550	-	49.00	49.00	-	179.00	179.00
47	IC35551	48.00	48.00	48.00	139.60	223.00	181.30
48	IC35552	47.00	52.00	49.50	141.00	212.00	176.50
49	IC35554	47.00	51.00	49.00	159.60	180.00	169.80
50	IC35560	51.00	49.00	50.00	151.00	227.00	189.00
51	KBGA-4	44.00	-	44.00	141.40	-	141.40
52	KBGA-15	52.00	-	52.00	143.40	-	143.40
	BGA-2 (C)	-	51.00	51.00	-	200.00	200.00
	BGA-4-9(C)	-	53.00	53.00	-	211.00	211.00
	GA-2(C)	-	54.00	54.00	-	214.20	214.20
	Suvarna (C)	-	51.00	51.00	-	216.60	216.60
	Minimum	44.00	46.00	45.00	82.40	150.00	116.20
	Maximum	54.00	58.00	56.00	159.60	252.00	205.80
	Mean	49.16	51.07	50.11	126.55	190.64	158.59
	CD(0.05)	-	-	-	-	6.20	6.20
	CV(%) Error	-	-	-	-	1.10	1.10
	CV (%) Phen.	3.90	4.52	4.21	14.62	13.74	14.18

Table 82. Data Grain amaranth (I Year) averaged over the locations - Kharif 2019 (Plains)contd.

S. No.	Genotypes	Days to 80% maturity			Grain yield/ Plant (g)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
1	IC35481	92.00	90.00	91.00	26.00	9.18	17.59
2	IC35482	91.00	-	91.00	20.67	-	20.67
3	IC35483	92.00	94.00	93.00	70.00	11.70	40.85
4	IC35484	93.00	95.00	94.00	50.00	10.10	30.05
5	IC35485	92.00	93.00	92.50	70.00	9.00	39.50
6	IC35486	94.00	94.00	94.00	80.00	9.00	44.50
7	IC35488	86.00	94.00	90.00	80.00	11.50	45.75
8	IC35489	87.00	95.00	91.00	25.00	9.60	17.30
9	IC35490	86.00	94.00	90.00	30.00	12.00	21.00
10	IC35491	86.00	92.00	89.00	30.00	10.00	20.00
11	IC35493	94.00	95.00	94.50	40.00	11.00	25.50
12	IC35495	91.00	-	91.00	42.00	-	42.00
13	IC35496	93.00	-	93.00	88.00	-	88.00
14	IC35497	91.00	96.00	93.50	70.00	11.00	40.50
15	IC35498	90.00	93.00	91.50	22.00	9.80	15.90
16	IC35501	89.00	94.00	91.50	38.00	10.10	24.05
17	IC35502	90.00	95.00	92.50	35.00	11.50	23.25
18	IC35503	90.00	93.00	91.50	22.10	9.60	15.85
19	IC35504	92.00	93.00	92.50	85.00	11.00	48.00
20	IC35505	88.00	96.00	92.00	50.00	11.00	30.50
21	IC35511	86.00	93.00	89.50	48.00	10.60	29.30
22	IC35514	-	94.00	94.00	-	10.80	10.80
23	IC35517	-	-	-	-	-	-
24	IC35518	86.00	94.00	90.00	42.00	10.60	26.30
25	IC35519	89.00	94.00	91.50	20.00	10.50	15.25
26	IC35520	-	93.00	93.00	-	11.00	11.00
27	IC35521	89.00	95.00	92.00	50.00	9.70	29.85
28	IC35523	91.00	90.00	90.50	50.00	9.90	29.95
29	IC35524	90.00	90.00	90.00	60.00	11.00	35.50
30	IC35525	-	92.00	92.00	-	9.50	9.50
31	IC35527	92.00	93.00	92.50	53.33	10.00	31.67
32	IC35528	-	93.00	93.00	-	10.20	10.20
33	IC35529	88.00	-	88.00	75.00	-	75.00
34	IC35530	91.00	-	91.00	50.00	-	50.00

S No.	Genotypes	Days to 80% maturity			Grain yield/ Plant (g)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
35	IC35531	92.00	-	92.00	37.50	-	37.50
36	IC35533	90.00	-	90.00	34.80	-	34.80
37	IC35536	-	93.00	93.00	-	9.80	9.80
38	IC35537	88.00	95.00	91.50	32.00	10.00	21.00
39	IC35538	89.00	95.00	92.00	23.00	9.75	16.38
40	IC35539	90.00	92.00	91.00	30.00	10.50	20.25
41	IC35541	92.00	90.00	91.00	48.00	10.80	29.40
42	IC35542	88.00	-	88.00	62.50	-	62.50
43	IC35545	90.00	96.00	93.00	60.00	9.90	34.95
44	IC35548	89.00	93.00	91.00	64.00	10.50	37.25
45	IC35549	90.00	95.00	92.50	62.00	9.60	35.80
46	IC35550	-	94.00	94.00	-	10.00	10.00
47	IC35551	88.00	96.00	92.00	50.00	10.20	30.10
48	IC35552	86.00	93.00	89.50	60.00	9.60	34.80
49	IC35554	87.00	96.00	91.50	47.00	9.90	28.45
50	IC35560	92.00	95.00	93.50	70.00	10.50	40.25
51	KBGA-4	85.00	-	85.00	82.50	-	82.50
52	KBGA-15	93.00	-	93.00	80.00	-	80.00
	BGA-2 ©	-	94.00	94.00	-	9.71	9.71
	BGA-4-9 ©	-	93.00	93.00	-	10.92	10.92
	GA-2 ©	-	90.00	90.00	-	9.92	9.92
	Suvarna ©	-	94.00	94.00	-	11.56	11.56
	Minimum	85.00	90.00	87.50	20.00	9.00	14.50
	Maximum	94.00	96.00	95.00	88.00	12.00	50.00
	Mean	89.73	93.58	91.66	50.34	10.31	30.33
	CD(0.05)	-	-	-	-	0.66	0.66
	CV(%) Error	-	-	-	-	2.34	2.34
	CV (%) Phen.	2.69	1.80	2.25	39.31	7.06	23.18

Table 83.Data Grain amaranth (II Year) averaged over the locations - Kharif 2019 (Plains) (Plains)

S. No.	Genotypes	Days to 50% flowering			Plant height (cm)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
1	IC001491	45.00	48.00	46.50	97.40	201.00	149.20
2	IC001493	45.00	50.00	47.50	110.33	109.00	109.67
7	IC21789	50.00	53.00	51.50	121.40	206.00	163.70
8	IC21790	44.00	52.00	48.00	134.40	153.00	143.70
9	IC21790A	44.00	49.00	46.50	140.20	190.00	165.10
10	IC21792	50.00	-	50.00	132.00	-	132.00
11	IC21793	45.00	-	45.00	74.67	-	74.67
12	IC21795	-	-	-	-	-	-
13	IC21796	-	-	-	-	-	-
14	IC21796A	-	-	-	-	-	-
15	IC21796B	-	-	-	-	-	-
16	IC21799	-	50.00	50.00	-	181.00	181.00
17	IC21800	-	51.00	51.00	-	161.00	161.00
18	IC21800A	-	52.00	52.00	-	170.00	170.00
19	IC21802	45.00	48.00	46.50	145.80	157.00	151.40
20	IC21802A	51.00	49.00	50.00	125.20	197.00	161.10
21	IC21803	51.00	52.00	51.50	123.60	212.00	167.80
22	IC21804	47.00	51.00	49.00	145.20	171.00	158.10
23	IC21805	51.00	52.00	51.50	132.00	201.00	166.50
24	IC21806	52.00	50.00	51.00	120.20	180.00	150.10
25	IC21808	-	51.00	51.00	-	212.00	212.00
26	IC21810	-	52.00	52.00	-	168.00	168.00
27	IC21940	49.00	48.00	48.50	121.00	165.00	143.00
28	IC21941	52.00	47.00	49.50	115.20	167.00	141.10
29	IC21943	46.00	50.00	48.00	84.80	202.00	143.40
30	IC21965	47.00	49.00	48.00	105.20	222.00	163.60
31	IC21970	48.00	53.00	50.50	81.33	223.00	152.17
32	IC32179	47.00	51.00	49.00	124.00	209.00	166.50
33	IC32189	47.00	50.00	48.50	119.80	206.00	162.90
34	IC32191	50.00	51.00	50.50	-	211.00	211.00
35	IC32192	51.00	47.00	49.00	116.20	213.00	164.60
36	IC32196	51.00	52.00	51.50	128.00	164.00	146.00
37	IC32197	-	50.00	50.00	-	220.00	220.00
38	IC32336	-	49.00	49.00	-	214.00	214.00

S.No	Genotypes	Days to 50% flowering			Plant height (cm)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
39	IC33861	47.00	48.00	47.50	139.60	216.00	177.80
40	IC35196	50.00	49.00	49.50	107.60	206.00	156.80
41	IC35361	47.00	48.00	47.50	103.33	204.00	153.67
42	IC35362	47.00	47.00	47.00	95.80	200.00	147.90
43	IC35363	50.00	-	50.00	107.80	-	107.80
44	IC35364	50.00	50.00	50.00	125.00	187.00	156.00
45	IC35365	51.00	52.00	51.50	136.40	194.00	165.20
46	IC35366	-	49.00	49.00	-	179.00	179.00
47	IC35367	-	-	-	-	-	-
48	IC35368	-	-	-	-	-	-
49	IC35370	-	50.00	50.00	-	203.00	203.00
50	IC35371	44.00	49.00	46.50	142.00	207.00	174.50
3	IC5527	45.00	52.00	48.50	123.40	196.00	159.70
4	IC5564	46.00	51.00	48.50	118.40	207.00	162.70
5	IC5994	46.00	52.00	49.00	134.00	172.00	153.00
6	IC6646	50.00	50.00	50.00	135.60	206.00	170.80
51	SKGPA144	44.00	52.00	48.00	121.00	240.00	180.50
52	SKGPA145	43.00	49.00	46.00	135.80	247.00	191.40
53	SKGPA146	44.00	53.00	48.50	112.20	248.00	180.10
54	SKGPA147	49.00	55.00	52.00	147.60	221.00	184.30
55	SKGPA148	52.00	51.00	51.50	161.40	214.00	187.70
56	SKGPA149	52.00	50.00	51.00	131.20	243.00	187.10
57	SKGPA150	50.00	49.00	49.50	133.00	221.00	177.00
58	SKGPA151	52.00	47.00	49.50	143.80	190.00	166.90
59	SKGPA152	53.00	49.00	51.00	147.00	246.00	196.50
60	SKGPA153	53.00	48.00	50.50	159.20	224.00	191.60
61	SKGPA154	54.00	50.00	52.00	151.20	219.00	185.10
62	SKGPA155	49.00	54.00	51.50	133.20	190.00	161.60
63	SKGPA156	53.00	52.00	52.50	120.60	179.00	149.80
64	SKGPA157	50.00	52.00	51.00	124.80	179.00	151.90
65	SKGPA158	51.00	49.00	50.00	121.20	181.00	151.10
66	SKGPA159	53.00	53.00	53.00	146.60	195.00	170.80
67	SKGPA160	54.00	48.00	51.00	135.60	186.00	160.80
68	SKGPA161	50.00	-	50.00	131.00	-	131.00
69	SKGPA162	47.00	50.00	48.50	111.80	160.00	135.90
70	SKGPA163	47.00	49.00	48.00	124.60	180.00	152.30

S.No	Genotypes	Days to 50% flowering			Plant height (cm)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
71	KBGA-4	48.00	-	48.00	132.20	-	132.20
72	KBGA-15	54.00	-	54.00	138.20	-	138.20
	BGA-2 ©	-	51.00	51	-	201.60	201.60
	BGA-4-9 ©	-	52.20	52.2	-	214.00	214.00
	GA-2 ©	-	53.60	53.6	-	217.20	217.20
	Suvarna ©	-	52.00	52	-	215.80	215.80
	Minimum	43.00	47.00	45	74.67	109.00	91.84
	Maximum	54.00	55.00	54.5	161.40	248.00	204.70
	Mean	48.82	50.36	49.59	125.54	198.03	161.78
	CD(0.05)	-	2.53	2.532	-	3.93	3.93
	CV(%) Error	-	1.82	1.817	-	0.69	0.69
	CV (%) Phen.	6.28	3.73	5.006	14.32	12.98	13.65

Table 84. Data Grain amaranth (II Year) averaged over the locations - Kharif 2019 (Plains) contd.

S. No.	Genotypes	Days to 80% maturity			Seed yield per plant (g)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
1	IC001491	86.00	90.00	88.00	24.00	8.60	16.30
2	IC001493	85.00	93.00	89.00	30.00	7.60	18.80
7	IC21789	92.00	90.00	91.00	22.00	7.80	14.90
8	IC21790	87.00	92.00	89.50	28.00	6.40	17.20
9	IC21790A	85.00	92.00	88.50	64.00	7.60	35.80
10	IC21792	93.00	-	93.00	65.00	-	65.00
11	IC21793	92.00	-	92.00	25.00	-	25.00
16	IC21799	-	88.00	88.00	-	7.80	7.80
17	IC21800	-	90.00	90.00	-	7.20	7.20
18	IC21800A	-	89.00	89.00	-	7.00	7.00
19	IC21802	88.00	92.00	90.00	52.00	7.10	29.55
20	IC21802A	90.00	91.00	90.50	54.00	8.00	31.00
21	IC21803	93.00	93.00	93.00	40.00	7.40	23.70
22	IC21804	88.00	93.00	90.50	30.00	7.60	18.80
23	IC21805	92.00	90.00	91.00	35.20	8.00	21.60
24	IC21806	93.00	89.00	91.00	48.00	7.10	27.55
25	IC21808	-	89.00	89.00	-	7.90	7.90
26	IC21810	-	92.00	92.00	-	8.00	8.00
27	IC21940	90.00	91.00	90.50	30.00	6.70	18.35
28	IC21941	95.00	92.00	93.50	56.00	7.10	31.55
29	IC21943	88.00	90.00	89.00	57.00	7.70	32.35
30	IC21965	89.00	93.00	91.00	54.00	9.40	31.70
31	IC21970	90.00	96.00	93.00	52.00	8.00	30.00
32	IC32179	88.00	89.00	88.50	65.00	7.80	36.40
33	IC32189	88.00	90.00	89.00	56.00	7.70	31.85
34	IC32191	90.00	93.00	91.50	51.00	8.00	29.50
35	IC32192	92.00	92.00	92.00	52.00	7.60	29.80
36	IC32196	93.00	92.00	92.50	48.00	7.80	27.90
37	IC32197	-	91.00	91.00	-	8.00	8.00
38	IC32336	-	94.00	94.00	-	8.80	8.80
39	IC33861	88.00	95.00	91.50	65.00	8.40	36.70
40	IC35196	90.00	92.00	91.00	50.00	8.50	29.25
41	IC35361	86.00	93.00	89.50	20.00	9.20	14.60
42	IC35362	87.00	89.00	88.00	34.00	8.90	21.45

S.No	Genotypes	Days to 80% maturity			Seed yield per plant (g)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
43	IC35363	90.00	-	90.00	22.00	-	22.00
44	IC35364	92.00	90.00	91.00	48.00	8.00	28.00
45	IC35365	92.00	91.00	91.50	50.00	8.40	29.20
46	IC35366	-	93.00	93.00	-	7.80	7.80
49	IC35370	-	91.00	91.00	-	8.30	8.30
50	IC35371	86.00	92.00	89.00	40.00	8.20	24.10
3	IC5527	92.00	92.00	92.00	36.00	7.50	21.75
4	IC5564	90.00	89.00	89.50	22.00	8.00	15.00
5	IC5994	91.00	91.00	91.00	17.00	8.40	12.70
6	IC6646	92.00	90.00	91.00	32.00	7.70	19.85
51	SKGPA144	85.00	92.00	88.50	58.00	9.20	33.60
52	SKGPA145	85.00	93.00	89.00	40.00	9.20	24.60
53	SKGPA146	86.00	75.00	80.50	28.00	7.90	17.95
54	SKGPA147	90.00	92.00	91.00	35.00	8.60	21.80
55	SKGPA148	92.00	94.00	93.00	26.00	8.50	17.25
56	SKGPA149	93.00	91.00	92.00	52.00	7.80	29.90
57	SKGPA150	90.00	89.00	89.50	56.00	8.90	32.45
58	SKGPA151	92.00	92.00	92.00	44.00	8.80	26.40
59	SKGPA152	92.00	87.00	89.50	66.00	7.60	36.80
60	SKGPA153	93.00	90.00	91.50	58.00	7.70	32.85
61	SKGPA154	94.00	91.00	92.50	62.00	9.20	35.60
62	SKGPA155	90.00	90.00	90.00	48.00	8.60	28.30
63	SKGPA156	90.00	89.00	89.50	17.00	8.60	12.80
64	SKGPA157	90.00	89.00	89.50	70.00	8.40	39.20
65	SKGPA158	91.00	90.00	90.50	50.00	7.80	28.90
66	SKGPA159	92.00	92.00	92.00	59.00	8.00	33.50
67	SKGPA160	90.00	91.00	90.50	46.00	7.80	26.90
68	SKGPA161	90.00	-	90.00	45.00	-	45.00
69	SKGPA162	88.00	92.00	90.00	22.00	7.40	14.70
70	SKGPA163	86.00	93.00	89.50	52.00	7.70	29.85

S.No	Genotypes	Days to 80% maturity			Seed yield per plant (g)		
		Bangalore	Mettupalayam	Mean	Bangalore	Mettupalayam	Mean
	KBGA-4 (C)	88.00	-	88.00	58.00	-	58.00
	KBGA-15 (C)	92.00	-	92.00	60.00	-	60.00
	BGA-2 (C)	-	94.00	94.00	-	8.06	8.06
	BGA-4-9 (C)	-	93.00	93.00	-	7.98	7.98
	GA-2 (C)	-	90.00	90.00	-	6.06	6.06
	Suvarna (C)	-	94.00	94.00	-	8.30	8.30
	Minimum	85.00	75.00	80.00	17.00	6.06	11.53
	Maximum	95.00	96.00	95.50	70.00	9.40	39.70
	Mean	89.86	91.05	90.45	44.32	7.99	26.15
	CD(0.05)	-	0.00	0.00	-	0.60	0.60
	CV(%) Error	-	0.00	0.00	-	2.95	2.95
	CV (%) Phen.	2.89	2.97	2.93	33.42	8.36	20.89

Table 85. Promising lines in Grain Amaranth germplasm during Kharif 2019 at different locations (Plains)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Bengaluru (50 Genotypes), Grain Amaranth (I Year)					
1	Days to 50% flowering	44.0	54.0	-	KBGA-4 (44.00)
2	Plant height (cm) Tall	82.4	159.6	IC35554 (159.60), IC35486 (157.80)	KBGA-15 (143.40)
3	Plant height (cm) Dwarf	82.4	159.6	IC35491 (82.40), IC35482 (89.25), IC35503 (92.00), IC35523 (95.00), IC35489 (99.20), IC35541 (103.00), IC35481 (105.60), IC35531 (107.20)	KBGA-4 (141.40)
4	Panicle length (cm)	26.2	62.0	IC35495 (62.00), IC35505 (61.20), IC35496 (61.20), IC35560 (60.50), IC35524 (59.60), IC35554 (57.20)	KBGA-4 (49.80)
5	Grain yield (g/pl)	20.00	88.00	IC35496 (88.00)	KBGA-4 (82.50)
6	days to maturity	85.00	94.00	-	KBGA-15 (93.00)
7	Leaf length (cm)	9.83	23.00	-	KBGA-15 (23.00)
8	Leaf width (cm)	5.50	15.33	IC35489 (15.33), IC35529 (12.50)	KBGA-15 (11.50)
9	Petiole length (cm)	4.33	14.67	-	KBGA-15 (14.67)
Bengaluru (70 Genotypes), Grain Amaranth (II Year)					
1	Days to 50% flowering	43.0	54.0	SKGPA145 (43.0), IC21790 (44.0), IC21790A (44.0), IC35371 (44.0), SKGPA144 (44.0), SKGPA146 (44.0)	KBGA-4 (48.0)
2	Plant height (cm) Tall	74.7	161.4	SKGPA148 (161.4), SKGPA153 (159.2), SKGPA154 (151.2), SKGPA147 (147.6)	KBGA-15 (138.2)
3	Plant height (cm) Dwarf	74.7	161.4	IC21793 (74.7), IC21970 (81.3), IC21943 (84.8), IC35362 (95.8), IC001491 (97.4), IC35361 (103.3), IC21965 (105.2), IC35196 (107.6),	KBGA-4 (132.2)
4	Panicle length (cm)	30.4	57.4	IC5527 (57.4), IC21803 (56.8), IC5994 (54.8), IC6646 (54.2),	KBGA-4 (49.8)
5	Grain yield per plant (g)	17.00	70.00	SKGPA157 (70.0), SKGPA152 (66.0)	KBGA-15 (60.0)
6	Days to maturity	85.00	95.00	-	KBGA-4 (88.0)
7	Leaf length (cm)	6.83	25.00	IC33861 (25.00)	KBGA-15 (22.67)
8	Leaf width (cm)	4.67	12.67	IC21790A (12.67), IC35196 (11.83), IC33861 (11.17)	KBGA-4 (9.33)
9	Petiole length (cm)	4.33	13.17	SKGPA154 (13.17)	KBGA-15 (12.00)
Mettupalayam (50 Genotypes), Grain Amaranth (I Year)					
1	Plant height (cm)	150.0	252.0	IC035490 (252.0), IC035497 (241.0), IC035504 (232.0)	Suvarna (216.6)
2	Days to 50% flowering	46.0	58.0	IC035521 (46.0), IC035536 (47.0), IC035498 (47.0)	Suvarna (51.0)
3	Days to 80% maturity	90.0	96.0	-	GA-2 (90.0)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
4	Inflorescence length (cm)	40.00	85.00	IC035523 (85.00), IC035490 (81.00), IC035539 (79.00), IC035504 (78.00)	BGA-4-9 (73.00)
5	Seed yield/plant (g)	5.64	9.60	IC035490 (9.60), IC035483 (9.40), IC035488 (9.20), IC035502 (9.20)	Suvarna (8.50)
6	Seed yield/ha (q)	9.00	12.00	-	Suvarna (11.56)
7	Seed volume weight (g/10ml)	7.20	8.60	IC035488 (8.60), IC035545 (8.50), IC035489 (8.50)	BGA-2 (8.20)
8	Plant stand at harvest	65.00	75.00	-	BGA-2 (72.20)
Mettupalayam (70 Genotypes), Grain Amaranth (II Year)					
1	Plant height (cm) Tall	109.0	248.0	SKGPA 146 (248.00), SKGPA 145 (247.00), SKGPA 152 (246.00), SKGPA 149 (243.00), SKGPA 144 (240.00)	GA-2 (217.20)
2	Days to 50% flowering	47.0	55.0	IC032192 (47.00), IC035362 (47.00), SKGPA 151 (47.00), IC021941 (47.00), SKGPA 153 (48.00), IC033861 (48.00), IC035361 (48.00), IC001491 (48.00)	BGA-2 (51.00)
3	Days to 80% maturity	75.0	96.0	SKGPA 146 (75.00)	GA-2 (90.00)
4	Inflorescence length (cm)	50.00	107.00	SKGPA 146 (107.00), IC035365 (97.00), IC021789 (87.00), SKGPA 152 (84.00), IC021965 (82.00), IC032179 (81.00), IC032197 (81.00), IC033861 (81.00)	BGA-4-9 (73.00)
5	Seed yield/plant (g)	6.06	9.40	IC021965 (9.40), SKGPA 154 (9.20), SKGPA 145 (9.20), SKGPA 144 (9.20), IC035361 (9.20), IC035362 (8.90), SKGPA 150 (8.90)	Suvarna (8.30)
6	Seed yield/ha (q)	8.00	11.75	-	Suvarna (11.14)
7	Seed volume weight (g/10ml)	7.40	9.10	IC021943 (9.10), IC021800 (9.00), SKGPA 154 (8.60)	BGA-4-9 (8.10)
8	Plant stand at harvest	67.00	78.00	IC032191 (78.00), SKGPA 146 (78.00), IC021799 (77.00), IC035362 (77.00), SKGPA 159 (77.00), SKGPA 158 (77.00)	BGA-4-9 (74.00)

Table 86. Promising lines in Grain Amaranth germplasm (I year) during Kharif 2019 based on locations (Plains)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Days to 50% flowering	44.00	54.50	KBGA-4 (44.00), IC35542 (46.00), IC35529 (47.00), IC35536 (47.00), IC35521 (47.50), IC35498 (48.00)	BGA-2 (51.00)
2	Plant height (cm) Dwarf	89.25	226.00	IC35482 (89.25), IC35531 (107.20), IC35491 (119.70), IC35530 (120.00), IC35542 (126.80), IC35495 (128.00)	BGA-2 (200.00)
3	Plant height (cm) Tall	89.25	226.00	IC35528 (226.00), IC35520 (222.00)	Suvarna (216.60)
	Days to 80% maturity	85.00	94.50	KBGA-4 (85.00), IC35529 (88.00), IC35542 (88.00), IC35491 (89.00)	GA-2 (90.00)
4	Grain yield/ Plant (g)	9.50	88.00	IC35496 (88.00), KBGA-4 (82.50), KBGA-15 (80.00), IC35529 (75.00), IC35542 (62.50)	Suvarna (11.56)

Table 87. Promising lines in Grain Amaranth germplasm (II year) during Kharif 2019 based on all locations (Plains)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Days to 50% flowering	45.00	54.50	IC21793 (45.00), SKGPA145 (46.00), IC001491 (46.50), IC21790A (46.50), IC21802 (46.50), IC35371 (46.50)	BGA-2 (51.0)
2	Plant height (cm) Dwarf	74.67	220.00	IC21793 (74.67), IC35363 (107.80), IC001493 (109.67), SKGPA161 (131.00), IC21792 (132.00), KBGA-4 (132.20)	BGA-2 (201.6)
	Plant height (cm) Tall	74.67	220.00	IC32197 (220.00)	GA-2 (217.2)
3	Days to 80% maturity	80.50	94.00	SKGPA146 (80.50), IC21799 (88.00), IC001491 (88.00), IC35362 (88.00), KBGA-4 (88.00), SKGPA144 (88.50)	GA-2 (90.00)
4	Seed yield per plant (g)	6.06	65.00	IC21792 (65.00), KBGA-15 (60.00), KBGA-4 (58.00), SKGPA161 (45.00), SKGPA157 (39.20), SKGPA152 (36.80), IC33861 (36.70), IC32179 (36.40), IC21790A (35.80)	Suvarna (8.30)

2.4.2.2 Winged bean (*Psophocarpus tetragonolobus*)

A set of 100 genotypes having 50 each in 1st and 2nd year was planned for evaluation at six locations viz. Akola, Ambikapur, Faizabad, Lamphelpet, Lembucherra, Rahuri, Raipur and Ranchi in Augmented Block Design along with 2 checks viz. AKWB-1 and IWB-1. The experimental details are presented in Table 88. Data were received from Ambikapur, Faizabad, Rahuri and Ranchi centre's. The list of promising lines including range and mean at all centres for all the descriptors is presented in Tables 89 to 102.

At IGKV Ambikapur, a set of 100 genotypes was evaluated for nine quantitative characters along with two checks i.e. AKWB-1 and Indira IWB-1 and are presented in Tables 89 and 96 to 102. Pod length varied from 15.0 cm to 22.0 cm and the genotype EC178308 (22.0 cm) showed superiority over the best check IWB-1 (21.11 cm). The genotypes EC178319 (78.13 g), EC178335 (76.54 g) and RWBGP-22 (69.44 g) showed best results for seed yield per plant as compared to the best check RMDWB-1 (42.43 g). None of the genotypes were superior over the best check in days to 50% flowering, days to 80% maturity, number of pods per plant, number of seeds/pod and green pod yield/plant.

At UBKV Cooch behar, a set of 100 genotypes were evaluated for eight quantitative characters along with two checks i.e. AKWB-1 and Indira IWB-1. The range and promising accessions are presented in Tables 90 and 96 to 102. The number of pods per plant ranged from 9.0 to 16.0 and the promising genotypes were RWBGP08, RWBGP25 and RWBGP01 (16.0) and were better than the best check IWB-1 (13.20). The genotypes RWBGP13 (32.58 g) followed by RWBGP25 (32.25 g) and RWBGP01 (32.04 g) were superior for high seed yield per plant as compared to the best check IWB-1 (24.36 g). The number of seeds per pods ranged from 7.0 to 14.0 and were recorded highest in RWBGP13 (14.0), RWBGP23 and RWBGP08 (13.0) and were better than best check IWB-1 (12.0). The bold seeded (100 seed weight) genotypes were RWBGP10 (36.52 g) followed by RWBGP04 (36.12 g) and RWBGP 01 (35.248g) and were significantly better than the best check IWB-1 (33.93 g). The genotypes RWBGP13 (17.8 cm) and RWBGP08 (17.4 cm) were promising for pod length, while genotypes RWBGP23 and RWBGP07 (3.3 cm) followed by RWBGP08 (3.2 cm) for pod width, which were better than the best check IWB-1 (14.82 cm and 2.86 cm, respectively).

At NDUAT Ayodhya, a set of 100 genotypes were evaluated for six quantitative characters. The range and promising accessions are presented in Tables 91 and 96 to 102. The early flowering genotypes were RWBPC15 (79.0 days) followed by RWBPC5 and RWBPC22 (80.0 days). The number of pods per plant ranged from 7.0 to 10.50 and the promising genotypes were RWBPC22 and RWBPC11 (10.5) followed by RWBPC19 (10.0). The genotypes RWBPC10 (23.0 g) followed by RWBPC24 (22.0 g) and RWBPC6 (21.5 g). The number of seeds per pods ranged from 8.0 to 12.0 and were recorded highest in RWBPC17 (12.0), RWBPC14 and RWBPC1 (11.25). The bold seeded (100 seed weight) genotypes were RWBPC16 (29.15 g) followed by RWBPC19 (29.10 g) and RWBPC23 (29.05 g).

At MKPV Rahuri, during I year a set of 50 genotypes was evaluated for eight quantitative characters along with two checks i.e. AKWB-1 and IWB-1 and are presented in Tables 92 and 96 to 102. The early flowering genotypes were RWBPG3 (71.0 days) followed by RWBPG5 (72.0 days) and RWBPG14 (73.0 days) and were better than best check IWB-1 (85.4 days), whereas genotypes EC178308 (163.0 days) followed by RWBPG10 (166.0 days) and EC178299 (167.0 days) which were superior than the best check IWB-1 (174.60 days) for early maturity. The genotypes EC178319 (20.3 cm) followed by EC178317 (18.8 cm) and RWBPG21 (18.7 cm) showed superiority for pod length over the best check IWB-1 (17.46 cm). Pod width was found maximum in the genotypes EC178309, RWBPG6 and EC178313 (2.8 cm) and were better than the best check AKWB-1 (2.4 cm). More number of seeds per pod were found in RWBPG25, RWBPG22 and RWBPG24 (12.0) and were better than the best check IWB-1 (10.6). The 100 seed weight ranged 19.0 g to 32.0 g having promising genotype IC26904 and IC26944 (32.0 g) followed by RWBPG4 (31.5 g) which were better than the best check IWB-1 (26.8 g).

At MKPV Rahuri, during II year a set of 50 genotypes was evaluated for eight quantitative characters along with two checks i.e. AKWB-1 and IWB-1 and are presented in Table 93 and 96 to 102. The early flowering genotypes were EC38824-2 (70.0 days) followed by IC095234 and IC095238 (72.0 days) and were better than best check IWB-1 (82.2 days), whereas genotypes EC038821-1 and EC027884 (169.0 days) followed by EC021904 (170.0 days) which were superior than the best check AKWB-1 (187.60 days) for early maturity. The genotypes IC095233 (22.0 cm) followed by EC021904 (19.9 cm) and IC112416 (18.9 cm) showed superiority for pod length over the best check IWB-1 (16.2 cm). Pod width was found

maximum in the genotypes IC095233 (3.0 cm), IC095224 (2.6 cm) and IC095227 (2.5 cm) and were better than the best check AKWB-1 (2.1 cm). More number of seeds per pod were found in EC21904 (14.0) followed by IC011885 and IC095228 (13.0) and were better than the best check IWB-1 (11.40). The promising genotypes for 25 grain pod weight were IC045232 and IC095233 (418.0 g) followed by IC095226 (416.0 g) which were better than the best check AKWB-1 (314.8 g). The 100 seed weight ranged 21.0 g to 34.5 g having promising genotypes IC095227 (34.5 g) followed by IC095226 (33.5 g) and IC026949 (33.0 g) which were better than the best check AKWB-1 (26.52g).

At BAU Ranchi, a set of 100 genotypes was evaluated for twenty quantitative characters along with two checks i.e. AKWB-1 and IWB-1 and are presented in Tables 94, 95 and 96 to 102. The pod length ranged from 14.0 cm to 24.0 cm and the promising genotypes were RWBPG16 (24.0 cm) followed by RWBPG22 (21.0 cm) and RWBPG7 (20.0 cm) showed superiority over the best check AKWB-1 (17.0 cm), while pod width was found maximum in the genotypes RWBPG19 (4.0 cm), RWBPG7 and RWBPG4 (3.5 cm) and were better than the best check HWB-1 (2.9 cm). More number of seeds per pod were found in RWBPG22 (19.0) followed by RWBPG16 (18.0) and RWBPG4 (17.0) and were better than the best check AKWB-1 (15.4) while more number of pods per plant were recorded in RWBPG25 (53.0) followed by RWBPG3 (50.0) and RWBPG18 (48.0) and were better than the best check RMDWB-1 (35.20). The 100 seed weight ranged 27.5 g to 36.5 g having promising genotype RWBPG4 (36.5 g) followed by EC178308 (36.4 g) which were better than the best check RMDWB-1 (33.56 g). The high yielding genotypes (seed yield per plant) were RWBPG13 (38.2 g) followed by RWBPG9 (36.5 g) and RWBPG20 (36.3 g) which were better than the best check HWB-1 (23.94 g).

Over the locations for all five centres viz., Ambikapur, Lamphelpat, Rahuri, Ranchi and Akola the performance of entries and best genotypes in comparison to the checks have been summarized in Tables 101 and 102. Significant differences were observed among the genotypes for days to 50% flowering, Pod length (cm), Pod width (cm), number of seeds per pods and seed yield per plant (g). The range for days to flowering varied from 69.0 days to 79.42 days and the best performing check was IWB-1 (75.0 days). The best performing genotypes for early flowering were RWBGP-3 (71.0 days) followed by RWBGP- 24 (72.67 days) and RWBGP- 5 (72.67 days) and were at par with the best check.

The maximum pod length over the locations was observed in genotypes RWBGP-16 (19.03 cm) followed by EC178297 (19.0 cm), while maximum pod width genotype was RWBGP-19 (3.35 cm) and were better than the best check IWB-1 (18.32 cm and 2.90 cm, respectively). The range for number of seeds per pod varied from 7.5 to 13.0 and the superior genotypes were RWBGP-08 and RWBGP-13 (12.13) which were better than check IWB-1 (12.0). The seed yield per plant ranged from 14.83 g to 27.79 g during first year evaluation and 14.10 g to 30.95 g during second year evaluation. The promising genotypes during first year were RWBGP-25 (27.13 g) followed by RWBGP- 01 (26.27 g) and were better than the check IWB-1 (24.36 g), while during second year evaluation the promising genotypes were EC178319 (47.15 g) followed by EC178335 (47.09 g) and EC178293 (39.79 g) and were better than the check RMDWB-1 (31.05 g)

Table 88. Experimental Details of Germplasm Evaluation in Winged bean: Kharif 2019 (Plains)

S. No	Items	Ambikapur	Coochbehar	Ayodhya	Rahuri 1	Rahuri 2	Ranchi
1	No. of Accessions	50	25	25	50	48	50
2	No. of Checks	3	1	1	3	2	4
3	Design	ABD	ABD	ABD	RBD	RBD	ABD
4	No. of Block	7	5	4	3	3	5
5	Number of Rows	2	3	2	6	16	3
6	Row Length (m)	4	3	4	3	3	4
7	Row spacing (cm)	60	60	60	60	60	60
8	Plant spacing (cm)	30	30	30	30	30	30
9	NPKS (kg/ha)	20:40:20	20:40:20	20:40:20	20:40:20	20:40:20	20:40:20
10	Plot size (m ²)	4.8	5.4	4.8	3.6 X 3	3.6 X 3	1.8 X 3.0
11	Sowing Date	29/06/2019	28/08/2019	17/07/2019	30/06/2019	30/06/2019	12/07/2019
12	Harvesting period	20/12/2019 to 30/12/2019	5/12/2019 to 27/12/2019	At maturity	21/12/2019	23/12/2019	26/12/2019

Table 89. Evaluation of germplasm in Winged bean at Ambikapur (I Year): Kharif 2019 (Plains)

S. No	Genotypes	Days to 50% flowering	Days to 80% maturity	Days to pod setting	Pod length(cm)	Pod/Plant	Seed/Pod	Green pod yield (g/plant)	Seed yield/ plant (g)	100 Seed Weight (g)
1	RWBGP-1	71.00	151.00	75.00	18.50	11.20	8.00	175.00	40.00	33.75
2	RWBGP-2	72.00	152.00	78.00	16.50	17.20	9.00	204.55	29.55	35.55
3	RWBGP-7	71.00	151.00	77.00	18.20	10.40	11.00	192.31	28.85	33.40
4	RWBGP-8	74.00	154.00	79.00	20.20	10.00	10.00	166.67	30.00	30.90
5	RWBGP-9	72.00	152.00	81.00	19.50	17.50	12.00	222.22	51.11	31.20
6	RWBGP-10	75.00	155.00	80.00	18.20	9.00	8.00	175.00	41.00	34.26
7	RWBGP-11	73.00	153.00	76.00	17.50	18.00	11.00	100.00	25.45	30.90
8	RWBGP-12	75.00	155.00	78.00	18.50	10.60	10.00	108.70	32.61	32.00
9	RWBGP-5	73.00	153.00	79.00	21.00	21.20	9.00	165.00	37.50	33.12
10	RWBGP-14	74.00	154.00	82.00	17.25	10.00	10.00	131.58	34.21	35.00
11	RWBGP-16	72.00	152.00	80.00	16.00	8.00	11.00	218.75	33.75	36.54
12	RWBGP-17	76.00	156.00	81.00	18.00	9.00	11.00	110.00	42.50	32.55
13	RWBGP-18	74.00	154.00	84.00	20.00	11.00	12.00	122.73	30.45	33.75
14	RWBGP-19	73.00	153.00	80.00	21.00	15.00	9.00	165.38	28.85	35.55
15	RWBGP-20	73.00	153.00	83.00	19.00	11.00	10.00	147.83	26.96	30.90
16	RWBGP-4	74.00	154.00	81.00	17.00	14.00	8.00	250.00	27.50	31.20
17	RWBGP-3	71.00	151.00	78.00	16.00	15.00	11.00	157.89	28.42	34.26
18	RWBGP-23	71.00	151.00	77.00	18.00	16.00	12.00	365.00	28.94	30.90
19	RWBGP-24	74.00	154.00	75.00	18.00	10.00	10.00	183.33	36.11	35.58
20	RWBGP-25	70.00	150.00	73.00	20.00	17.50	9.00	175.00	22.50	32.00
21	RWBGP-1	72.00	152.00	75.00	21.00	9.00	11.00	295.45	38.64	33.12
22	RWBGP-6	75.00	155.00	79.00	20.00	18.00	10.00	115.79	65.79	35.00
23	RWBGP-13	71.00	151.00	75.00	16.00	10.60	8.00	135.00	65.00	36.65
24	RWBGP-15	69.00	149.00	73.00	16.00	21.20	10.00	195.45	43.18	32.56
25	RWBGP-21	71.00	151.00	81.00	15.00	10.00	11.00	142.31	21.54	31.55
26	RWBGP-22	74.00	154.00	78.00	18.00	8.00	13.00	305.56	69.44	33.75
27	IC 15018	73.00	153.00	78.00	16.00	12.00	10.00	125.00	47.50	33.40
28	IC 17005	75.00	155.00	77.00	18.00	15.00	9.00	263.16	39.47	30.90
29	IC 17009	73.00	153.00	81.00	21.00	12.25	8.00	187.50	40.63	35.65
30	IC 26904	71.00	151.00	78.00	20.00	16.25	9.00	333.33	30.00	36.45
31	IC 26944-1	73.00	153.00	81.00	21.00	12.00	8.00	130.00	28.75	33.45
32	IC95229	73.00	153.00	78.00	20.00	14.00	9.00	177.78	36.11	31.20
33	IC 95239	73.00	153.00	77.00	19.00	16.00	10.00	220.00	22.50	34.26

S. No	Genotypes	Days to 50% flowering	Days to 80% maturity	Days to pod setting	Pod length(cm)	Pod/Plant	Seed/Pod	Green pod yield (g/plant)	Seed yield/ plant (g)	100 Seed Weight (g)
34	EC 178282	74.00	154.00	72.00	18.00	12.00	11.00	100.00	38.64	30.90
35	EC 178291	71.00	151.00	75.00	17.00	15.00	11.00	138.46	48.72	34.55
36	EC 178293	78.00	158.00	83.00	16.00	14.00	10.00	238.89	69.44	32.00
37	EC 178297	69.00	149.00	75.00	21.00	12.00	8.00	185.00	37.50	33.12
38	EC 178299	73.00	153.00	77.00	19.00	13.00	10.00	227.27	29.55	35.00
39	EC 178308	78.00	158.00	83.00	22.00	12.00	11.00	130.43	23.48	36.54
40	EC 178309	72.00	152.00	77.00	18.00	17.50	13.00	300.00	42.50	30.12
41	EC 178310	75.00	155.00	81.00	18.75	9.00	9.00	178.95	65.79	33.23
42	EC 178311	78.00	158.00	84.00	19.00	18.00	10.00	367.50	63.63	31.20
43	EC 178312	72.00	152.00	77.00	18.25	10.60	12.00	325.20	51.49	34.26
44	EC 178313	79.00	159.00	83.00	16.98	21.20	8.00	222.22	28.64	30.90
45	EC 178314	77.00	157.00	81.00	17.25	10.00	11.00	239.13	28.26	35.55
46	EC 178315	80.00	160.00	87.00	16.25	8.00	10.00	110.00	22.50	34.56
47	EC 178317	81.00	161.00	87.00	19.50	9.00	8.00	142.11	44.74	31.56
48	EC 178319	74.00	154.00	84.00	16.00	12.00	10.00	268.75	78.13	32.00
49	EC 178335	79.00	159.00	85.00	20.25	15.00	11.00	182.72	76.54	33.12
50	EC 178336	81.00	161.00	88.00	18.45	16.00	13.00	282.35	58.18	35.00
	AKWB-1 (C)	71.86	149.86	77.86	18.86	21.86	13.86	253.22	37.76	35.32
	IWB-1 (C)	74.86	154.86	78.86	21.11	24.86	12.86	369.92	36.85	32.76
	RMDWB-1 (C)	87.86	155.86	93.86	18.31	25.86	15.86	361.20	42.43	37.43
	Minimum	69.00	149.00	72.00	15.00	8.00	8.00	100.00	21.54	30.12
	Maximum	87.86	161.00	93.86	22.00	25.86	15.86	369.92	78.13	37.43
	Mean	74.14	153.89	79.44	18.58	13.73	10.24	202.98	40.46	33.38
	CD(0.05)							64.73	15.19	
	CV(%) Error							7.26	14.48	
	CV (%) Phen.	4.53	1.85	5.15	9.45	31.42	16.39	36.65	37.07	5.79

Table 90. Evaluation of germplasm in Winged bean at Cooch behar (I Year): Kharif 2019 (Plains)

S. No	Genotypes	Days to 50% flowering	Days to 80% maturity	No. of pods/plant	Pod length (cm)	Pod width (cm)	No. of seeds/pod	Seed yield/plant (g)	100-seed wt. (g)
1	RWBGP-01	76.00	146.00	16.00	13.20	2.50	11.00	32.04	35.24
2	RWBGP-02	73.00	142.00	12.00	14.30	2.70	12.00	24.14	34.26
3	RWBGP-03	68.00	140.00	10.00	15.60	3.10	11.00	17.54	32.54
4	RWBGP-04	72.00	145.00	15.00	12.80	3.20	9.00	23.46	36.12
5	RWBGP-05	74.00	151.00	11.00	14.60	2.80	12.00	18.68	28.94
6	RWBGP-06	70.00	138.00	13.00	15.40	3.20	11.00	22.46	32.15
7	RWBGP-07	73.00	148.00	12.00	16.40	3.30	12.00	21.84	30.58
8	RWBGP-08	68.00	141.00	16.00	17.40	3.20	13.00	28.32	27.89
9	RWBGP-09	66.00	144.00	10.00	13.80	2.80	10.00	16.54	32.56
10	RWBGP-10	69.00	149.00	13.00	14.50	2.90	11.00	24.48	36.52
11	RWBGP-11	73.00	153.00	11.00	16.30	3.10	9.00	17.15	34.57
12	RWBGP-12	78.00	150.00	15.00	12.80	2.60	12.00	30.08	33.54
13	RWBGP-13	80.00	154.00	16.00	17.80	2.90	14.00	32.58	28.47
14	RWBGP-14	72.00	145.00	12.00	16.20	3.10	9.00	19.89	30.56
15	RWBGP-15	75.00	142.00	9.00	14.80	2.70	7.00	19.12	29.14
16	RWBGP-16	71.00	156.00	12.00	15.70	2.90	9.00	17.54	34.21
17	RWBGP-17	81.00	152.00	13.00	13.80	2.70	11.00	21.23	32.16
18	RWBGP-18	77.00	157.00	16.00	14.90	2.60	12.00	28.45	35.04
19	RWBGP-19	74.00	151.00	12.00	15.80	2.90	9.00	16.15	32.58
20	RWBGP-20	73.00	146.00	11.00	16.40	3.10	8.00	19.18	27.59
21	RWBGP-21	69.00	142.00	14.00	15.70	2.90	12.00	22.57	29.87
22	RWBGP-23	78.00	154.00	16.00	16.40	3.30	13.00	29.56	32.54
23	RWBGP-24	72.00	148.00	12.00	13.80	3.20	10.00	22.01	34.18
24	RWBGP-25	75.00	153.00	16.00	14.70	2.80	13.00	32.25	32.57
25	RWBGP-27	68.00	142.00	12.00	15.80	2.50	9.00	18.74	33.69
	IWB-1 (C)	70.80	145.80	13.20	14.82	2.86	12.00	24.36	33.93
	Minimum	66.00	138.00	9.00	12.80	2.50	7.00	16.15	27.59
	Maximum	81.00	157.00	16.00	17.80	3.30	14.00	32.58	36.52
	Mean	72.92	147.49	13.01	15.14	2.92	10.81	23.09	32.36
	CV (%) Phen.	5.31	3.60	16.56	8.68	8.35	16.35	22.59	7.83

Table 91. Evaluation of germplasm in Winged bean at Ayodhya (I Year): Kharif 2019 (Plains)

S.No.	Genotypes	Days to 50% flowering	No of pod/plant	No of seeds/pod	Yield/plant (g)	100 seed wt. (g)
1	RWBPC-1	84.00	8.25	11.25	20.50	27.45
2	RWBPC-2	90.00	9.75	9.25	19.00	27.10
3	RWBPC-3	81.00	8.00	9.75	15.50	28.35
4	RWBPC-4	84.00	7.00	10.25	20.00	26.94
5	RWBPC-5	80.00	9.25	9.50	19.70	28.03
6	RWBPC-6	83.00	8.25	10.75	21.50	27.20
7	RWBPC-7	88.00	9.75	11.00	19.00	27.68
8	RWBPC-8	91.00	7.50	11.25	17.50	28.13
9	RWBPC-9	81.00	8.75	9.75	18.00	29.02
10	RWBPC-10	84.00	9.00	9.25	23.00	27.70
11	RWBPC-11	82.00	10.50	8.75	20.50	28.13
12	RWBPC-12	83.00	8.00	9.25	17.50	29.02
13	RWBPC-13	89.00	7.50	10.25	16.00	27.70
14	RWBPC-14	91.00	9.75	11.25	19.50	27.04
15	RWBPC-15	79.00	8.50	9.00	15.50	28.70
16	RWBPC-16	83.00	8.75	11.00	14.75	29.15
17	RWBPC-17	84.00	9.75	12.00	18.00	27.50
18	RWBPC-18	87.00	7.50	11.25	20.00	28.50
19	RWBPC-19	85.00	10.00	10.75	16.70	29.10
20	RWBPC-20	81.00	8.75	8.00	13.50	27.50
21	RWBPC-21	83.00	8.75	9.50	20.00	28.50
22	RWBPC-22	80.00	10.50	10.25	14.00	29.00
23	RWBPC-23	87.00	9.75	9.75	18.00	29.05
24	RWBPC-24	86.00	10.00	10.75	22.00	28.50
25	RWBPC-25	89.00	9.75	9.00	14.50	27.70
	Minimum	79.00	7.00	8.00	13.50	26.94
	Maximum	91.00	10.50	12.00	23.00	29.15
	Mean	84.60	8.93	10.11	18.17	28.11
	CV (%) Phen.	3.57	1.00	0.99	2.60	0.72

Table 92. Evaluation of germplasm in Winged bean (I year) at Rahuri: Kharif 2019 (Plains)

Sr. No.	Genotypes	Seed yield (q/ha)	25 Green Pod wt (g)	Days to 50 % Flow.	Days to 80% maturity	Pod length (cm)	Pod width (cm)	No. of seeds/ pod	100 seed weight (g)
1	EC 178282	9.36	255.00	82.00	169.00	13.60	1.80	10.00	24.50
2	EC 178291	12.50	368.00	95.00	167.00	15.50	2.20	9.00	25.00
3	EC 178293	10.14	325.00	79.00	168.00	16.10	1.80	8.00	25.00
4	EC 178297	19.58	348.00	97.00	172.00	17.00	2.30	8.00	28.00
5	EC 178299	11.89	458.00	74.00	167.00	18.00	2.50	9.00	28.50
6	EC 178308	18.61	442.00	95.00	163.00	18.20	2.40	11.00	25.00
7	EC 178309	12.58	423.00	96.00	174.00	16.30	2.80	11.00	22.50
8	EC 178310	10.00	333.00	84.00	172.00	11.50	2.20	11.00	27.00
9	EC 178311	15.00	462.00	86.00	185.00	16.80	2.30	11.00	24.50
10	EC 178312	9.75	360.00	87.00	186.00	14.90	2.40	9.00	22.50
11	EC 178313	15.94	430.00	83.00	175.00	15.40	2.80	11.00	22.00
12	EC 178314	11.72	338.00	99.00	180.00	13.90	2.40	10.00	24.00
13	EC 178315	9.33	360.00	83.00	168.00	15.20	2.10	9.00	21.00
14	EC 178317	13.83	393.00	87.00	189.00	18.80	2.70	9.00	26.00
15	EC 178319	16.17	450.00	96.00	172.00	20.30	2.30	8.00	22.00
16	EC 178335	17.64	440.00	86.00	174.00	14.00	2.30	10.00	24.50
17	EC 178336	12.36	433.00	82.00	187.00	16.10	2.60	10.00	25.50
18	IC 15018	14.03	417.00	81.00	180.00	11.80	2.10	10.00	29.00
19	IC 17005	11.39	370.00	84.00	170.00	16.10	2.50	9.00	29.00
20	IC 17009	9.08	371.00	97.00	175.00	12.30	1.80	10.00	27.00
21	IC 26904	14.08	448.00	96.00	177.00	13.00	2.00	10.00	32.00
22	IC 26940- A	11.86	368.00	82.00	172.00	12.90	2.00	10.00	20.50
23	IC 26944- 1	9.22	347.00	87.00	169.00	12.50	1.50	9.00	32.00
24	IC 95229	12.97	260.00	83.00	171.00	12.20	1.50	10.00	27.50
25	IC 95239	11.83	348.00	80.00	176.00	13.70	2.20	9.00	31.50
26	RWBG-1	18.06	308.00	80.00	173.00	15.40	1.80	11.00	19.00
27	RWBG-10	13.64	332.00	75.00	166.00	15.90	2.20	11.00	24.00
28	RWBG-11	16.75	308.00	83.00	175.00	16.90	2.10	10.00	27.00
29	RWBG-12	17.39	340.00	75.00	177.00	14.00	2.20	11.00	28.00
30	RWBG-13	14.06	281.00	77.00	179.00	15.00	2.10	11.00	26.00
31	RWBG-14	20.17	373.00	73.00	180.00	16.50	2.30	9.00	26.00
32	RWBG-15	11.25	432.00	98.00	173.00	17.00	2.00	9.00	23.00
33	RWBG-16	17.47	325.00	79.00	180.00	17.10	2.10	10.00	29.50
34	RWBG-17	8.17	400.00	80.00	186.00	15.30	2.20	9.00	30.00

Sr. No.	Genotypes	Seed yield (q/ha)	25 Green Pod wt (g)	Days to 50 % Flow.	Days to 80% maturity	Pod length (cm)	Pod width (cm)	No. of seeds/ pod	100 seed weight (g)
35	RWBG-18	17.64	330.00	77.00	184.00	15.00	2.10	11.00	25.00
36	RWBG-19	18.00	447.00	82.00	172.00	15.20	2.70	11.00	26.00
37	RWBG-2	16.11	403.00	79.00	169.00	14.00	2.40	11.00	24.00
38	RWBG-20	11.69	392.00	79.00	167.00	16.20	2.30	9.00	30.50
39	RWBG-21	20.61	452.00	82.00	177.00	18.70	2.70	9.00	29.00
40	RWBG-22	15.08	405.00	85.00	177.00	15.20	2.20	12.00	27.50
41	RWBG-23	11.28	365.00	78.00	180.00	14.60	1.90	11.00	25.50
42	RWBG-24	13.22	375.00	76.00	178.00	15.50	1.70	12.00	26.50
43	RWBG-25	18.39	400.00	83.00	181.00	18.10	2.30	12.00	29.50
44	RWBG-3	14.92	280.00	71.00	186.00	14.40	2.00	11.00	28.00
45	RWBG-4	14.83	449.00	85.00	185.00	16.40	2.30	10.00	31.50
46	RWBG-5	15.92	458.00	72.00	174.00	12.10	2.30	11.00	25.00
47	RWBG-6	17.25	435.00	98.00	178.00	16.30	2.80	11.00	22.00
48	RWBG-7	13.06	428.00	83.00	174.00	14.90	2.20	8.00	23.00
49	RWBG-8	14.89	333.00	85.00	172.00	14.00	2.30	9.00	28.50
50	RWBG-9	14.39	372.00	83.00	169.00	15.90	2.20	11.40	24.00
	AKWB-1 (C)	16.32	365.60	90.60	174.60	15.79	2.40	10.40	25.50
	IWB-1 (C)	16.96	442.80	85.40	174.60	17.46	2.32	10.60	26.80
	Minimum	8.17	255.00	71.00	163.00	11.50	1.50	8.00	19.00
	Maximum	20.61	462.00	99.00	189.00	20.30	2.80	12.00	32.00
	Mean	14.20	380.35	84.13	175.37	15.36	2.22	10.05	26.08
	CV (%) Phen.	22.41	14.58	8.79	3.53	12.55	13.56	10.83	11.71

Table 93. Evaluation of germplasm in Winged bean (II year) at Rahuri: Kharif 2019 (Plains)

Sl. No.	Genotypes	Seed yield (q/ha)	25 Green Pod wt (g)	Days to 50 % Flow.	Days to 80% maturity	Pod length (cm)	Pod width (cm)	No. of seeds/ pod	100 seed weight (g)
1	IC-17005-1	16.72	378.00	87.00	175.00	15.30	2.30	12.00	26.50
2	IC-17006-1	13.02	253.00	99.00	177.00	12.90	2.50	11.00	22.50
3	IC-26170-2	14.08	353.00	96.00	184.00	14.20	2.20	9.00	29.00
4	IC-26945	17.44	353.00	98.00	196.00	15.40	2.20	9.00	32.00
5	IC-26946	17.50	348.00	81.00	189.00	17.30	2.10	11.00	27.50
6	IC-26949	14.14	346.00	82.00	194.00	15.90	2.10	11.00	33.00
7	IC-26949-1	19.00	279.00	89.00	195.00	14.40	2.00	9.00	27.00
8	IC-31981	18.25	385.00	83.00	193.00	15.60	2.50	10.00	25.50
9	IC-34865-1	17.42	310.00	81.00	189.00	16.10	1.80	12.00	25.00
10	IC-34865-2	18.92	298.00	83.00	197.00	15.60	2.10	9.00	30.00
11	IC-38683	18.22	405.00	83.00	196.00	15.80	1.90	10.00	32.00
12	IC-41979	11.44	410.00	82.00	197.00	16.40	2.00	10.00	33.00
13	IC-41980	16.97	405.00	80.00	195.00	16.60	2.30	11.00	32.50
14	IC-45225	17.36	418.00	88.00	196.00	15.70	2.30	11.00	27.00
15	IC-45229	12.39	373.00	88.00	194.00	17.50	2.40	8.00	29.00
16	IC-45229-1	16.00	413.00	96.00	192.00	17.70	1.90	11.60	23.00
17	IC-95222	15.39	376.00	88.00	195.00	15.80	2.20	12.00	26.50
18	IC-95223	14.61	361.00	86.00	186.00	14.00	2.20	9.00	24.50
19	IC-95224	10.53	336.00	88.00	178.00	15.20	2.60	11.00	26.00
20	IC-95225	12.22	392.00	80.00	180.00	15.40	2.20	11.20	25.00
21	IC-95226	11.83	416.00	81.00	179.00	16.80	2.20	12.00	33.50
22	IC-95227	8.28	415.00	86.00	181.00	16.80	2.50	11.00	34.50
23	IC-95228	14.11	318.00	75.00	183.00	16.40	2.10	13.00	25.00
24	IC-95230	17.92	355.00	89.00	174.00	14.70	2.00	13.00	25.50
25	IC-95231	16.44	339.00	86.00	174.00	16.20	2.10	12.00	28.00
26	IC-95232	10.94	296.00	81.00	181.00	14.90	2.20	9.00	25.00
27	IC-95233	13.81	418.00	87.00	181.00	22.00	3.00	10.00	29.00
28	IC-95234	12.67	339.00	72.00	179.00	14.30	2.30	9.00	29.50
29	IC-95235	17.86	349.00	73.00	177.00	13.80	2.40	10.00	22.50
30	IC-95237-1	10.78	367.00	80.00	196.00	14.80	2.00	9.00	29.50
31	IC-95238	7.50	301.00	72.00	190.00	16.10	2.50	10.00	23.00
32	IC-95240	13.00	268.00	73.00	188.00	14.70	1.90	10.00	27.00
34	IC-95241	17.78	298.00	74.00	177.00	13.80	2.10	9.00	23.00
35	IC-95242	16.86	400.00	81.00	197.00	16.50	2.00	8.00	26.00

S. No.	Genotypes	Seed yield (q/ha)	25 Green Pod wt (g)	Days to 50 % Flow.	Days to 80% maturity	Pod length (cm)	Pod width (cm)	No. of seeds/ pod	100 seed weight (g)
36	IC-112416	13.31	368.00	88.00	198.00	18.90	2.40	9.00	26.00
37	IC-112417	18.64	293.00	98.00	171.00	15.10	2.20	10.00	21.00
38	IC-11885	15.31	335.00	99.00	174.00	16.80	2.20	13.00	23.50
39	EC-21904	19.33	408.00	97.00	170.00	19.90	2.10	14.00	28.50
40	EC- 27884	16.33	361.00	80.00	169.00	17.50	1.90	12.00	24.00
41	EC- 27885-1	15.14	345.00	79.00	174.00	16.30	1.80	11.00	24.00
42	EC-27886A-1	15.28	331.00	79.00	179.00	16.30	2.30	12.00	32.00
43	EC- 27886A 2	8.97	350.00	87.00	172.00	16.30	2.40	9.00	25.50
45	EC- 38821- 1	7.86	310.00	79.00	169.00	16.20	1.70	12.00	32.00
46	EC-38821 P4	12.14	350.00	80.00	191.00	14.80	2.30	9.00	23.00
47	EC- 38823	13.42	268.00	78.00	193.00	13.50	1.70	11.00	27.50
48	EC-38824	7.31	365.00	75.00	192.00	16.60	1.80	10.00	25.00
49	EC- 38824-1	9.86	375.00	96.00	198.00	14.20	2.00	12.00	24.50
50	EC- 38824-2	8.59	298.00	70.00	177.00	14.60	1.90	10.00	27.00
	AKWB-1 (C)	15.08	314.80	88.20	187.60	15.22	2.14	9.80	26.52
	IWB-1 (C)	15.47	311.80	82.20	188.60	16.20	1.88	11.40	26.20
	Minimum	7.31	253.00	70.00	169.00	12.90	1.70	8.00	21.00
	Maximum	19.33	418.00	99.00	198.00	22.00	3.00	14.00	34.50
	Mean	14.27	349.09	84.07	185.16	15.86	2.16	10.56	27.07
	CV (%) Phen.	23.67	12.72	9.10	5.02	10.11	11.72	13.41	12.40

Table 94. Evaluation of germplasm in Winged bean at Ranchi (I Year): Kharif 2019 (Plains)

S. No.	Genotypes	Petiole length (cm)	Stem thickness	Days to 50% flowering	Days to 80% maturity	Initial plant stand	Plant stand at harvest	100-seed weight (g)	Seed yield/plant(g)	No. of pods/plant	No. of seeds/pod
1	EC178299	3.50	2.50	79.00	173.00	10.00	10.00	30.50	15.60	24.00	15.00
2	EC178308	3.00	2.50	79.00	173.00	20.00	12.00	36.40	23.30	24.00	13.00
3	EC178310	4.00	3.00	73.00	172.00	10.00	10.00	31.50	18.40	41.00	16.00
4	EC178317	4.00	3.00	75.00	164.00	20.00	20.00	27.50	15.80	45.00	13.00
5	RWBG-21	4.00	2.50	76.00	173.00	17.00	16.00	29.20	13.20	42.00	15.00
6	RWBG-22	5.00	3.00	67.00	175.00	18.00	17.00	31.80	34.50	40.00	19.00
7	RWBG-23	5.00	3.50	72.00	172.00	13.00	13.00	32.90	15.90	32.00	15.00
8	RWBG-24	5.00	3.50	68.00	170.00	17.00	16.00	32.20	23.80	44.00	14.00
9	RWBG-25	4.00	2.50	75.00	173.00	15.00	14.00	30.10	29.30	53.00	13.00
10	RWBG-10	4.00	2.50	78.00	170.00	12.00	11.00	33.50	35.80	32.00	16.00
11	RWBG-11	4.50	2.50	75.00	163.00	17.00	17.00	31.60	20.40	28.00	13.00
12	RWBG-16	6.00	3.00	80.00	168.00	14.00	14.00	29.50	17.30	46.00	18.00
13	RWBG-17	6.00	3.50	74.00	170.00	10.00	10.00	32.30	31.50	29.00	15.00
14	RWBG-18	5.00	3.00	79.00	172.00	14.00	13.00	29.80	19.30	48.00	14.00
15	RWBG-19	4.50	3.00	73.00	169.00	13.00	13.00	27.90	12.60	37.00	12.00
16	RWBG-20	6.00	3.50	75.00	177.00	19.00	19.00	30.90	36.30	39.00	16.00
17	RWBG-3	4.00	2.50	71.00	170.00	17.00	16.00	30.90	16.90	50.00	16.00
18	RWBG-7	5.00	3.00	75.00	175.00	18.00	18.00	31.60	22.80	22.00	17.00
19	RWBG-9	4.00	3.50	72.00	177.00	12.00	12.00	33.90	36.50	28.00	12.00
20	RWBG-1	3.50	3.00	78.00	171.00	14.00	14.00	29.20	20.80	24.00	12.00
21	RWBG-12	4.00	2.50	77.00	168.00	16.00	16.00	32.50	16.80	37.00	16.00
22	RWBG-13	4.00	4.00	76.00	169.00	17.00	17.00	31.90	38.20	25.00	17.00
23	RWBG-14	4.50	3.50	79.00	165.00	13.00	13.00	30.10	25.90	46.00	13.00
24	RWBG-15	5.50	3.00	67.00	177.00	19.00	19.00	33.90	29.10	38.00	16.00
25	RWBG-2	4.00	3.00	71.00	161.00	19.00	19.00	32.30	17.80	18.00	14.00
26	RWBG-4	4.00	2.50	75.00	176.00	15.00	14.00	36.50	19.40	17.00	17.00
27	RWBG-5	3.00	2.00	73.00	169.00	18.00	18.00	35.50	19.90	27.00	14.00
28	RWBG-6	2.50	3.00	67.00	164.00	18.00	18.00	32.80	32.40	26.00	14.00
29	RWBG-8	3.00	2.50	71.00	172.00	13.00	12.00	28.90	20.80	18.00	12.00
	RMDWB-1 (C)	4.30	3.10	68.20	173.40	18.20	18.40	33.56	19.66	35.20	14.00
	AKWB-1(C)	11.50	2.80	71.20	167.40	14.20	13.20	31.70	22.10	32.40	15.40
	IWB-1	3.70	3.10	72.00	169.80	14.20	12.00	30.94	20.78	32.80	14.60
S.	Genotypes	Petiole	Stem	Days to	Days to	Initial	Plant	100-seed	Seed yield/	No. of	No. of

No.		length (cm)	thickness	50% flowering	80% maturity	plant stand	stand at harvest	weight (g)	plant(g)	Pods/plant	seeds/pod
	HWB-1 (C)	4.20	3.00	75.00	168.40	20.20	18.80	31.04	23.94	32.00	14.80
	Minimum	2.50	2.00	67.00	161.00	10.00	10.00	27.50	12.60	17.00	12.00
	Maximum	11.50	4.00	80.00	177.00	20.20	20.00	36.50	38.20	53.00	19.00
	Mean	4.49	2.94	73.83	170.52	15.60	14.95	31.66	23.24	33.71	14.72
	CV (%) Phen.	33.92	14.66	5.12	2.40	19.42	20.21	6.84	31.54	29.11	12.17

Table 95. Evaluation of germplasm in Winged bean at Ranchi (I Year): Kharif 2019 (Plains) contd...

S. No.	Genotypes	Plant height (cm)	No. of branches/ plant	No. of pods/ plant	No. of seeds/pod	Pod length (cm)	Pod width (cm)	No. of pods/cluster	No. of clusters/ plant	Leaf length (cm)	Leaf width (cm)
1	EC178299	293.00	4.00	24.00	15.00	17.00	2.50	2.00	5.00	10.00	8.00
2	EC178308	320.00	4.00	24.00	13.00	14.00	2.50		4.00	8.50	5.50
3	EC178310	319.00	3.00	41.00	16.00	18.50	3.50	2.00	6.00	9.00	7.00
4	EC178317	327.00	5.00	45.00	13.00	15.00	2.50	3.00	6.00	10.00	8.00
5	RWBGP-21	285.00	3.00	42.00	15.00	19.00	3.00	2.00	4.00	8.00	7.00
6	RWBGP-22	395.00	4.00	40.00	19.00	21.00	2.50	3.00	5.00	10.00	6.00
7	RWBGP-23	353.00	3.00	32.00	15.00	20.00	2.50	2.00	2.00	11.00	9.00
8	RWBGP-24	350.00	5.00	44.00	14.00	18.00	3.00	2.00	6.00	10.00	9.50
9	RWBGP-25	400.00	5.00	43.00	13.00	16.00	2.50	2.00	2.00	12.00	7.00
10	RWBGP-10	410.00	4.00	32.00	16.00	18.00	2.00	2.00	6.00	9.50	8.00
11	RWBGP-11	277.00	3.00	28.00	13.00	15.00	2.00	2.00	4.00	10.00	9.50
12	RWBGP-16	380.00	5.00	46.00	18.00	24.00	3.00	2.00	5.00	11.00	14.00
13	RWBGP-17	338.00	4.00	29.00	15.00	17.00	3.00	2.00	4.00	11.00	9.50
14	RWBGP-18	338.00	5.00	44.00	14.00	15.00	2.00	2.00	3.00	10.00	9.50
15	RWBGP-19	350.00	4.00	37.00	12.00	14.00	4.00	2.00	3.00	10.00	8.00
16	RWBGP-20	384.00	3.00	39.00	16.00	18.00	2.50	2.00	5.00	13.00	13.00
17	RWBGP-3	391.00	5.00	45.00	16.00	18.00	3.00	2.00	4.00	10.00	7.00
18	RWBGP-7	340.00	5.00	32.00	17.00	20.00	3.50	2.00	4.00	12.00	11.00
19	RWBGP-9	300.00	3.00	28.00	12.00	14.00	3.00	2.00	2.00	10.50	10.00
20	RWBGP-1	306.00	4.00	34.00	12.00	14.00	3.00	2.00	3.00	5.00	4.00
21	RWBGP-12	350.00	4.00	37.00	16.00	17.00	2.50	2.00	3.00	8.00	6.50
22	RWBGP-13	363.00	2.00	25.00	17.00	19.00	3.00	2.00	3.00	10.00	8.50
S.	Genotypes	Plant	No. of branches/	No. of	No. of	Pod length	Pod	No. of	No. of	Leaf	Leaf

No.		height (cm)	plant	pods/ plant	seeds/pod	(cm)	width (cm)	pods/cluster	clusters/ plant	length (cm)	width (cm)
23	RWBGP-14	320.00	4.00	46.00	13.00	16.00	2.00	2.00	5.00	10.00	9.00
24	RWBGP-15	313.00	5.00	38.00	16.00	18.00	3.50	2.00	5.00	13.00	11.00
25	RWBGP-2	261.00	2.00	38.00	14.00	16.00	2.00	2.00	2.00	8.50	6.00
26	RWBGP-4	277.00	3.00	37.00	17.00	19.00	3.50	2.00	3.00	9.00	8.50
27	RWBGP-5	322.00	3.00	27.00	14.00	18.00	2.00	2.00	2.00	8.00	8.00
28	RWBGP-6	306.00	3.00	26.00	14.00	16.00	2.50	2.00	2.00	7.00	5.00
29	RWBGP-8	360.00	4.00	28.00	12.00	14.00	2.00	2.00	2.00	9.00	7.00
	RMDWB-1 (C)	388.40	5.20	35.20	14.00	16.80	2.90	2.00	3.80	11.20	9.30
	AKWB-1(C)	358.60	4.40	32.40	15.40	17.00	2.60	1.60	2.40	9.10	8.20
	IWB-1(C)	333.40	3.80	32.80	14.60	16.40	2.90	1.60	4.80	9.30	7.80
	HWB-1(C)	355.80	3.60	32.00	14.80	16.80	2.90	1.40	2.40	9.80	8.80
	Minimum	261.00	2.00	24.00	12.00	14.00	2.00	1.40	2.00	5.00	4.00
	Maximum	410.00	5.20	46.00	19.00	24.00	4.00	3.00	6.00	13.00	14.00
	Mean	338.31	3.88	35.25	14.72	17.14	2.72	2.02	3.74	9.77	8.31
	CV (%) Phen.	11.42	23.38	19.68	12.17	13.21	19.35	14.53	36.48	16.59	25.21

Table 96. Data Winged bean (I Year) averaged over the locations - Kharif 2019 (Plains)

S. No.	Genotypes	Days to 50% flowering			No. of pods/plant			No. of seeds/pod		
		Cooch Behar	Faizabad	Mean	Cooch Behar	Faizabad	Mean	Cooch Behar	Faizabad	Mean
1	RWBGP-01	76.00	84.00	80.00	16.00	8.25	12.13	11.00	11.25	11.13
2	RWBGP-02	73.00	90.00	81.50	12.00	9.75	10.88	12.00	9.25	10.63
3	RWBGP-03	68.00	81.00	74.50	10.00	8.00	9.00	11.00	9.75	10.38
4	RWBGP-04	72.00	84.00	78.00	15.00	7.00	11.00	9.00	10.25	9.63
5	RWBGP-05	74.00	80.00	77.00	11.00	9.25	10.13	12.00	9.50	10.75
6	RWBGP-06	70.00	83.00	76.50	13.00	8.25	10.63	11.00	10.75	10.88
7	RWBGP-07	73.00	88.00	80.50	12.00	9.75	10.88	12.00	11.00	11.50
8	RWBGP-08	68.00	91.00	79.50	16.00	7.50	11.75	13.00	11.25	12.13
9	RWBGP-09	66.00	81.00	73.50	10.00	8.75	9.38	10.00	9.75	9.88
10	RWBGP-10	69.00	84.00	76.50	13.00	9.00	11.00	11.00	9.25	10.13
11	RWBGP-11	73.00	82.00	77.50	11.00	10.50	10.75	9.00	8.75	8.88
12	RWBGP-12	78.00	83.00	80.50	15.00	8.00	11.50	12.00	9.25	10.63
13	RWBGP-13	80.00	89.00	84.50	16.00	7.50	11.75	14.00	10.25	12.13
14	RWBGP-14	72.00	91.00	81.50	12.00	9.75	10.88	9.00	11.25	10.13
15	RWBGP-15	75.00	79.00	77.00	9.00	8.50	8.75	7.00	9.00	8.00
16	RWBGP-16	71.00	83.00	77.00	12.00	8.75	10.38	9.00	11.00	10.00
17	RWBGP-17	81.00	84.00	82.50	13.00	9.75	11.38	11.00	12.00	11.50
18	RWBGP-18	77.00	87.00	82.00	16.00	7.50	11.75	12.00	11.25	11.63
19	RWBGP-19	74.00	85.00	79.50	12.00	10.00	11.00	9.00	10.75	9.88
20	RWBGP-20	73.00	81.00	77.00	11.00	8.75	9.88	8.00	8.00	8.00
21	RWBGP-21	69.00	83.00	76.00	14.00	8.75	11.38	12.00	9.50	10.75
22	RWBGP-23	78.00	80.00	79.00	16.00	10.50	13.25	13.00	10.25	11.63

S. No.	Genotypes	Days to 50% flowering			No. of pods/plant			No. of seeds/pod		
		Cooch Behar	Faizabad	Mean	Cooch Behar	Faizabad	Mean	Cooch Behar	Faizabad	Mean
23	RWBGP-24	72.00	87.00	79.50	12.00	9.75	10.88	10.00	9.75	9.88
24	RWBGP-25	75.00	86.00	80.50	16.00	10.00	13.00	13.00	10.75	11.88
25	RWBGP-27	68.00	89.00	78.50	12.00	9.75	10.88	9.00	9.00	9.00
	IWB-1(C)	70.80		70.80	13.20		13.20	12.00		12.00
	Minimum	66.00	79.00	72.50	9.00	7.00	8.00	7.00	8.00	7.50
	Maximum	81.00	91.00	86.00	16.00	10.50	13.25	14.00	12.00	13.00
	Mean	72.92	84.60	78.76	13.01	8.93	10.97	10.81	10.11	10.46
	CV (%) Phen.	5.31	3.57	4.44	16.56	1.00	8.78	16.35	0.99	8.67

Table 97. Data Winged bean (I Year) averaged over the locations - Kharif 2019 (Plains) contd.

S. No.	Genotypes	Seed yield/plant (g)			100-seed wt. (g)		
		Cooch Behar	Ayodhya	Mean	Cooch Behar	Ayodhya	Mean
1	RWBGP-01	32.04	20.50	26.27	35.24	27.45	31.35
2	RWBGP-02	24.14	19.00	21.57	34.26	27.10	30.68
3	RWBGP-03	17.54	15.50	16.52	32.54	28.35	30.45
4	RWBGP-04	23.46	20.00	21.73	36.12	26.94	31.53
5	RWBGP-05	18.68	19.70	19.19	28.94	28.03	28.49
6	RWBGP-06	22.46	21.50	21.98	32.15	27.20	29.68
7	RWBGP-07	21.84	19.00	20.42	30.58	27.68	29.13
8	RWBGP-08	28.32	17.50	22.91	27.89	28.13	28.01
9	RWBGP-09	16.54	18.00	17.27	32.56	29.02	30.79
10	RWBGP-10	24.48	23.00	23.74	36.52	27.70	32.11
11	RWBGP-11	17.15	20.50	18.83	34.57	28.13	31.35
12	RWBGP-12	30.08	17.50	23.79	33.54	29.02	31.28
13	RWBGP-13	32.58	16.00	24.29	28.47	27.70	28.09
14	RWBGP-14	19.89	19.50	19.70	30.56	27.04	28.80
15	RWBGP-15	19.12	15.50	17.31	29.14	28.70	28.92
16	RWBGP-16	17.54	14.75	16.15	34.21	29.15	31.68
17	RWBGP-17	21.23	18.00	19.62	32.16	27.50	29.83
18	RWBGP-18	28.45	20.00	24.23	35.04	28.50	31.77

19	RWBGP-19	16.15	16.70	16.43	32.58	29.10	30.84
20	RWBGP-20	19.18	13.50	16.34	27.59	27.50	27.55
21	RWBGP-21	22.57	20.00	21.29	29.87	28.50	29.19
22	RWBGP-23	29.56	14.00	21.78	32.54	29.00	30.77
23	RWBGP-24	22.01	18.00	20.01	34.18	29.05	31.62
24	RWBGP-25	32.25	22.00	27.13	32.57	28.50	30.54
25	RWBGP-27	18.74	14.50	16.62	33.69	27.70	30.70
	IWB-1(C)	24.36		24.36	33.93		33.93
	Minimum	16.15	13.50	14.83	27.59	26.94	27.27
	Maximum	32.58	23.00	27.79	36.52	29.15	32.84
	Mean	23.09	18.17	20.63	32.36	28.11	30.24
	CV (%)	22.59	2.60	12.59	7.83	0.72	4.28
	Phen.						

Table 98. Data Winged bean (II Year) averaged over the locations - Kharif 2019 (Plains)

S. No	Genotypes	Days to 50% flowering				Pod length(cm)				Seed yield/ plant (g)			
		Ambikapur	Rahuri	Ranchi	Mean	Ambikapur	Rahuri	Ranchi	Mean	Ambikapur	Rahuri	Ranchi	Mean
1	AKWB-1	75.00	-	-	75.00	22.00	-	-	22.00	25.56	-	-	25.56
2	AKWB-1	75.00	-	-	75.00	19.00	-	-	19.00	66.09	-	-	66.09
3	EC 178282	74.00	82.00	-	78.00	18.00	13.60	-	15.80	38.64	9.36	-	24.00
4	EC 178291	71.00	95.00	-	83.00	17.00	15.50	-	16.25	48.72	12.50	-	30.61
5	EC 178293	78.00	79.00	-	78.50	16.00	16.10	-	16.05	69.44	10.14	-	39.79
6	EC 178297	69.00	97.00	-	83.00	21.00	17.00	-	19.00	37.50	19.58	-	28.54
7	EC 178299	73.00	74.00	79.00	75.33	19.00	18.00	17.00	18.00	29.55	11.89	15.60	19.01
8	EC 178308	78.00	95.00	79.00	84.00	22.00	18.20	14.00	18.07	23.48	18.61	23.30	21.80
9	EC 178309	72.00	96.00	-	84.00	18.00	16.30	-	17.15	42.50	12.58	-	27.54
10	EC 178310	75.00	84.00	73.00	77.33	18.75	11.50	18.50	16.25	65.79	10.00	18.40	31.40
11	EC 178311	78.00	86.00	-	82.00	19.00	16.80	-	17.90	63.63	15.00	-	39.31
12	EC 178312	72.00	87.00	-	79.50	18.25	14.90	-	16.58	51.49	9.75	-	30.62
13	EC 178313	79.00	83.00	-	81.00	16.98	15.40	-	16.19	28.64	15.94	-	22.29
14	EC 178314	77.00	99.00	-	88.00	17.25	13.90	-	15.58	28.26	11.72	-	19.99
15	EC 178315	80.00	83.00	-	81.50	16.25	15.20	-	15.73	22.50	9.33	-	15.92
16	EC 178317	81.00	87.00	75.00	81.00	19.50	18.80	15.00	17.77	44.74	13.83	15.80	24.79
17	EC 178319	74.00	96.00	-	85.00	16.00	20.30	-	18.15	78.13	16.17	-	47.15
18	EC 178335	79.00	86.00	-	82.50	20.25	14.00	-	17.13	76.54	17.64	-	47.09
19	EC 178336	81.00	82.00	-	81.50	18.45	16.10	-	17.28	58.18	12.36	-	35.27
20	IC 15018	73.00	81.00	-	77.00	16.00	11.80	-	13.90	47.50	14.03	-	30.77
21	IC 17005	75.00	84.00	-	79.50	18.00	16.10	-	17.05	39.47	11.39	-	25.43
22	IC 17009	73.00	97.00	-	85.00	21.00	12.30	-	16.65	40.63	9.08	-	24.85
23	IC 26904	71.00	96.00	-	83.50	20.00	13.00	-	16.50	30.00	14.08	-	22.04
24	IC 26940-A	75.00	82.00	-	78.50	20.00	12.90	-	16.45	44.74	11.86	-	28.30
25	IC 26944-1	73.00	87.00	-	80.00	21.00	12.50	-	16.75	28.75	9.22	-	18.99
26	IC 95239	73.00	83.00	-	78.00	19.00	12.20	-	15.60	22.50	12.97	-	17.74
27	IC95229	73.00	80.00	-	76.50	20.00	13.70	-	16.85	36.11	11.83	-	23.97
28	RWBGP-1	71.00	80.00	78.00	76.33	18.50	15.40	14.00	15.97	40.00	18.06	20.80	26.29
29	RWBGP-1	72.00	-	-	72.00	21.00	-	-	21.00	38.64	-	-	38.64
30	RWBGP-10	75.00	75.00	78.00	76.00	18.20	15.90	18.00	17.37	41.00	13.64	35.80	30.15

S. No	Genotypes	Days to 50% flowering				Pod length(cm)				Seed yield/ plant (g)			
		Ambikapur	Rahuri	Ranchi	Mean	Ambikapur	Rahuri	Ranchi	Mean	Ambikapur	Rahuri	Ranchi	Mean
31	RWBGP-11	73.00	83.00	75.00	77.00	17.50	16.90	15.00	16.47	25.45	16.75	20.40	20.87
32	RWBGP-12	75.00	75.00	77.00	75.67	18.50	14.00	17.00	16.50	32.61	17.39	16.80	22.27
33	RWBGP-13	71.00	77.00	76.00	74.67	16.00	15.00	19.00	16.67	65.00	14.06	38.20	39.09
34	RWBGP-14	74.00	73.00	79.00	75.33	17.25	16.50	16.00	16.58	34.21	20.17	25.90	26.76
35	RWBGP-15	69.00	98.00	67.00	78.00	16.00	17.00	18.00	17.00	43.18	11.25	29.10	27.84
36	RWBGP-16	72.00	79.00	80.00	77.00	16.00	17.10	24.00	19.03	33.75	17.47	17.30	22.84
37	RWBGP-17	76.00	80.00	74.00	76.67	18.00	15.30	17.00	16.77	42.50	8.17	31.50	27.39
38	RWBGP-18	74.00	77.00	79.00	76.67	20.00	15.00	15.00	16.67	30.45	17.64	19.30	22.46
39	RWBGP-19	73.00	82.00	73.00	76.00	21.00	15.20	14.00	16.73	28.85	18.00	12.60	19.82
40	RWBGP-2	72.00	79.00	71.00	74.00	16.50	14.00	16.00	15.50	29.55	16.11	17.80	21.15
41	RWBGP-20	73.00	79.00	75.00	75.67	19.00	16.20	18.00	17.73	26.96	11.69	36.30	24.98
42	RWBGP-21	71.00	82.00	76.00	76.33	15.00	18.70	19.00	17.57	21.54	20.61	13.20	18.45
43	RWBGP-22	74.00	85.00	67.00	75.33	18.00	15.20	21.00	18.07	69.44	15.08	34.50	39.67
44	RWBGP-23	71.00	78.00	72.00	73.67	18.00	14.60	20.00	17.53	28.94	11.28	15.90	18.71
45	RWBGP-24	74.00	76.00	68.00	72.67	18.00	15.50	18.00	17.17	36.11	13.22	23.80	24.38
46	RWBGP-25	70.00	83.00	75.00	76.00	20.00	18.10	16.00	18.03	22.50	18.39	29.30	23.40
47	RWBGP-3	71.00	71.00	71.00	71.00	16.00	14.40	18.00	16.13	28.42	14.92	16.90	20.08
48	RWBGP-4	74.00	85.00	75.00	78.00	17.00	16.40	19.00	17.47	27.50	14.83	19.40	20.58
49	RWBGP-5	73.00	72.00	73.00	72.67	21.00	12.10	18.00	17.03	37.50	15.92	19.90	24.44
50	RWBGP-6	75.00	98.00	67.00	80.00	20.00	16.30	16.00	17.43	65.79	17.25	32.40	38.48
51	RWBGP-7	71.00	83.00	75.00	76.33	18.20	14.90	20.00	17.70	28.85	13.06	22.80	21.57
52	RWBGP-8	74.00	85.00	71.00	76.67	20.20	14.00	14.00	16.07	30.00	14.89	20.80	21.90
53	RWBGP-9	72.00	83.00	72.00	75.67	19.50	15.90	14.00	16.47	51.11	14.39	36.50	34.00
	AKWB-1 (C)	71.86	90.60	71.20	77.89	18.86	15.79	17.00	17.22	37.76	16.32	22.10	25.40
	IWB-1(C)	74.86	85.40	72.00	77.42	21.11	17.46	16.40	18.32	36.85	16.96	20.78	24.86
	RMDWB-1 (C)	87.86	-	68.20	78.03	18.31	-	16.80	17.55	42.43	-	19.66	31.05
	HWB-1(C)		-	75.00	75.00	-	-	16.80	16.80	-	-	23.94	23.94
	Minimum	69.00	71.00	67.00	69.00	15.00	11.50	14.00	13.50	21.54	8.17	12.60	14.10
	Mean	74.14	84.13	80.00	79.42	18.58	15.36	24.00	19.31	40.46	14.20	38.20	30.95
	CD(0.05)	-	8.79	73.83	41.31	-	12.55	17.14	14.84	15.19	22.41	23.24	20.28
	CV(%) Error	-	-	5.12	5.12	-	-	13.21	13.21	14.48	-	31.54	23.01
	CV (%) Phen.	4.53	-	-	4.53	9.45	-	-	9.45	37.07	-	-	37.07

Table 99. Data Winged bean (II Year) averaged over the locations - Kharif 2019 (Plains) Contd.

Sl. No	Genotypes	Seed/Pod				100 Seed Weight (g)				Days to 80% maturity			
		Ambikapur	Rahuri	Ranchi	Mean	Ambikapur	Rahuri	Ranchi	Mean	Ambikapur	Rahuri	Ranchi	Mean
1	EC 178282	11.00	10.00	-	10.50	30.90	24.50	-	27.70	154.00	-	-	154.00
2	EC 178291	11.00	9.00	-	10.00	34.55	25.00	-	29.78	151.00	-	-	151.00
3	EC 178293	10.00	8.00	-	9.00	32.00	25.00	-	28.50	158.00	-	-	158.00
4	EC 178297	8.00	8.00	-	8.00	33.12	28.00	-	30.56	149.00	-	-	149.00
5	EC 178299	10.00	9.00	15.00	11.33	35.00	28.50	30.50	31.33	153.00	-	173.00	163.00
6	EC 178308	11.00	11.00	13.00	11.67	36.54	25.00	36.40	32.65	158.00	-	173.00	165.50
7	EC 178309	13.00	11.00	-	12.00	30.12	22.50	-	26.31	152.00	-	-	152.00
8	EC 178310	9.00	11.00	16.00	12.00	33.23	27.00	31.50	30.58	155.00	-	172.00	163.50
9	EC 178311	10.00	11.00	-	10.50	31.20	24.50	-	27.85	158.00	-	-	158.00
10	EC 178312	12.00	9.00	-	10.50	34.26	22.50	-	28.38	152.00	-	-	152.00
11	EC 178313	8.00	11.00	-	9.50	30.90	22.00	-	26.45	159.00	-	-	159.00
12	EC 178314	11.00	10.00	-	10.50	35.55	24.00	-	29.78	157.00	-	-	157.00
13	EC 178315	10.00	9.00	-	9.50	34.56	21.00	-	27.78	160.00	-	-	160.00
14	EC 178317	8.00	9.00	13.00	10.00	31.56	26.00	27.50	28.35	161.00	-	164.00	162.50
15	EC 178319	10.00	8.00	-	9.00	32.00	22.00	-	27.00	154.00	-	-	154.00
16	EC 178335	11.00	10.00	-	10.50	33.12	24.50	-	28.81	159.00	-	-	159.00
17	EC 178336	13.00	10.00	-	11.50	35.00	25.50	-	30.25	161.00	-	-	161.00
18	IC 15018	10.00	10.00	-	10.00	33.40	29.00	-	31.20	153.00	-	-	153.00
19	IC 17005	9.00	9.00	-	9.00	30.90	29.00	-	29.95	155.00	-	-	155.00
20	IC 17009	8.00	10.00	-	9.00	35.65	27.00	-	31.33	153.00	-	-	153.00
21	IC 26904	9.00	10.00	-	9.50	36.45	32.00	-	34.23	151.00	-	-	151.00
22	IC 26944-1	8.00	9.00	-	8.50	33.45	32.00	-	32.73	153.00	-	-	153.00
23	IC 95239	10.00	10.00	-	10.00	34.26	27.50	-	30.88	153.00	-	-	153.00
24	IC95229	9.00	9.00	-	9.00	31.20	31.50	-	31.35	153.00	-	-	153.00
25	RWBGP-1	8.00	11.00	12.00	10.33	33.75	19.00	29.20	27.32	151.00	-	171.00	161.00
26	RWBGP-1	11.00			11.00	33.12		-	33.12	152.00	-		152.00
27	RWBGP-10	8.00	11.00	16.00	11.67	34.26	24.00	33.50	30.59	155.00	-	170.00	162.50
28	RWBGP-11	11.00	10.00	13.00	11.33	30.90	27.00	31.60	29.83	153.00	-	163.00	158.00
29	RWBGP-12	10.00	11.00	16.00	12.33	32.00	28.00	32.50	30.83	155.00	-	168.00	161.50
30	RWBGP-13	8.00	11.00	17.00	12.00	36.65	26.00	31.90	31.52	151.00	-	169.00	160.00

Sl. No	Genotypes	Seed/Pod				100 Seed Weight (g)				Days to 80% maturity			
		Ambikapur	Rahuri	Ranchi	Mean	Ambikapur	Rahuri	Ranchi	Mean	Ambikapur	Rahuri	Ranchi	Mean
31	RWBGP-14	10.00	9.00	13.00	10.67	35.00	26.00	30.10	30.37	154.00	-	165.00	159.50
32	RWBGP-15	10.00	9.00	16.00	11.67	32.56	23.00	33.90	29.82	149.00	-	177.00	163.00
33	RWBGP-16	11.00	10.00	18.00	13.00	36.54	29.50	29.50	31.85	152.00	-	168.00	160.00
34	RWBGP-17	11.00	9.00	15.00	11.67	32.55	30.00	32.30	31.62	156.00	-	170.00	163.00
35	RWBGP-18	12.00	11.00	14.00	12.33	33.75	25.00	29.80	29.52	154.00	-	172.00	163.00
36	RWBGP-19	9.00	11.00	12.00	10.67	35.55	26.00	27.90	29.82	153.00	-	169.00	161.00
37	RWBGP-2	9.00	11.00	14.00	11.33	35.55	24.00	32.30	30.62	152.00	-	161.00	156.50
38	RWBGP-20	10.00	9.00	16.00	11.67	30.90	30.50	30.90	30.77	153.00	-	177.00	165.00
39	RWBGP-21	11.00	9.00	15.00	11.67	31.55	29.00	29.20	29.92	151.00	-	173.00	162.00
40	RWBGP-22	13.00	12.00	19.00	14.67	33.75	27.50	31.80	31.02	154.00	-	175.00	164.50
41	RWBGP-23	12.00	11.00	15.00	12.67	30.90	25.50	32.90	29.77	151.00	-	172.00	161.50
42	RWBGP-24	10.00	12.00	14.00	12.00	35.58	26.50	32.20	31.43	154.00	-	170.00	162.00
43	RWBGP-25	9.00	12.00	13.00	11.33	32.00	29.50	30.10	30.53	150.00	-	173.00	161.50
44	RWBGP-3	11.00	11.00	16.00	12.67	34.26	28.00	30.90	31.05	151.00	-	170.00	160.50
45	RWBGP-4	8.00	10.00	17.00	11.67	31.20	31.50	36.50	33.07	154.00	-	176.00	165.00
46	RWBGP-5	9.00	11.00	14.00	11.33	33.12	25.00	35.50	31.21	153.00	-	169.00	161.00
47	RWBGP-6	10.00	11.00	14.00	11.67	35.00	22.00	32.80	29.93	155.00	-	164.00	159.50
48	RWBGP-7	11.00	8.00	17.00	12.00	33.40	23.00	31.60	29.33	151.00	-	175.00	163.00
49	RWBGP-8	10.00	9.00	12.00	10.33	30.90	28.50	28.90	29.43	154.00	-	172.00	163.00
50	RWBGP-9	12.00	11.40	12.00	11.80	31.20	24.00	33.90	29.70	152.00	-	177.00	164.50
	AKWB-1 (C)	13.86	10.40	15.40	13.22	35.32	25.50	31.70	30.84	149.86	-	167.40	158.63
	IWB-1(C)	12.86	10.60	14.60	12.69	32.76	26.80	30.94	30.17	154.86	-	169.80	162.33
	RMDWB-1 (C)	15.86	-	14.00	14.93	37.43	-	33.56	35.49	155.86	-	173.40	164.63
	HWB-1 (C)	-	-	14.80	14.80	-	-	31.04	31.04	-	-	168.40	168.40
	Minimum	8.00	8.00	12.00	9.33	30.12	19.00	27.50	25.54	149.00	-	161.00	155.00
	Mean	10.24	10.05	19.00	13.10	33.38	26.08	36.50	31.99	153.89	-	177.00	165.44
	CD(0.05)		10.83	14.72	12.78		11.71	31.66	21.69		-	170.52	170.52
	CV(%) Error			12.17	12.17			6.84	6.84		-	2.40	2.40
	CV (%) Phen.	16.39			16.39	5.79			5.79	1.85	-		1.85

Table 100. Promising lines in Winged bean germplasm during Kharif 2019 at different locations (Plains)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Ambikapur I Year (50 Genotypes), Winged bean					
1	Days to 50% flowering	69.00	87.86	-	AKWB-1 (71.86)
2	Days to 80% maturity	149.00	161.00	-	AKWB-1 (149.86)
3	Days to pod setting	72.00	93.86	EC178282 (72.00), RWBGP-15 (73.00), RWBGP-25 (73.00)	AKWB-1 (77.86)
4	Pod length(cm)	15.00	22.00	EC178308 (22.00)	IWB-1 (21.11)
5	No. of pods/plant	8.00	25.86	-	RMDWB-1 (25.86)
6	No. of seeds/pod	8.00	15.86	-	RMDWB-1 (15.86)
7	Green pod yield/plant (g)	100.00	369.92	-	IWB-1 (369.92)
8	Seed yield/plant (g)	21.54	78.13	EC178319 (78.13), EC178335 (76.54), RWBGP-22 (69.44), EC178293 (69.44), EC178310 (65.79), RWBGP-6 (65.79), RWBGP-13 (65.00), EC178311 (63.63), EC178336 (58.18), EC178312 (51.49), RWBGP-9 (51.11), EC178291 (48.72)	RMDWB-1 (42.43)
9	100 Seed weight (g)	30.12	37.43	-	RMDWB-1 (37.43)
Cooch Behar I Year (50 Genotypes), Winged bean					
1	No. of pods/plant	9.00	16.00	RWBGP-08 (16.00), RWBGP-01 (16.00), RWBGP-25 (16.00), RWBGP-23 (16.00), RWBGP-13 (16.00), RWBGP-18 (16.00)	IWB-1 (13.20)
2	Pod length (cm)	12.80	17.80	RWBGP-13 (17.80), RWBGP-08 (17.40)	IWB-1 (14.82)
3	Pod width (cm)	2.50	3.30	RWBGP-23 (3.30), RWBGP-07 (3.30), RWBGP-08 (3.20), RWBGP-06 (3.20), RWBGP-24 (3.20), RWBGP-04 (3.20)	IWB-1 (2.86)
4	No. of seeds/pod	7.00	14.00	RWBGP-13 (14.00), RWBGP-23 (13.00), RWBGP-08 (13.00), RWBGP-25 (13.00)	IWB-1 (12.00)
5	Seed yield/plant (g)	16.15	32.58	RWBGP-13 (32.58), RWBGP-25 (32.25), RWBGP-01 (32.04), RWBGP-12 (30.08), RWBGP-23 (29.56), RWBGP-18 (28.45), RWBGP-08 (28.32)	IWB-1 (24.36)
6	100 Seed weight (g)	27.59	36.52	RWBGP-10 (36.52), RWBGP-04 (36.12), RWBGP-01 (35.24), RWBGP-18 (35.04)	IWB-1 (33.93)
Ayodhya I Year (50 Genotypes), Winged bean					
1	Days to 50% flowering	79.00	91.00	RWBPC-15 (79.00), RWBPC-5 (80.00), RWBPC-22 (80.00), RWBPC-3 (81.00), RWBPC-9 (81.00), RWBPC-20 (81.00)	Mean 84.6
2	No. of pods/plant	7.00	10.50	RWBPC-22 (10.50), RWBPC-11 (10.50), RWBPC-19 (10.00), RWBPC-24 (10.00), RWBPC-17 (9.75), RWBPC-23 (9.75)	Mean 8.93

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
3	No. of seeds/pod	8.00	12.00	RWBPC-17 (12.00), RWBPC-14 (11.25), RWBPC-1 (11.25), RWBPC-18 (11.25), RWBPC-8 (11.25), RWBPC-7 (11.00), RWBPC-16 (11.00)	Mean 10.11
4	Seed yield/plant (g)	13.50	23.00	RWBPC-10 (23.00), RWBPC-24 (22.00), RWBPC-6 (21.50), RWBPC-1 (20.50), RWBPC-11 (20.50), RWBPC-18 (20.00)	Mean 18.17
5	100 Seed weight (g)	26.94	29.15	RWBPC-16 (29.15), RWBPC-19 (29.10), RWBPC-23 (29.05), RWBPC-9 (29.02), RWBPC-12 (29.02)	Mean 28.11
Rahuri I Year (50 Genotypes), Winged bean (1st year)					
1	Days to 50 % flowering	71.0	99.00	RWBG-3 (71.00), RWBG-5 (72.00), RWBG-14 (73.00), EC 178299 (74.00), RWBG-12 (75.00), RWBG-10 (75.00), RWBG-24 (76.00)	IWB-1 (85.40)
2	Days to 80% maturity	163.00	189.00	EC 178308 (163.00), RWBG-10 (166.00), EC 178299 (167.00), RWBG-20 (167.00), EC 178291 (167.00), EC 3178293 (168.00), EC 178315 (168.00)	IWB-1 (174.60)
3	Pod length (cm)	11.50	20.30	EC 178319 (20.30), EC 178317 (18.80), RWBG-21 (18.70)	IWB-1 (17.46)
4	Pod width (cm)	1.50	2.80	EC 178309 (2.80), RWBG-6 (2.80), EC 178313 (2.80), EC 178317 (2.70), RWBG-21 (2.70), RWBG-19 (2.70)	AKWB-1 (2.40)
5	No. of seeds/pod	8.00	12.00	RWBG-25 (12.00), RWBG-22 (12.00), RWBG-24 (12.00), RWBG-9 (11.40), EC 178309 (11.00), RWBG-6 (11.00), EC 178313 (11.00), RWBG-19 (11.00), EC 178308 (11.00)	IWB-1 (10.60)
6	Seed yield/ha (q)	8.2	20.6	-	IWB-1 (16.96)
7	25 Green pod weight (g)	255.0	462.0	EC 178311 (462.00), RWBG-5 (458.00), EC 178299 (458.00), RWBG-21 (452.00)	IWB-1 (442.80)
8	100 seed weight (g)	19.00	32.00	IC 26904 (32.00), IC 26944- 1 (32.00), RWBG-4 (31.50), IC 95239 (31.50), RWBG-20 (30.50), RWBG-17 (30.00), RWBG-25 (29.50), RWBG-16 (29.50), IC 15018 (29.00), RWBG-21 (29.00), IC 17005 (29.00)	IWB-1 (26.80)
Rahuri II Year (50 Genotypes), Winged bean (2nd year)					
1	Days to 50 % flowering	70.00	99.00	EC38824-2 (70.00), IC095234 (72.00), IC095238 (72.00), IC095235 (73.00), IC095240 (73.00), IC095241 (74.00), EC38824 (75.00), IC095228 (75.00), EC38823 (78.00), EC27885-1 (79.00), EC27886A-1 (79.00), EC38821- 1 (79.00)	IWB-1 (82.20)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
2	Days to 80% maturity	169.00	198.00	EC038821- 1 (169.00), EC027884 (169.00), EC021904 (170.00), IC0112417 (171.00), EC27886A2 (172.00), EC027885-1 (174.00), IC0095231 (174.00), IC0095230 (174.00), IC0011885 (174.00),	AKWB-1 (187.60)
3	Pod length (cm)	12.90	22.00	IC095233 (22.00), EC021904 (19.90), IC112416 (18.90), IC045229-1 (17.70), EC027884 (17.50), IC045229 (17.50)	IWB-1 (16.20)
4	Pod width (cm)	1.70	3.00	IC095233 (3.00), IC095224 (2.60), IC095227 (2.50), IC095238 (2.50), IC031981 (2.50), IC017006-1 (2.50), IC0112416 (2.40), IC045229 (2.40), EC27886A2 (2.40), IC095235 (2.40)	AKWB-1 (2.14)
5	No. of seeds/pod	8.00	14.00	EC21904 (14.00), IC011885 (13.00), IC095228 (13.00), IC095230 (13.00), EC27886A-1 (12.00), IC017005-1 (12.00)	IWB-1 (11.40)
6	Seed yield/ha (q)	7.31	19.33	EC21904 (19.33), IC026949-1 (19.00), IC034865-2 (18.92), IC0112417 (18.64), IC031981 (18.25), IC038683 (18.22), IC095230 (17.92), IC095235 (17.86), IC095241 (17.78), IC026946 (17.50)	IWB-1 (15.47)
7	25 Green pod weight (g)	253.00	418.00	IC045225 (418.00), IC095233 (418.00), IC095226 (416.00), IC095227 (415.00), IC045229-1 (413.00), IC041979 (410.00), EC21904 (408.00), IC038683 (405.00), IC041980 (405.00), IC095242 (400.00)	AKWB-1 (314.8)
8	100 Seed weight (g)	21.00	34.50	IC095227 (34.50), IC095226 (33.50), IC026949 (33.00), IC041979 (33.00), IC041980 (32.50), EC27886A-1 (32.00), EC38821-1 (32.00), IC038683 (32.00)	AKWB-1 (26.52)
Ranchi I Year (50 Genotypes), Winged bean					
1	Plant height (cm)	261.00	410.00	-	RMDWB-1 (388.40)
2	No. of branches/plant	2.00	5.20	-	RMDWB-1 (5.20)
3	No. of pods/plant	24.00	46.00	RWBG-16 (46.00), RWBG-14 (46.00), RWBG-3 (45.00), EC178317 (45.00), RWBG-24 (44.00), RWBG-18 (44.00), RWBG-25 (43.00), RWBG-21 (42.00), EC178310 (41.00)	RMDWB-1 (35.20)
4	No. of seeds/pod	12.00	19.00	RWBG-22 (19.00), RWBG-16 (18.00), RWBG-4 (17.00), RWBG-7 (17.00), RWBG-13 (17.00),	AKWB-1 (15.40)
5	Pod length (cm)	14.00	24.00	RWBG-16 (24.00), RWBG-22 (21.00), RWBG-7 (20.00), RWBG-23 (20.00), RWBG-4 (19.00), RWBG-13 (19.00)	AKWB-1 (17.00)
6	Pod width (cm)	2.00	4.00	RWBG-19 (4.00), RWBG-7 (3.50), RWBG-4 (3.50),	HWB-1 (2.90)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
				EC178310 (3.50)	
7	No. of pods/cluster	1.40	3.00	RWBGP-22 (3.00), EC178317 (3.00)	RMDWB-1 (2.00)
8	No. of clusters/plant	2.00	6.00	EC178317 (6.00), EC178310 (6.00), RWBGP-24 (6.00), RWBGP-10 (6.00)	IWB-1 (4.80)
9	Leaf length (cm)	5.00	13.00	RWBGP-15 (13.00), RWBGP-20 (13.00)	RMDWB-1 (11.20)
10	Leaf width (cm)	4.00	14.00	RWBGP-16 (14.00), RWBGP-20 (13.00), RWBGP-15 (11.00), RWBGP-7 (11.00)	RMDWB-1 (9.30)
11	Petiole length (cm)	2.50	11.50	-	AKWB-1 (11.50)
12	Stem thickness	2.00	4.00	RWBGP-13 (4.00), RWBGP-20 (3.50), RWBGP-17 (3.50), RWBGP-24 (3.50), RWBGP-23 (3.50), RWBGP-14 (3.50), RWBGP-9 (3.50)	RMDWB-1 (3.10)
13	Days to 50% flowering	67.00	80.00	-	RMDWB-1 (68.20)
14	Days to 80% maturity	161.00	177.00	-	AKWB-1 (167.40)
15	Initial plant stand	10.00	20.20	-	HWB-1 (20.20)
16	Plant stand at harvest	10.00	20.00	EC178317 (20.00)	HWB-1 (18.80)
17	100-seed weight (g)	27.50	36.50	RWBGP-4 (36.50), EC178308 (36.40)	RMDWB-1 (33.56)
18	Seed yield/plant (g)	12.60	38.20	RWBGP-13 (38.20), RWBGP-9 (36.50), RWBGP-20 (36.30), RWBGP-10 (35.80), RWBGP-22 (34.50), RWBGP-6 (32.40), RWBGP-17 (31.50), RWBGP-25 (29.30), RWBGP-15 (29.10), RWBGP-14 (25.90)	HWB-1 (23.94)
19	No. of seeds/pod	12.00	19.00	RWBGP-22 (19.00), RWBGP-16 (18.00), RWBGP-13 (17.00), RWBGP-7 (17.00), RWBGP-4 (17.00)	AKWB-1 (15.40)

Table 101. Promising lines in Winged bean (I year) germplasm during Kharif 2019 based on all locations (Plains)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Days to 50% flowering	72.50	86.00	-	IWB-1 (70.80)
2	No. of pods/plant	8.00	13.25	-	IWB-1 (13.20)
3	No. of seeds/pod	7.50	13.00	RWBG-08 (12.13), RWBG-13 (12.13)	IWB-1 (12.00)
4	Seed yield/plant (g)	14.83	27.79	RWBG-25 (27.13), RWBG-01 (26.27)	IWB-1 (24.36)
5	100-seed wt. (g)	27.27	32.84	-	IWB-1 (33.93)

Table 102. Promising lines in Winged bean germplasm (II year) during Kharif 2019 based on all locations (Plains)

S. No	Descriptions	Range		Promising Accessions	Checks
		Min	Max		
1	Days to 50% flowering	71.00	79.42	RWBG-3 (71.00), RWBG-24 (72.67), RWBG-5 (72.67), RWBG-23 (73.67)	IWB-1 (75.00)
2	Pod length(cm)	13.50	19.03	RWBG-16 (19.03), EC 178297 (19.00)	IWB-1 (18.32)
3	Seed yield/ plant (g)	14.10	47.15	EC 178319 (47.15), EC 178335 (47.09), EC 178293 (39.79), RWBG-22 (39.67), EC 178311 (39.31), RWBG-13 (39.09), RWBG-6 (38.48), EC 178336 (35.27)	RMDWB-1 (31.05)
4	Pod width (cm)	1.50	3.35	RWBG-19 (3.35)	IWB-1 (2.90)

2.4.2.3 Adzuki bean (*Vigna angularis*)

At BAU Ranchi, a set of 50 genotypes along with two checks HPU 51 and Totru Local were evaluated in ABD for fifteen quantitative characters. The experimental details are presented in Table 103. The promising genotypes and statistical parameters for all the characters have been presented in Tables 104 to 106. For flowering and maturity the data ranged from 33.0 days to 50.0 days and 60.0 days to 82.0 days, respectively. The early flowering genotype was EC000271 (33.0 days) which was better than the best check Totru Local (36.1 days), while none of the genotypes were superior than the best check Totru Local (63.5 days) for early maturity. The promising genotypes for plant height were IC485396 (48.0 cm) followed by EC340267 (44.0 cm) and IC341959 (43.0 cm) and were better than the best check HPU 51 (31.0 cm). The maximum pod length was recorded in IC341959 (10.0 cm), EC000263 and EC340251 (9.5 cm) which were better than the check HPU 51 (8.3 cm), while promising genotypes for more pod width were EC000263, IC469175 and EC340271 (1.0 cm) and were better than the check HPU 51 (0.7 cm). The data ranged from 4.0 to 15.0 for number of pods per plant and 5.0 to 11.0 for number of seeds per pod. The best performing genotype for more number of pods per plant were IC485396 (15.0) followed by EC108080 and EC000293 (14.0) which were significantly better than the best check HPU 51 (9.9). The maximum number of seeds per pod were observed in IC485396 and EC000293 (11.0) followed by EC108080 (10.0) which were better than the best check Totru Local (8.4).

Table 103: Experimental Details of Germplasm Evaluation in Adzuki bean at Ranchi: Kharif 2019 (Plains)

S. No	Items	Ranchi
1	No. of Accessions.	50
2	No. of Checks	2
3	Design	ABD
4	No. of Block	10
5	Number of Rows	
6	Row Length (m)	4
7	Row spacing (cm)	30
8	Plant spacing (cm)	10
9	NPKS (kg/ha)	20:40:20:20
10	Plot size (m ²)	2.7
11	Sowing Date	31/07/2019
12	Harvesting period	02/10/2019 to 20/10/2019

Table 104. Evaluation of germplasm in Adzuki bean at Ranchi (I Year): Kharif 2019 (Plains)

S. N.	Accession	Petiole length (cm)	No. of pods/plant	No. of seeds/pod	No. of pods/cluster	No. of clusters/plant	Days to 50% flowering	Days to 80% maturity
1	EC000276	2.00	4.00	5.00	2.00	2.00	42.00	71.00
2	EC340240	2.00	9.00	8.00	2.00	3.00	39.00	65.00
3	EC340267	2.50	8.00	8.00	3.00	2.00	41.00	68.00
4	EC057459	2.50	7.00	9.00	2.00	3.00	38.00	64.00
5	IC341959	2.00	10.00	10.00	3.00	2.00	43.00	62.00
6	EC000263	2.00	11.00	9.00	2.00	4.00	44.00	72.00
7	EC340256	2.00	9.00	9.00	2.00	2.00	46.00	63.00
8	EC340276	2.00	4.00	5.00	2.00	2.00	44.00	74.00
9	IC485396	2.50	15.00	11.00	2.00	5.00	49.00	77.00
10	IC085382	1.50	11.00	9.00	2.00	4.00	44.00	60.00
11	EC000264	2.50	8.00	9.00	2.00	3.00	43.00	71.00
12	EC340280	2.00	6.00	7.00	2.00	3.00	45.00	77.00
13	EC059489	2.00	10.00	9.00	2.00	3.00	40.00	70.00
14	IC024105	2.00	13.00	9.00	3.00	3.00	49.00	76.00
15	IC455396	2.00	10.00	8.00	2.00	3.00	43.00	68.00
16	EC000254	1.50	8.00	9.00	2.00	3.00	48.00	70.00
17	EC340246	1.50	5.00	8.00	2.00	2.00	47.00	75.00
18	EC340263	2.00	6.00	10.00	2.00	2.00	50.00	73.00
19	EC340285	1.50	5.00	7.00	2.00	3.00	38.00	64.00
20	IC241041	1.50	8.00	7.00	3.00	2.00	46.00	78.00
21	EC120466	2.00	8.00	9.00	3.00	2.00	47.00	75.00
22	EC340272	1.50	7.00	8.00	2.00	2.00	44.00	74.00
23	EC341962	1.50	5.00	6.00	2.00	2.00	41.00	70.00
24	IC108855	2.50	8.00	9.00	2.00	3.00	43.00	71.00
25	IC469175	2.00	11.00	8.00	2.00	2.00	49.00	74.00
26	EC340253	1.50	13.00	7.00	2.00	2.00	47.00	64.00
27	EC340265	2.50	10.00	9.00	2.00	3.00	49.00	80.00
28	EC340281	1.50	8.00	7.00	2.00	2.00	39.00	74.00
29	EC340284	1.00	5.00	8.00	2.00	2.00	46.00	70.00
30	IC341954	1.00	6.00	9.00	2.00	3.00	49.00	73.00
31	EC340251	2.50	11.00	10.00	3.00	2.00	39.00	74.00
32	EC340266	2.00	9.00	10.00	3.00	2.00	50.00	80.00
33	IC108854	1.50	10.00	10.00	3.00	2.00	37.00	65.00
S. N.	Accession	Petiole length	No. of	No. of	No. of	No. of	Days to 50%	Days to 80%

		(cm)	pods/plant	seeds/pod	pods/cluster	clusters/plant	flowering	maturity
34	IC341941	1.50	13.00	8.00	4.00	4.00	38.00	63.00
35	IC485386	1.50	7.00	9.00	2.00	2.00	50.00	80.00
36	EC108080	2.00	14.00	10.00	3.00	4.00	41.00	66.00
37	EC340250	1.50	12.00	7.00	2.00	5.00	40.00	63.00
38	IC341955	2.50	10.00	9.00	3.00	2.00	39.00	72.00
39	IC485385	1.50	13.00	9.00	3.00	3.00	40.00	69.00
40	IC485388	1.50	11.00	8.00	2.00	4.00	45.00	75.00
41	EC015257	1.50	13.00	9.00	2.00	5.00	35.00	60.00
42	EC340271	2.00	9.00	6.00	2.00	2.00	48.00	61.00
43	EC340273	1.50	8.00	7.00	2.00	3.00	42.00	69.00
44	EC008707	1.00	6.00	8.00	3.00	2.00	45.00	72.00
45	IC469174	1.50	6.00	9.00	2.00	2.00	40.00	78.00
46	EC000262	2.00	9.00	8.00	3.00	2.00	42.00	82.00
47	EC000271	2.00	12.00	7.00	2.00	2.00	33.00	77.00
48	EC000293	1.50	14.00	11.00	2.00	3.00	46.00	75.00
49	EC057959	1.00	12.00	9.00	2.00	3.00	41.00	66.00
50	IC024522	2.00	5.00	9.00	2.00	2.00	46.00	73.00
	HPU-51 (C)	2.10	9.90	8.00	2.30	2.70	44.30	74.40
	Totru local (C)	1.65	8.60	8.40	2.50	2.60	36.10	63.50
	Minimum	1.00	4.00	5.00	2.0	2.00	33.00	60.00
	Maximum	2.5	15.00	11.00	4.00	5.00	50.00	82.00
	Mean	1.81	9.05	8.37	2.30	2.70	43.28	70.79
	CV (%) Phen.	23.25	31.52	15.68	21.52	32.21	9.84	8.15

Table 105. Evaluation of germplasm in Adzuki bean at Ranchi (I Year): Kharif 2019 (Plains) Contnd....

S.No.	Accession	No. of branches/plant	Plant height (cm)	Pod length (cm)	Pod width (cm)	Stem thickness (cm)	Leaf length (cm)	Leaf width (cm)
1	EC000276	5.00	33.00	7.00	0.50	1.50	7.00	5.00
2	EC340240	6.00	26.00	7.00	0.60	2.00	7.50	5.50
3	EC340267	5.00	44.00	7.50	0.40	2.00	8.50	6.50
4	EC057459	8.00	29.00	9.00	0.50	2.00	10.00	6.00
5	IC341959	8.00	43.00	10.00	0.50	2.50	8.00	6.00
6	EC000263	6.00	34.00	9.50	0.50	2.00	8.00	6.00
7	EC340256	6.00	28.00	7.00	0.50	2.00	7.00	5.50
8	EC340276	3.00	21.00	6.00	0.60	2.00	6.00	4.00
9	IC485396	8.00	48.00	9.00	0.40	2.50	10.00	7.00
10	IC085382	7.00	30.00	8.00	0.70	1.50	6.00	4.50
11	EC000264	6.00	36.00	8.50	0.70	2.00	7.00	5.00
12	EC340280	4.00	26.00	7.50	0.50	1.50	9.00	7.00
13	EC059489	5.00	22.00	8.00	0.50	2.00	6.50	4.00
14	IC024105	5.00	32.00	9.00	0.50	2.50	7.00	5.00
15	IC455396	5.00	33.00	7.50	0.60	2.00	10.00	6.00
16	EC000254	6.00	21.00	7.00	0.50	2.00	6.00	4.50
17	EC340246	4.00	22.00	7.00	0.40	2.00	6.00	5.00
18	EC340263	8.00	23.00	9.00	0.50	2.00	6.50	5.00
19	EC340285	4.00	19.00	5.50	0.60	1.50	5.00	3.50
20	IC241041	5.00	29.00	7.50	0.60	2.00	6.00	5.00
21	EC120466	5.00	25.00	7.50	0.50	2.00	7.00	6.00
22	EC340272	6.00	28.00	7.00	0.40	2.00	6.00	5.00
23	EC341962	3.00	25.00	6.00	1.00	1.50	6.00	5.00
24	IC108855	6.00	36.00	8.50	0.70	2.00	7.00	5.00
25	IC469175	5.00	26.00	6.00	1.00	2.50	5.50	4.00
26	EC340253	9.00	20.00	7.50	0.40	2.50	7.00	4.00
27	EC340265	5.00	30.00	9.00	0.60	2.00	8.00	5.00
28	EC340281	5.00	33.00	7.00	0.50	2.00	7.00	6.00
29	EC340284	4.00	24.00	9.00	0.50	2.00	4.00	3.00
30	IC341954	5.00	26.00	8.00	0.60	1.50	4.50	4.00
31	EC340251	5.00	34.00	9.50	0.60	2.00	8.00	6.00
32	EC340266	5.00	24.00	9.50	0.50	2.50	9.50	5.50
33	IC108854	4.00	26.00	8.00	0.40	2.00	4.50	4.50
S.No.	Accession	No. of	Plant height	Pod length (cm)	Pod width	Stem thickness	Leaf length	Leaf width

		branches/plant	(cm)		(cm)	(cm)	(cm)	(cm)
34	IC341941	7.00	34.00	7.00	0.50	2.50	6.00	5.00
35	IC485386	4.00	22.00	9.00	0.50	2.00	6.50	5.00
36	EC108080	7.00	38.00	9.00	0.40	2.00	8.00	5.50
37	EC340250	6.00	30.00	7.00	0.60	3.00	7.00	6.50
38	IC341955	7.00	31.00	9.00	0.40	2.50	7.00	6.00
39	IC485385	5.00	30.00	7.00	0.60	2.00	5.00	4.00
40	IC485388	6.00	35.00	8.00	0.50	2.50	7.00	4.00
41	EC015257	6.00	22.00	7.00	0.50	2.50	6.00	4.50
42	EC340271	6.00	25.00	6.00	1.00	1.50	7.00	5.00
43	EC340273	4.00	22.00	8.00	0.70	2.00	5.50	1.50
44	EC008707	4.00	24.00	8.50	0.50	2.00	5.00	3.00
45	IC469174	5.00	26.00	9.00	0.60	1.50	5.00	4.00
46	EC000262	5.00	30.00	7.50	1.00	2.50	7.50	4.00
47	EC000271	6.00	30.00	8.00	0.50	2.50	7.50	6.00
48	EC000293	4.00	38.00	9.00	0.50	2.00	7.00	5.50
49	EC057959	6.00	30.00	8.00	0.60	2.00	5.00	4.00
50	IC024522	4.00	22.00	8.00	0.50	2.00	6.00	4.50
	HPU-51 (C)	6.10	31.00	8.30	0.70	2.30	8.20	5.10
	Totru local (C)	5.00	25.00	6.00	0.43	1.80	4.85	3.55
	Minimum	3.0	19.0	5.5	0.4	1.5	4.0	1.5
	Maximum	9.0	48.0	10.0	1.0	3.0	10.0	7.0
	Mean	5.46	28.87	7.85	0.56	2.06	6.77	4.92
	CV (%) Phen.	24.18	22.01	13.87	27.10	16.58	21.23	21.74

Table 106. Promising lines in Adzuki bean germplasm during Kharif 2019 (I Year): (Plains)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Ranchi (50 Genotypes), Adzuki bean					
1	Leaf length (cm)	4.00	10.00	IC485396 (10.00), EC057459 (10.00), IC455396 (10.00), EC340266 (9.50), EC340280 (9.00)	HPU-51 (8.20)
2	Leaf width (cm)	1.50	7.00	IC485396 (7.00), EC340280 (7.00), EC340267(6.50), EC340250 (6.50), EC057459 (6.00), IC455396 (6.00), EC000263 (6.00), IC341959 (6.00), EC340251 (6.00), EC000271 (6.00)	HPU-51 (5.10)
3	Petiole length (cm)	1.00	2.50	IC485396 (2.50), EC340267 (2.50), EC057459 (2.50), EC340251 (2.50), IC341955 (2.50), EC340265 (2.50), EC000264 (2.50), IC108855 (2.50)	HPU-51 (2.10)
4	No. of pods/plant	4.00	15.00	IC485396 (15.00), EC108080 (14.00), EC000293 (14.00), IC024105 (13.00), IC341941 (13.00), EC015257 (13.00), EC340253 (13.00), IC485385 (13.00), EC000271 (12.00), EC340250 (12.00), EC057959 (12.00)	HPU-51 (9.90)
5	No. of seeds/pod	5.00	11.00	IC485396 (11.00), EC000293 (11.00), EC108080 (10.00), EC340251 (10.00), IC341959 (10.00), IC108854 (10.00), EC340266 (10.00), EC340263 (10.00)	Totru local (8.40)
6	No. of pods/cluster	2.00	4.00	IC341941 (4.00), EC108080 (3.00), EC340251 (3.00), IC341959 (3.00), IC108854 (3.00), EC340266 (3.00), IC024105 (3.00), IC485385 (3.00), IC341955 (3.00)	Totru local (2.50)
7	No. of clusters/plant	2.00	5.00	IC485396 (5.00), EC015257 (5.00), EC340250 (5.00), IC341941 (4.00), EC108080 (4.00), EC000263 (4.00), IC085382 (4.00), IC485388 (4.00), IC024105 (3.00), IC485385 (3.00), EC000293 (3.00), EC057959 (3.00)	HPU-51 (2.70)
8	Days to 50% flowering	33.00	50.00	EC000271 (33.00)	Totru local (36.10)
9	No. of branches/plant	3.00	9.00	EC340253 (9.00), IC341959 (8.00), EC057459 (8.00), EC340263 (8.00), IC485396 (8.00), IC085382 (7.00), IC341941 (7.00), EC108080 (7.00), IC341955 (7.00)	HPU-51 (6.10)
10	Plant height (cm)	19.00	48.00	IC485396 (48.00), EC340267 (44.00), IC341959 (43.00), EC108080 (38.00), EC000293 (38.00), EC000264 (36.00), IC108855 (36.00), IC485388 (35.00)	HPU-51 (31.00)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
12	Pod length (cm)	5.50	10.00	IC341959 (10.00), EC000263 (9.50), EC340251 (9.50), EC340266 (9.50), IC485396 (9.00), EC108080 (9.00), EC000293 (9.00), IC024105 (9.00), IC341955 (9.00), EC340265 (9.00)	HPU-51 (8.30)
13	Pod width (cm)	0.40	1.00	EC000262 (1.00), IC469175 (1.00), EC340271 (1.00), EC341962 (1.00)	HPU-51 (0.70)
14	Stem thickness (cm)	1.50	3.00	EC340250 (3.00), EC000262 (2.50), IC469175 (2.50), IC341959 (2.50), EC340266 (2.50), IC024105 (2.50), IC485388 (2.50), EC000271 (2.50), IC341941 (2.50)	HPU-51 (2.30)
15	Insect reaction (%)	0.00	40.00	EC340285 (40.00), IC341954 (33.00), IC469174 (33.00), EC000276 (25.00), EC340276 (25.00), EC340246 (20.00), IC108854 (20.00), IC024522 (20.00)	HPU-51 (13.47)

2.4.2.4 Jobs tear (*Coix lacryma-jobi*)

At BAU Ranchi, a set of 50 genotypes along with one check Mayoore were evaluated in ABD for ten quantitative characters. The experimental details are presented in Table 107. The promising genotypes and statistical parameters for all the characters have been presented in Tables 108 to 109. The data ranged from 75.0 days to 100.0 days and 151.0 days 185.0 days for flowering and maturity, respectively. The early flowering genotype were RJTGP1 (75.0 days) followed by RJTGP125 (76.0 days) and RJTGP74 (78.0 days) which were better than the check Mayoore (92.0 days), while genotypes RJTGP101 (151.0 days) followed by RJTGP105 and RJTGP104 (152.0 days) were superior than the best check Mayoore (179.08 days) for early maturity. The promising genotypes for plant height were RJTGP124 and RJTGP125 (109.0 cm) followed by RJTGP73 (108.0 cm) and were better than the best check Mayoore (65.8 cm). The maximum branches per plant were recorded in RJTGP122, RJTGP3 and RJTGP121 (6.0), which were better than the check Mayoore (2.0), while promising genotypes for maximum number of seeds per pod were RJTGP93 and RJTGP71 (41.0), followed by RJTGP92 (40.0) and were better than the check Mayoore (16.4). The plant stand at harvest was found maximum in RJTGP74 and RJTGP50 (33.0) followed by RJTGP75 (32.0) which were better than the check Mayoore (19.0).

Table 107: Experimental Details of Germplasm Evaluation in Job's Tear at Ranchi: Kharif 2019 (Plains)

S. No	Items	Ranchi
1	No. of Accessions.	125
2	No. of Checks	1
3	Design	ABD
4	No. of Block	10
5	Number of Rows	-
6	Row Length (m)	4
7	Row spacing (cm)	30
8	Plant spacing (cm)	10
9	NPKS (kg/ha)	20:40:20:20
10	Plot size (m ²)	2.7
11	Sowing Date	16/07/2019
12	Harvesting period	12/01/2020 to 31/01/2020

Table 108. Evaluation of germplasm in Job's Tear at Ranchi: Kharif 2019 (Plains)

S. No.	Genotypes	Plant height (cm)	Days to 50% flowering	Days to maturity	Initial plant population	Leaf length (cm)	Leaf breadth (cm)	Plant stand at harvest	No. of branches/plant	No. of seeds/pod	Stem thickness (cm)
1	RJTGP1	76.00	75.00	174.00	26.00	33.00	3.00	17.00	4.00	20.00	4.00
2	RJTGP2	70.00	97.00	180.00	23.00	20.00	3.50	15.00	3.00	17.00	3.00
3	RJTGP3	77.00	79.00	170.00	30.00	31.00	3.00	21.00	6.00	22.00	3.00
4	RJTGP4	77.00	79.00	170.00	30.00	31.00	3.00	21.00	6.00	22.00	3.00
5	RJTGP5	57.00	96.00	167.00	30.00	19.00	2.50	16.00	2.00	18.00	3.00
6	RJTGP6	51.00	95.00	169.00	26.00	23.00	2.50	10.00	3.00	17.00	3.50
7	RJTGP7	104.00	84.00	177.00	30.00	33.00	3.00	20.00	3.00	30.00	4.50
8	RJTGP8	44.00	97.00	175.00	25.00	14.00	3.00	19.00	2.00	12.00	3.00
9	RJTGP9	69.00	91.00	178.00	20.00	21.00	2.50	14.00	2.00	13.00	3.50
10	RJTGP14	43.00	80.00	166.00	25.00	25.00	2.00	18.00	3.00	11.00	2.50
11	RJTGP15	38.00	93.00	176.00	30.00	20.00	2.50	13.00	2.00	10.00	2.50
12	RJTGP16	45.00	95.00	177.00	23.00	19.00	3.00	10.00	4.00	20.00	2.50
13	RJTGP19	78.00	90.00	165.00	27.00	18.00	2.50	12.00	3.00	16.00	3.00
14	RJTGP20	65.00	89.00	168.00	22.00	16.00	3.00	10.00	2.00	13.00	2.50
15	RJTGP21	94.00	97.00	178.00	32.00	23.00	3.50	16.00	3.00	20.00	3.00
16	RJTGP22	80.00	96.00	179.00	31.00	19.00	3.00	19.00	2.00	18.00	3.00
17	RJTGP23	63.00	92.00	180.00	30.00	22.00	3.50	17.00	2.00	17.00	2.50
18	RJTGP24	72.00	96.00	177.00	29.00	19.00	3.00	17.00	2.00	17.00	3.00
19	RJTGP25	79.00	89.00	172.00	27.00	24.00	2.00	10.00	5.00	28.00	3.50
20	RJTGP29	54.00	90.00	171.00	29.00	27.00	2.50	12.00	3.00	20.00	3.50
21	RJTGP31	48.00	97.00	173.00	28.00	20.00	3.00	14.00	3.00	20.00	2.50
22	RJTGP36	60.00	90.00	179.00	35.00	24.00	3.00	30.00	3.00	12.00	2.50
23	RJTGP37	91.00	93.00	180.00	31.00	32.00	2.50	22.00	3.00	24.00	4.50
24	RJTGP38	42.00	95.00	181.00	24.00	20.00	2.50	10.00	2.00	13.00	3.00
25	RJTGP39	52.00	96.00	177.00	24.00	18.00	2.00	19.00	2.00	11.00	2.50
26	RJTGP40	87.00	86.00	178.00	29.00	38.00	3.00	25.00	4.00	33.00	3.50
27	RJTGP41	64.00	94.00	181.00	30.00	18.00	3.00	25.00	3.00	17.00	4.00
28	RJTGP42	66.00	95.00	176.00	33.00	22.00	3.00	18.00	2.00	17.00	3.50
29	RJTGP43	91.00	97.00	177.00	28.00	17.00	2.50	22.00	3.00	39.00	4.00
30	RJTGP44	71.00	94.00	181.00	26.00	28.00	3.50	23.00	3.00	27.00	3.00
31	RJTGP45	49.00	86.00	175.00	34.00	20.00	2.00	21.00	2.00	13.00	3.50
32	RJTGP46	75.00	92.00	182.00	31.00	22.00	3.00	19.00	5.00	29.00	4.00
33	RJTGP47	78.00	98.00	180.00	38.00	18.00	2.00	30.00	2.00	19.00	3.00

S. No.	Genotypes	Plant height (cm)	Days to 50% flowering	Days to maturity	Initial plant population	Leaf length (cm)	Leaf breadth (cm)	Plant stand at harvest	No. of branches/plant	No. of seeds/pod	Stem thickness (cm)
34	RJTGP48	93.00	97.00	176.00	35.00	28.00	3.50	13.00	3.00	27.00	4.00
35	RJTGP49	58.00	96.00	182.00	31.00	21.00	3.00	15.00	2.00	14.00	3.00
36	RJTGP50	69.00	94.00	181.00	37.00	23.00	3.00	33.00	3.00	22.00	2.50
37	RJTGP51	35.00	90.00	183.00	25.00	19.00	3.00	19.00	2.00	14.00	4.00
38	RJTGP52	60.00	99.00	179.00	33.00	20.00	2.50	30.00	3.00	26.00	3.50
39	RJTGP53	71.00	94.00	180.00	25.00	23.00	3.00	22.00	2.00	18.00	3.00
40	RJTGP54	88.00	98.00	175.00	26.00	27.00	2.50	20.00	4.00	28.00	4.50
41	RJTGP59	45.00	94.00	182.00	31.00	18.00	3.00	16.00	2.00	13.00	3.50
42	RJTGP60	73.00	97.00	181.00	27.00	19.00	4.00	11.00	4.00	21.00	3.50
43	RJTGP61	68.00	95.00	182.00	31.00	20.00	3.50	16.00	3.00	36.00	4.00
44	RJTGP62	53.00	98.00	180.00	26.00	25.00	3.50	12.00	2.00	14.00	4.00
45	RJTGP63	56.00	100.00	179.00	28.00	19.00	4.00	21.00	3.00	22.00	4.50
46	RJTGP65	92.00	96.00	182.00	34.00	25.00	3.50	28.00	3.00	27.00	4.00
47	RJTGP66	66.00	95.00	183.00	21.00	21.00	3.50	19.00	2.00	20.00	4.00
48	RJTGP67	90.00	98.00	178.00	28.00	28.00	4.00	14.00	3.00	24.00	4.50
49	RJTGP68	91.00	100.00	184.00	29.00	18.00	3.50	24.00	3.00	20.00	5.00
50	RJTGP69	60.00	95.00	182.00	30.00	20.00	3.50	21.00	2.00	11.00	4.00
51	RJTGP70	80.00	94.00	183.00	35.00	20.00	4.00	12.00	3.00	23.00	4.00
52	RJTGP71	96.00	91.00	185.00	29.00	28.00	4.50	15.00	2.00	41.00	4.50
53	RJTGP72	99.00	90.00	177.00	38.00	25.00	3.00	29.00	4.00	36.00	4.00
54	RJTGP73	108.00	85.00	176.00	24.00	24.00	3.00	19.00	3.00	28.00	3.00
55	RJTGP74	91.00	78.00	174.00	39.00	36.00	4.00	33.00	4.00	38.00	4.00
56	RJTGP75	84.00	80.00	172.00	35.00	35.00	3.00	32.00	4.00	34.00	4.00
57	RJTGP76	101.00	83.00	173.00	26.00	22.00	3.00	20.00	3.00	38.00	3.50
58	RJTGP77	99.00	92.00	175.00	22.00	27.00	4.00	17.00	2.00	30.00	4.00
59	RJTGP78	83.00	98.00	180.00	36.00	20.00	3.00	12.00	2.00	22.00	3.50
60	RJTGP79	74.00	94.00	177.00	28.00	25.00	3.50	23.00	3.00	23.00	3.50
61	RJTGP80	84.00	90.00	176.00	25.00	22.00	3.00	21.00	4.00	28.00	4.50
62	RJTGP81	66.00	91.00	178.00	26.00	21.00	3.50	20.00	2.00	15.00	4.00
63	RJTGP82	73.00	91.00	176.00	30.00	19.00	3.00	24.00	2.00	13.00	3.50
64	RJTGP83	72.00	92.00	180.00	31.00	21.00	3.00	24.00	2.00	16.00	4.00
65	RJTGP84	55.00	94.00	181.00	38.00	21.00	3.50	30.00	2.00	15.00	3.50
66	RJTGP85	65.00	92.00	183.00	36.00	18.00	3.00	11.00	3.00	19.00	3.50
67	RJTGP89	62.00	82.00	184.00	21.00	25.00	4.00	18.00	3.00	18.00	3.00
68	RJTGP90	81.00	87.00	182.00	27.00	26.00	4.00	14.00	4.00	26.00	4.00
69	RJTGP91	94.00	87.00	183.00	28.00	29.00	3.50	16.00	5.00	36.00	4.00

S. No.	Genotypes	Plant height (cm)	Days to 50% flowering	Days to maturity	Initial plant population	Leaf length (cm)	Leaf breadth (cm)	Plant stand at harvest	No. of branches/plant	No. of seeds/pod	Stem thickness (cm)
70	RJTGP92	100.00	87.00	183.00	28.00	23.00	4.00	15.00	6.00	40.00	3.50
71	RJTGP93	104.00	81.00	182.00	31.00	30.00	4.00	18.00	4.00	41.00	4.50
72	RJTGP94	66.00	81.00	177.00	31.00	20.00	4.00	19.00	2.00	24.00	3.50
73	RJTGP95	104.00	81.00	178.00	25.00	30.00	4.00	11.00	5.00	40.00	4.50
74	RJTGP96	55.00	85.00	179.00	20.00	19.00	3.00	16.00	2.00	15.00	3.00
75	RJTGP98	80.00	94.00	168.00	23.00	20.00	3.50	18.00	3.00	20.00	3.00
76	RJTGP100	60.00	88.00	157.00	28.00	27.00	3.00	14.00	2.00	24.00	4.50
77	RJTGP101	74.00	83.00	151.00	25.00	24.00	3.00	19.00	3.00	33.00	3.50
78	RJTGP102	66.00	88.00	156.00	22.00	23.00	3.00	17.00	2.00	21.00	3.50
79	RJTGP103	86.00	83.00	153.00	26.00	29.00	3.00	20.00	4.00	36.00	4.00
80	RJTGP104	87.00	82.00	152.00	24.00	30.00	4.00	19.00	3.00	38.00	5.00
81	RJTGP105	75.00	80.00	152.00	24.00	26.00	3.00	19.00	2.00	29.00	3.00
82	RJTGP106	92.00	86.00	154.00	32.00	24.00	4.00	19.00	3.00	34.00	4.00
83	RJTGP107	73.00	85.00	158.00	26.00	24.00	3.00	20.00	3.00	24.00	3.00
84	RJTGP108	76.00	86.00	157.00	26.00	26.00	3.50	20.00	3.00	31.00	3.50
85	RJTGP109	74.00	87.00	160.00	27.00	27.00	4.00	12.00	3.00	30.00	3.50
86	RJTGP111	73.00	82.00	161.00	30.00	28.00	3.00	16.00	4.00	22.00	4.00
87	RJTGP112	62.00	87.00	160.00	23.00	30.00	3.00	18.00	2.00	15.00	3.50
88	RJTGP113	53.00	85.00	162.00	25.00	25.00	3.00	11.00	2.00	10.00	3.50
89	RJTGP115	71.00	86.00	166.00	30.00	23.00	3.00	16.00	4.00	24.00	4.00
90	RJTGP116	86.00	84.00	167.00	27.00	20.00	3.50	13.00	3.00	24.00	3.50
91	RJTGP117	90.00	85.00	182.00	28.00	29.00	4.00	24.00	3.00	23.00	4.50
92	RJTGP118	82.00	79.00	176.00	23.00	25.00	3.50	18.00	4.00	30.00	3.50
93	RJTGP119	78.00	81.00	179.00	34.00	22.00	3.00	28.00	3.00	32.00	3.50
94	RJTGP121	108.00	95.00	175.00	27.00	27.00	4.00	21.00	6.00	35.00	4.00
95	RJTGP122	102.00	94.00	174.00	27.00	27.00	4.00	21.00	6.00	35.00	4.00
96	RJTGP123	103.00	90.00	175.00	27.00	26.00	3.50	23.00	5.00	35.00	5.00
97	RJTGP124	109.00	90.00	175.00	27.00	26.00	3.50	23.00	5.00	35.00	5.00
98	RJTGP125	109.00	76.00	177.00	38.00	32.00	4.00	31.00	5.00	34.00	4.00
	Mayoori (C)	65.80	92.00	179.08	23.00	25.88	2.50	19.00	2.00	16.40	2.50
	Minimum	35.00	75.00	151.00	20.00	14.00	2.00	10.00	2.00	10.00	2.50
	Maximum	109.00	100.00	185.00	39.00	38.00	4.50	33.00	6.00	41.00	5.00
	Mean	74.84	89.93	174.53	28.42	23.84	3.20	18.86	3.09	23.65	3.61
	CV (%) Phen.	24.00	6.91	4.84	15.55	19.98	17.41	29.83	36.12	36.25	17.86

Table 109. Promising lines in Jobs tear germplasm during Kharif 2019: (Plains)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Ranchi (50 Genotypes), Jobs Tear					
1	Plant height (cm)	35.0	109.0	RJTGP124 (109.00), RJTGP125 (109.00), RJTGP73 (108.00), RJTGP121 (108.00), RJTGP7 (104.00), RJTGP93 (104.00), RJTGP95 (104.00), RJTGP123 (103.00), RJTGP122 (102.00), RJTGP76 (101.00), RJTGP92 (100.00)	Mayoori (65.80)
2	Days to 50% flowering	75.0	100.0	RJTGP1 (75.00), RJTGP125 (76.00), RJTGP74 (78.00), RJTGP118 (79.00), RJTGP3 (79.00), RJTGP4 (79.00), RJTGP75 (80.00), RJTGP105 (80.00), RJTGP14 (80.00), RJTGP93 (81.00), RJTGP95 (81.00), RJTGP119 (81.00), RJTGP94 (81.00)	Mayoori (92.00)
3	Days to 80% maturity	151.0	185.0	RJTGP101 (151.00), RJTGP105 (152.00), RJTGP104 (152.00), RJTGP103 (153.00), RJTGP106 (154.00), RJTGP102 (156.00), RJTGP108 (157.00), RJTGP100 (157.00), RJTGP107 (158.00), RJTGP109 (160.00), RJTGP112 (160.00), RJTGP111 (161.00), RJTGP113 (162.00)	Mayoori (179.08)
4	Initial plant population	20.00	39.00	RJTGP74 (39.00), RJTGP125 (38.00), RJTGP72 (38.00), RJTGP47 (38.00), RJTGP84 (38.00), RJTGP50 (37.00), RJTGP78 (36.00), RJTGP85 (36.00), RJTGP75 (35.00), RJTGP48 (35.00), RJTGP36 (35.00), RJTGP70 (35.00)	Mayoori (23.00)
5	Leaf length (cm)	14.00	38.00	RJTGP40 (38.00), RJTGP74 (36.00), RJTGP75 (35.00), RJTGP7 (33.00), RJTGP1 (33.00), RJTGP125 (32.00), RJTGP37 (32.00), RJTGP3 (31.00), RJTGP4 (31.00), RJTGP93 (30.00)	Mayoori (25.88)
6	Leaf breadth (cm)	2.00	4.50	RJTGP71 (4.50), RJTGP74 (4.00), RJTGP125 (4.00), RJTGP93 (4.00), RJTGP95 (4.00), RJTGP104 (4.00), RJTGP117 (4.00), RJTGP67 (4.00), RJTGP109 (4.00), RJTGP122 (4.00), RJTGP121 (4.00), RJTGP77 (4.00)	Mayoori (2.50)
7	Plant stand at harvest	10.00	33.00	RJTGP74 (33.00), RJTGP50 (33.00), RJTGP75 (32.00), RJTGP125 (31.00), RJTGP84 (30.00), RJTGP36 (30.00), RJTGP52 (30.00), RJTGP47 (30.00), RJTGP72 (29.00), RJTGP65 (28.00), RJTGP119 (28.00)	Mayoori (19.00)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
8	No. of branches/plant	2.00	6.00	RJTGP122 (6.00), RJTGP121 (6.00), RJTGP3 (6.00), RJTGP4 (6.00), RJTGP92 (6.00), RJTGP125 (5.00), RJTGP124 (5.00), RJTGP123 (5.00), RJTGP46 (5.00), RJTGP91 (5.00), RJTGP95 (5.00), RJTGP25 (5.00)	Mayoori (2.00)
9	No. of seeds/pod	10.00	41.00	RJTGP93 (41.00), RJTGP71 (41.00), RJTGP92 (40.00), RJTGP95 (40.00), RJTGP43 (39.00), RJTGP74 (38.00), RJTGP76 (38.00), RJTGP104 (38.00), RJTGP91 (36.00), RJTGP72 (36.00), RJTGP103 (36.00), RJTGP61 (36.00), RJTGP122 (35.00),	Mayoori (16.40)
10	Stem thickness (cm)	2.50	5.00	RJTGP104 (5.00), RJTGP124 (5.00), RJTGP123 (5.00), RJTGP68 (5.00), RJTGP93 (4.50), RJTGP71 (4.50), RJTGP95 (4.50), RJTGP7 (4.50), RJTGP80 (4.50), RJTGP54 (4.50), RJTGP37 (4.50), RJTGP67 (4.50), RJTGP100 (4.50), RJTGP117 (4.50), RJTGP63 (4.50)	Mayoori (2.50)

2.4.2.5 Pillipasera

A set of 25 genotypes were planned for 2nd year evaluation at two locations viz. OUA&T Bhubaneswar and TNAU Mettupalayam in ABD. A set of 35 genotypes were planned for 1st year evaluation at three locations viz. OUA&T Bhubaneswar, UBKV Cooch behar and TNAU Mettupalayam in ABD. The experimental details are presented in Table 110. Data were received from Bhubaneswar centre. The list of promising lines and mean and range for all the characters have been presented in Tables 111 to 112.

At OUA&T Bhubaneswar, a set of 25 and 35 genotypes of Pillipesara without check was evaluated for ten quantitative characters. The promising genotypes and statistical parameters for all the characters have been presented in Tables 111 to 112. The early flowering genotypes were IC553544 (53.0 days) followed by IC553530 (57.0 days) and IC553517 (58.0 days), while early maturing genotypes were IC553544 (80.0 days) followed by IC553530 (86.0 days). The germplasm ranged from 43.0 days to 65.0 days for 50% flowering while 80.0 days to 96.0 days for maturity. The plant height ranged from 47.8 cm to 61.6 cm. The genotypes IC553518 (61.6 cm) followed by IC550538 (60.6 cm) have the maximum plant height, while more number of branches per plant were found in IC553547 and IC550538 (2.4). Number of pods per plant ranged from 2.6 to 4.8 and genotypes IC5535172 (4.8) followed by IC553547 (4.2) were found superior. More number of seed per pods were observed in IC553547, IC553518 (10.8) and IC550538 (10.4). The better genotypes for 1000 seed weight are IC553544 (10.1 g) followed by IC553518 (10.08 g) and IC553517 (10.02 g).

Table 110: Experimental Details of Germplasm Evaluation in Pillipesara at Bhubaneswar: Kharif 2019 (Plains)

S. No	Items	Bhubaneswar
1	No. of Accessions.	16
2	No. of Checks	-
3	Design	ABD
4	No. of Block	-
5	Number of Rows	2
6	Row Length (m)	3
7	Row spacing (cm)	30
8	Plant spacing (cm)	50
9	NPKS (kg/ha)	25:40:40
10	Plot size (m ²)	1.2
11	Sowing Date	-
12	Harvesting period	At Maturity

Table 111. Evaluation of germplasm in Pillipesara at Bhubaneswar: Kharif 2019 (Plains)

Variety		Height (cm)	Days to 50% flowering	Days to maturity	No of branches / plant	No of cluster/ plant	No of pods/plant	Lenth of pod	No of seed /pod	1000 seed weight (g)	Plot yield (g)
V3	IC 553517	59.2	58.0	88.0	1.8	2.6	4.8	5.1	10.2	10.02	0.682
V4	IC 553518	61.6	61.0	89.0	2.1	2.8	3.4	5.2	10.8	10.08	0.632
V6	IC 553530	51.8	57.0	86.0	1.2	2.8	3.6	4.4	9.2	10.00	0.544
V7	IC 553544	54.4	53.0	80.0	1.8	3.4	3.8	4.2	9.4	10.10	0.400
V8	IC 553547	47.8	58.0	90.0	2.4	3.6	4.2	5.2	10.8	9.14	0.402
V9	IC 550538	60.6	65.0	96.0	2.4	3.4	3.6	5.0	10.4	9.95	0.420
V10	IC 550540	55.6	59.0	90.0	2.2	2.4	2.6	5.1	10.2	9.38	0.380
	Avg.	55.9	58.7	88.4	2.0	3.0	3.7	4.9	10.1	9.81	0.43

Table 112. Promising lines in Pillipesara germplasm during Kharif 2019 (Plains)

S. No.	Descriptions	Range		Promising Accessions	Trial Mean
		Min.	Max.		
Bhubaneswar (25 Genotypes), Pillipesara					
1	Plant height (cm)	47.8	61.6	IC 553518 (61.6), IC 550538 (60.6)	55.9
2	Days to 50% flowering	53.0	65.0	IC 553544 (53.0), IC 553530 (57.0), IC 553517 (58.0), IC 553547 (58.0)	58.71
3	Days to 80% maturity	80.0	96.00	IC 553544 (80.0), IC 553530 (86.0)	88.43
4	No. of branches/plant	1.20	2.40	IC 553547 (2.4), IC 550538 (2.4), IC 550540 (2.2)	1.99
5	No. of cluster/plant	2.40	3.60	IC 553547 (3.6), IC 550538 (3.4), IC 553544 (3.4)	3.00
6	No. of pods/plant	2.60	4.80	IC 553517 (4.8), IC 553547 (4.2), IC 553544 (3.8)	3.71
7	Pod length (cm)	4.20	5.20	IC 553547 (5.2), IC 553518 (5.2), IC 553517 (5.1), IC 550540 (5.1)	4.89
8	No. of seeds/pod	9.20	10.80	IC 553547 (10.8), IC 553518 (10.8), IC 550538 (10.4)	10.14
9	1000 Seed weight (g)	9.14	10.10	IC 553544 (10.10), IC 553518 (10.08), IC 553517 (10.02), IC 553530 (10.00)	9.81
10	Seed yield/plot (g)	0.38	0.68	IC 553517 (0.68), IC 553518 (0.63), IC 553530 (0.54)	0.43

2.4.2.6 Kalingada (*Citrullus lanatus*)

At AU Mandor, a set of 50 genotypes were evaluated in ABD for seven quantitative characters with two checks GK-1 and CAZJK-13-2. The experimental details are presented in Table 113. The promising genotypes and statistical parameters for all the characters have been presented in Tables 114 to 115. The number of days to fruit initiation was lowest in genotypes CAZJK37 (48.0 days) followed by CAZJK45 and CAZJK50 (51.0 days) which were better than the best check GK 1 (55.6 days), while more number of fruits per plant were recorded in the genotypes CAZJK49 (5.33) followed by CAZJK47 (4.75) and CAZJK50 (4.6) which were better than the best check GK 2 (3.77). The best performing genotypes for more fruit yield per hectare were CAZJK45 (54.0 q) followed by CAZJK36 (52.17 q) and CAZJK32 (52.0 q) which were better than the best check CAZJK13-2 (38.23 q), while high seed yielding (q/ha) were CAZJK45 (2.4 q) followed by CAZJK50 (1.88 q) and CAZJK32 (1.76 q).

Table 113: Experimental Details of Germplasm Evaluation in Kalingada at Mandor: Kharif 2019 (Plains)

S. No	Items	Mandor
1	No. of Accessions	50
2	No. of Checks	3
3	Design	ABD
4	No. of Block	5
5	Number of Rows	3
6	Row Length (m)	3
7	Row spacing (cm)	300
8	Plant spacing (cm)	100
9	NPKS (kg/ha)	60:40:00
10	Plot size (m ²)	36
11	Sowing Date	20/07/2019
12	Harvesting period	08/10/2019 to 22/10/2019

Table 114. Evaluation of germplasm in Kalingada at Mandor: Kharif 2019 (Plains)

S. No.	Genotypes	Days to Fruit Initiation	Days to 80% Maturity	No. Fruits/ Plant	Fruit Diameter (cm)	Fruit Yield (q/ha)	100- Seed weight (g)	Seed Yield (q/ha)
1	CAZJK 1	56.00	80.00	2.86	5.40	13.43	4.02	0.58
2	CAZJK 2	61.00	80.00	1.00	6.12	16.45	3.67	0.55
3	CAZJK 3	62.00	89.00	1.00	5.83	13.33	-	-
7	CAZJK 4	64.00	89.00	3.00	8.30	13.78	5.68	0.56
8	CAZJK 5	62.00	89.00	1.50	7.20	18.33	6.26	0.57
9	CAZJK 6	60.00	89.00	1.00	5.65	21.67	-	-
10	CAZJK 7	59.00	87.00	2.50	7.86	12.50	6.34	0.57
11	CAZJK 8	58.00	88.00	3.00	8.10	17.92	5.35	0.63
12	CAZJK 9	60.00	86.00	3.00	9.10	20.80	6.83	0.75
13	CAZJK 10	60.00	85.00	2.00	10.20	21.33	5.33	0.56
15	CAZJK 20	57.00	86.00	1.75	7.60	18.17	5.01	0.51
16	CAZJK 19	55.00	84.00	4.00	8.90	19.67	5.21	0.77
17	CAZJK 18	55.00	83.00	2.00	7.60	13.60	6.43	0.55
18	CAZJK 17	55.00	84.00	1.50	8.60	18.42	6.21	0.52
22	CAZJK 16	61.00	87.00	2.33	8.50	32.33	5.74	0.89
23	CAZJK 15	54.00	84.00	2.33	8.03	25.67	6.13	1.10
24	CAZJK 14	54.00	84.00	3.00	7.57	15.33	5.24	0.57
25	CAZJK 13	59.00	80.00	3.25	7.83	16.58	4.88	0.68
26	CAZJK 12	56.00	80.00	3.50	10.40	51.00	5.03	1.35
27	CAZJK 11	55.00	85.00	2.67	8.43	16.33	5.76	0.67
29	CAZJK 21	57.00	79.00	3.00	10.50	23.07	5.80	0.60
30	CAZJK 22	56.00	85.00	1.75	9.43	17.83	5.22	0.57
31	CAZJK 23	58.00	79.00	2.25	8.93	18.33	5.89	0.79
32	CAZJK 24	55.00	80.00	3.75	9.63	22.42	6.55	0.87
33	CAZJK 25	59.00	80.00	4.00	9.37	32.08	3.97	0.52
34	CAZJK 26	55.00	85.00	2.50	8.67	13.83	5.33	0.50
35	CAZJK 27	55.00	82.00	3.00	9.40	34.22	6.89	1.22
36	CAZJK 28	54.00	85.00	2.75	7.33	16.25	5.04	0.58
37	CAZJK 29	56.00	83.00	3.29	8.60	25.67	4.98	0.64
41	CAZJK 30	60.00	85.00	1.33	9.40	15.56	6.20	0.53
43	CAZJK 40	53.00	79.00	3.00	9.70	30.75	6.07	0.89
44	CAZJK 39	61.00	88.00	2.67	10.23	27.11	7.60	0.57
45	CAZJK 38	57.00	88.00	2.00	6.50	20.33	7.05	0.50
46	CAZJK 37	48.00	80.00	3.67	9.40	38.67	6.43	1.13

S. No.	Genotypes	Days to Fruit Initiation	Days to 80% Maturity	No. Fruits/ Plant	Fruit Diameter (cm)	Fruit Yield (q/ha)	100- Seed weight (g)	Seed Yield (q/ha)
47	CAZJK 36	53.00	81.00	2.83	10.97	52.17	5.36	1.18
48	CAZJK 35	56.00	85.00	2.00	9.37	13.67	6.18	0.62
49	CAZJK 34	-	-	-	-	-	-	-
50	CAZJK 33	59.00	88.00	1.67	10.33	23.56	7.24	0.70
51	CAZJK 32	52.00	80.00	3.29	9.83	52.00	7.17	1.76
52	CAZJK 31	57.00	84.00	4.00	10.10	39.17	5.59	0.57
57	CAZJK 41	57.00	80.00	1.67	9.33	20.22	6.35	0.59
58	CAZJK 42	53.00	88.00	1.50	10.40	10.83	6.71	0.60
59	CAZJK 43	55.00	85.00	1.50	6.10	15.33	5.87	0.60
60	CAZJK 44	53.00	85.00	2.75	10.80	48.42	7.46	1.43
61	CAZJK 45	51.00	82.00	3.40	10.50	54.00	7.40	2.40
62	CAZJK 46	62.00	89.00	1.00	7.75	18.33	7.60	0.57
63	CAZJK 47	62.00	87.00	4.75	10.05	32.50	5.14	1.03
64	CAZJK 48	54.00	85.00	3.60	9.30	26.67	6.02	0.80
65	CAZJK 49	52.00	85.00	5.33	9.53	39.33	6.35	1.06
66	CAZJK 50	51.00	84.00	4.60	10.00	48.47	6.45	1.88
	CAZJK 13-2 (C)	56.80	81.00	3.44	10.84	38.23	6.40	1.02
	GK 1 (C)	55.60	82.60	3.48	7.79	20.58	6.34	0.71
	GK 2 (C)	56.40	85.80	3.77	7.66	21.20	5.85	0.66
	Minimum	48.00	79.00	1.00	5.40	10.83	3.67	0.60
	Maximum	64.00	89.00	5.33	10.97	54.00	7.60	2.40
	Mean	56.59	84.12	2.71	8.75	25.14	5.95	0.81
	CV (%) Phen.	5.98	3.73	37.82	16.53	47.68	15.21	48.63

Table 115. Promising lines in Kalingada germplasm during Kharif 2019: (Plains)

S. No.	Descriptions	Range		Promising Accessions	Checks
		Min.	Max.		
Mandor (50 Genotypes), Kalingada					
1	Days to fruit initiation	48.0	64.0	CAZJK 37 (48.00), CAZJK 45 (51.00), CAZJK 50 (51.00), CAZJK 32 (52.00), CAZJK 49 (52.00), CAZJK 40 (53.00), CAZJK 36 (53.00), CAZJK 42 (53.00), CAZJK 44 (53.00)	GK 1 (55.60)
2	Days to 80% maturity	79.0	89.0	-	CAZJK 13-2 (81.00)
3	No. fruits/plant	1.0	5.33	CAZJK 49 (5.33), CAZJK 47 (4.75), CAZJK 50 (4.60)	GK 2 (3.77)
4	Fruit diameter (cm)	5.40	10.97	-	CAZJK 13-2 (10.84)
5	Fruit yield/ha (q)	10.83	54.00	CAZJK 45 (54.00), CAZJK 36 (52.17), CAZJK 32 (52.00), CAZJK 12 (51.00), CAZJK 50 (48.47), CAZJK 44 (48.42)	CAZJK 13-2 (38.23)
6	100 Seed weight (g)	3.67	7.60	CAZJK 39 (7.60), CAZJK 46 (7.60), CAZJK 44 (7.46), CAZJK 45 (7.40), CAZJK 33 (7.24), CAZJK 32 (7.17), CAZJK 38 (7.05)	CAZJK 13-2 (6.40)
7	Seed yield/ha (q)	0.60	2.40	CAZJK 45 (2.40), CAZJK 50 (1.88), CAZJK 32 (1.76), CAZJK 44 (1.43), CAZJK 12 (1.35), CAZJK 27 (1.22), CAZJK 36 (1.18), CAZJK 37 (1.13)	CAZJK 13-2 (1.02)

Table 116. Status of Potential Crops (303) conserved in National Gene Bank during 1.04.2019 to 31.3.2020

CropName	Botanical name	Accns	Total
Amaranth	<i>Amaranthus caudatus</i>	5	157
Amaranth	<i>Amaranthus cruentus</i>	2	
Amaranth	<i>Amaranthus dubius</i>	1	
Amaranth	<i>Amaranthus hypocondriacus</i>	23	
Amaranth	<i>Amaranthus sp.</i>	86	
Amaranth	<i>Amaranthus spinosus</i>	1	
Amaranth(Vegetable)	<i>Amaranthus tricolor</i>	39	
Buckwheat	<i>Fagopyrum esculentum</i>	15	36
Buckwheat	<i>Fagopyrum tataricum</i>	21	
Chenopodium	<i>Chenopodium botrys</i>	4	22
Chenopodium	<i>Chenopodium hybridum</i>	2	
Chenopodium	<i>Chenopodium karoii</i>	1	
Chenopodium	<i>Chenopodium sp.</i>	15	
Faba bean	<i>Vicia faba</i>	1	1
Jatropha	<i>Jatropha curcas</i>	75	75
Job`s Tears	<i>Coix lacryma-jobi</i>	10	10
Perilla	<i>Perilla frutescens</i>	1	1
Teasel Gourd	<i>Momordica dioica</i>	1	1
TOTAL		303	303

Table 117. Status of Potential Crops germplasm conserved in National Gene Bank (up to 31.3.2020)

Crop Name	Botanical Name	Accns.	TOTAL
Adzuki Bean	<i>Vigna angularis</i>	187	187
Amaranth	<i>Amaranthus tristis</i>	7	5734
Amaranth	<i>Amaranthus polygonoides</i>	4	
Amaranth	<i>Amaranthus rudis</i>	1	
Amaranth	<i>Amaranthus deflexus</i>	2	
Amaranth	<i>Amaranthus powellii</i>	3	
Amaranth	<i>Amaranthus floridanus</i>	2	
Amaranth	<i>Amaranthus acutifolius</i>	3	
Amaranth	<i>Amaranthus retroflexus</i>	9	
Amaranth	<i>Amaranthus graecizans</i>	30	
Amaranth	<i>Amaranthus fimbriatus</i>	2	
Amaranth	<i>Amaranthus caudatus</i>	207	
Amaranth	<i>Amaranthus dubius</i>	66	
Amaranth	<i>Amaranthus oleraceus</i>	23	
Amaranth	<i>Amaranthus spinosus</i>	34	
Amaranth	<i>Amaranthus caudatus var. atropurpurea</i>	1	
Amaranth	<i>Amaranthus palmeri</i>	3	
Amaranth	<i>Amaranthus leucocarpus</i>	2	
Amaranth	<i>Amaranthus amora</i>	6	
Amaranth	<i>Amaranthus blitum</i>	29	
Amaranth	<i>Amaranthus flavus</i>	1	
Amaranth	<i>Amaranthus edulis</i>	1	
Amaranth	<i>Amaranthus lividus</i>	2	
Amaranth	<i>Amaranthus australis</i>	2	
Amaranth	<i>Amaranthus mangostanus</i>	7	
Amaranth	<i>Amaranthus blitoides</i>	2	
Amaranth	<i>Amaranthus hypocondriacus</i>	3141	
Amaranth	<i>Amaranthus caudatus var. albiflorus</i>	1	
Amaranth	<i>Amaranthus cordatus</i>	3	
Amaranth	<i>Amaranthus cruentus</i>	157	
Amaranth	<i>Amaranthus pumilus</i>	5	
Amaranth	<i>Amaranthus caudatum</i>	10	
Amaranth	<i>Amaranthus hybridus</i>	86	
Amaranth	<i>Amaranthus albus</i>	4	
Amaranth	<i>Amaranthus paniculatus</i>	17	
Amaranth	<i>Amaranthus crispus</i>	1	
Amaranth	<i>Amaranthus cannabinus</i>	5	
Amaranth	<i>Amaranthus sp.</i>	1351	
Amaranth(Vegetable)	<i>Amaranthus gangeticus</i>	26	
Amaranth(Vegetable)	<i>Amaranthus viridis</i>	56	
Amaranth(Vegetable)	<i>Amaranthus tricolor</i>	422	

Crop Name	Botanical Name	Accns.	TOTAL
Buckwheat	<i>Fagopyrum sp.</i>	39	1058
Buckwheat	<i>Fagopyrum esculentum</i>	562	
Buckwheat	<i>Fagopyrum gracilipes</i>	1	
Buckwheat	<i>Fagopyrum emarginatum</i>	1	
Buckwheat	<i>Fagopyrum himalianum</i>	8	
Buckwheat	<i>Fagopyrum tataricum</i>	447	
Chenopodium	<i>Chenopodium giganteum</i>	2	97
Chenopodium	<i>Chenopodium pallidicaule</i>	3	
Chenopodium	<i>Chenopodium sp.</i>	60	
Chenopodium	<i>Chenopodium hybridum</i>	4	
Chenopodium	<i>Chenopodium karoii</i>	1	
Chenopodium	<i>Chenopodium botrys</i>	8	
Chenopodium	<i>Chenopodium quinoa</i>	19	
Faba bean	<i>Vicia faba</i>	867	867
Jatropha	<i>Jatropha curcas</i>	2157	2164
Jatropha	<i>Jatropha gossypifolia</i>	7	
Job`s Tears	<i>Coix aquatica</i>	1	132
Job`s Tears	<i>Coix lacryma-jobi</i>	130	
Job`s Tears	<i>Trilobachne cookei</i>	1	
Perilla	<i>Perilla frutescens</i>	258	258
Teasel Gourd	<i>Momordica dioica</i>	55	66
Teasel Gourd	<i>Momordica subangulata ssp. renigera</i>	11	
TOTAL		10563	10563

Table 118. Status of Potential Crops conserved at TCCU

S. No.	Crop name	Total accessions (Cryo preserved)
1	Grain amaranth	57
2	Adzuki bean	4
3	Buckwheat	3
4	Faba bean	3
5	Perilla	46
6	Paradise tree	10
7	Kankoda	5
8	Karingda	4
9	Job's tear	69
10	Jojoba	4 +12*
11	Jatropha	94
12	Tumba	11
Total		322
12* as <i>in vitro</i> cultures		

Inland Supply to the indentors during 1.4.2019 to 31.3.2020

A total of 883 accessions comprising seed/planting material of different crops were supplied to ICAR institutes/coordinated projects, agricultural universities and other users in India. Based on specific requests received samples were supplied as per details given below under the Material Transfer Agreement (MTA) and GEX 01 Forms.

Table 119. Inland Supply of Potential Crops (883)

Crop	Accessions	Supplied To	Source
Amaranth	259	Indian Institute of Science Education and Research, Tirupati; UAHS, Shivamogga, Mudigere; Rani Lakshmi Bai Central Agricultural University, Jhansi; ICAR-RC for Eastern Region Patna	NBPGR RS, Shimla
<i>A.hybridus</i> (05), <i>A.dubius</i> (05) and <i>A.tricolor</i> (05)	15	ICAR-RC for Eastern Region Patna	ICAR-NBPGR, RS, Thrissur
Buckwheat	60	University of Kashmir, Srinagar	NBPGR RS, Shimla
<i>Chenopodium quinoa</i>	232	CSSRI, Karnal; UAS, Bangalore; IIVR, Varanasi	NBPGR, New Delhi
<i>Chenopodium album</i>	25	ICAR-RC for Eastern Region Patna	NBPGR RS, Shimla
Rice bean	292	ICAR- RC for NEH Region, Umium	NBPGR RS, Shimla
Total	883		

III. CROP IMPROVEMENT

3.1 HILLS

3.1.1 Grain Amaranth (*Amaranthus* spp.)

Grain amaranth is an important crop in mid and high hills of North-Western Himalaya. Its seeds being rich in protein and essential amino acids (lysine), are used for various confectionary items and other nutritious food products including as mixture in the multi-grain flour.

Initial and Advanced Varietal trials on grain amaranth were conducted during Kharif 2019. Although many species of grain amaranth are economically important, but entries from three species, namely, *A. hypochondriacus*, *A. caudatus* and *A. cruentus*, being the important grain yielding types, are included in the testing programme.

3.1.1.1 Initial Varietal Trial (IVT): Kharif 2019

The Initial Varietal Trial comprising 8 entries and 3 checks was conducted at four locations i.e. Almora, Ranichauri, Bajaura (Palampur) and Shimla and data were received from all the locations. The performance of the entries as compared to the checks has been summarized in Tables 120 - 127.

Among checks, Annapurna at Almora and Bajaura and Durga at Ranichauri and Shimla were the best checks for plant height. Entry IC 38758 at all the centres except Ranichauri; IC 583640-1 at all the centres except Bajaura; SKNA 808 at Almora and Shimla and SKNA 1313 at Shimla were significantly dwarf than the respective best checks.

Among checks, Durga was the best check at all the centers tested for days to 50% flowering. Entry IC 583640-1 at all the locations tested; IC 38758 at Almora and Shimla and SKNA 808 at Almora and Bajaura were found to be significantly early flowering than the best check.

Among checks, Durga was the best check at all the centers tested for days to 80% maturity except at Almora where PRA-3 was best check. Entries IC 38758 and IC 583640-1 at Almora and Shimla; and SKNA 808 at Almora and Bajaura were found to be significantly early maturing than the best check.

PRA-3 was the best check for inflorescence length at all the locations tested except at Shimla where Annapurna was superior check. All the entries tested at Bajaura except SKNA 808 and SKNA 1313 had significantly longer inflorescence than the best check. None of the entries at the remaining locations had significantly longer inflorescence compared to the respective best checks.

Durga was the best check for number of spikelets per plant at all the locations tested except at Ranichauri where PRA-3 was best check. Entry SKNA 808 had significantly higher number of spikelets per plant at Bajaura than the best check. None of the entries at all other locations tested could produce significantly higher spikelets than their respective best checks.

Annapurna at Almora and Bajaura; PRA 3 at Ranichauri and Shimla were the best checks for seed volume weight (g/ 10 ml). Entry IC 258250 had significantly higher test weight at Shimla than the best check. Rest most of the entries were statistically at par with the respective best checks for this trait at all the locations.

Durga at Almora and Bajaura; PRA 3 at Ranichauri and Shimla were the best checks for grain yield. Entries IC 258250, IC 326896 and IC 341551 produced significantly higher yield than the best check at Shimla. None of the entries at other locations tested could produce significantly higher yield compared to their respective best checks.

3.1.1.2 Advanced Varietal Trials –I & II (AVT-I & II): Kharif 2019

The Advanced Varietal Trials - I & II comprising 8 entries and 3 checks were conducted at four locations i.e. Almora, Bajaura, Ranichauri and Shimla and data were received from all the locations. The performance of the entries as compared to the checks has been summarized in Tables 128 - 135.

Among checks, Annapurna was the best check for plant height at all the locations tested except at Shimla where Durga was best check. Entry SKNA 1207 at Almora was significantly dwarf than the respective best check. None of the entries tested at any of the locations were significantly dwarf than their respective best checks for this trait.

Among checks, Durga was the best check at all the centers tested for days to 50% flowering except at Ranichauri where Annapurna was best check. Entries IC 037156 flowered significantly

early than the respective best checks at all the locations tested except at Bajaura. Besides, entry SKNA 1207 also flowered significantly early than the best check at Almora.

Among checks, PRA-3 at Almora, Annapurna at Bajaura and Ranichauri and Durga at Shimla were best checks for days to 80% maturity. Entries IC 037156 and SKNA 1207 at Almora; IC 341505 at Bajaura and entry IC 313273 at Ranichauri matured significantly earlier than the respective best checks.

PRA-3 at Almora and Bajaura; Durga at Ranichauri and Annapurna at Shimla were best checks for inflorescence length. Entries IC 313273, IC 326898 and IC 37156 at Bajaura and IC 326898 at Almora had significantly longer inflorescence than the best check.

Durga was the best check for number of spikelets per plant at all the locations tested. None of the entries at any of the locations tested could produce significantly higher spikelets than the best check.

Annapurna was the best check for seed volume weight (g/ 10ml) at all the locations tested except at Shimla where PRA 3 was the best check. Entry SKNA 1207 had significantly higher test weight at Bajaura than the best check. Rest most of the entries were statistically at par with the respective best checks for this trait at all the locations.

Durga was the best check for grain yield at Almora and Bajaura; while Annapurna was best check at Ranichauri and Shimla. All the entries tested at Shimla except SKNA 1207 produced significantly higher yield than the best check. At all other locations, none of the entries tested could produce yield statistically higher than their respective best checks except entry IC 313273 at Ranichauri.

3.1.2 Buckwheat (*Fagopyrum* spp.)

3.1.2.1 Initial Varietal and Advanced Varietal Trials I & II (IVT, AVT-I & II): Kharif 2019

The Initial and Advanced Varietal Trials - I & II comprising 14 entries and 4 checks were constituted at four locations i.e. Almora, Ranichauri, Sangla (Palampur) and Shimla and data were received from three locations. The trials at Sangla (Palampur) center were not conducted properly, hence, were rejected at the time of monitoring. The performance of the entries as compared to the checks has been summarized in Tables 136 - 141.

Among checks from *F. tataricum*, Shimla B-1 was the best check for plant height at all the locations tested, while among checks from *F. esculentum*, PRB-1 was the best check for plant height. None of the entries tested were significantly taller than the respective best checks at any of the locations tested except EC 125940 at Shimla.

Among checks from *F. tataricum*, Shimla B-1 was the best check for days to 50% flowering at all the locations tested, while among checks from *F. esculentum*, PRB-1 was the best check for this trait. Entries IC 26755, IC 329199 and IC 341589 at Almora and entries IC 24300, IC 26755 and NIC 8817 at Shimla flowered significantly earlier than their respective best checks.

Among checks from *F. tataricum*, Shimla B-1 was the best check for days to 80% maturity at all the locations tested, while among checks from *F. esculentum*, VL-7 was the best check for this trait. Entry IC 26755 at Shimla required significantly lesser days to mature compared to the best control, while none of the entries tested at all the locations was found to be early maturing compared to their respective best checks.

Among checks from *F. tataricum*, Himpriya at Almora and Shimla and Shimla B-1 at Ranichauri were the best checks for 100 seed weight, while among checks from *F. esculentum*, VL-7 at Almora and Shimla and PRB-1 at Ranichauri were the best checks for this trait. Entry EC 125940 at Shimla and IC 341589 at Almora and Shimla had significantly higher test weight than the respective best checks.

Among checks from *F. tataricum*, Shimla B-1 at Ranichauri and Shimla and Himpriya at Almora were the best checks for grain yield, while among checks from *F. esculentum*, PRB-1 at Ranichauri and VL-7 at Almora and Shimla were best checks for this trait. Entries IC 26755, EC 125940, IC 318859, IC 108508 and IC 341589 at Shimla produced significantly higher grain yield than their respective best checks. None of the entries tested at Almora and Ranichauri could produce significantly higher grain yield than the respective best checks.

3.1.3 Chenopodium (Chenopodium quinoa)

3.1.3.1 Advanced Varietal Trial (AVT-I): Kharif 2019

The Advanced Varietal Trial-I comprising 13 entries was constituted at four locations i.e. Almora, Ranichauri, Shimla and Bajaura (Palampur) and data were received from two locations i.e. Shimla and Bajaura. Almora did not conduct the trial while trial failed due to non-

germination of seeds at Ranichauri. Since there is no released cultivar for *Chenopodium quinoa*, therefore, the entries were compared against the trial mean. The performance of the entries as compared to the trial mean has been summarized in Tables 142 - 150.

Entries IC 363733 and NIC 22506 at both the locations tested and entry EC 507739 at Bajaura produced significantly taller plants than the trial mean. Rest most of the entries also had statistically at par height with trial mean.

Entries EC507738, EC 507739 and EC 507742 at Shimla produced significantly higher no. of branches per plant compared to the trial mean, while at Bajaura most of the entries were statistically at par for this trait.

Entries EC507738, EC 507739, EC 507740, EC 507742 and EC 507748 at Shimla and entries EC 507738, EC 507741, EC 507744, EC 507747, EC 507749 at Bajaura flowered significantly earlier than the trial mean.

Entries EC507738, EC 507739, EC 507740, EC 507741, EC 507744 and NIC 22506 at Shimla and entries EC 507739, EC507742, EC 507747 and EC 507748 at Bajaura matured significantly earlier than the trial mean.

Entries EC 507747 and IC 363733 at Shimla and EC 507747 and EC 507749 at Bajaura had significantly longer inflorescence than the trial mean. The performance of most of the remaining entries at both the locations tested was statistically at par for this trait.

Entries EC 507746 and EC 507747 at Bajaura had significantly higher spikelets per plant than the trial mean. The performance of most of the remaining entries at both the locations tested was statistically at par for this trait.

Entries EC 507742 and IC 363733 at Shimla and EC 507744, IC 363733 and NIC 22506 at Bajaura had significantly higher seed volume wt. (g/ 10ml). The performance of most of the remaining entries at both the locations tested was statistically at par for this trait.

Entries NIC 22506 and IC 363733 at Shimla and IC 363733 at Bajaura produced significantly higher seed yield compared to the trial mean.

3.1.4 Adzuki bean (*Vigna angularis*)

3.1.4.1 Initial Varietal Trial (IVT): Kharif 2019

The Initial Varietal Trial comprising 12 entries and 2 checks was conducted at three locations i.e. Palampur, Pasighat and Shimla and data were received from all the locations.

Ranichauri centre reported that the trial failed due to germination and plant stand issues. The performance of the entries as compared to the checks has been summarized in Tables 151 - 160.

HPU-51 was the best check at all the locations tested for plant height except at Pasighat where Totru local was the best check. Entries IC 016761, IC 089957, IC 341945, EC 030270, EC 120460, EC 187896 and EC 340254 at Pasighat and entries IC 341937, IC 341943, IC 341945, IC 341949, EC 187896, EC 340254 and EC 340283 at Shimla were significantly taller than the respective best checks while at Palampur most of the entries were statistically at par for this trait with the best check.

Totru local was the best check for number of branches per plant at Palampur, while HPU-51 was best check for this trait at Pasighat and Shimla. None of the entries tested had significantly higher number of branches than the respective best check at any of the locations. Totru local was the best check for days to 50% flowering at all the locations tested. None of the entries tested flowered significantly earlier than the best check at any of the locations.

Totru local was the best check for number of pods per plant at all the locations. None of the entries tested had significantly higher no. of pods per plant compared to the respective best check at any location except entries IC 341949 and EC 030270 at Pasighat.

HPU-51 was the best check for pod length across the locations. Entries IC 341945 at Shimla and EC 187896 at Pasighat produced significantly longer pods than the respective best checks. Rest of the entries at most of the locations produced pods of statistically at par length with the best checks.

HPU-51 at Palampur and Pasighat and Totru Local at Shimla were the best checks for number of seeds per pod. All the entries tested at Pasighat except entries IC 016761, IC 089957, IC 341937 and IC 485382 produced significantly higher number of seeds per pod than the best check. Entries EC 030270 and EC 340283 also produced significantly higher number of seeds per pod than the best check at Shimla. Rest most of the entries at all the locations produced number of seeds per pod statistically at par with the best check.

Totru local was the best check for days to 80% maturity at Pasighat and Shimla, while HPU-51 was best check at Palampur. None of the entries tested matured significantly earlier than the respective best checks at any of the locations except entries IC 341945 and IC 341949 at Palampur.

HPU-51 was the best check for 100 seed wt. across the locations. Entries IC 016761, IC 485382 and EC 187896 at Palampur; IC 089957, IC 341937, IC 341945, IC 485382, EC 187896 and EC 340254 at Pasighat and entries IC 341937 and IC 485382 at Shimla possessed significantly higher test wt. than the respective best checks. Most of the other entries tested at Palampur and Shimla had test weight statistically at par with the best check.

HPU-51 was the best check for seed yield across the locations. All the entries tested at Pasighat; entries EC 030270 and EC 340283 at Palampur and all the entries tested at Shimla except IC 089957, IC 341943, EC 187896 yielded significantly higher than the best check.

3.1.4.2 Advanced Varietal Trials-I & II (AVT-I & II): Kharif 2019

The Advanced Varietal Trials - I & II comprising 6 entries and 2 checks were conducted at three locations i.e. Palampur, Pasighat and Shimla and data were received from all the locations. Ranichauri centre reported that the trial failed due to germination and plant stand issues. The performance of the entries as compared to the checks has been summarized in Tables 161 - 170.

HPU-51 was the best check at all the locations tested for plant height. All the entries tested at Shimla except ADHP-9; entry IC 341939 across all the locations and ADHP-7 at Palampur were significantly taller than the best check.

Totru local was the best check for number of branches per plant at Palampur, while HPU-51 was best check for this trait at Pasighat and Shimla. None of the entries tested had significantly higher number of branches than the respective best check at any of the locations.

Totru local was the best check for days to 50% flowering at all the locations tested except at Pasighat where HPU-51 was best check. None of the entries tested flowered significantly earlier than the best check at any of the locations.

Totru local was the best check for number of pods per plant at all the locations. None of the entries tested had significantly higher number of pods per plant compared to the respective best check at any location except entries ADHP-6 and ADHP-8 at Pasighat.

HPU-51 was the best check for pod length across the locations. Entries ADHP-6 and ADHP-8 at Shimla produced significantly longer pods than the respective best check. Rest of the entries at most of the locations produced pods of statistically at par length with the best checks.

HPU-51 at Palampur and Pasighat and Totru Local at Shimla were the best checks for number of seeds per pod. All the entries tested at Pasighat except entries IC 341939, IC 100072 and ADHP-9 produced significantly higher number of seeds per pod than the best check. Entry ADHP-8 also produced significantly higher number of seeds per pod than the best check at Shimla. Rest most of the entries at all the locations produced number of seeds per pod statistically at par with the best check.

HPU-51 was the best check for days to 80% maturity at Palampur and Pasighat, while Totru local was best check at Shimla. None of the entries tested matured significantly earlier than the respective best checks at any of the locations.

HPU-51 was the best check for 100 seed wt. across the locations. Entries IC 100072 at Palampur; ADHP-7 at Pasighat and ADHP-9 at Shimla possessed significantly higher test wt. than the respective best check. Most of the other entries tested at Palampur and Shimla had test weight statistically at par with the best check.

HPU-51 was the best check for seed yield at Palampur and Shimla, while Totru Local was best check at Pasighat. All the entries tested at Pasighat; entries IC 341939 and ADHP-7 at Palampur and IC 341939, IC 100072 and ADHP-8 at Shimla yielded significantly higher than the respective best checks.

3.1.5 Perilla (*Perilla frutescens*)

3.1.5.1 Initial Varietal Trial (IVT): Kharif 2019

The Initial Varietal Trial comprising 8 entries and one check was conducted at four locations i.e. Kolasib (Mizoram), Lamphelpat (Manipur), Ranichauri (Uttarakhand) and Umiam (Meghalaya) and data were received from all the locations. The performance of the entries as compared to the only check Thoiding local has been summarized in Tables 171– 179.

Entries IC 615369 and IC 615382 at all the locations tested except Kolasib; IC 615377 at Kolasib and Ranichauri; IC 615380 at Lamphelpat and IC 615388 at Ranichauri produced significantly taller plants than the check Thoiding Local.

All the entries tested at Kolasib and all the entries tested at Ranichauri except IC 615372, IC 615380 and IC 615388 produced significantly higher number of branches per plant compared to the check Thoiding Local. At Lamphelpat and Umiam most of the entries were statistically at par for this trait.

Entries IC 615372 and IC 615376 at all the three locations tested and entries IC 615369, IC 615380 and IC 615382 at Lamphelpat and Umiam flowered significantly earlier than the check Thoiding Local.

All the entries tested at Umiam except IC 615393 and all the entries tested at Lamphelpat except IC 615377 and IC 615393 had significantly longer inflorescence than the check Thoiding Local. The performance of entries at Ranichauri was statistically at par for this trait.

All the entries tested at Kolasib and Ranichauri possessed significantly higher number of inflorescences per plant than the check Thoiding local. Besides, entries IC 615382 at Lamphelpat and Umiam and IC 615369 at Umiam also had significantly higher number of inflorescences per plant than the check. The performance of most of the remaining entries tested was statistically at par for this trait.

All the entries tested at Lamphelpat and entry IC 615376 at Umiam matured significantly earlier than the check Thoiding local. The performance of most of the remaining entries tested was statistically at par for this trait.

All the entries tested at Lamphelpat except IC 615393 and all the entries tested at Umiam except IC 615377, IC 615388 and IC 615393 had significantly higher 1000 seed weight than the check Thoiding local. The performance of most of the remaining entries tested was statistically at par for this trait.

All the entries tested at Umiam; all the entries tested at Lamphelpat except IC 615393; all the entries tested at Ranichauri except IC 615380 and IC 615393 and entries IC 615372, IC 615377 and IC 615388 at Kolasib produced significantly higher seed yield compared to the check Thoiding local.

Table 120: Experimental Details of IVT of Grain Amaranth Kharif 2019 (Hills)

S. No	Items	Almora	Bajaura (Palampur)	Ranichauri	Shimla
1	No. of Entries	8	8	8	8
2	No. of Checks	3	3	3	3
3	Design	RBD	RBD	RBD	RBD
4	No. of Replication	3	3	3	3
5	Number of Rows	4	4	4	4
6	Row length (m)	3	2.5	3	3
7	Row spacing (cm)	50	40	50	50
8	Plant spacing (cm)	15	10	-	15
9	NPKS (Kg/ha)	60:40:20	-	-	60:40:20
10	Plot Size (m ²)	3m × 2m	4	-	6
11	Sowing Date	26/06/2019	26-06-2019	28-05-2019	12/06/2019
12	Harvesting Period	At maturity	29-11-2019	14-09-2019 – 04-11-2019	05-11-2019 – 12-11-2019

Table 121 Plant height(cm) in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
IVT						
1	IC 258250	170.67	150.33	140.40	237.97	174.84
2	IC 326896	160.33	157.33	146.20	247.87	177.93
3	IC 341551	159.33	152.67	164.20	268.53	186.18
4	IC 38378	167.33	161.67	160.17	239.13	182.08
5	IC 38758	103.00	92.33	116.87	139.97	113.04
6	IC 583640-1	115.33	141.00	93.40	161.57	127.83
7	SKNA-808	115.33	183.33	139.80	184.73	155.80
8	SKNA-1313	154.00	155.00	134.10	185.67	157.19
9	Annapurna (C)	154.00	150.33	157.47	243.50	176.33
10	Durga (C)	156.67	167.33	129.60	201.43	163.76
11	PRA-3 (C)	163.00	169.33	170.40	268.93	192.92
	Mean	147.18	152.79	141.15	216.30	164.35
	CD (0.05)	16.28	11.22	21.75	7.69	-
	CV (%) Error	6.59	4.30	9.05	2.09	-

Table 122: Days to 50% flowering in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
IVT						
1	IC 258250	60.67	61.33	74.33	91.67	72.00
2	IC 326896	56.67	49.67	76.00	81.00	65.83
3	IC 341551	57.67	63.00	76.00	81.00	69.42
4	IC 38378	55.67	59.33	71.67	73.33	65.00
5	IC 38758	39.67	48.00	78.00	40.67	51.58
6	IC 583640-1	41.00	42.00	59.67	48.00	47.67
7	SKNA-808	41.00	45.67	77.00	69.67	58.33
8	SKNA-1313	61.33	60.33	79.33	80.00	70.25
9	Annapurna (C)	61.33	51.00	78.67	79.33	67.58
10	Durga (C)	53.00	49.33	64.00	55.67	55.50
11	PRA-3 (C)	60.00	59.67	75.67	84.33	69.92
	Mean	53.45	53.58	73.67	71.33	63.01
	CD (0.05)	3.10	2.10	2.12	3.25	-
	CV (%) Error	3.51	2.36	1.69	2.68	-

Table 123: Days to 80% maturity in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
IVT						
1	IC 258250	98.33	158.00	145.67	154.00	139.00
2	IC 326896	92.33	146.67	146.00	155.67	135.17
3	IC 341551	98.67	157.00	147.67	156.67	140.00
4	IC 38378	92.33	152.33	144.67	157.33	136.67
5	IC 38758	71.67	154.00	149.00	110.33	121.25
6	IC 583640-1	70.33	155.33	143.33	125.33	123.58
7	SKNA-808	70.33	144.67	149.33	139.00	125.83
8	SKNA-1313	95.33	156.00	149.33	149.67	137.58
9	Annapurna (C)	95.33	148.00	149.00	155.67	137.00
10	Durga (C)	96.67	148.00	144.00	133.67	130.58
11	PRA-3 (C)	95.00	154.00	146.67	159.67	138.83
	Mean	88.76	152.18	146.79	145.18	133.23
	CD (0.05)	3.98	2.29	2.43	2.96	-
	CV (%) Error	2.70	0.91	0.97	1.20	-

Table 124: Inflorescence length (cm) in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
IVT						
1	IC 258250	67.00	69.00	54.33	71.20	65.38
2	IC 326896	65.33	52.67	52.67	66.13	59.20
3	IC 341551	63.00	61.33	53.30	64.27	60.48
4	IC 38378	71.00	73.00	54.83	62.17	65.25
5	IC 38758	53.67	58.33	34.20	66.70	53.23
6	IC 583640-1	53.67	76.33	26.37	58.27	53.66
7	SKNA-808	53.67	50.67	42.03	44.53	47.73
8	SKNA-1313	62.33	35.33	38.40	48.33	46.10
9	Annapurna (C)	62.33	45.33	51.73	67.07	56.62
10	Durga (C)	42.67	44.33	34.30	57.07	44.59
11	PRA-3 (C)	66.67	48.00	56.23	65.70	59.15
	Mean	60.12	55.85	45.31	61.04	55.58
	CD (0.05)	9.65	4.63	8.48	5.49	-
	CV (%) Error	9.47	5.09	10.99	5.28	-

Table 125: Number of spikelets/plant in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
IVT						
1	IC 258250	75.33	20.67	61.47	51.33	52.20
2	IC 326896	69.33	25.00	64.77	48.00	51.78
3	IC 341551	69.33	20.33	76.80	51.00	54.37
4	IC 38378	67.00	19.33	60.67	51.00	49.50
5	IC 38758	54.00	33.00	30.63	23.67	35.33
6	IC 583640-1	76.67	25.00	28.90	26.67	39.31
7	SKNA-808	76.67	39.33	43.10	45.33	51.11
8	SKNA-1313	64.67	34.00	38.27	44.33	45.32
9	Annapurna (C)	64.67	22.33	55.93	46.67	47.40
10	Durga (C)	78.67	34.33	28.57	49.00	47.64
11	PRA-3 (C)	65.33	30.67	68.47	47.00	52.87
	Mean	69.24	27.64	50.69	44.00	47.89
	CD (0.05)	10.28	4.87	11.12	4.76	-
	CV (%) Error	9.15	11.21	12.89	6.35	-

Table 126: Seed volume weight (g/10ml) in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
IVT						
1	IC 258250	7.95	7.03	10.97	8.12	8.52
2	IC 326896	7.75	7.65	11.03	7.78	8.55
3	IC 341551	8.19	7.38	10.57	7.75	8.47
4	IC 38378	8.09	7.78	10.90	7.16	8.48
5	IC 38758	8.16	7.32	10.53	7.57	8.39
6	IC 583640-1	8.15	5.89	10.20	7.56	7.95
7	SKNA-808	8.15	7.17	10.53	7.03	8.22
8	SKNA-1313	8.42	7.54	10.87	7.27	8.52
9	Annapurna (C)	8.42	7.90	10.53	7.58	8.61
10	Durga (C)	7.70	6.96	11.00	7.29	8.24
11	PRA-3 (C)	7.95	6.12	11.17	7.61	8.21
	Mean	8.08	7.16	10.75	7.52	8.38
	CD (0.05)	0.65	0.53	1.23	0.34	-
	CV (%) Error	4.86	4.41	6.73	2.65	-

Table 127: Grain yield (q/ha) in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
IVT						
1	IC 258250	14.44	4.24	12.78	25.62	17.61
2	IC 326896	15.39	5.46	16.90	26.61	19.63
3	IC 341551	12.14	5.48	13.70	26.23	17.36
4	IC 38378	14.82	4.53	18.41	22.12	18.45
5	IC 38758	13.37	2.13	12.22	14.08	13.22
6	IC 583640-1	15.89	2.36	7.89	16.46	13.41
7	SKNA-808	15.48	6.82	11.58	12.72	13.26
8	SKNA-1313	11.03	5.70	12.11	13.80	12.31
9	Annapurna (C)	12.94	4.96	11.13	20.23	14.77
10	Durga (C)	16.56	7.18	15.96	17.53	16.68
11	PRA-3 (C)	15.22	2.63	17.98	20.42	17.87
	Mean	14.30	4.68	13.69	19.62	15.87
	CD (0.05)	3.58	0.77	2.75	2.80	-
	CV (%) Error	15.26	9.28	11.78	8.39	-

*Poor yields; data not considered for calculating means over locations

Table 128: Experimental Details of AVT – I & II of Grain Amaranth Kharif 2019 (Hills)

S. No	Items	Almora	Bajaura (Palampur)	Ranichauri	Shimla
1	No. of Entries	8	8	8	8
2	No. of Checks	3	3	3	3
3	Design	RBD	RBD	RBD	RBD
4	No. of Replication	3	3	3	3
5	Number of Rows	4	4	4	4
6	Row length (m)	3	2.5	3	3
7	Row spacing (cm)	50	40	50	50
8	Plant spacing (cm)	15	10	-	15
9	NPKS (Kg/ha)	60:40:20	-	-	60:40:20
10	Plot Size (m ²)	3m × 2m	4	-	6
11	Sowing Date	26/06/2019	26-06-2019	28-05-2019	12/06/2019
12	Harvesting Period	At maturity	29-11-2019	14-09-2019 – 04-11-2019	05-11-2019 – 12-11-2019

Table 129: Plant height(cm) in Advanced Varietal Trials-I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
AVT-I						
1	IC 313273	163.67	163.67	182.93	259.63	192.48
2	IC 326898	152.00	145.33	170.40	260.63	182.09
3	IC 037156	148.00	183.33	140.87	200.43	168.16
4	SKGPA-61	167.33	159.00	172.87	265.37	191.14
5	SKNA-1207	103.00	175.67	161.27	272.10	178.01
AVT-II						
6	IC 341505	170.33	165.67	180.10	245.90	190.50
7	IC 361853	144.67	150.67	166.40	265.30	181.76
8	IC 362199	166.00	171.67	173.47	258.07	192.30
9	Annapurna (C)	154.00	150.33	151.57	257.17	178.27
10	Durga (C)	156.67	167.33	180.25	199.97	176.06
11	PRA-3 (C)	163.00	169.33	155.02	269.53	189.22
	Mean	153.52	163.82	166.83	250.37	183.63
	CD (0.05)	16.28	11.22	24.60	10.31	-
	CV (%) Error	6.59	4.30	8.66	2.42	-

Table 130: Days to 50% flowering in Advanced Varietal Trials-I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
AVT-I						
1	IC 313273	55.00	56.00	69.67	75.33	64.00
2	IC 326898	55.67	62.00	73.67	83.33	68.67
3	IC 037156	49.33	48.00	68.00	50.67	54.00
4	SKGPA-61	55.67	61.00	78.33	87.33	70.58
5	SKNA-1207	39.67	49.00	81.00	86.67	64.08
AVT-II						
6	IC 341505	57.00	48.00	73.33	81.00	64.83
7	IC 361853	58.67	53.67	74.67	86.00	68.25
8	IC 362199	55.67	56.00	74.67	80.67	66.75
9	Annapurna (C)	61.33	51.00	70.52	79.33	65.55
10	Durga (C)	53.00	49.33	82.62	52.00	59.24
11	PRA-3 (C)	60.00	59.67	72.73	82.67	68.77
	Mean	54.64	53.97	74.47	76.82	64.97
	CD (0.05)	3.10	2.10	2.51	1.94	-
	CV (%) Error	3.51	2.36	1.98	1.49	-

Table 131: Days to 80% maturity in Advanced Varietal Trials-I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
AVT-I						
1	IC 313273	92.67	150.00	145.00	161.33	137.25
2	IC 326898	93.00	159.00	149.33	160.67	140.50
3	IC 037156	80.67	146.33	146.00	137.33	127.58
4	SKGPA-61	92.33	154.00	153.00	163.00	140.58
5	SKNA-1207	71.67	157.33	154.00	166.33	137.33
AVT-II						
6	IC 341505	92.00	145.33	149.67	161.67	137.17
7	IC 361853	100.33	148.00	150.67	161.67	140.17
8	IC 362199	92.67	154.00	150.33	161.33	139.58
9	Annapurna (C)	95.33	148.00	148.33	159.67	137.83
10	Durga (C)	96.67	148.00	152.89	133.33	132.72
11	PRA-3 (C)	95.00	154.00	151.27	160.00	140.07
	Mean	91.12	151.27	150.04	156.94	137.34
	CD (0.05)	3.98	2.29	2.72	3.32	-
	CV (%) Error	2.70	0.91	1.07	1.24	-

Table 132: Inflorescence length (cm) in Advanced Varietal Trials-I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
AVT-I						
1	IC 313273	67.33	78.33	62.73	64.93	68.33
2	IC 326898	81.33	56.67	53.07	64.33	63.85
3	IC 037156	46.33	56.67	45.13	51.07	49.80
4	SKGPA-61	71.00	40.67	44.13	64.40	55.05
5	SKNA-1207	53.67	39.67	53.73	62.80	52.47
AVT-II						
6	IC 341505	64.67	44.33	60.43	61.93	57.84
7	IC 361853	60.33	51.33	58.67	71.97	60.58
8	IC 362199	64.33	62.67	62.93	65.40	63.83
9	Annapurna (C)	62.33	45.33	49.10	66.23	55.75
10	Durga (C)	42.67	44.33	62.74	57.13	51.72
11	PRA-3 (C)	66.67	48.00	46.61	66.03	56.83
	Mean	61.88	51.64	54.48	63.29	57.82
	CD (0.05)	9.65	4.63	11.21	6.12	-
	CV (%) Error	9.47	5.09	12.08	5.68	-

Table 133: Number of spikelets/plant in Advanced Varietal Trials-I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
AVT-I						
1	IC 313273	78.00	18.67	60.03	47.67	51.09
2	IC 326898	76.67	20.00	50.77	46.00	48.36
3	IC 037156	73.33	23.33	36.47	47.67	45.20
4	SKGPA-61	67.00	35.00	43.03	47.67	48.18
5	SKNA-1207	54.00	31.67	50.47	49.00	46.28
AVT-II						
6	IC 341505	59.67	19.67	55.87	46.00	45.30
7	IC 361853	61.33	20.67	45.13	45.67	43.20
8	IC 362199	57.33	25.00	57.43	41.33	45.28
9	Annapurna (C)	64.67	22.33	44.86	45.33	44.30
10	Durga (C)	78.67	34.33	62.16	47.00	55.54
11	PRA-3 (C)	65.33	30.67	28.63	44.00	42.16
	Mean	66.91	25.58	48.62	46.12	46.81
	CD (0.05)	10.28	4.87	11.54	3.85	-
	CV (%) Error	9.15	11.21	13.94	4.90	-

Table 134: Seed volume weight (g/10ml) in Advanced Varietal Trials-I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
AVT-I						
1	IC 313273	8.23	7.54	11.00	7.64	8.60
2	IC 326898	7.96	6.13	11.00	7.52	8.15
3	IC 037156	7.82	7.63	11.13	7.46	8.51
4	SKGPA-61	8.09	7.85	10.87	7.68	8.62
5	SKNA-1207	8.16	8.41	11.13	7.77	8.87
AVT-II						
6	IC 341505	8.24	7.40	10.17	7.61	8.35
7	IC 361853	8.28	6.94	10.97	7.63	8.46
8	IC 362199	8.50	7.68	11.10	7.55	8.71
9	Annapurna (C)	8.42	7.90	11.12	7.49	8.73
10	Durga (C)	7.70	6.96	10.69	7.30	8.16
11	PRA-3 (C)	7.95	6.12	10.70	7.79	8.14
	Mean	8.12	7.32	10.90	7.59	8.48
	CD (0.05)	0.65	0.53	1.02	0.27	-
	CV (%) Error	4.86	4.41	5.51	2.05	-

Table 135: Grain yield (q/ha) in Advanced Varietal Trials-I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Hills)

S. No.	Genotypes	Almora	Bajaura (Palampur)	Ranichauri	Shimla	Mean
AVT-I						
1	IC 313273	14.56	4.32	14.07	25.04	17.89
2	IC 326898	13.01	4.83	7.58	25.48	15.36
3	IC 037156	12.41	7.80	9.99	22.39	14.93
4	SKGPA-61	13.68	5.98	10.80	23.14	15.87
5	SKNA-1207	15.89	5.15	10.28	20.72	15.63
AVT-II						
6	IC 341505	13.94	5.87	9.10	23.08	15.38
7	IC 361853	10.67	4.76	10.28	24.14	15.03
8	IC 362199	17.89	5.28	12.11	21.72	17.24
9	Annapurna (C)	12.94	4.96	12.19	18.89	14.68
10	Durga (C)	16.56	7.18	7.04	17.81	13.80
11	PRA-3 (C)	15.22	2.63	5.49	18.63	13.11
	Mean	14.25	5.34	9.90	21.91	15.36
	CD (0.05)	3.58	0.77	1.65	2.32	-
	CV (%) Error	15.26	9.28	9.80	6.22	-

*Poor yields; data not considered for calculating means over locations

Table 136: Experimental Details of IVT & AVT of Buckwheat Kharif 2019 (Hills)

S. No	Items	Almora	Ranichauri	Shimla
1	No. of Entries	14	14	14
2	No. of Checks	4	4	4
3	Design	RBD	RBD	RBD
4	No. of Replication	3	3	3
5	Number of Rows	5	4	4
6	Row length (m)	3	3	3
7	Row spacing (cm)	25	30	30
8	Plant spacing (cm)	10	10	10
9	NPKS (Kg/ha)	40:20:20	40:20:20	-
10	Plot Size (m ²)	3m × 1.25 m	3.6	-
11	Sowing Date	23/07/2019	18/06/2019	30/05/2019
12	Harvesting Period	At maturity	05-09-2019 to 12-11-2019	27/08/2019 – 25/09/2019

Table 137: Plant height (cm) in Initial and Advanced Varietal Trials (IVT & AVT) on buckwheat: Kharif 2019 (Hills)

S. No.	Genotypes\$	Almora	Ranichauri	Shimla	Mean
IVT					
1	IC 24300	88.00	102.27	109.40	99.89
2	IC 26755	126.67	136.97	143.27	135.63
3	IC 37296	99.33	106.40	144.73	116.82
4	IC 42412 (<i>F. esculentum</i>)	149.67	147.93	180.13	159.24
5	IC 329195	105.67	134.87	135.97	125.50
6	NIC 8817	95.00	97.33	152.73	115.02
7	EC 125940 (<i>F. esculentum</i>)	121.00	141.93	201.47	154.80
AVT-I					
8	IC 329199 (<i>F. esculentum</i>)	154.67	130.13	179.90	154.90
9	IC 318859	107.00	103.20	157.80	122.67
10	IC 108508	85.33	113.43	158.43	119.07
11	IC 37269 (<i>F. esculentum</i>)	152.67	144.40	182.40	159.82
12	SANGLA-B-444	81.67	106.03	154.43	114.04
AVT-II					
13	Sangla-B-464 (<i>F. esculentum</i>)	116.67	113.33	163.40	131.13
14	IC 341589	95.33	103.73	153.43	117.50
15	Himpriya (C)	89.33	109.93 (123.13)*	147.90	115.72 (120.12)
16	Shimla-B-1 (C)	139.33	122.30 (137.87)	178.07	146.57 (151.76)
17	PRB-1 (C) (<i>F. esculentum</i>)	144.67	158.60 (164.53)	191.37	164.88 (166.85)
18	VL-7 (C) (<i>F. esculentum</i>)	140.67	110.97 (131.10)	181.03	144.22 (150.93)
	Mean	116.26	121.32 (124.37)	161.99	133.19 (134.21)
	CD(0.05)	20.79	21.43 (23.86)	7.73	-
	CV(%) Error	10.78	10.51 (10.82)	2.88	-

\$Entries of *F. tataricum*; *Values in parenthesis for IVT

Table 138: Days to 50% flowering in Initial and Advanced Varietal Trials (IVT & AVT) on buckwheat: Kharif 2019 (Hills)

S. No.	Genotypes\$	Almora	Ranichauri	Shimla	Mean
IVT					
1	IC 24300	41.33	47.00	34.33	40.89
2	IC 26755	31.00	44.00	32.67	35.89
3	IC 37296	37.00	51.67	43.67	44.11
4	IC 42412 (<i>F. esculentum</i>)	30.67	45.67	40.67	39.00
5	IC 329195	44.00	58.00	56.67	52.89
6	NIC 8817	41.00	50.33	33.67	41.67
7	EC 125940 (<i>F. esculentum</i>)	27.67	44.33	44.67	38.89
AVT-I					
8	IC 329199 (<i>F. esculentum</i>)	25.67	44.67	42.00	37.44
9	IC 318859	41.33	56.33	48.67	48.78
10	IC 108508	43.67	55.67	53.33	50.89
11	IC 37269 (<i>F. esculentum</i>)	32.67	43.67	44.00	40.11
12	SANGLA-B-444	44.67	57.00	51.00	50.89
AVT-II					
13	Sangla-B-464 (<i>F. esculentum</i>)	32.00	44.33	43.33	39.89
14	IC 341589	36.33	56.00	40.00	44.11
15	Himpriya (C)	45.33	61.33 (61.33)*	64.00	56.89 (56.89)
16	Shimla-B-1 (C)	40.00	41.00 (42.33)	38.33	39.78 (40.22)
17	PRB-1 (C) (<i>F. esculentum</i>)	31.00	57.67 (58.00)	49.00	45.89 (46.00)
18	VL-7 (C) (<i>F. esculentum</i>)	33.00	38.67 (38.67)	38.67	36.78 (36.78)
Mean		36.57	49.85 (49.94)	44.37	43.60 (43.63)
CD(0.05)		3.61	1.86 (3.16)	2.12	-
CV(%) Error		5.96	2.16 (3.77)	2.88	-

\$Entries of *F. tataricum*, *Values in parenthesis for IVT

Table 139: Days to maturity in Initial and Advanced Varietal Trials (IVT & AVT) on buckwheat: Kharif 2019 (Hills)

S. No.	Genotypes\$	Almora	Ranichauri	Shimla	Mean
IVT					
1	IC 24300	64.33	83.33	91.33	79.67
2	IC 26755	64.33	78.00	83.33	75.22
3	IC 37296	64.67	103.67	107.67	92.00
4	IC 42412 (<i>F. esculentum</i>)	63.33	132.33	112.67	102.78
5	IC 329195	72.00	139.00	112.67	107.89
6	NIC 8817	66.00	103.67	86.33	85.33
7	EC 125940 (<i>F. esculentum</i>)	53.33	103.67	114.33	90.44
AVT-I					
8	IC 329199 (<i>F. esculentum</i>)	64.67	86.33	110.00	87.00
9	IC 318859	82.00	86.33	111.33	93.22
10	IC 108508	72.33	90.00	109.33	90.56
11	IC 37269 (<i>F. esculentum</i>)	68.00	111.67	113.00	97.56
12	SANGLA-B-444	80.67	118.00	115.00	104.56
AVT-II					
13	Sangla-B-464 (<i>F. esculentum</i>)	66.00	103.33	115.67	95.00
14	IC 341589	65.33	105.67	108.33	93.11
15	Himpriya (C)	78.67	147.00 (142.67)*	125.33	117 (115.56)
16	Shimla-B-1 (C)	65.33	83.00 (83.00)	89.00	79.11 (79.11)
17	PRB-1 (C) (<i>F. esculentum</i>)	63.33	142.67 (140.67)	122.33	109.45 (108.78)
18	VL-7 (C) (<i>F. esculentum</i>)	57.00	77.67 (81.33)	109.67	81.45 (82.67)
Mean		67.30	105.30 (105.15)	107.63	93.41 (93.36)
CD(0.05)		3.99	4.96 (3.40)	3.81	-
CV(%) Error		3.57	2.78 (1.84)	2.13	-

\$Entries of *F. tataricum*, *Values in parenthesis for IVT

Table 140: 100 seed weight (g) in Initial and Advanced Varietal Trials (IVT & AVT) on buckwheat: Kharif 2019 (Hills)

S. No.	Genotypes\$	Almora	Ranichauri	Shimla	Mean
IVT					
1	IC 24300	2.10	3.01	1.62	2.25
2	IC 26755	2.58	2.98	1.63	2.40
3	IC 37296	2.30	2.99	1.61	2.30
4	IC 42412 (<i>F. esculentum</i>)	2.67	2.90	2.23	2.60
5	IC 329195	2.20	3.10	1.87	2.39
6	NIC 8817	2.34	2.97	2.06	2.46
7	EC 125940 (<i>F. esculentum</i>)	2.29	3.31	4.00	3.20
AVT-I					
8	IC 329199 (<i>F. esculentum</i>)	2.23	3.28	2.14	2.55
9	IC 318859	2.08	2.98	2.01	2.36
10	IC 108508	2.06	3.06	1.83	2.31
11	IC 37269 (<i>F. esculentum</i>)	2.10	3.10	2.24	2.48
12	SANGLA-B-444	2.44	3.11	1.76	2.44
AVT-II					
13	Sangla-B-464 (<i>F. esculentum</i>)	2.18	2.97	2.34	2.50
14	IC 341589	2.98	3.12	2.44	2.85
15	Himpriya (C)	2.56	2.93 (3.08)*	2.12	2.54 (2.59)
16	Shimla-B-1 (C)	2.10	3.03 (3.14)	1.74	2.29 (2.33)
17	PRB-1 (C) (<i>F. esculentum</i>)	2.34	3.27 (3.27)	2.06	2.56 (2.56)
18	VL-7 (C) (<i>F. esculentum</i>)	2.76	3.11 (3.11)	2.88	2.92 (2.92)
	Mean	2.35	3.07 (3.08)	2.14	2.52 (2.52)
	CD(0.05)	-	0.22 (0.23)	0.06	-
	CV(%) Error	-	4.16 (4.40)	1.82	-

\$Entries of *F. tataricum*, *Values in parenthesis for IVT

Table 141: Grain yield (q/ha) in Initial and Advanced Varietal Trials (IVT & AVT) on buckwheat: Kharif 2019 (Hills)

S. No.	Genotypes\$	Almora	Ranichauri	Shimla	Mean
IVT					
1	IC 24300	4.27	4.50	2.67	3.81
2	IC 26755	4.71	5.16	3.74	4.54
3	IC 37296	5.21	4.79	2.10	4.03
4	IC 42412 (<i>F. esculentum</i>)	4.51	4.40	2.94	3.95
5	IC 329195	3.51	4.75	3.09	3.78
6	NIC 8817	4.49	3.73	3.03	3.75
7	EC 125940 (<i>F. esculentum</i>)	4.36	4.49	4.17	4.34
AVT-I					
8	IC 329199 (<i>F. esculentum</i>)	6.18	4.63	2.43	4.41
9	IC 318859	5.28	5.07	4.30	4.89
10	IC 108508	5.57	3.63	5.05	4.75
11	IC 37269 (<i>F. esculentum</i>)	5.47	3.85	2.60	3.97
12	SANGLA-B-444	5.15	4.95	2.21	4.10
AVT-II					
13	Sangla-B-464 (<i>F. esculentum</i>)	5.26	4.94	2.11	4.10
14	IC 341589	6.31	4.02	5.26	5.20
15	Himpriya (C)	5.64	4.44 (4.22)*	2.22	4.10 (4.03)
16	Shimla-B-1 (C)	3.91	5.55 (5.82)	3.01	4.16 (4.25)
17	PRB-1 (C) (<i>F. esculentum</i>)	5.60	6.39 (6.16)	2.36	4.78 (4.71)
18	VL-7 (C) (<i>F. esculentum</i>)	5.80	4.04 (3.94)	2.90	4.25 (4.21)
	Mean	5.07	4.63 (4.61)	3.12	4.27 (4.27)
	CD(0.05)	1.08	1.03 (1.26)	0.34	-
	CV(%) Error	12.79	12.86 (15.68)	6.57	-

\$Entries of *F. tataricum*, *Values in parenthesis for IVT

Table 142: Experimental Details of AVT – I of Chenopodium quinoa Kharif 2019 (Hills)

S. No	Items	Shimla	Palampur
1	No. of Entries	13	13
2	No. of Checks	-	-
3	Design	RBD	RBD
4	No. of Replication	3	3
5	Number of Rows	4	4
6	Row length (m)	3	2.5
7	Row spacing (cm)	30	30
8	Plant spacing (cm)	15	10
9	NPKS (Kg/ha)	-	-
10	Plot Size (m ²)	3.6	3.0
11	Sowing Date	04/06/2019	22/06/2019
12	Harvesting Period	04/09/2019 – 30/09/2019	10/10/2019

Table 143: Plant height (cm) in Advanced Varietal Trial - I (AVT-I) on Chenopodium quinoa: Kharif 2019 (Hills)

S. No.	Genotypes	Shimla	Palampur (Bajaura)	Mean
AVT-1				
1	EC-507738	160.13	103.00	131.57
2	EC-507739	143.50	114.00	128.75
3	EC-507740	121.97	102.33	112.15
4	EC-507741	122.07	96.33	109.20
5	EC-507742	126.33	98.00	112.17
6	EC-507743	145.13	85.67	115.40
7	EC-507744	133.43	75.00	104.22
8	EC-507746	151.67	78.67	115.17
9	EC-507747	143.97	104.00	123.98
10	EC-507748	133.47	95.33	114.40
11	EC-507749	154.97	109.33	132.15
12	IC 363733	227.77	144.00	185.88
13	NIC 22506	214.03	116.67	165.35
	Mean	152.19	101.72	126.95
	CD(0.05)	8.48	10.96	-
	CV(%) Error	3.31	6.39	-

Table 144: Number of branches per plant in Advanced Varietal Trial - I (AVT-I) on Chenopodium quinoa: Kharif 2019 (Hills)

S. No.	Genotypes	Shimla	Palampur (Bajaura)	Mean
AVT-1				
1	EC-507738	7.67	6.33	7.00
2	EC-507739	9.67	5.00	7.33
3	EC-507740	6.00	5.33	5.67
4	EC-507741	5.67	6.00	5.83
5	EC-507742	7.33	5.33	6.33
6	EC-507743	6.67	4.00	5.33
7	EC-507744	6.33	5.67	6.00
8	EC-507746	6.00	4.67	5.33
9	EC-507747	5.67	6.00	5.83
10	EC-507748	6.33	5.33	5.83
11	EC-507749	5.33	7.00	6.17
12	IC 363733	1.33	5.33	3.33
13	NIC 22506	0.00	5.33	2.67
	Mean	5.69	5.49	5.59
	CD(0.05)	1.11	2.10	-
	CV(%) Error	10.66	22.67	-

Table 145: Days to 50% flowering in Advanced Varietal Trial - I (AVT-I) on Chenopodium quinoa: Kharif 2019 (Hills)

S. No.	Genotypes	Shimla	Palampur (Bajaura)	Mean
AVT-1				
1	EC-507738	48.67	45.00	46.83
2	EC-507739	46.00	46.67	46.33
3	EC-507740	46.67	47.00	46.83
4	EC-507741	50.67	44.67	47.67
5	EC-507742	48.67	48.00	48.33
6	EC-507743	51.33	49.00	50.17
7	EC-507744	51.33	44.67	48.00
8	EC-507746	51.00	49.00	50.00
9	EC-507747	54.33	45.33	49.83
10	EC-507748	48.00	45.67	46.83
11	EC-507749	54.67	45.00	49.83
12	IC 363733	61.00	47.67	54.33
13	NIC 22506	50.67	46.00	48.33
	Mean	51.00	46.44	48.72
	CD(0.05)	1.78	1.08	-
	CV(%) Error	2.07	1.39	-

Table 146: Days to maturity in Advanced Varietal Trial - I (AVT-I) on *Chenopodium quinoa*: Kharif 2019 (Hills)

S. No.	Genotypes	Shimla	Palampur (Bajaura)	Mean
AVT-1				
1	EC-507738	93.33	104.00	98.67
2	EC-507739	98.33	102.33	100.33
3	EC-507740	95.33	104.00	99.67
4	EC-507741	97.67	104.67	101.17
5	EC-507742	103.67	101.00	102.33
6	EC-507743	105.00	103.33	104.17
7	EC-507744	101.00	105.33	103.17
8	EC-507746	107.00	104.00	105.50
9	EC-507747	109.67	101.67	105.67
10	EC-507748	108.33	102.00	105.17
11	EC-507749	108.67	103.00	105.83
12	IC 363733	117.67	104.67	111.17
13	NIC 22506	99.67	105.00	102.33
	Mean	103.49	103.46	103.47
	CD(0.05)	2.46	0.89	-
	CV(%) Error	1.41	0.51	-

Table 147: Inflorescence length (cm) in Advanced Varietal Trial - I (AVT-I) on Chenopodium quinoa: Kharif 2019 (Hills)

S. No.	Genotypes	Shimla	Palampur (Bajaura)	Mean
AVT-1				
1	EC-507738	30.27	31.33	30.80
2	EC-507739	29.43	31.33	30.38
3	EC-507740	29.73	24.00	26.87
4	EC-507741	28.53	28.67	28.60
5	EC-507742	31.63	35.33	33.48
6	EC-507743	29.93	23.33	26.63
7	EC-507744	29.20	27.33	28.27
8	EC-507746	32.20	25.67	28.93
9	EC-507747	34.53	47.67	41.10
10	EC-507748	27.90	28.33	28.12
11	EC-507749	33.13	42.67	37.90
12	IC 363733	34.60	35.33	34.97
13	NIC 22506	29.63	37.33	33.48
	Mean	30.83	32.18	31.50
	CD(0.05)	3.47	6.82	-
	CV(%) Error	6.68	12.58	-

Table 148: Number of spikelets/ plant in Advanced Varietal Trial - I (AVT-I) on Chenopodium quinoa: Kharif 2019 (Hills)

S. No.	Genotypes	Shimla	Palampur (Bajaura)	Mean
AVT-1				
1	EC-507738	19.33	9.67	14.50
2	EC-507739	18.33	14.67	16.50
3	EC-507740	19.00	10.33	14.67
4	EC-507741	19.00	10.00	14.50
5	EC-507742	19.00	10.67	14.83
6	EC-507743	17.67	15.33	16.50
7	EC-507744	16.67	7.67	12.17
8	EC-507746	19.33	23.67	21.50
9	EC-507747	20.00	21.67	20.83
10	EC-507748	18.33	16.33	17.33
11	EC-507749	18.33	19.67	19.00
12	IC 363733	19.33	18.33	18.83
13	NIC 22506	16.67	23.67	20.17
Mean		18.54	15.51	17.03
CD(0.05)		1.87	4.85	-
CV(%) Error		5.98	18.55	-

Table 149: Seed volume weight (g/10ml) in Advanced Varietal Trial - I (AVT-I) on Chenopodium quinoa: Kharif 2019 (Hills)

S. No.	Genotypes	Shimla	Palampur (Bajaura)	Mean
AVT-1				
1	EC-507738	6.14	5.05	5.59
2	EC-507739	5.92	5.18	5.55
3	EC-507740	5.81	3.83	4.82
4	EC-507741	6.15	4.79	5.47
5	EC-507742	6.55	3.91	5.23
6	EC-507743	5.84	5.07	5.46
7	EC-507744	6.26	5.23	5.75
8	EC-507746	5.72	4.67	5.20
9	EC-507747	6.17	3.67	4.92
10	EC-507748	6.10	3.70	4.90
11	EC-507749	5.82	3.71	4.77
12	IC 363733	6.51	7.04	6.77
13	NIC 22506	6.30	5.30	5.80
	Mean	6.10	4.70	5.40
	CD(0.05)	0.27	0.51	-
	CV(%) Error	2.66	6.41	-

Table 150: Seed yield (q/ha) in Advanced Varietal Trial - I (AVT-I) on Chenopodium quinoa: Kharif 2019 (Hills)

S. No.	Genotypes	Shimla	Palampur (Bajaura)	Mean
AVT-1				
1	EC-507738	3.93	2.72	3.33
2	EC-507739	4.71	4.04	4.37
3	EC-507740	4.10	3.82	3.96
4	EC-507741	3.45	3.12	3.28
5	EC-507742	4.90	3.24	4.07
6	EC-507743	4.50	3.29	3.89
7	EC-507744	4.48	2.90	3.69
8	EC-507746	4.17	2.99	3.58
9	EC-507747	3.46	3.20	3.33
10	EC-507748	3.55	3.34	3.45
11	EC-507749	2.97	2.75	2.86
12	IC 363733	6.17	8.36	7.26
13	NIC 22506	6.99	3.43	5.21
	Mean	4.41	3.63	4.02
	CD(0.05)	0.74	0.48	-
	CV(%) Error	9.89	7.78	-

Table 151: Experimental Details of IVT of Adzuki bean Kharif 2019 (Hills)

S. No	Items	Palampur	Pasighat	Shimla
1	No. of Entries	12	12	12
2	No. of Checks	2	2	2
3	Design	RBD	RBD	RBD
4	No. of Replication	3	3	3
5	Number of Rows	4	6	4
6	Row length (m)	3	2	3
7	Row spacing (cm)	30	15	30
8	Plant spacing (cm)	10	10	10
9	NPKS (Kg/ha)	20:40:20	40:20:20:20	-
10	Plot Size (m ²)	3.6	1.5 x 2=3m ²	-
11	Sowing Date	10-06-2019	08-07-2019	27-05-2019
12	Harvesting Period	25-10-2019	15 Oct. to 27 Oct, 2019	28-09-2019

Table 152: Plant Height (cms) in Initial Varietal Trial IVT on Adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
IVT					
1	IC 016761	81.23	61.70	81.21	74.71
2	IC 089957	75.90	62.80	81.94	73.55
3	IC 341937	81.60	53.33	97.79	77.57
4	IC 341943	75.87	57.77	96.99	76.87
5	IC 341945	83.30	61.13	100.89	81.77
6	IC 341949	79.90	58.90	108.92	82.57
7	IC 485382	77.37	48.90	90.83	72.37
8	EC 030270	83.33	64.47	87.45	78.42
9	EC 120460	85.83	63.37	86.09	78.43
10	EC 187896	82.13	66.10	107.12	85.12
11	EC 340254	87.83	63.90	98.49	83.41
12	EC 340283	80.27	57.23	101.46	79.65
13	HPU-51 (C)	87.90	50.83	87.84	75.52
14	Totru Local (C)	77.63	52.63	82.12	70.80
Mean		82.74	58.79	95.69	79.07
CD (0.05)		4.71	6.77	4.28	-
CV(%) Error		3.45	6.86	2.70	-

Table 153: Number of primary branches/plant in Initial Varietal Trial IVT on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
IVT					
1	IC 016761	1.80	2.97	4.32	3.03
2	IC 089957	1.87	2.43	3.77	2.69
3	IC 341937	2.20	2.80	3.44	2.81
4	IC 341943	2.20	2.33	4.11	2.88
5	IC 341945	1.53	3.10	3.89	2.84
6	IC 341949	1.73	2.10	3.55	2.46
7	IC 485382	2.40	2.20	3.55	2.72
8	EC 030270	1.53	2.43	3.33	2.43
9	EC 120460	1.67	2.37	3.55	2.53
10	EC 187896	2.07	2.57	4.33	2.99
11	EC 340254	1.73	2.43	3.88	2.68
12	EC 340283	1.47	2.77	3.77	2.67
13	HPU-51 (C)	2.47	2.93	3.77	3.06
14	Totru Local (C)	2.73	2.67	3.33	2.91
	Mean	2.09	2.58	3.77	2.81
	CD(0.05)	0.60	0.64	0.66	-
	CV(%) Error	17.46	14.73	10.61	-

Table 154: Days to 50% flowering in Initial Varietal Trial IVT on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
IVT					
1	IC 016761	58.67	44.67	70.67	58.00
2	IC 089957	55.00	44.33	70.00	56.44
3	IC 341937	62.67	43.00	77.67	61.11
4	IC 341943	56.67	43.67	71.33	57.22
5	IC 341945	55.67	43.33	69.33	56.11
6	IC 341949	58.67	45.33	70.33	58.11
7	IC 485382	65.33	44.33	85.67	65.11
8	EC 030270	57.00	43.67	72.67	57.78
9	EC 120460	57.33	44.00	67.67	56.33
10	EC 187896	57.33	43.33	69.67	56.78
11	EC 340254	56.67	43.67	68.67	56.33
12	EC 340283	54.67	47.67	69.67	57.33
13	HPU-51 (C)	56.67	42.33	67.00	55.33
14	Totru Local (C)	53.00	42.00	64.33	53.11
	Mean	61.30	43.95	70.83	58.70
	CD (0.05)	1.41	1.70	4.51	-
	CV(%) Error	1.40	2.31	3.85	-

Table 155: Pods per plant in Initial Varietal Trial IVT on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
IVT					
1	IC 016761	35.53	32.77	33.11	33.80
2	IC 089957	34.67	46.97	31.33	37.65
3	IC 341937	40.27	25.13	32.11	32.50
4	IC 341943	37.73	54.23	28.78	40.25
5	IC 341945	39.33	40.47	34.66	38.15
6	IC 341949	30.40	58.00	31.11	39.84
7	IC 485382	40.40	33.00	32.88	35.43
8	EC 030270	39.47	58.53	31.66	43.22
9	EC 120460	29.47	44.33	32.44	35.41
10	EC 187896	36.47	38.57	32.22	35.75
11	EC 340254	32.20	18.90	32.22	27.77
12	EC 340283	32.87	33.97	33.88	33.57
13	HPU-51 (C)	49.80	45.33	34.77	43.30
14	Totru Local (C)	50.07	51.00	36.44	45.84
	Mean	38.22	41.51	32.81	37.51
	CD(0.05)	3.58	5.62	2.58	-
	CV(%) Error	5.67	8.07	4.75	-

Table 156: Pod length (cms) in Initial Varietal Trial IVT on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasihat	Shimla	Mean
IVT					
1	IC 016761	9.03	7.77	11.53	9.44
2	IC 089957	9.30	9.03	11.28	9.87
3	IC 341937	10.10	7.57	8.77	8.81
4	IC 341943	9.20	9.23	11.66	10.03
5	IC 341945	9.90	9.30	11.85	10.35
6	IC 341949	9.47	9.23	11.31	10.00
7	IC 485382	8.23	7.90	10.44	8.86
8	EC 030270	9.70	9.03	10.54	9.76
9	EC 120460	9.07	8.93	9.97	9.32
10	EC 187896	9.40	9.80	10.71	9.97
11	EC 340254	9.17	9.33	11.13	9.88
12	EC 340283	8.17	7.83	11.39	9.13
13	HPU-51 (C)	8.63	9.00	11.26	9.63
14	Totru Local (C)	8.27	6.13	8.76	7.72
	Mean	9.01	8.58	10.92	9.50
	CD(0.05)	1.50	0.47	0.41	-
	CV(%) Error	10.06	3.29	2.28	-

Table 157: Number of seeds/ pod in Initial Varietal Trial IVT on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
IVT					
1	IC 016761	8.40	5.10	8.00	7.17
2	IC 089957	9.07	7.33	8.55	8.32
3	IC 341937	8.40	4.57	9.00	7.32
4	IC 341943	7.73	9.67	9.00	8.80
5	IC 341945	8.93	8.90	9.77	9.20
6	IC 341949	8.60	9.10	9.00	8.90
7	IC 485382	7.60	6.20	8.00	7.27
8	EC 030270	8.87	8.80	10.00	9.22
9	EC 120460	8.27	8.33	8.22	8.27
10	EC 187896	8.73	8.57	8.77	8.69
11	EC 340254	8.53	8.57	9.28	8.79
12	EC 340283	7.73	8.90	10.33	8.99
13	HPU-51 (C)	8.40	7.57	9.22	8.40
14	Totru Local (C)	6.47	5.23	9.33	7.01
	Mean	8.25	7.63	9.05	8.31
	CD(0.05)	1.03	0.47	0.82	-
	CV(%) Error	7.52	3.66	5.46	-

Table 158: Days to 80% maturity in Initial Varietal Trial IVT on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
IVT					
1	IC 016761	109.33	75.00	116.33	100.22
2	IC 089957	109.33	75.00	109.67	98.00
3	IC 341937	113.67	72.67	117.67	101.33
4	IC 341943	107.33	73.33	120.33	100.33
5	IC 341945	104.33	73.00	109.67	95.67
6	IC 341949	105.00	75.67	117.67	99.44
7	IC 485382	112.67	74.67	120.67	102.67
8	EC 030270	107.67	73.33	115.33	98.78
9	EC 120460	107.00	74.00	110.00	97.00
10	EC 187896	107.67	74.33	121.67	101.22
11	EC 340254	107.33	73.00	118.00	99.44
12	EC 340283	108.67	78.67	112.00	99.78
13	HPU-51 (C)	106.67	71.00	115.00	97.56
14	Totru Local (C)	107.67	70.33	112.00	96.67
	Mean	110.15	73.86	116.85	99.15
	CD(0.05)	1.33	3.20	4.63	-
	CV(%) Error	0.73	2.58	2.40	-

Table 159: 100 Seed yield (g) in Initial Varietal Trial IVT on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
IVT					
1	IC 016761	10.98	7.90	12.01	10.30
2	IC 089957	10.64	9.53	11.67	10.61
3	IC 341937	10.53	13.80	16.87	13.73
4	IC 341943	9.69	8.13	10.53	9.45
5	IC 341945	10.91	9.77	10.26	10.31
6	IC 341949	9.69	6.37	10.67	8.91
7	IC 485382	11.33	12.23	14.48	12.68
8	EC 030270	9.48	7.63	11.86	9.66
9	EC 120460	10.44	7.47	10.13	9.34
10	EC 187896	11.73	8.60	10.94	10.42
11	EC 340254	10.33	9.70	12.87	10.97
12	EC 340283	9.39	7.47	10.72	9.19
13	HPU-51 (C)	9.97	8.03	12.07	10.03
14	Totru Local (C)	6.39	3.93	5.27	5.20
	Mean	10.19	8.61	11.66	10.15
	CD(0.05)	0.99	0.34	0.84	-
	CV(%) Error	5.86	2.37	4.36	-

Table 160: Seed yield (q/ha) in Initial Varietal Trial IVT on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
IVT					
1	IC 016761	7.69	10.77	17.80	12.09
2	IC 089957	8.15	10.80	13.54	10.83
3	IC 341937	8.62	9.90	16.52	11.68
4	IC 341943	7.32	10.30	13.39	10.34
5	IC 341945	6.49	11.20	15.89	11.19
6	IC 341949	7.51	11.70	15.44	11.55
7	IC 485382	7.23	9.03	16.54	10.93
8	EC 030270	9.82	12.57	17.85	13.41
9	EC 120460	6.02	10.33	16.73	11.03
10	EC 187896	7.23	10.30	13.64	10.39
11	EC 340254	5.47	7.73	16.98	10.06
12	EC 340283	8.71	11.27	18.53	12.84
13	HPU-51 (C)	7.41	5.20	12.70	8.44
14	Totru Local (C)	6.95	3.80	9.67	6.81
	Mean	7.61	9.64	14.98	10.75
	CD (0.05)	1.25	1.54	1.16	-
	CV(%) Error	9.90	9.50	4.68	-

Table 161: Experimental Details of AVT – I & II of Adzuki bean Kharif 2019 (Hills)

S. No	Items	Palampur	Pasighat	Shimla
1	No. of Entries	6	6	6
2	No. of Checks	2	2	2
3	Design	RBD	RBD	RBD
4	No. of Replication	3	3	3
5	Number of Rows	4	6	4
6	Row length (m)	3	3	3
7	Row spacing (cm)	30	15	30
8	Plant spacing (cm)	10	10	10
9	NPKS (Kg/ha)	20:40:20	40:20:20:20	-
10	Plot Size (m ²)	3.6	3.0m ²	-
11	Sowing Date	10-06-2019	08-07-2019	27-05-2019
12	Harvesting Period	25-10-2019	15-10-2019 – 27-10-2019	28-09-2019

Table 162: Seed yield (q/ha) in Advanced Varietal Trials - I & II (AVT-I & II) on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
AVT-I					
1	IC 341939	10.52	14.68	15.79	13.66
2	IC 100072	7.97	10.19	15.48	11.21
AVT-II					
3	ADHP-6	6.49	14.17	12.63	11.10
4	ADHP-7	10.10	14.25	12.26	12.20
5	ADHP-8	5.28	13.41	15.95	11.55
6	ADHP-9	7.32	12.13	12.36	10.60
7	HPU-51 (C)	7.41	5.42	12.70	8.51
8	Totru Local (C)	6.95	5.62	9.67	7.41
	Mean	7.61	11.23	14.98	11.28
	CD(0.05)	1.25	1.62	1.16	-
	CV(%) Error	9.90	8.21	4.68	-

Table 163: Plant Height (cms) in Advanced Varietal Trials - I & II (AVT-I & II) on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
AVT-I					
1	IC 341939	97.60	68.33	111.47	92.47
2	IC 100072	82.63	63.33	115.20	87.05
AVT-II					
3	ADHP-6	78.03	66.13	92.33	78.83
4	ADHP-7	98.53	60.03	109.04	89.20
5	ADHP-8	78.80	63.33	107.64	83.26
6	ADHP-9	79.07	58.47	68.93	68.82
7	HPU-51 (C)	87.90	61.13	87.84	78.96
8	Totru Local (C)	77.63	58.33	82.12	72.70
	Mean	82.74	62.39	95.69	80.27
	CD(0.05)	4.71	5.69	4.28	-
	CV(%) Error	3.45	5.21	2.70	-

Table 164: Days to 50% flowering in Advanced Varietal Trials - I & II (AVT-I & II) on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
AVT-I					
1	IC 341939	80.67	42.67	72.33	65.22
2	IC 100072	60.67	43.00	71.00	58.22
AVT-II					
3	ADHP-6	71.33	43.00	69.33	61.22
4	ADHP-7	73.67	42.33	70.00	62.00
5	ADHP-8	69.67	42.67	69.67	60.67
6	ADHP-9	64.67	43.33	69.67	59.22
7	HPU-51 (C)	56.67	42.33	67.00	55.33
8	Totru Local (C)	53.00	43.67	64.33	53.67
	Mean	61.30	42.88	70.83	58.34
	CD(0.05)	1.41	0.94	4.51	-
	CV(%) Error	1.40	1.25	3.85	-

Table 165: Number of primary branches/plant in Advanced Varietal Trials - I & II (AVT-I & II) on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
AVT-I					
1	IC 341939	3.13	2.90	3.89	3.31
2	IC 100072	1.87	2.10	3.89	2.62
AVT-II					
3	ADHP-6	2.00	2.67	3.44	2.70
4	ADHP-7	2.47	2.67	4.11	3.08
5	ADHP-8	2.67	2.80	3.89	3.12
6	ADHP-9	2.20	2.10	3.55	2.62
7	HPU-51 (C)	2.47	2.90	3.77	3.05
8	Totru Local (C)	2.73	2.10	3.33	2.72
	Mean	2.09	2.53	3.77	2.79
	CD(0.05)	0.60	0.72	0.66	-
	CV(%) Error	17.46	16.20	10.61	-

Table 166: Days to 80% maturity in Advanced Varietal Trials - I & II (AVT-I & II) on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
AVT-I					
1	IC 341939	127.67	72.33	119.33	106.44
2	IC 100072	111.00	74.33	120.33	101.89
AVT-II					
3	ADHP-6	114.00	74.67	125.00	104.56
4	ADHP-7	114.33	70.33	118.67	101.11
5	ADHP-8	112.33	72.67	117.33	100.78
6	ADHP-9	109.33	75.33	120.33	101.67
7	HPU-51 (C)	106.67	72.00	115.00	97.89
8	Totru Local (C)	107.67	76.67	112.00	98.78
	Mean	110.15	73.54	116.85	101.64
	CD(0.05)	1.33	3.04	4.63	-
	CV(%) Error	0.73	3.45	2.40	-

Table 167: 100 Seed yield (g) in Advanced Varietal Trials - I & II (AVT-I & II) on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
AVT-I					
1	IC 341939	10.17	9.40	10.89	10.16
2	IC 100072	11.05	7.33	12.23	10.20
AVT-II					
3	ADHP-6	10.68	7.87	12.02	10.19
4	ADHP-7	10.08	9.60	12.27	10.65
5	ADHP-8	10.03	7.97	11.46	9.82
6	ADHP-9	10.30	7.50	13.88	10.56
7	HPU-51 (C)	9.97	9.40	12.07	10.48
8	Totru Local (C)	6.39	3.50	5.27	5.05
	Mean	10.19	7.82	11.66	9.89
	CD(0.05)	0.99	0.15	0.84	-
	CV(%) Error	5.86	1.13	4.36	-

Table 168: Pods per plant in Advanced Varietal Trials - I & II (AVT-I & II) on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
AVT-I					
1	IC 341939	48.47	31.43	33.00	37.63
2	IC 100072	35.13	23.33	33.44	30.64
AVT-II					
3	ADHP-6	35.47	67.20	31.55	44.74
4	ADHP-7	37.53	32.20	33.33	34.35
5	ADHP-8	42.33	61.77	32.33	45.48
6	ADHP-9	36.80	38.23	34.89	36.64
7	HPU-51 (C)	49.80	50.00	34.77	44.86
8	Totru Local (C)	50.07	51.00	36.44	45.84
	Mean	38.22	44.40	32.81	38.47
	CD(0.05)	3.58	5.26	2.58	-
	CV(%) Error	5.67	6.76	4.75	-

Table 169: Pod length (cms) in Advanced Varietal Trials - I & II (AVT-I & II) on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
AVT-I					
1	IC 341939	7.53	9.20	11.15	9.30
2	IC 100072	8.70	8.47	11.62	9.60
AVT-II					
3	ADHP-6	8.97	9.20	11.95	10.04
4	ADHP-7	9.17	8.50	11.15	9.61
5	ADHP-8	8.57	8.90	11.91	9.79
6	ADHP-9	9.53	8.13	9.93	9.20
7	HPU-51 (C)	8.63	9.07	11.26	9.65
8	Totru Local (C)	8.27	6.30	8.76	7.78
	Mean	9.01	8.47	10.92	9.46
	CD(0.05)	1.50	0.28	0.41	-
	CV(%) Error	10.06	1.89	2.28	-

Table 170: Number of seeds/pod in Advanced Varietal Trials - I & II (AVT-I & II) on adzuki bean: Kharif 2019 (Hills)

S. No.	Genotypes	Palampur	Pasighat	Shimla	Mean
AVT-I					
1	IC 341939	7.93	7.90	9.00	8.28
2	IC 100072	8.13	5.97	8.00	7.37
AVT-II					
3	ADHP-6	8.47	9.10	9.55	9.04
4	ADHP-7	8.60	8.10	8.89	8.53
5	ADHP-8	8.20	8.10	10.00	8.77
6	ADHP-9	8.00	6.57	9.11	7.89
7	HPU-51 (C)	8.40	7.67	9.22	8.43
8	Totru Local (C)	6.47	4.77	9.33	6.85
	Mean	8.25	7.27	9.05	8.14
	CD(0.05)	1.03	0.43	0.82	-
	CV (%) Error	7.52	4.96	5.46	-

Table 171: Experimental Details of IVT – I of Perilla bean Kharif 2019 (Hills)

S. No	Items	Kolasib (Mizoram)	Lamphelpat (Manipur)	Ranichauri (Uttarakhand)	Umiam (Meghalaya)
1	No. of Entries	8	8	8	8
2	No. of Checks	1	1	1	1
3	Design	RBD	RBD	RBD	RBD
4	No. of Replication	3	5	3	3
5	Number of Rows	3	3	4	3
6	Row length (m)	3	3	3	3
7	Row spacing (cm)	50	50	45	50
8	Plant spacing (cm)	15	15	15	15
9	NPKS (Kg/ha)	60:40:40	-	40:20:20	-
10	Plot Size (m ²)	3x1.5	3x1.5	5.4	-
11	Sowing Date	-	08/06/2019	11-05-2019	24-06-2019
12	Harvesting Period	-	At Maturity	05-12-2019 – 15-12-2019	At Maturity

Table 172: Seed yield (q/ha) in Initial Varietal Trial - I (IVT-I) on Perilla: Kharif 2019 (Hills)

S. No.	Genotypes	Kolasib (Mizoram)	Lamphelpat (Manipur)	Ranichauri (Uttarakhand)	Umiam (Meghalaya)	Mean
IVT-1						
1	IC615369	4.97	29.40	3.24	29.39	16.75
2	IC615372	8.51	22.82	3.03	22.86	14.31
3	IC615376	6.56	26.63	1.15	26.62	15.24
4	IC615377	8.90	22.55	1.28	22.57	13.83
5	IC615380	-	18.06	0.80	18.06	12.31
6	IC615382	9.15	28.23	2.30	28.27	16.99
7	IC615388	7.08	17.40	1.08	17.42	10.75
8	IC615393	9.27	12.53	0.82	12.52	8.78
9	Thoiding local (c)	6.10	12.14	0.81	12.14	7.80
	Mean	7.57	21.09	1.61	21.10	12.97
	CD (0.05)	2.08	3.21	0.20	0.09	-
	CV(%) Error	15.66	11.83	7.14	0.25	-

Table 173: Plant height (cm) in Initial Varietal Trial - I (IVT-I) on Perilla: Kharif 2019 (Hills)

S. No.	Genotypes	Kolasib (Mizoram)	Lamphelpat (Manipur)	Ranichauri (Uttarakhand)	Umiam (Meghalaya)	Mean
IVT-1						
1	IC615369	147.78	205.20	122.00	205.20	170.04
2	IC615372	151.97	171.80	97.50	171.60	148.22
3	IC615376	159.28	135.66	70.73	135.67	125.33
4	IC615377	194.89	164.60	104.03	164.53	157.01
5	IC615380	-	189.00	65.47	189.13	147.87
6	IC615382	153.00	212.00	101.93	212.07	169.75
7	IC615388	136.67	166.40	105.63	166.33	143.76
8	IC615393	163.67	162.00	86.07	161.93	143.42
9	Thoiding local (c)	150.00	160.36	64.47	160.33	133.79
	Mean	157.16	174.11	90.87	174.09	149.06
	CD (0.05)	17.78	15.22	23.06	29.07	-
	CV(%) Error	6.46	6.79	14.66	9.65	-

Table 174: Days to 50% flowering in Initial Varietal Trial - I (IVT-I) on Perilla: Kharif 2019 (Hills)

S. No.	Genotypes	Kolasib (Mizoram)	Lamphelpat (Manipur)	Ranichauri (Uttarakhand)	Umiam (Meghalaya)	Mean
IVT-1						
1	IC615369	-	130.00	128.33	130.00	129.44
2	IC615372	-	131.40	124.00	132.00	129.13
3	IC615376	-	111.60	117.33	112.00	113.64
4	IC615377	-	147.00	128.67	147.00	140.89
5	IC615380	-	132.00	125.67	132.00	129.89
6	IC615382	-	132.00	127.33	132.00	130.44
7	IC615388	-	149.80	137.67	150.00	145.82
8	IC615393	-	152.40	128.33	152.00	144.24
9	Thoiding local (c)	-	148.00	127.00	148.00	141.00
	Mean	-	137.13	127.15	137.22	133.83
	CD (0.05)	-	1.89	2.97	3.88	-
	CV(%) Error	-	1.07	1.35	1.63	-

Table 175: Inflorescence length (cm) in Initial Varietal Trial - I (IVT-I) on Perilla: Kharif 2019 (Hills)

S. No.	Genotypes	Kolasib (Mizoram)	Lamphelpat (Manipur)	Ranichauri (Uttarakhand)	Umiam (Meghalaya)	Mean
IVT-1						
1	IC615369	-	8.75	7.13	8.80	8.23
2	IC615372	-	8.74	8.17	8.73	8.55
3	IC615376	-	12.32	7.53	12.33	10.73
4	IC615377	-	7.98	6.23	8.00	7.40
5	IC615380	-	8.44	6.23	8.43	7.70
6	IC615382	-	9.14	7.90	9.13	8.72
7	IC615388	-	8.38	7.67	8.37	8.14
8	IC615393	-	7.06	6.63	7.07	6.92
9	Thoiding local (c)	-	6.98	7.17	6.97	7.04
	Mean	-	8.64	7.19	8.65	8.16
	CD (0.05)	-	1.20	1.04	0.10	-
	CV(%) Error	-	10.77	8.38	0.66	-

Table 176: Number of inflorescence/ plant in Initial Varietal Trial - I (IVT-I) on Perilla: Kharif 2019 (Hills)

S. No.	Genotypes	Kolasib (Mizoram)	Lamphelpat (Manipur)	Ranichauri (Uttarakhand)	Umiam (Meghalaya)	Mean
IVT-1						
1	IC615369	66.67	246.00	34.23	256.00	150.73
2	IC615372	70.68	272.20	34.17	232.00	152.26
3	IC615376	41.28	156.60	32.47	156.67	96.75
4	IC615377	95.00	264.40	26.67	248.33	158.60
5	IC615380	-	222.20	20.50	222.33	155.01
6	IC615382	78.22	300.60	27.27	300.67	176.69
7	IC615388	65.89	235.40	26.47	235.33	140.77
8	IC615393	46.56	242.40	23.93	222.33	133.81
9	Thoiding local (c)	22.56	221.20	17.20	221.33	120.57
	Mean	60.86	240.11	26.99	232.78	140.18
	CD (0.05)	15.60	52.80	3.96	29.07	-
	CV(%) Error	14.64	17.07	8.48	7.22	-

Table 177: Days to maturity in Initial Varietal Trial - I (IVT-I) on Perilla: Kharif 2019 (Hills)

S. No.	Genotypes	Kolasib (Mizoram)	Lamphelpat (Manipur)	Ranichauri (Uttarakhand)	Umiam (Meghalaya)	Mean
IVT-1						
1	IC615369	-	173.20	178.00	169.00	173.40
2	IC615372	-	170.60	175.67	165.07	170.44
3	IC615376	-	146.80	173.67	141.97	154.14
4	IC615377	-	181.60	182.33	176.00	179.98
5	IC615380	-	168.20	181.00	164.00	171.07
6	IC615382	-	172.20	178.00	167.00	172.40
7	IC615388	-	192.00	179.00	187.00	186.00
8	IC615393	-	192.20	180.00	187.00	186.40
9	Thoiding local (c)	-	195.20	176.00	185.00	185.40
	Mean	-	176.89	178.19	171.34	175.47
	CD (0.05)	-	2.11	8.45	29.06	-
	CV(%) Error	-	0.92	2.74	9.80	-

Table 178: 1000 Seed weight (g) in Initial Varietal Trial - I (IVT-I) on Perilla: Kharif 2019 (Hills)

S. No.	Genotypes	Kolasib (Mizoram)	Lamphelpat (Manipur)	Ranichauri* (Uttarakhand)	Umiam (Meghalaya)	Mean
IVT-1						
1	IC615369	-	1.44	0.28	1.43	1.44
2	IC615372	-	1.46	0.24	1.43	1.45
3	IC615376	-	1.42	0.23	1.43	1.42
4	IC615377	-	1.36	0.25	1.37	1.36
5	IC615380	-	1.59	0.23	1.57	1.58
6	IC615382	-	1.54	0.26	1.53	1.54
7	IC615388	-	1.28	0.25	1.30	1.29
8	IC615393	-	1.20	0.24	1.23	1.22
9	Thoiding local (c)	-	1.23	0.25	1.23	1.23
	Mean	-	1.39	0.25	1.39	1.39
	CD (0.05)	-	0.02	0.03	0.15	-
	CV(%) Error	-	1.26	6.30	6.31	-

*Data recorded as seed volume weight (g/10 ml), hence not considered for calculating means over locations.

Table 179: Branches/ plant in Initial Varietal Trial - I (IVT-I) on Perilla: Kharif 2019 (Hills)

S. No.	Genotypes	Kolasib (Mizoram)	Lamphelpat (Manipur)	Ranichauri (Uttarakhand)	Umiam (Meghalaya)	Mean
IVT-1						
1	IC615369	14.33	21.60	13.33	21.60	17.72
2	IC615372	14.50	21.40	10.33	20.40	16.66
3	IC615376	12.00	21.70	10.73	21.67	16.53
4	IC615377	14.00	22.40	12.33	22.40	17.78
5	IC615380	-	22.40	8.67	22.40	17.82
6	IC615382	17.62	22.20	10.57	22.20	18.15
7	IC615388	15.22	17.40	10.03	17.40	15.01
8	IC615393	13.00	22.40	11.53	22.40	17.33
9	Thoiding local (c)	7.03	22.40	8.07	21.30	14.70
	Mean	13.46	21.54	10.62	21.31	16.73
	CD (0.05)	3.86	3.99	2.26	3.89	-
	CV (%) Error	16.36	14.36	12.28	10.55	-

3.2 PLAINS

The varietal evaluation program was constituted in grain amaranth at two centres, winged bean at four centers, kalingada at three centers, kankoda at four centers and pillipesara at two centers were conducted during *Kharif 2019* season in the plains region. The details of results obtained in IVT, AVT-I and AVT-II are described as under.

3.2.1 Grain Amaranth (*Amaranthus* spp.)

3.2.1.1 Initial Varietal Trial (IVT): *Kharif 2019*

The Initial Varietal Trial comprising 6 entries and four checks was conducted at two locations i.e. Bengaluru and Mettupalayam and data were received from both the centres. The performance of the entries as compared to the checks has been summarized in Tables 180 - 186.

Among the checks, BGA-2 was the best check for plant height at both the locations. Most of the entries tested were at par with the best check at both the centres.

Suvarna at Bengaluru and GA-2 at Mettupalayam were the best check for days to 50% flowering. Entries VL 110 and VL 115 tested at Bengaluru flowered significantly earlier than the best check, while at Mettupalayam, all the entries tested flowered statistically at par with the best check.

BGA-2 at Bengaluru and Suvarna at Mettupalayam were the best early maturing checks. Entries VL 110 and VL 115 at Bengaluru matured significantly earlier than the best check. All other entries evaluated matured statistically at par with the best check at both the locations.

GA-2 at Bengaluru and BGA 4-9 at Mettupalayam were the best checks for Inflorescence length. None of the entries tested had significantly longer inflorescence than the best check at any location.

Suvarna was the best check for seed volume weight at both the locations. Most of the entries evaluated were statistically at par with the best check at both the locations for this trait.

Among checks, Suvarna was the best check at both the locations for grain yield. Entry SKNA 808 produced significantly higher yield than the best check at Bengaluru. Besides, entries SKGPA 61 at both the locations and VL 115 at Bengaluru produced yield statistically at par with the check.

3.2.1.2 *Advanced Varietal Trials-I and II (AVT-I & II): Kharif - 2019*

In this trial three entries with four checks were tested at two locations i.e Bengaluru and Mettupalayam and data were received from both the locations. The performance of the entries as compared to the checks has been summarized in Tables 187 - 193.

Among the checks, BGA-2 was the best check at both the locations for plant height. Entry SKGPA 110 was significantly dwarf than the best check at Mettupalayam. Most of the other entries tested at both the locations were statistically at par with the check for this trait.

Suvarna was the best check at both the locations for days to 50% flowering. All the entries tested at Mettupalayam flowered statistically at par with the best check, however, at Bengaluru none of the entries tested could flower earlier than the best check.

BGA-2 was the best early maturing check at both the locations. However, most of the entries tested at both the locations matured statistically at par with the best check.

GA-2 at Bengaluru and BGA-2 at Mettupalayam were the best checks for Inflorescence length. All the entries tested at both the locations had statistically at par inflorescence length with the best check.

BGA 4-9 at Bengaluru and BGA-2 at Mettupalayam were the best checks for seed volume weight. All the entries evaluated were statistically at par with the respective best checks at both the locations for this trait.

Suvarna was the best check for grain yield at both the locations. All the entries evaluated were statistically at par with the respective best checks at both the locations for this trait.

3.2.2 *Winged Bean (Psophocarpus tetragonolobus)*

3.2.2.1 *Initial Varietal Trial (IVT): Kharif - 2019*

The Initial Varietal Trial comprising 14 entries and 3 checks was conducted at four locations i.e. Ambikapur, Ayodhya, Rahuri and Ranchi. Data were received from all the locations. The performance of the entries as compared to the checks has been summarized in Tables 194 - 202.

Among the checks, Indira Winged Bean-1 (IWB-1) at Ambikapur, Ayodhya and Rahuri and AKWB-1 at Ranchi were best checks for days to 50% flowering. Entries RWB-29 and RWB-30 at Ambikapur; RWB-24, RWB-25, RWB-26, RWB-28 and RWB-31 at Rahuri flowered significantly earlier than the respective best checks.

RMDWB-1 at Ambikapur; IWB-1 at Ayodhya and AKWB-1 at Rahuri were the best checks for days to 80% maturity. All the entries tested matured statistically at par with the respective best checks.

RMDWB-1 at Ambikapur and IWB-1 at Ranchi were the best checks for number of pods per plant. Entry RWB 26 had significantly higher number of pods than the best check at Ranchi while remaining entries produced statistically at par number of pods with the best check. Similarly, at Ambikapur, most of the entries produced statistically at par number of pods with the best check.

AKWB-1 at Ranchi and RMDWB-1 at Ambikapur and Rahuri were the best checks for pod length. None of the entries tested had significantly longer pods, however, most of the entries tested produced statistically at par length of pods with the respective best check.

AKWB-1 at Rahuri and Ranchi and IWB-1 at Ambikapur and Ayodhya were the best checks for number of seeds per pod. None of the entries tested could produce significantly higher number of seeds per pod than the respective best check at any of the location tested, however, most of the entries could produce number of seeds per pod statistically at par with the respective best checks at all the locations tested.

AKWB-1 was the best check for 100-seed weight at all the locations tested except at Ayodhya where RMDWB-1 was the best check. None of the entries tested had significantly higher test weight than the respective best check at any of the location tested, however, most of the entries possessed test weight statistically at par with the respective best checks at all the locations tested.

RMDWB-1 at Ambikapur, Ayodhya and Rahuri and IWB-1 at Ranchi were the best check for seed yield production. Entries RWB-20, RWB-25, RWB-27, RWB-28, RWB-29 and RWB-30 at Ranchi produced significantly higher seed yield than the respective best check. At other locations, none of the entries could produce significantly higher yields than the respective best checks.

Among checks, RMDWB-1 produced highest pod yield across the locations tested. Entries RWB-25 and RWB-27 at Ranchi produced significantly higher pod yield than the respective best check. Most of the entries tested produced green pod yield statistically at par with the respective best checks.

3.2.2.2 *Advanced Varietal Trials – I & II (AVT-I & AVT-II): Kharif - 2019*

The Advanced Varietal Trials comprising seven entries and three checks were conducted at four locations i.e. Ambikapur, Ayodhya, Rahuri and Ranchi. Data were received from all the locations. The performance of the entries as compared to the checks has been summarized in Tables 203 - 211.

Among the checks, Indira Winged Bean-1 (IWB-1) at Ayodhya, RMDWB-1 at Ambikapur and Rahuri and AKWB-1 at Ranchi were best checks for days to 50% flowering. Entries RWB-11 and RWB-18 tested at Ayodhya and Ranchi flowered significantly earlier than the respective best checks.

RMDWB-1 at Ambikapur and IWB-1 at Ayodhya and Rahuri were the best checks for days to 80% maturity. None of the entries tested could mature earlier than the best check at any of the locations tested.

RMDWB-1 at Ambikapur and IWB-1 at Ranchi were the best check for number of pods per plant. None of the entries tested produced significantly higher number of pods than the best check at Ambikapur. At Ranchi, entries RWB-13, RWB-15 and RWB-18 produced significantly higher number of pods per plant compared to the best check.

AKWB-1 was the best check for pod length across the locations. Entries RWB-11 and RWB-13 had significantly longer pods at Ranchi, however, most of the entries tested at Ambikapur and Rahuri produced statistically at par length of pods with the respective best checks.

AKWB-1 at Ambikapur, IWB-1 at Ayodhya and Rahuri and RMDWB-1 at Ranchi were the best checks for number of seeds per pod. Entries RWB-11 and RWB-13 had significantly higher number of seeds per pod at Ranchi. None of the other entries tested could produce significantly higher number of seeds per pod than the respective best check at any of the location tested.

AKWB-1 at Rahuri and Ranchi and RMDWB-1 at Ambikapur and Ayodhya were the best checks for 100-seed weight. None of the entries tested could produce significantly higher test weight than the respective best checks except entries RWB-11 and RWB-13 that possessed significantly higher test weight at Ranchi.

RMDWB-1 at Ambikapur and Rahuri and IWB-1 at Ranchi were the best check for seed yield production. Entry PWB 17-1 at Rahuri and RWB-15 at Ranchi produced significantly

higher seed yield than the respective best checks. The remaining entries at all the locations tested produced seed yield statistically at par with the respective best checks.

Among checks, RMDWB-1 at Ranchi and Rahuri and IWB-1 at Ambikapur produced highest pod yield. All the entries tested across the locations produced green pod yield statistically at par with the respective best checks.

3.2.3 Kalingada (*Citrullus lanatus*)

Kalingada is primarily a vegetable crop grown for its unripe fruits which are used as vegetable. However, its seed yields useful oil.

3.2.3.1 Initial and Advanced Varietal Trials (IVT, AVT-I & AVT-II): Kharif – 2019

The Initial and Advanced Varietal Trials consisting of eleven entries including three checks were conducted at Mandor, SK Nagar and Jaisalmer during Kharif 2019. Data were received from Mandor only where the overall performance of the trials were very poor. The trials vitiated due to heavy rains at SK Nagar. Hence, the trials need to be repeated. The performance of the entries as compared to the checks has been summarized in Tables 212 - 215.

Among checks, SKNK 1102 at Mandor was the best check for fruit yield. Entry CAZJK-48 at Mandor produced significantly higher fruit yield than the respective best check.

GK-1 at Mandor was best check for seed yield. None of the entries produced significantly higher seed yield than the respective best check.

Among checks, GK-1 at Mandor was the best check for days to fruit setting. Entries SKNK 1703, SKNK 1706, CAZJK-48, SKNK 1302 and SKNK 1501 at Mandor set fruit significantly earlier than the best check.

CAZRI Kalingada-1 was the best check for days to maturity at Mandor. All the entries tested matured statistically at par with the best check.

CAZRI Kalingada-1 was the best check for 100 seed wt. at Mandor. Entry CAZJK 48 produced significantly higher test wt. compared to the best check. Remaining most of the entries produced statistically at par test wt. with the best check at this location.

Among checks, SKNK 1102 was the best check for fruit size. None of the entries tested could produce fruit size significantly better than the best check.

SKNK 1102 at Mandor was the best check for number of fruits per plant. Entry CAZJK 48 produced significantly higher no. of fruits per plant than the best check at Mandor.

3.2.4 Kankoda (*Momordica dioica*)

Kankoda is an important vegetable crop grown throughout the country. Its green immature fruits are preferred for their delicacy.

3.2.4.1 Advanced Varietal Trial (AVT I): Kharif – 2019

The Advanced Varietal Trial-I on five entries including two checks were conducted at three locations. The trials vitiated due to heavy rains at Rahuri. The yield was very low at Ayodhya; hence, data were not considered for calculating means over locations. The performance of the entries has been presented in Tables 216 - 221.

Among checks, RMDSG-3 was the best check for fruit yield at all the locations. All the entries tested across the locations produced fruit yield statistically at par with the best check.

Indira Kankoda-1 at Ranchi and RMDSG-3 at Ambikapur and Ayodhya were the best checks for days to fruit setting. Entries ASG 18-3 at Ambikapur and Ranchi and ASG 18-1 at Ranchi set fruit significantly earlier than the best check. Rest of the entries tested at all the locations were statistically at par with the respective best checks for this trait.

RMDSG-3 was the best check at all the locations for days to maturity except at Ayodhya where Indira Kankoda-1 was best check. None of the entries tested matured significantly earlier than the best check at any of the locations. However, most of the entries tested at all the locations matured statistically at par with the best check.

Indira Kankoda-1 at Ambikapur and RMDSG-3 at Ranchi were the best checks for number of fruits per plant. All the entries tested at Ranchi produced significantly higher number of fruits per plant compared to the best check.

RMDSG-3 at Ambikapur and Ranchi was the best check for fruit size. None of the entries tested could produce fruits of bigger size as compared to the best check except ASG 18-3 which produced significantly bigger fruits at Ranchi.

3.2.5 Pillipasera (*Vigna trilobata*)

Pillipasera is a new crop that holds promise as a nutritious fodder crop.

3.2.5.1 Advanced Varietal Trial-I (AVT-I): Kharif – 2019

The Advanced Varietal Trial - I on 18 entries was conducted at Mettupalayam and Bhubaneswar. Since no variety has been released in this crop, hence, fodder cowpea variety was included in the trial for comparison but based on the data received on seed and pod traits it was found prudent to compare the entries against trial mean. The performance of the entries has been presented in Tables 222 – 232.

Two entries i.e. IC 550540 and IC 550542 at Mettupalayam and two entries IC 553494 and IC 550543 at Bhubaneswar were significantly taller than the trial mean.

Entry IC 550538 at Mettupalayam and entries IC 553494 and IC 553547 at Bhubaneswar produced significantly higher number of branches per plant than the trial mean.

Entry IC 550532 flowered significantly earlier than the trial mean at Bhubaneswar. Rest most of the entries flowered statistically at par with the trial mean.

Entries IC 550542 and IC 550543 at Mettupalayam and entries IC 553517 and IC 553518 at Bhubaneswar produced significantly higher number of pods per plant. The remaining entries produced pods statistically at par with each other.

All the entries tested were statistically at par with each other for pod length at Mettupalayam while entries IC 553494 and IC 553547 at Bhubaneswar produced significantly longer pods.

All the entries tested were statistically at par with each other for number of seeds per pod at Mettupalayam while entries IC 553517 and IC 553518 at Bhubaneswar produced significantly more number of seeds per pod.

Most of the entries tested were statistically at par with each other for test weight at Mettupalayam while entries IC 553494, IC 553517, IC 553518 and IC 261321 at Bhubaneswar had significantly higher 1000 seed weight.

Most of the entries tested were statistically at par with each other for days to maturity at Mettupalayam while entries IC 550532, IC 553544, and IC 553517 matured significantly earlier than trial mean at Bhubaneswar.

Entry IC 553502 at Mettupalayam and IC 553517 and IC 553518 at Bhubaneswar produced significantly higher seed yield than the trial mean. All the entries tested at Mettupalayam produced green biomass yield statistically at par with each other.

Table 180: Experimental Details of IVT of Grain Amaranth Kharif 2019 (Plains)

S. No	Items	Bengaluru	Mettupalayam
1	No. of Entries	6	6
2	No. of Checks	4	4
3	Design	RBD	RBD
4	No. of Replication	3	3
5	Number of Rows	4	4
6	Row length (m)	4	4
7	Row spacing (cm)	45	50
8	Plant spacing (cm)	15	15
9	NPKS (Kg/ha)	-	60:40:20:20
10	Plot Size (m ²)	7.20 m ²	4x2 (8m ²)
11	Sowing Date	20/07/2019	04/07/2019
12	Harvesting Period	25/10/2019	05/10/2019

Table 181: Plant height (cm) in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
IVT				
1	SKGPA 92	154.60	233.33	193.97
2	SKGPA 73	134.60	242.00	188.30
3	SKGPA 61	171.73	258.33	215.03
4	SKNA 808	165.27	254.33	209.80
5	VL 110	150.47	234.00	192.23
6	VL 115	154.67	240.33	197.50
7	Suvarna (c)	159.80	263.33	211.57
8	GA 2 (c)	174.73	260.00	217.37
9	BGA 2 (c)	139.67	245.67	192.67
10	BGA 4-9 (c)	172.73	256.67	214.70
	Mean	157.83	248.80	203.31
	CD (0.05)	16.25	36.00	-
	CV (%) Error	6.00	8.43	-

Table 182: Days to flowering in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
IVT				
1	SKGPA 92	54.00	48.67	51.33
2	SKGPA 73	52.00	50.33	51.17
3	SKGPA 61	56.00	49.33	52.67
4	SKNA 808	52.00	52.33	52.17
5	VL 110	44.67	50.00	47.33
6	VL 115	44.67	50.33	47.50
7	Suvarna (c)	51.00	51.33	51.17
8	GA 2 (c)	55.00	49.33	52.17
9	BGA 2 (c)	56.00	51.33	53.67
10	BGA 4-9 (c)	56.00	51.67	53.83
	Mean	52.13	50.47	51.30
	CD (0.05)	0.71	3.94	-
	CV (%) Error	0.79	4.55	-

Table 183: Days to 80% maturity in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
IVT				
1	SKGPA 92	91.00	88.00	89.50
2	SKGPA 73	91.67	91.00	91.33
3	SKGPA 61	91.00	93.33	92.17
4	SKNA 808	91.67	88.67	90.17
5	VL 110	86.00	90.67	88.33
6	VL 115	86.00	91.67	88.83
7	Suvarna (c)	91.00	89.67	90.33
8	GA 2 (c)	94.00	91.33	92.67
9	BGA 2 (c)	90.67	90.67	90.67
10	BGA 4-9 (c)	92.33	91.00	91.67
	Mean	90.53	90.60	90.57
	CD (0.05)	1.79	5.75	-
	CV (%) Error	1.15	3.70	-

Table 184: Inflorescence length (cm) in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
IVT				
1	SKGPA 92	48.47	87.00	67.73
2	SKGPA 73	46.33	71.67	59.00
3	SKGPA 61	58.27	87.00	72.63
4	SKNA 808	43.87	64.00	53.93
5	VL 110	44.73	68.00	56.37
6	VL 115	42.73	72.00	57.37
7	Suvarna (c)	38.20	57.67	47.93
8	GA 2 (c)	57.13	77.67	67.40
9	BGA 2 (c)	40.20	60.67	50.43
10	BGA 4-9 (c)	52.60	79.67	66.13
	Mean	47.25	72.53	59.89
	CD (0.05)	7.53	13.37	-
	CV (%) Error	9.29	10.75	-

Table 185: Seed volume weight (g/10ml) in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
IVT				
1	SKGPA 92	9.00	7.90	8.45
2	SKGPA 73	9.33	7.57	8.45
3	SKGPA 61	8.55	8.60	8.58
4	SKNA 808	9.00	8.00	8.50
5	VL 110	9.67	7.67	8.67
6	VL 115	9.00	7.53	8.27
7	Suvarna (c)	9.33	9.17	9.25
8	GA 2 (c)	9.33	8.73	9.03
9	BGA 2 (c)	9.00	7.60	8.30
10	BGA 4-9 (c)	9.00	8.00	8.50
	Mean	9.12	8.08	8.60
	CD (0.05)	0.81	0.75	-
	CV (%) Error	5.18	5.40	-

Table 186: Grain yield (q/ha) in Initial Varietal Trial (IVT) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
IVT				
1	SKGPA 92	10.42	9.03	9.73
2	SKGPA 73	14.26	9.23	11.75
3	SKGPA 61	19.43	11.70	15.57
4	SKNA 808	22.42	9.00	15.71
5	VL 110	17.13	7.90	12.51
6	VL 115	20.31	8.53	14.42
7	Suvarna (c)	19.47	11.07	15.27
8	GA 2 (c)	11.30	10.33	10.82
9	BGA 2 (c)	14.03	9.33	11.68
10	BGA 4-9 (c)	17.06	9.37	13.21
	Mean	16.58	9.55	13.07
	CD (0.05)	2.71	1.47	-
	CV (%) Error	9.52	8.98	-

Table 187: Experimental Details of AVT – I & II of Grain Amaranth Kharif 2019 (Plains)

S. No	Items	Bengaluru	Mettupalayam
1	No. of Entries	3	3
2	No. of Checks	4	4
3	Design	RBD	RBD
4	No. of Replication	3	3
5	Number of Rows	6	6
6	Row length (m)	4	4
7	Row spacing (cm)	45	50
8	Plant spacing (cm)	15	15
9	NPKS (Kg/ha)	-	60:40:20:20
10	Plot Size (m ²)	10.80m ²	4x3m (12m ²)
11	Sowing Date	20/07/2019	04/07/2019
12	Harvesting Period	26/10/2019	05/10/2019

Table 188: Plant height (cm) in Advanced Varietal Trials -I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
AVT-I				
1	SKGPA-87	189.33	212.67	201.00
2	SKGPA-110	184.80	187.67	186.23
AVT-II				
3	KBGA-14	162.87	207.67	185.27
4	GA-2 (C)	169.87	213.00	191.43
5	Suvarna (C)	171.53	219.67	195.60
6	BGA-2 (C)	157.13	210.00	183.57
7	BGA-4-9 (c)	186.87	206.33	196.60
Mean		174.63	208.14	191.39
CD(0.05)		20.34	22.01	-
CV(%) Error		6.55	5.95	-

Table 189: Days to 50% flowering in Advanced Varietal Trials -I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
AVT-I				
1	SKGPA-87	53.00	49.33	51.17
2	SKGPA-110	54.00	53.67	53.83
AVT-II				
3	KBGA-14	52.00	50.00	51.00
4	GA-2 (C)	56.00	51.67	53.83
5	Suvarna (C)	51.00	50.67	50.83
6	BGA-2 (C)	52.00	51.67	51.83
7	BGA-4-9 (c)	54.00	51.00	52.50
	Mean	53.14	51.14	52.14
	CD(0.05)	1.45	3.20	-
	CV(%) Error	1.54	3.51	-

Table 190: Days to 80% maturity in Advanced Varietal Trials -I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
AVT-I				
1	SKGPA-87	92.00	92.33	92.17
2	SKGPA-110	92.00	94.67	93.33
AVT-II				
3	KBGA-14	92.00	93.33	92.67
4	GA-2 (C)	95.00	91.67	93.33
5	Suvarna (C)	92.00	91.33	91.67
6	BGA-2 (C)	91.00	88.67	89.83
7	BGA-4-9 (c)	93.00	92.33	92.67
	Mean	92.43	92.05	92.24
	CD(0.05)	1.92	3.68	-
	CV(%) Error	1.17	2.25	-

Table 191: Inflorescence length (cm) in Advanced Varietal Trials -I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
AVT-I				
1	SKGPA-87	61.27	75.33	68.30
2	SKGPA-110	58.33	68.67	63.50
AVT-II				
3	KBGA-14	57.07	75.67	66.37
4	GA-2 (C)	63.93	67.33	65.63
5	Suvarna (C)	44.73	63.67	54.20
6	BGA-2 (C)	45.00	69.67	57.33
7	BGA-4-9 (c)	60.47	67.00	63.73
	Mean	55.83	69.62	62.72
	CD(0.05)	8.04	12.35	-
	CV(%) Error	8.09	9.97	-

Table 192: Seed volume weight (g/10ml) in Advanced Varietal Trials -I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
AVT-I				
1	SKGPA-87	8.56	7.83	8.19
2	SKGPA-110	8.44	8.10	8.27
AVT-II				
3	KBGA-14	8.33	7.87	8.10
4	GA-2 (C)	8.44	7.70	8.07
5	Suvarna (C)	8.33	7.90	8.12
6	BGA-2 (C)	8.33	8.07	8.20
7	BGA-4-9 (c)	8.67	7.97	8.32
	Mean	8.44	7.92	8.18
	CD(0.05)	0.63	0.34	-
	CV(%) Error	4.16	2.39	-

Table 193: Grain yield (q/ha) in Advanced Varietal Trials -I & II (AVT-I & II) on grain amaranth: Kharif 2019 (Plains)

S. No.	Genotypes	Bengaluru	Mettupalayam	Mean
AVT-I				
1	SKGPA-87	16.82	10.97	13.90
2	SKGPA-110	18.73	8.38	13.56
AVT-II				
3	KBGA-14	22.52	9.05	15.79
4	GA-2 (C)	11.48	9.90	10.69
5	Suvarna (C)	20.67	10.67	15.67
6	BGA-2 (C)	18.06	9.00	13.53
7	BGA-4-9 (c)	16.80	9.20	13.00
	Mean	17.87	9.60	13.73
	CD(0.05)	3.48	1.83	-
	CV(%) Error	10.96	10.72	-

Table 194: Experimental Details of IVT of Winged bean Kharif 2019 (Plains)

S. No	Items	Ambikapur	Ayodhya	Rahuri	Ranchi
1	No. of Entries	12	12	14	14
2	No. of Checks	3	3	3	3
3	Design	RBD	RBD	RBD	RBD
4	No. of Replication	3	3	3	3
5	Number of Rows	4	6	4	-
6	Row length (m)	4	4	3	4
7	Row spacing (cm)	60	60	60	60
8	Plant spacing (cm)	30	30	30	30
9	NPKS (Kg/ha)	-	-	20:40:20	20:40:20:20
10	Plot Size (m ²)	2.4m ²	14.4	7.2	7.2
11	Sowing Date	25/06/2019	03/08/2019	03/07/2019	10/07/2019
12	Harvesting Period	At Maturity	At Maturity	23/12/2019	08/12/2019 to 12/12/2019

Table 195: Days to 50% flowering in Initial Varietal Trial (IVT) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
IVT						
1	RWB-20	-	-	-	69.33	69.33
2	RWB-21	78.67	70.33	75.00	70.00	73.50
3	RWB-22	81.33	76.33	71.00	77.33	76.50
4	RWB-23	78.33	76.00	76.00	73.67	76.00
5	RWB-24	78.67	67.66	70.00	69.67	71.50
6	RWB-25	77.00	67.66	70.33	67.67	70.67
7	RWB-26	77.33	70.00	70.33	69.00	71.67
8	RWB-27	77.67	75.00	70.67	68.67	73.00
9	RWB-28	76.00	72.33	70.00	72.67	72.75
10	RWB-29	75.00	74.00	70.67	62.67	70.58
11	RWB-30	74.00	75.33	72.67	73.00	73.75
12	RWB-31	-	70.00	70.00	79.00	73.00
13	PWB-17-14	76.33	-	83.00	74.67	78.00
14	PWB-17-18	78.33	-	83.00	70.00	77.11
15	AKWB-1 (c)	82.67	68.00	78.00	64.33	73.25
16	IWB-1 (c)	77.67	67.00	75.00	69.33	72.25
17	RMDWB-1 (c)	78.00	73.00	76.67	72.00	74.92
	Mean	77.80	71.62	73.90	70.76	73.52
	CD(0.05)	2.52	3.48	4.63	2.95	-
	CV(%) Error	1.94	2.89	3.78	2.51	-

Table 196: Days to 80% maturity in Initial Varietal Trial (IVT) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
IVT						
1	RWB-20	-	-	-	-	
2	RWB-21	155.33	165.00	178.67	-	166.33
3	RWB-22	154.33	165.33	185.00	-	168.22
4	RWB-23	155.33	157.00	180.00	-	164.11
5	RWB-24	155.33	170.00	184.67	-	170.00
6	RWB-25	154.67	156.33	183.00	-	164.67
7	RWB-26	154.67	162.33	178.33	-	165.11
8	RWB-27	154.33	169.00	177.67	-	167.00
9	RWB-28	154.67	169.33	174.33	-	166.11
10	RWB-29	155.67	174.00	181.67	-	170.44
11	RWB-30	156.00	171.33	174.00	-	167.11
12	RWB-31	-	163.33	176.67	-	170.00
13	PWB-17-14	155.67	-	184.33	-	170.00
14	PWB-17-18	154.67	-	180.67	-	167.67
15	AKWB-1 (c)	154.67	162.67	178.67	-	165.33
16	IWB-1 (c)	155.67	156.33	184.00	-	165.33
17	RMDWB-1 (c)	154.33	172.67	184.33	-	170.44
	Mean	155.02	165.33	180.57	-	166.97
	CD(0.05)	1.86	5.69	5.32	-	
	CV(%) Error	0.72	2.05	1.77	-	

Table 197: No. of pods/ plant in Initial Varietal Trial (IVT) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
IVT						
1	RWB-20	-	-	-	27.80	27.80
2	RWB-21	19.13	-	-	28.07	23.60
3	RWB-22	16.93	-	-	27.20	22.07
4	RWB-23	16.07	-	-	27.87	21.97
5	RWB-24	14.30	-	-	28.43	21.37
6	RWB-25	14.80	-	-	28.57	21.68
7	RWB-26	20.40	-	-	33.33	26.87
8	RWB-27	17.60	-	-	29.20	23.40
9	RWB-28	16.60	-	-	29.10	22.85
10	RWB-29	19.97	-	-	29.13	24.55
11	RWB-30	14.80	-	-	24.80	19.80
12	RWB-31	-	-	-	24.47	24.47
13	PWB-17-14	14.73	-	-	26.87	20.80
14	PWB-17-18	13.47	-	-	26.93	20.20
15	AKWB-1 (c)	14.00	-	-	27.67	20.83
16	IWB-1 (c)	12.80	-	-	27.93	20.37
17	RMDWB-1 (c)	14.80	-	-	27.47	21.13
	Mean	16.03	-	-	27.93	22.57
	CD(0.05)	9.10	-	-	3.42	-
	CV(%) Error	33.94	-	-	7.36	-

Table 198: Pod length (cms) in Initial Varietal Trial (IVT) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
IVT						
1	RWB-20	-	-	-	16.17	16.17
2	RWB-21	18.67	-	16.17	15.17	16.67
3	RWB-22	18.50	-	15.97	15.03	16.50
4	RWB-23	19.83	-	14.23	15.67	16.58
5	RWB-24	19.13	-	15.17	15.47	16.59
6	RWB-25	20.97	-	16.27	15.27	17.50
7	RWB-26	18.20	-	15.97	15.37	16.51
8	RWB-27	18.17	-	16.37	15.47	16.67
9	RWB-28	18.33	-	17.30	16.77	17.47
10	RWB-29	19.20	-	16.80	15.97	17.32
11	RWB-30	19.07	-	16.90	16.27	17.41
12	RWB-31	-	-	16.20	15.10	15.65
13	PWB-17-14	19.20	-	16.17	15.57	16.98
14	PWB-17-18	17.90	-	16.27	16.43	16.87
15	AKWB-1 (c)	18.03	-	16.53	16.23	16.93
16	IWB-1 (c)	19.37	-	15.33	15.30	16.67
17	RMDWB-1 (c)	19.53	-	18.07	15.40	17.67
	Mean	18.94	-	16.21	15.68	16.94
	CD(0.05)	1.91	-	1.58	1.35	-
	CV(%) Error	6.04	-	5.87	5.19	-

Table 199: No. of seeds/ pod in Initial Varietal Trial (IVT) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
IVT						
1	RWB-20	-	-	-	13.73	13.73
2	RWB-21	9.27	9.67	12.00	13.07	11.00
3	RWB-22	9.63	10.67	11.67	13.00	11.24
4	RWB-23	9.77	10.67	10.33	13.47	11.06
5	RWB-24	9.07	10.67	11.33	13.20	11.07
6	RWB-25	9.50	11.00	11.33	12.93	11.19
7	RWB-26	9.70	11.00	11.00	13.07	11.19
8	RWB-27	10.37	13.00	10.33	13.07	11.69
9	RWB-28	10.10	10.00	12.00	14.60	11.68
10	RWB-29	10.37	12.00	12.00	13.87	12.06
11	RWB-30	11.23	11.00	11.33	13.80	11.84
12	RWB-31	-	10.00	12.00	13.07	11.69
13	PWB-17-14	10.27	-	12.33	13.33	11.98
14	PWB-17-18	9.10	-	12.00	14.50	11.87
15	AKWB-1 (c)	10.50	11.00	11.33	14.00	11.71
16	IWB-1 (c)	11.60	13.00	10.67	13.13	12.10
17	RMDWB-1 (c)	10.47	11.00	11.00	12.93	11.35
	Mean	10.06	11.05	11.35	13.46	11.67
	CD(0.05)	1.80	2.13	1.68	1.34	-
	CV(%) Error	10.72	11.47	8.88	5.98	-

Table 200: 100-seed weight (g) in Initial Varietal Trial (IVT) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
IVT						
1	RWB-20	-	-	-	30.70	30.70
2	RWB-21	34.23	23.83	27.00	27.50	28.14
3	RWB-22	42.50	23.50	34.00	28.30	32.08
4	RWB-23	31.63	22.33	26.00	28.63	27.15
5	RWB-24	30.87	25.83	28.50	29.10	28.57
6	RWB-25	39.13	24.83	28.50	31.27	30.93
7	RWB-26	31.90	23.50	28.50	29.47	28.34
8	RWB-27	32.72	23.83	28.50	28.00	28.26
9	RWB-28	32.72	22.16	29.00	30.43	28.58
10	RWB-29	34.25	22.83	28.00	31.10	29.05
11	RWB-30	33.77	23.66	28.00	32.33	29.44
12	RWB-31	-	24.33	30.50	26.53	27.12
13	PWB-17-14	34.88	-	28.00	30.57	31.15
14	PWB-17-18	33.60	-	29.00	29.60	30.73
15	AKWB-1 (c)	37.93	24.00	34.00	33.07	32.25
16	IWB-1 (c)	33.95	22.83	33.00	29.63	29.85
17	RMDWB-1 (c)	35.52	25.83	28.50	31.50	30.34
	Mean	34.64	23.81	29.50	29.87	29.57
	CD(0.05)	5.52	0.95	0.00	4.13	-
	CV(%) Error	9.53	2.39	0.00	8.32	-

Table 201: Seed yield (q/ha) in Initial Varietal Trial (IVT) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya*	Rahuri	Ranchi	Mean
IVT						
1	RWB-20	-	-	-	13.63	13.63
2	RWB-21	12.33	4.44	10.55	11.63	11.50
3	RWB-22	12.33	5.13	16.04	11.60	13.32
4	RWB-23	12.53	5.82	12.84	11.70	12.36
5	RWB-24	15.10	5.14	17.82	11.00	14.64
6	RWB-25	14.17	5.63	19.03	15.63	16.28
7	RWB-26	16.35	5.76	16.81	12.70	15.29
8	RWB-27	14.27	6.13	13.72	15.17	14.39
9	RWB-28	15.97	5.59	11.66	13.10	13.58
10	RWB-29	14.31	5.39	13.02	13.50	13.61
11	RWB-30	13.37	4.17	19.12	14.60	15.69
12	RWB-31	-	4.84	13.27	12.23	12.75
13	PWB-17-14	15.10	-	18.01	11.67	14.93
14	PWB-17-18	16.04	-	20.43	10.60	15.69
15	AKWB-1 (c)	12.99	4.64	12.58	11.73	12.43
16	IWB-1 (c)	13.61	5.05	13.63	12.07	13.10
17	RMDWB-1 (c)	13.89	5.27	16.23	10.60	13.57
Mean		14.16	5.21	15.15	12.54	13.95
CD(0.05)		2.84	0.65	4.42	0.93	-
CV(%) Error		11.98	7.41	17.52	4.46	-

*Poor yields; data not considered for calculating means over locations

Table 202: Green pod yield (q/ha) in Initial Varietal Trial (IVT) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
IVT						
1	RWB-20	-	-	-	158.00	158.00
2	RWB-21	100.35	-	146.50	136.67	127.84
3	RWB-22	91.04	-	99.90	134.00	108.31
4	RWB-23	102.71	-	107.85	132.33	114.30
5	RWB-24	95.24	-	143.25	127.33	121.94
6	RWB-25	113.99	-	156.50	180.00	150.16
7	RWB-26	95.97	-	126.03	153.33	125.11
8	RWB-27	93.65	-	130.51	166.33	130.16
9	RWB-28	81.98	-	142.33	142.33	122.22
10	RWB-29	89.62	-	131.42	155.67	125.57
11	RWB-30	104.65	-	144.64	161.33	136.88
12	RWB-31	-	-	149.71	151.00	150.35
13	PWB-17-14	103.09	-	154.96	148.00	135.35
14	PWB-17-18	102.85	-	151.11	143.33	132.43
15	AKWB-1 (c)	83.19	-	144.26	147.00	124.82
16	IWB-1 (c)	90.94	-	144.14	147.67	127.58
17	RMDWB-1 (c)	93.47	-	155.39	161.67	136.84
	Mean	96.18	-	137.64	149.76	127.86
	CD(0.05)	36.61	-	33.26	3.36	
	CV(%) Error	22.76	-	14.53	1.35	

Table 203: Experimental Details of AVT-I & II of Winged bean Kharif 2019 (Plains)

S. No	Items	Ambikapur	Ayodhya	Rahuri	Ranchi
1	No. of Entries	4	6	3	6
2	No. of Checks	3	2	4	3
3	Design	RBD	RBD	RBD	RBD
4	No. of Replication	3	3	3	3
5	Number of Rows	6	6	6	-
6	Row length (m)	4	4	3	4
7	Row spacing (cm)	60	60	60	60
8	Plant spacing (cm)	30	30	30	30
9	NPKS (Kg/ha)	-	-	20:40:20	20:40:20:20
10	Plot Size (m ²)	14.4m ²	14.4	10.80	10.80
11	Sowing Date	28/06/2019	17/07/2019	30/06/2019	22/07/2019
12	Harvesting Period	At Maturity	At Maturity	21/12/2019	23/12/2019

Table 204: Days to 50% flowering in Advanced Varietal Trials I & II (AVT I & II) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
AVT-I						
1	PWB-17-1	70.00	77.00	89.67	72.33	77.25
2	PWB-17-9	72.33	77.33	82.00	77.00	77.17
AVT-II						
3	RWB-11	71.00	64.33	73.00	62.00	67.58
4	RWB-13	72.00	76.00	78.00	65.00	72.75
5	RWB-15	-	72.66	-	69.33	71.00
6	RWB-18	-	62.66	-	60.67	61.66
7	RWB-19	-	71.00	-	76.00	73.50
8	AKWB-1 (c)	73.00	-	81.33	66.33	73.56
9	IWB-1 (c)	74.00	73.33	82.00	72.33	75.42
10	RMDWB-1 (c)	71.67	75.00	79.33	75.00	75.25
	Mean	72.00	72.15	80.76	69.60	73.63
	CD(0.05)	4.86	5.09	7.00	4.04	-
	CV(%) Error	3.80	4.07	4.87	3.39	-

Table 205: Days to 80% Maturity in Advanced Varietal Trials I & II (AVT I & II) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
AVT-I						
1	PWB-17-1	153.00	168.33	184.00	-	168.44
2	PWB-17-9	151.00	169.00	187.33	-	169.11
AVT-II						
3	RWB-11	154.67	167.66	186.67	-	169.66
4	RWB-13	151.33	166.66	189.67	-	169.22
5	RWB-15	-	167.00	-	-	167.00
6	RWB-18	-	165.00	-	-	165.00
7	RWB-19	-	161.33	-	-	161.33
8	AKWB-1 (c)	154.00	-	186.67	-	170.33
9	IWB-1 (c)	153.33	159.33	184.33	-	165.67
10	RMDWB-1 (c)	152.67	167.33	189.67	-	169.89
	Mean	152.86	165.74	186.90	-	168.50
	CD(0.05)	3.90	5.36	2.78	-	-
	CV(%) Error	1.43	1.87	0.84	-	-

Table 206: No. of pods/plant in Advanced Varietal Trials I & II (AVT I & II) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
AVT-I						
1	PWB-17-1	25.00	-	-	19.90	22.45
2	PWB-17-9	24.50	-	-	18.20	21.35
AVT-II						
3	RWB-11	23.67	-	-	29.90	26.78
4	RWB-13	24.33	-	-	34.87	29.60
5	RWB-15	-	-	-	38.47	38.47
6	RWB-18	-	-	-	30.30	30.30
7	RWB-19	-	-	-	28.33	28.33
8	AKWB-1 (c)	24.50	-	-	20.23	22.37
9	IWB-1 (c)	23.00	-	-	26.20	24.60
10	RMDWB-1 (c)	24.50	-	-	18.90	21.70
	Mean	24.21	-	-	26.53	25.37
	CD (0.05)	3.59	-	-	3.84	-
	CV (%) Error	8.34	-	-	8.44	-

Table 207: Pod length (cms) in Advanced Varietal Trials I & II (AVT I & II) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
AVT-I						
1	PWB-17-1	17.33	-	15.43	16.67	16.48
2	PWB-17-9	18.00	-	19.03	16.17	17.73
AVT-II						
3	RWB-11	17.07	-	14.53	18.00	16.53
4	RWB-13	17.70	-	16.73	17.50	17.31
5	RWB-15	-	-	-	15.70	15.70
6	RWB-18	-	-	-	17.00	17.00
7	RWB-19	-	-	-	16.77	16.77
8	AKWB-1 (c)	18.83	-	19.03	16.87	18.24
9	IWB-1 (c)	17.33	-	15.80	15.77	16.30
10	RMDWB-1 (c)	17.07	-	16.33	15.77	16.39
	Mean	17.62	-	16.70	16.62	16.98
	CD(0.05)	1.96	-	3.69	0.62	-
	CV(%) Error	6.25	-	12.41	2.17	-

Table 208: No. of seeds/ pod in Advanced Varietal Trials I & II (AVT I & II) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
AVT-I						
1	PWB-17-1	12.00	11.66	13.00	12.50	12.29
2	PWB-17-9	13.00	12.66	12.67	12.50	12.71
AVT-II						
3	RWB-11	13.00	11.66	11.67	12.97	12.32
4	RWB-13	14.00	12.66	11.67	13.43	12.94
5	RWB-15	-	11.66	-	12.20	11.93
6	RWB-18	-	11.00	-	12.27	11.63
7	RWB-19	-	13.00	-	12.67	12.83
8	AKWB-1 (c)	13.50	-	12.00	12.00	12.50
9	IWB-1 (c)	12.00	13.66	12.33	11.50	12.37
10	RMDWB-1 (c)	11.83	13.00	11.67	12.23	12.18
	Mean	12.76	12.33	12.14	12.43	12.42
	CD(0.05)	2.46	2.31	1.91	0.71	-
	CV(%) Error	10.85	10.81	8.86	3.32	-

Table 209: 100-seed weight (g) in Advanced Varietal Trials I & II (AVT I & II) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
AVT-I						
1	PWB-17-1	31.05	26.80	27.00	30.50	28.84
2	PWB-17-9	31.83	25.50	27.50	30.27	28.78
AVT-II						
3	RWB-11	33.77	26.50	30.00	34.23	31.13
4	RWB-13	33.38	27.00	32.67	34.30	31.84
5	RWB-15	-	27.60	-	29.30	28.45
6	RWB-18	-	27.10	-	30.23	28.67
7	RWB-19	-	26.30	-	30.77	28.53
8	AKWB-1 (c)	33.85	-	32.00	30.63	32.16
9	IWB-1 (c)	32.00	26.10	28.50	29.90	29.13
10	RMDWB-1 (c)	35.20	27.10	29.00	30.10	30.35
	Mean	33.01	26.67	29.52	31.02	30.06
	CD(0.05)	4.96	0.82	2.46	1.03	-
	CV(%) Error	8.45	1.78	4.69	1.93	-

Table 210: Green pod yield (q/ha) in Advanced Varietal Trials I & II (AVT I & II) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya	Rahuri	Ranchi	Mean
AVT-I						
1	PWB-17-1	131.32	-	127.97	160.67	139.99
2	PWB-17-9	143.13	-	156.90	153.33	151.12
AVT-II						
3	RWB-11	147.92	-	131.51	161.00	146.81
4	RWB-13	141.09	-	154.90	151.67	149.22
5	RWB-15	-	-	-	167.67	167.67
6	RWB-18	-	-	-	161.67	161.67
7	RWB-19	-	-	-	155.33	155.33
8	AKWB-1 (c)	142.25	-	112.71	147.00	133.99
9	IWB-1 (c)	151.20	-	128.15	147.67	142.34
10	RMDWB-1 (c)	140.93	-	134.86	166.00	147.26
	Mean	142.55	-	135.29	157.20	145.01
	CD(0.05)	15.21	-	26.94	5.22	-
	CV(%) Error	6.00	-	11.20	1.94	-

Table 211: Seed yield (q/ha) in Advanced Varietal Trials I & II (AVT I & II) on winged bean: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ayodhya*	Rahuri	Ranchi	Mean
AVT-I						
1	PWB-17-1	14.75	5.16	20.62	13.33	16.23
2	PWB-17-9	15.60	4.46	16.53	13.30	15.15
AVT-II						
3	RWB-11	16.88	5.75	18.18	13.42	16.16
4	RWB-13	16.85	5.09	17.16	14.28	16.10
5	RWB-15	-	5.69	-	14.80	14.80
6	RWB-18	-	5.72	-	13.60	13.60
7	RWB-19	-	5.21	-	13.60	13.60
8	AKWB-1 (c)	16.09	-	13.53	11.75	13.79
9	IWB-1 (c)	14.54	5.67	14.41	12.09	13.68
10	RMDWB-1 (c)	16.09	6.48	16.34	10.61	14.35
	Mean	15.83	5.47	16.68	13.08	15.20
	CD (0.05)	4.16	0.77	3.65	1.49	-
	CV (%) Error	14.77	8.16	12.30	6.64	-

*Poor yields; data not considered for calculating means over locations

Table 212: Experimental Details of IVT and AVT of Kalingada Kharif 2019 (Plains)

S. No	Items	Mandor	SK Nagar
1	No. of Entries	8	8
2	No. of Checks	3	3
3	Design	RBD	RBD
4	No. of Replication	3	3
5	Number of Rows	3	3
6	Row length (m)	4	4
7	Row spacing (cm)	300	300
8	Plant spacing (cm)	100	100
9	NPKS (Kg/ha)	60:40:0	-
10	Plot Size (m ²)	36	9.0x4
11	Sowing Date	20/07/2019	22/07/2019
12	Harvesting Period	08/10/2019 – 22/10/2019	Experiment Failed due to heavy rains

Table 213: Different characters of Kalingada entries in Initial & Advanced Varietal Trials (IVT & AVT) Kharif 2019 (Plains)

S. No.	Genotypes	Fruit yield (q/ha)				Seed yield (q/ha)			
		Mandor	S.K. Nagar*	Jaisalmer	Mean	Mandor	S.K. Nagar	Jaisalmer	Mean
IVT									
1	SKNK 1703	22.27	-	-	22.27	0.72	-	-	0.72
2	SKNK 1706	18.17	-	-	18.17	0.72	-	-	0.72
AVT-I									
3	CAZJK 48	35.26	-	-	35.26	0.98	-	-	0.98
4	SKNK 1407	31.78	-	-	31.78	1.18	-	-	1.18
5	SKNK 1504	19.83	-	-	19.83	0.62	-	-	0.62
AVT-II									
6	SKNK 1301	15.66	-	-	15.66	0.63	-	-	0.63
7	SKNK 1302	29.90	-	-	29.90	0.83	-	-	0.83
8	SKNK 1501	24.98	-	-	24.98	0.81	-	-	0.81
9	CAZRI Kalingada-1 (C)	16.84	-	-	16.84	0.92	-	-	0.92
10	GK 1 (C)	19.68	-	-	19.68	1.00	-	-	1.00
11	SKNK 1102 (C)	24.66	-	-	24.66	0.93	-	-	0.93
Mean		23.55	-	-	23.55	0.85	-	-	0.85
CD (0.05)		8.62	-	-	-	0.33	-	-	-
CV (%) Error		21.48	-	-	-	22.59	-	-	-

*Experiments vitiated due to heavy rains

Table 214: Different characters of Kalingada entries in Initial & Advanced Varietal Trials (IVT & AVT) Kharif 2019 (Plains)

S. No.	Genotypes	Days to fruit setting				Days to maturity				100 seed wt. (g)			
		Mandor	S.K. Nagar*	Jaisalmer	Mean	Mandor	S.K. Nagar	Jaisalmer	Mean	Mandor	S.K. Nagar	Jaisalmer	Mean
IVT													
1	SKNK 1703	47.67	-	-	47.67	81.33	-	-	81.33	5.58	-	-	5.58
2	SKNK 1706	50.00	-	-	50.00	81.67	-	-	81.67	6.70	-	-	6.70
AVT-I													
3	CAZJK 48	45.33	-	-	45.33	84.00	-	-	84.00	7.40	-	-	7.40
4	SKNK 1407	50.67	-	-	50.67	81.67	-	-	81.67	6.49	-	-	6.49
5	SKNK 1504	55.67	-	-	55.67	82.00	-	-	82.00	5.17	-	-	5.17
AVT-II													
6	SKNK 1301	56.33	-	-	56.33	83.00	-	-	83.00	6.04	-	-	6.04
7	SKNK 1302	47.33	-	-	47.33	84.33	-	-	84.33	6.75	-	-	6.75
8	SKNK 1501	49.33	-	-	49.33	86.33	-	-	86.33	6.18	-	-	6.18
9	CAZRI Kalingada-1 (C)	55.67	-	-	55.67	81.33	-	-	81.33	6.74	-	-	6.74
10	GK 1 (C)	52.67	-	-	52.67	85.00	-	-	85.00	6.04	-	-	6.04
11	SKNK 1102 (C)	53.67	-	-	53.67	82.00	-	-	82.00	6.38	-	-	6.38
	Mean	51.30	-	-	51.30	82.97	-	-	82.97	6.31	-	-	6.31
	CD (0.05)	2.44	-	-	-	3.55	-	-	-	0.39	-	-	-
	CV (%) Error	2.80	-	-	-	2.51	-	-	-	3.64	-	-	-

*Experiments vitiated due to heavy rains

Table 215: Different characters of Kalingada entries in Initial & Advanced Varietal Trials (IVT & AVT) Kharif 2019 (Plains)

S. No.	Genotypes	Fruit diameter (cms.)				Fruits per plant			
		Mandor	S.K. Nagar*	Jaisalmer	Mean	Mandor	S.K. Nagar	Jaisalmer	Mean
IVT									
1	SKNK 1703	9.46	-	-	9.46	3.90	-	-	3.90
2	SKNK 1706	9.14	-	-	9.14	2.79	-	-	2.79
AVT-I									
3	CAZJK 48	10.13	-	-	10.13	4.62	-	-	4.62
4	SKNK 1407	9.13	-	-	9.13	3.70	-	-	3.70
5	SKNK 1504	8.94	-	-	8.94	2.94	-	-	2.94
AVT-II									
6	SKNK 1301	8.93	-	-	8.93	2.83	-	-	2.83
7	SKNK 1302	9.36	-	-	9.36	3.11	-	-	3.11
8	SKNK 1501	9.67	-	-	9.67	3.45	-	-	3.45
9	CAZRI Kalingada-1 (C)	8.04	-	-	8.04	2.22	-	-	2.22
10	GK 1 (C)	8.96	-	-	8.96	3.15	-	-	3.15
11	SKNK 1102 (C)	9.19	-	-	9.19	3.27	-	-	3.27
Mean		9.18	-	-	9.18	3.27	-	-	3.27
CD (0.05)		1.50	-	-	-	0.86	-	-	-
CV (%) Error		9.61	-	-	-	15.49	-	-	-

*Experiments vitiated due to heavy rains

Table 216: Experimental Details of AVT – I of Kankoda Kharif 2019 (Plains)

S. No	Items	Ambikapur	Ranchi	Ayodhya
1	No. of Entries	3	3	3
2	No. of Checks	2	2	2
3	Design	RBD	RBD	RBD
4	No. of Replication	-	3	3
5	Number of Rows	3	-	3
6	Row length (m)	4	2	2
7	Row spacing (m)	2	1	0.60
8	Plant spacing (m)	2	1	0.60
9	NPKS (Kg/ha)	-	-	20:40:20:20
10	Plot Size (m ²)	16m ²	9	4
11	Sowing Date	17/07/2019	15/05/2019	10/07/2019
12	Harvesting Period	At Maturity	16/09/2019 – 12/10/2019	At Maturity

Table 217: Fruit yield (q/ha) in Advanced Varietal Trials I (AVT I) on Kankoda: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ranchi	Ayodhya*	Mean
AVT-I					
1	ASG 18-1	54.98	18.53	10.89	36.76
2	ASG 18-2	50.00	21.23	9.04	35.62
3	ASG 18-3	48.98	19.50	10.19	34.24
4	Indira Kankoda-1 (C)	47.38	15.00	12.28	31.19
5	RMDSG-3 (C)	48.55	20.87	14.83	34.71
	Mean	49.98	19.03	11.44	34.50
	CD (0.05)	7.67	2.76	1.79	-
	CV (%) Error	9.96	7.70	8.30	-

*Very low yields, data not considered for calculating mean over locations.

Table 218: Days to fruit setting in Advanced Varietal Trials I (AVT I) on Kankoda: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ranchi	Ayodhya	Mean
AVT-I					
1	ASG 18-1	39.50	54.00	58.60	50.70
2	ASG 18-2	41.25	60.00	55.60	52.28
3	ASG 18-3	35.50	56.00	57.60	49.70
4	Indira Kankoda-1 (C)	41.75	59.00	56.60	52.45
5	RMDSG-3 (C)	38.75	61.00	55.60	51.78
	Mean	39.35	58.00	56.80	51.38
	CD (0.05)	2.60	1.68	4.59	-
	CV (%) Error	4.28	1.54	4.29	-

Table 219: Days to maturity in Advanced Varietal Trials I (AVT I) on kankoda: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ranchi	Ayodhya	Mean
AVT-I					
1	ASG 18-1	113.00	102.67	115.00	110.22
2	ASG 18-2	112.25	96.33	118.30	108.96
3	ASG 18-3	111.50	101.00	112.00	108.17
4	Indira Kankoda-1 (C)	113.25	104.00	114.60	110.62
5	RMDSG-3 (C)	112.25	97.00	116.00	108.42
	Mean	112.45	100.20	115.18	109.28
	CD (0.05)	4.80	3.87	4.22	-
	CV (%) Error	2.77	2.05	1.95	-

Table 220: Fruits per plant in Advanced Varietal Trials I (AVT I) on Kankoda: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ranchi	Ayodhya	Mean
AVT-I					
1	ASG 18-1	152.00	43.67	-	97.83
2	ASG 18-2	160.25	51.67	-	105.96
3	ASG 18-3	155.75	62.00	-	108.88
4	Indira Kankoda-1 (C)	169.00	34.00	-	101.50
5	RMDSG-3 (C)	163.25	36.67	-	99.96
	Mean	160.05	45.60	-	102.83
	CD (0.05)	4.28	2.86	-	-
	CV (%) Error	1.73	3.33	-	-

Table 221: Fruit diameter (cms) in Advanced Varietal Trials I (AVT I) on Kankoda: Kharif 2019 (Plains)

S. No.	Genotypes	Ambikapur	Ranchi	Ayodhya	Mean
AVT-I					
1	ASG 18-1	4.10	4.33	-	4.22
2	ASG 18-2	3.68	4.23	-	3.95
3	ASG 18-3	4.13	4.77	-	4.45
4	Indira Kankoda-1 (C)	4.75	3.93	-	4.34
5	RMDSG-3 (C)	4.93	4.17	-	4.55
	Mean	4.32	4.29	-	4.30
	CD (0.05)	1.04	0.26	-	-
	CV (%) Error	15.63	3.22	-	-

Table 222: Experimental Details of AVT - I of Pillipesara Kharif 2019 (Plains)

S. No	Items	Bhubaneswar	Mettupalayam
1	No. of Entries	18	18
2	No. of Checks	1	1
3	Design	RBD	RBD
4	No. of Replication	3	3
5	Number of Rows	-	8
6	Row length (m)	-	4
7	Row spacing (cm)	30	30
8	Plant spacing (cm)	15	10
9	NPKS (Kg/ha)	25:50:25	25:50:25
10	Plot Size (m ²)	2.0 x 0.9	10m ²
11	Sowing Date	21/07/2019	20/09/2019
12	Harvesting Period	20/10/2019	25/01/2020

Table 223: Plant height (cms) in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	72.33	-	72.33
2	IC 524667	73.67	-	73.67
3	IC 553494	-	71.17	71.17
4	IC 550524	-	59.53	59.53
5	IC 550531	84.33	-	84.33
6	IC 550532	76.67	61.80	69.23
7	IC 553544	-	54.23	54.23
8	IC 550536	82.67	-	82.67
9	IC 550537	85.00	-	85.00
10	IC 550538	83.67	56.27	69.97
11	IC 550540	91.67	58.57	75.12
12	IC 550542	87.67	-	87.67
13	IC 550543	81.00	69.20	75.10
14	IC 550557	69.67	-	69.67
15	IC 553502	79.67	62.23	70.95
16	IC 553530	-	51.83	51.83
17	IC 553517	77.67	63.27	70.47
18	IC 553518	83.33	61.47	72.40
19	IC553547	-	48.83	48.83
20	IC261321	-	56.73	56.73
21	Fodder Cowpea (C)	80.67	-	80.67
	Trial Mean	80.64	59.63	70.14
	CD (0.05)	5.96	4.73	-
	CV (%) Error	4.42	4.71	-

Table 224: Number of branches/plant in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	9.00	-	9.00
2	IC 524667	9.67	-	9.67
3	IC 553494	-	2.40	2.40
4	IC 550524	-	1.60	1.60
5	IC 550531	9.33	-	9.33
6	IC 550532	9.67	1.47	5.57
7	IC 553544	-	2.00	2.00
8	IC 550536	8.00	-	8.00
9	IC 550537	10.00	-	10.00
10	IC 550538	13.67	2.13	7.90
11	IC 550540	10.00	1.60	5.80
12	IC 550542	9.33	-	9.33
13	IC 550543	9.33	1.60	5.47
14	IC 550557	9.00	-	9.00
15	IC 553502	8.33	1.87	5.10
16	IC 553530	-	1.47	1.47
17	IC 553517	6.67	1.40	4.03
18	IC 553518	9.33	2.00	5.67
19	IC553547	-	2.40	2.40
20	IC261321	-	2.20	2.20
21	Fodder Cowpea (C)	9.00	-	9.00
	Trial Mean	9.36	1.86	5.61
	CD (0.05)	1.65	0.44	-
	CV (%) Error	10.53	14.04	-

Table 225: Days to 50% flowering in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	40.33	-	40.33
2	IC 524667	41.00	-	41.00
3	IC 553494	-	59.67	59.67
4	IC 550524	-	58.67	58.67
5	IC 550531	40.67	-	40.67
6	IC 550532	40.33	56.33	48.33
7	IC 553544	-	58.00	58.00
8	IC 550536	41.33	-	41.33
9	IC 550537	39.67	-	39.67
10	IC 550538	41.33	61.33	51.33
11	IC 550540	41.00	60.67	50.83
12	IC 550542	41.00	-	41.00
13	IC 550543	40.00	59.67	49.83
14	IC 550557	40.33	-	40.33
15	IC 553502	40.00	60.67	50.33
16	IC 553530	-	58.33	58.33
17	IC 553517	40.67	60.00	50.33
18	IC 553518	39.33	58.67	49.00
19	IC553547	-	67.67	67.67
20	IC261321	-	60.33	60.33
21	Fodder Cowpea (C)	39.67		39.67
	Trial Mean	40.44	60.00	50.22
	CD (0.05)	2.28	2.75	-
	CV (%) Error	3.36	2.72	-

Table 226: Number of pods/plant in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	72.67	-	72.67
2	IC 524667	76.33	-	76.33
3	IC 553494	-	8.20	8.20
4	IC 550524	-	7.40	7.40
5	IC 550531	76.67	-	76.67
6	IC 550532	77.00	5.47	41.23
7	IC 553544	-	6.57	6.57
8	IC 550536	75.67	-	75.67
9	IC 550537	78.67	-	78.67
10	IC 550538	79.00	6.20	42.60
11	IC 550540	82.67	5.27	43.97
12	IC 550542	88.00	-	88.00
13	IC 550543	84.33	8.07	46.20
14	IC 550557	81.67	-	81.67
15	IC 553502	79.00	6.67	42.83
16	IC 553530	-	8.27	8.27
17	IC 553517	82.67	9.00	45.83
18	IC 553518	77.33	9.13	43.23
19	IC553547	-	5.93	5.93
20	IC261321	-	7.60	7.60
21	Fodder Cowpea (C)	42.67	-	42.67
	Trial Mean	76.96	7.21	42.08
	CD (0.05)	6.04	1.10	-
	CV (%) Error	4.69	9.08	-

Table 227: Pod length (cms) in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	4.03	-	4.03
2	IC 524667	3.73	-	3.73
3	IC 553494	-	5.57	5.57
4	IC 550524	-	5.03	5.03
5	IC 550531	3.90	-	3.90
6	IC 550532	3.63	4.97	4.30
7	IC 553544	-	4.83	4.83
8	IC 550536	3.83	-	3.83
9	IC 550537	3.87	-	3.87
10	IC 550538	3.77	4.83	4.30
11	IC 550540	4.03	4.63	4.33
12	IC 550542	3.90	-	3.90
13	IC 550543	4.00	4.73	4.37
14	IC 550557	4.00	-	4.00
15	IC 553502	4.23	4.73	4.48
16	IC 553530	-	5.00	5.00
17	IC 553517	3.90	5.10	4.50
18	IC 553518	3.97	5.03	4.50
19	IC553547	-	5.47	5.47
20	IC261321	-	5.40	5.40
21	Fodder Cowpea (C)	11.33	-	11.33
	Trial Mean	4.41	5.03	4.72
	CD (0.05)	0.47	0.39	-
	CV (%) Error	6.38	4.61	-

Table 228: Number of seeds per pod in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	6.00	-	6.00
2	IC 524667	5.67	-	5.67
3	IC 553494	-	9.53	9.53
4	IC 550524	-	8.60	8.60
5	IC 550531	5.00	-	5.00
6	IC 550532	5.33	9.07	7.20
7	IC 553544	-	9.20	9.20
8	IC 550536	4.00	-	4.00
9	IC 550537	6.00	-	6.00
10	IC 550538	6.67	9.87	8.27
11	IC 550540	6.33	9.17	7.75
12	IC 550542	6.33	-	6.33
13	IC 550543	5.00	9.97	7.48
14	IC 550557	5.67	-	5.67
15	IC 553502	7.33	9.40	8.37
16	IC 553530	-	9.93	9.93
17	IC 553517	6.33	11.07	8.70
18	IC 553518	5.33	11.20	8.27
19	IC553547	-	9.73	9.73
20	IC261321	-	8.27	8.27
21	Fodder Cowpea (C)	13.57	-	13.57
	Trial Mean	6.30	9.62	7.96
	CD (0.05)	1.58	1.10	-
	CV (%) Error	15.00	6.80	-

Table 229: 1000 seed weight (g) in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	8.12	-	8.12
2	IC 524667	6.44	-	6.44
3	IC 553494	-	10.15	10.15
4	IC 550524	-	10.04	10.04
5	IC 550531	8.57	-	8.57
6	IC 550532	8.17	9.94	9.05
7	IC 553544	-	9.25	9.25
8	IC 550536	8.16	-	8.16
9	IC 550537	9.10	-	9.10
10	IC 550538	9.07	9.75	9.41
11	IC 550540	9.17	9.76	9.46
12	IC 550542	8.67	-	8.67
13	IC 550543	8.47	9.88	9.18
14	IC 550557	8.54	-	8.54
15	IC 553502	8.47	9.97	9.22
16	IC 553530	-	10.02	10.02
17	IC 553517	8.96	10.43	9.69
18	IC 553518	8.96	10.12	9.54
19	IC553547	-	9.18	9.18
20	IC261321	-	10.22	10.22
21	Fodder Cowpea (C)	70.17	-	70.17
	Trial Mean	8.49	9.90	9.20
	CD (0.05)	1.27	0.21	-
	CV (%) Error	6.02	1.29	-

Table 230: Days to 80% maturity in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	76.00	-	76.00
2	IC 524667	80.33	-	80.33
3	IC 553494	-	97.00	97.00
4	IC 550524	-	95.33	95.33
5	IC 550531	76.33	-	76.33
6	IC 550532	74.33	89.00	81.67
7	IC 553544	-	90.33	90.33
8	IC 550536	74.67	-	74.67
9	IC 550537	75.33	-	75.33
10	IC 550538	73.00	96.00	84.50
11	IC 550540	75.33	98.00	86.67
12	IC 550542	81.67	-	81.67
13	IC 550543	79.33	97.33	88.33
14	IC 550557	78.00	-	78.00
15	IC 553502	74.67	96.00	85.33
16	IC 553530	-	97.00	97.00
17	IC 553517	73.33	90.00	81.67
18	IC 553518	75.33	98.33	86.83
19	IC553547	-	92.67	92.67
20	IC261321	-	97.00	97.00
21	Fodder Cowpea (C)	79.33	-	79.33
	Trial Mean	76.47	94.92	85.69
	CD (0.05)	5.73	3.71	-
	CV (%) Error	4.48	2.32	-

Table 231: Seed yield (q/ha) in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	0.96	-	0.96
2	IC 524667	0.76	-	0.76
3	IC 553494	-	0.83	0.83
4	IC 550524	-	0.70	0.70
5	IC 550531	0.67	-	0.67
6	IC 550532	0.54	0.70	0.62
7	IC 553544	-	0.66	0.66
8	IC 550536	0.44	-	0.44
9	IC 550537	0.70	-	0.70
10	IC 550538	0.84	0.78	0.81
11	IC 550540	1.08	0.72	0.90
12	IC 550542	0.97	-	0.97
13	IC 550543	0.72	0.80	0.76
14	IC 550557	1.36	-	1.36
15	IC 553502	1.74	0.68	1.21
16	IC 553530	-	0.81	0.81
17	IC 553517	0.97	0.92	0.94
18	IC 553518	1.33	0.97	1.15
19	IC553547	-	0.67	0.67
20	IC261321	-	0.74	0.74
21	Fodder Cowpea (C)	2.83	-	2.83
	Trial Mean	1.06	0.77	0.91
	CD (0.05)	0.47	0.13	-
	CV (%) Error	26.78	10.17	-

Table 232: Green biomass yield (q/ha) in Advanced Varietal Trial-I (AVT-I) on Pillipesara: Kharif 2019 (Plains)

S. No.	Genotypes	Mettupalayam	Bhubaneswar	Mean
AVT-I				
1	IC 524639	135.80	-	135.80
2	IC 524667	150.35	-	150.35
3	IC 553494	-	-	-
4	IC 550524	-	-	-
5	IC 550531	135.22	-	135.22
6	IC 550532	136.02	-	136.02
7	IC 550533	-	-	-
8	IC 550536	147.16	-	147.16
9	IC 550537	136.05	-	136.05
10	IC 550538	158.54	-	158.54
11	IC 550540	142.99	-	142.99
12	IC 550542	141.61	-	141.61
13	IC 550543	156.04	-	156.04
14	IC 550557	149.38	-	149.38
15	IC 553502	156.10	-	156.10
16	IC 553530	-	-	-
17	IC 553517	131.33	-	131.33
18	IC 553518	143.39	-	143.39
19	Fodder Cowpea (C)	163.26	-	163.26
	Trial Mean	145.55	-	145.55
	CD (0.05)	17.48	-	-
	CV (%) Error	7.18	-	-

IV. CROP PRODUCTION AND PROTECTION

4.1 CROP PRODUCTION

A total of eleven agronomic experiments were formulated to be conducted at nine locations in 17 trials during Kharif 2019. These comprised of five studies on amaranth, three on Pillipesara and one each on Kalingada, Winged bean and Spine gourd. Out of these, results of fourteen trials of ten agronomic experiments were received from nine locations. Centre wise details of experiments are presented in Table 233 and the findings are as follows:

Experiment 1 : Response of promising genotypes (AVT-II entries) of Kalingada to different levels of management

Objective : To evaluate promising genotypes (AVT-II entries) of Kalingada under different levels of management

Year of start : 2015

Location : Mandor and S K Nagar

Treatments : A. Genotypes (4)

G 1 : SKNK 1301

G 2 : SKNK 1302

G 3 : SKNK 1501

G 4 : CAZK 13-02

B. Spacing (3)

S 1 : 2 x 1 m

S 2 : 3 x 1 m

C. Fertilizer doses

F 1 : RDF

F 2 : 75% RDF

F 3 : 125% RDF

Design : Factorial

Replications : 3

Results: The experiment vitiated due to heavy and continuous rainfall at flowering and fruit development stage during August, 2019, hence, will be repeated in the next crop season.

Experiment 2 : Response of promising genotypes (AVT-II entries) of winged bean to different levels of management

Objectives : To evaluate promising genotypes (AVT-II entries) of winged bean under different levels of management

Year of start : 2015

Locations : Ambikapur, Cooch Behar, Rahuri and Ranchi

Treatments :

A. Genotypes (4)

V 1 : RWB-11

V 2 : RWB-13

V 3 : AKWB-1

V 4 : IWB-1

B. Fertilizer doses (3)

F 1 : RDF

F 2 : 75% RDF

F 3 : 125% RDF

Spacing : 60x30 cm

Design : Factorial

Replications : 3

Results: At Ambikapur (Table 234), among different genotypes, AKWB-1 recorded maximum green pod yield of 132.87 q/ha followed by RWB-13 (127.89 q/ha), IWB-1 (127.78 q/ha) & RWB-11 (126.16 q/ha). However, IWB-1 produced highest seed yield (17.52 q/ha) followed by RWB-13 (16.67 q/ha), RWB-11 (15.95 q/ha) & IWB-1 (15.91 q/ha). Genotypes did not show significant impact on green pod yield as well as seed yield production. Among different fertility levels 75% RDF recorded highest green pod yield of 131.51 q/ha followed by RDF (127.34 q/ha) & 125% RDF (127.17 q/ha) remaining at par with each other. However, significantly higher seed yields were recorded by RDF (17.39 q/ha) & 75% RDF (16.73 q/ha) over 125% RDF (15.43 q/ha).

Among various treatment combinations, genotype IWB-1 with RDF recorded maximum seed yield (18.40 q/ha) followed by RWB-13 with 75% RDF (17.53 q/ha) and lowest with RWB-11 with 125% RDF and in respect to green pod yield, genotype AKBW-1 with 75% RDF recorded maximum pod yield (142.36 q/ha) followed by a yield of 135.76 q/ha recorded by IWB-1 with RDF and lowest with RWB-13 with RDF, however, treatment

combinations couldn't impact significantly on seed yield as well as green pod yield and were statistically at par with each other (Table 234).

At Ranchi (Table 235), genotypic effects were significant for seed yield of winged bean, entry RWB-13 recorded significantly highest seed yield of 14.73 q/ha followed by RWB-11 (13.37 q/ha), AKWB-1 (10.77) & IWB-1 (9.64).

No. of pods/plant were significantly influenced by genotypes, RWB-13 (52.01) recorded significantly highest no. of pods as compared to rest of the entries/ checks followed by RWB-11 (43.89), IWB-1 (37.94) & AKWB-1 (36.42). However, IWB-1 & AKWB-1 remained statistically at par to each other for this trait.

Significant interaction effects of different treatment combinations of genotype & fertilizers were observed at Ranchi. Among various treatment combinations, genotype RWB-13 with 125% RDF recorded maximum seed yield (15.10 q/ha) followed RWB-13 with RDF (15.08 q/ha) and lowest seed yield was recorded in IWB-1 with 75% RDF combination (Table 235).

Cooch Behar center deviated from the technical program and conducted trial with IWB- 1, AWB 13-4 & AWB 13-5 genotypes. Similarly, the centre conducted trial with 50 % RDF in place of 75% RDF as decided in the technical program. The results revealed that among different genotypes, AWB 13-4 (V2) recorded maximum green pod yield (q/ha), average green pod yield (g/plant), pod length (cm), no of seeds/pod, days to 50% flowering and seed yield (q/ha), however IWB-1 (V1) recorded highest 100-Seed Weight (g). Genotypes did not show significant impact on winged bean traits studied except in case of seed yield where AWB 13-4 (V2) produced significantly higher seed yield (16.20 q/ha) followed by AWB 13-5 (V3) (11.81 q/ha) & IWB-1 (V1) (9.72 q/ha).

Among different fertility levels 125% RDF (F3) recorded highest green pod yield (q/ha), pod length (cm), no of seed/pod, days to 50% flowering and seed yield (q/ha) whereas, 50% RDF (F2) recorded highest average green pod yield (g/plant) & 100-Seed Weight (g). However, interaction effects of different treatment combinations of genotype & fertilizers were non-significant (Table 236).

Rahuri center didn't conduct the experiment as per the approved technical program and conducted trial with PWB 11-2, AKWB-1 and IWB-1 genotypes and added three spacing levels. The results (Table 237) revealed that genotypic effects were significant on seed yield, green pod yield, days to maturity & 100 seed weight of winged bean, PWB 11-2 (V1) recorded maximum green pod yield (149.06 q/ha) followed by IWB-1 (V3) (94.58 q/ha)

&AKWB-1 (V2) (91.81 q/ha). Highest seed yield was recorded by PWB 11-2 (17.51 q/ha) followed by AKWB-1 (V2) (16.04 q/ha) & IWB-1 (V3) (15.42q/ha). Fertility level effects were also significantly different for seed yield, green pod yield and 100 seed weight, RDF recorded highest green pod yield (122.17 q/ha) followed by 125% RDF (107.65 q/ha) and 75% RDF (105. 63 q/ha). However, significantly higher seed yield was recorded in treatments RDF (17.13 q/ha) and 125% RDF (16.18 kg/ha) over 75% RDF (15.67 kg/ha).

Experiment 3 : Response of grain amaranth to Sulphur fertilization

Objectives : To study the effect of different levels of Sulphur fertilization on promising varieties of grain amaranth.

Year of start : 2018

Locations : Ranichauri

Treatments :

A. Sulphur Doses (4)

F 0 : Control

F 1 : RDF + Sulphur 20 kg /ha

F 2 : RDF + Sulphur 40 kg /ha

F 3 : RDF

B. Varieties (2)

V 1 : Annapurna

V 2 : PRA-3

Design : Split plot

Replications : 3

Results: The sulphur doses effects were significant on seed yield, straw yield and inflorescence length of amaranth. F2 (14.70 q/ha) recorded highest seed yield but was statistically at par with F1 (14.52 q/ha) followed by F3 (11.05 q/ha) and lowest with F0 (7.87 q/ha).

Seed and straw yields were also significantly influenced by genotypes, V2 (13.26 q/ha & 62.28 q/ha) recorded significantly highest yield compared to V1 (10.81 q/ha & 53.60 q/ha). Interaction of different treatment combinations of sulphur doses and genotype were non-significant (Table 238).

Conclusion/ Recommendation: Based on two years data it is concluded that PRA-3 produced highest seed yield of grain amaranth with the application of sulphur @ 20 kg/ha along with recommended dose of fertilizers (NPK 60:40:20) followed by RDF + Sulphur @

40 kg/ha. Maximum benefit: cost ratio (5.5) was also reported in PRA-3 along with the application of RDF+ 20 kg Sulphur /ha (Table 239).

Experiment 4 : Effect of different levels of management on grain amaranth genotypes

Objectives : To study the effect of different doses of nitrogen fertilizers on promising genotypes of grain amaranth.

Year of start : 2016

Locations : Bengaluru

Treatments :

A. Fertilizers Doses (3)

F 1 : 75% RDF

F 2 : RDF

F 3 : 125% RDF

B. Genotypes (3)

G 1 : KBGA-14

G 2 : Suvarna

G 3 : KBGA 4

Design : Split plot

Replications : 3

Results: Center deviated from the technical program and conducted experiment with KBGA-14, Suvarna and KBGA- 4 genotypes. The results revealed that different fertilizer doses have significant effects on seed yield, gross returns, net returns & B:C ratio in grain amaranth (Table 240). F3 (15.61 q/ha) recorded statistically superior seed yield followed by F2 (13.99 q/ha) and lowest with F1 (11.15 q/ha). Highest gross return was observed with F3 (Rs. 78052.13) followed by F2 (Rs. 69942.62) and F1 (Rs. 55769.89). However, F3 recorded highest Net return & B: C ratio (Rs. 50154.13 & 1.80) statistically at par with F2 (Rs. 43354.62 & 1.63) and lowest with F1 (Rs. 30513.89 & 1.21). Genotype failed to significantly influence plant height, panicle length, grain yield and economics (Gross return, Net return & B:C ratio) in this experiment. However, V2 produced highest grain yield (14.25 q/ha) and economics Gross return, Net return & B: C ratio of Rs. 71258.23, Rs. 44677.56 and 1.67, respectively, followed by V1 and V3 in that order.

Interaction of different treatment combinations of fertilizer doses and genotype were found non-significant effect on grain yield and economics (Gross return, Net return & B:C ratio) of grain amaranth (Table 240).

Experiment 5 : To determine optimum time of sowing of Pillipesara in Eastern region

Objectives : To identify the appropriate time of sowing of Pillipesara in eastern region

Year of start : 2016

Locations : Bhubaneswar and Cooch Behar

Treatments : Dates of sowing (3)

S 1 : June I week

S 2 : June II week

S 3 : June III week

A. Genotypes (3)

F 1 : IC- 550522

F 2 : IC- 550525

F 3 : IC- 553547

Design : Split plot

Replications : 3

Results: At Bhubaneswar centre genotypes IC 550522 and IC 550525 did not germinate. Therefore, the data is incomplete. Hence, the trial will be repeated.

At Cooch Behar trial could not been conducted because Mettupalayam centre could not supply seed.

Experiment 6 : Effect of spacing and fertilizers on different genotypes of Pillipesara

Objectives : To find out optimum spacing and fertilizer dose for Pillipesara in the eastern region

Year of start : 2016

Locations : Bhubaneswar and Cooch Behar

Treatments :

B. Spacing (4)

D 1 : 30x10 cm

D 2 : 30x15 cm

D 3 : 45x10 cm

D 4 : 45x15 cm

C. Fertilizer doses (4)

G 1 : 20-40-20 kg NPK/ha

G 2 : 75% of F₁

G 3 : 125% of F₁

G 4 : Control

Design : Split plot

Replications : 3

Results: The experiment was started in the year 2016 at Bhubaneswar centre and concluded last year.

Conclusion/ Recommendation: Among different spacing levels, spacing of 30 x 10 cm recorded highest seed yield of 1.54 q/ha followed by 30 x 15 cm (1.47 q/ha) which remained at par with each other. Among fertility levels, 125% RFD (25-50-25 NPK kg/ha) recorded highest yield of 1.46 q/ha followed by RFD @ 20-40-20 NPK Kg/ha (1.40 q/ha) and were statistically at par. However, a combination of RFD and 30 x 10 cm spacing resulted in highest seed yield of Pillipesara (1.64 q/ha).

Experiment 7 : Response of promising genotypes (AVT-II entries) of spine gourd to different intercrop systems

Objectives : To assess effect of different intercrop systems on different genotypes of spine gourd

Year of start : 2018

Locations : Ambikapur

Treatments : Intercrop Systems (5)

I 1 : Spine gourd (Sole) (Spacing- 2X2 m)

I 2 : Spine gourd + Tomato {(1:2) spacing for SG is 2X2 m and for tomato is 30X30cm}

I 3 : Spine gourd + Brinjal {(1:2) spacing for SG is 2X2 m and for Brinjal is 30X30cm}45x10 cm

I 4 : Spine gourd + Chili {(1:2) spacing for SG is 2X2 m and for Chili is 30X30cm}

I 5 : Spine gourd + Okra {(1:2) spacing for SG is 2X2 m and for Okra is 30X30cm}

Design : RBD

Replications : 4

Results: All the intercropping systems studied were significantly superior to sole spine gourd in terms of equivalent yield (q/ha) & economics (gross returns, net returns & B:C ratio) (Table 241). Spine gourd + brinjal gave significantly higher spine gourd equivalent yield (93.84 q/ha), gross returns (Rs. 14,07,600/ha), net returns (Rs. 12,56,900/ha) and B:C Ratio (8.3) followed by spine gourd + tomato (79.62 q/ha, Rs. 11,94,150 & 10,43,430/ha and 6.9), spine gourd + okra (76.64 q/ha, Rs. 11,49,600 & 9,97,200/ha, and 6.5), spine gourd + chilli (74.86 q/ha, Rs. 11,22,900 & 9,72,185/ha, and 6.4), respectively during 2019 (Table 9).

Conclusion/ Recommendation: Spine gourd + brinjal intercropping system resulted in highest yield (q/ha) & economics (gross returns, net returns & B:C ratio) during both the years of experimentation, can be recommended for higher productivity and profitability of spine gourd (Table 241).

Experiment 8 : Phosphorus use efficiency in grain amaranth

Objectives :

- i. To study the phosphorous uptake in different varieties
- ii. To work out the phosphorous use efficiency of different varieties
- iii. To work out the economics of grain Amaranth

Year of start : 2018

Locations : Bengaluru

Treatments :

A. Genotypes (4)

V 1 : KBGA-4

V 2 : Suvarna

B. Phosphorus Doses

F 1 : Control (Recommended dose of NK&S)

F 2 : 20 kg P₂O₅/ha + Recommended dose of NK&S

F 3 : 30 kg P₂O₅/ha + Recommended dose of NK&S

F 4 : 20 kg P₂O₅/ha + PSB @ 2.5 kg/ha + VAM @ 2.5 kg/ha soil application + Recommended dose of NK&S

- F 5 : 30 kg P₂O₅/ha + PSB @ 2.5 kg/ha + VAM @ 2.5 kg/ha soil application + Recommended dose of NK&S
- F 6 : PSB @ 2.5 kg/ha + VAM @ 2.5 kg/ha soil application alone + Recommended dose of NK&S
- F 7 : Recommended dose of fertilizer (NPKNS)

Design : Split Plot
 Replications : 3
 Seed supply : UAS Bengaluru

Results: Among the varieties, Grain yield (q/ha), Grain yield advantage (q/ha), agronomic efficiency of P was significantly higher with KBGA-4 (V1) (15.13, 4.73 & 15.5) as compared to Suvarna (V2) (13.32, 3.72 & 12.30), respectively. Among Phosphorus doses, significantly higher yield advantage was recorded with application of 30 kg P₂O₅/ha + PSB @ 2.5 kg/ha + VAM @ 2.5 kg/ha soil application + RD of NK&S (7.58 q/ha) which was at par with recommended dose of fertilizer (NPKS).

Significantly higher gross returns, net returns and B:C ratio were recorded with application of 30 kg P₂O₅/ha + PSB @ 2.5 kg/ha + VAM @ 2.5 kg/ha soil application + RD of NK&S (Rs. 87925/ha, Rs.60336/ha and 2.19), respectively (Table 242).

Experiment 9 : Effect of genotypes spacings and fertilizers doses on fodder value and quality parameters in Pillipesara

Objectives : To study the fodder and nutritional value of Pillipesara in Eastern region

Year of start : 2018

Locations : Bhubaneswar

Treatments :

A. Genotypes (2)

- V 1 : IC 012822
 V 2 : IC 550532

B. Spacing (2)

- S 1 : 30 x 10 cm
 S 2 : 45 x 10 cm

C. Fertilizer Doses

- F 1 : N₂₅P₅₀K₂₅
 F 2 : N₁₅P₃₀K₁₅

Design : Factorial RBD

Replications : 3

Observation to be recorded:

- i. Biometric observations at 50% flowering stage.
- ii. Fodder mass value at 50% flowering stage
- iii. The Proximate composition of *Pillipesara* whole plant

Results: Center deviated from the technical programme, proposed genotypes were IC 012822 and IC 550532 whereas center conducted trial with Hyderabad Local. Among different spacing level, 30 cm X 10 cm recorded maximum green fodder yield of 153.55 q/ha. Among fertility levels, F2 (15-30-15 NPK kg/ha) recorded highest green fodder yield of 147.69 q/ha followed by F1 (25-50-25 NPK kg/ha) but remaining statistically at par with each other. Similarly, among various treatment combinations, spacing at 30 cm X 10cm with fertilizer dose of F2 (15-30-15 NPK kg/ha) recorded maximum green fodder yield (165.74 q/ha) followed by 141.36 q/ha recorded by spacing of 30cm x 10cm with a fertilizer dose of F1 (25-50-25 NPK kg/ha) but remaining statistically at par with each other (Table 243).

Among various treatment combinations, spacing at 30 cm x 10 cm with a fertilizer dose of 15-30-15 NPK/ha (T2) recorded an average of highest values of M.E (Metabolizable Energy) (1196), Crude Protein (8.47 %), ether extract (0.90 %) and lower value of Crude fiber (23.65 %) than other treatment combinations. The same treatment has been found to be suitable for fodder production and nutrition value in *Pillipesara* (Table 244).

Experiment 10 : Effect of time of sowing and spacing on Grain Amaranth in hilly region of Uttarakhand

Objectives : To find out optimum spacing and appropriate time of sowing of Grain Amaranth in hilly region of Uttarakhand

Year of start : 2019

Locations : Ranichauri

Treatments :

A. Date of sowing (5)

D 1 : 15 May

D 2 : 25 May

D 3 : 05 June

D 4 : 15 June

D 5 : 25 June

B. Spacing (3)

S 1 : 15 x 15 cm

S 2 : 30 x 15 cm

S 3 : 45 x 15 cm

Design : Split plot

Replications : 3

Results: Experiment failed due to long dry spell after sowing. The seeds germinated in all the treatments at the same time after rainfall. The trial will be repeated.

Experiment 11 : Effect of different post emergent weedicides on growth and yield of Grain amaranth in plains

Objectives : To test the bio-efficacy of different post emergence weedicides on grassy weeds and grain yield of amaranth

Year of start : 2019

Locations : Bengaluru

Treatments :

T 1 : Fenoxaprop-p-ethyl 10% EC @ 25 g a.i/ha

T 2 : Quizalopop ethyl 5% EC @ 50 g a.i/ha

T 3 : Clomazone 20% EC @ 750 g a.i/ha

T 4 : Propaquizaprop 10% EC @ 12 g a.i/ha

T 5 : Imazethapyr 10% SL @ 150 g a.i/ha

T 6 : One manual weeding at 4 WAS

T 7 : Weed free check

T 8 : Weedy check

Design : RBD

Replications : 3

Results : Experiment failed due to heavy rainfall after treatment application.

Table 233: Centre-wise details of agronomic experiments allotted/conducted on different Potential crops during Kharif 2019.

Sr. No.	Experiments	Ambikapur	Bengaluru	Bhubaneswar	Cooch Behar	Mandor	Rahuri	Ranchi	Ranichauri	SK Nagar	Total
1	Response of promising genotypes (AVT-II entries) of Kalingada to different levels of management					1(1)				1(1)	2(2)
2	Response of promising genotypes (AVT-II entries) of winged bean to different levels of management	1(1)			1(1)		1(1)	1(1)			4(4)
3	Response of amaranth to Sulphur fertilization								1(1)		1(1)
4	Effect of different levels of management on grain amaranth genotypes		1(1)								1(1)
5	To determine optimum time of sowing of Pillipesara in Eastern region			1(1)	1(0)						2(1)
6	Effect of spacing and fertilizers on different genotypes of Pillipesara			1(0)	1(0)						2(0)
7	Response of promising genotypes (AVT-II entries) of spine gourd to different intercrop systems	1(1)									1(1)
8	Phosphorus use efficiency in grain amaranth		1(1)								1(1)
9	Effect of genotypes spacings and fertilizers doses on fodder value and quality parameters in Pillipesara			1(1)							1(1)
10	Effect of time of sowing and spacing on Grain Amaranth in hilly region of Utrakhand								1(1)		1(1)
11	Effect of different post emergent weedicides on growth and yield of Grain amaranth in plains		1(1)								1(1)
	No. of trials allotted/(Conducted)	2(2)	3(3)	3(2)	3(1)	1(1)	1(1)	1(1)	2(2)	1(2)	17(14)

Table 234: Response of promising genotypes (AVT-II entries) of Winged bean to different levels of management at IGKV, Ambikapur.

S.N.	Treatment Combination	Seed yield (q/ha)	Green pod yield (q/ha)
1	V1F1	16.78	127.08
2	V1F2	16.89	132.99
3	V1F3	14.18	118.40
4	V2F1	17.42	118.06
5	V2F2	17.53	130.21
6	V2F3	15.07	135.42
7	V3F1	16.94	128.47
8	V3F2	15.35	142.36
9	V3F3	15.45	127.78
10	V4F1	18.40	135.76
11	V4F2	17.15	120.49
12	V4F3	17.01	127.08
Mean		16.51	128.67
CD (0.05) Interaction		NS	NS
	V1	15.95	126.16
	V2	16.67	127.89
	V3	15.91	132.87
	V4	17.52	127.78
CD (0.05) Variety		NS	NS
	F1	17.39	127.34
	F2	16.73	131.51
	F3	15.43	127.17
CD (0.05) Fertilizer		1.20	NS
CV (%) Error		8.54	8.41

Table 235: Response of promising genotypes (AVT-II entries) of Winged Bean to different levels of management at Ranchi.

Sr. No.	Treatment	Days to 50% flowering	Days to Maturity	No. of pods/plant	Plant Height (cm)	Seed yield (q/ha)	Seed yield/plot (kg)
1	V1F1	64.67	166.67	45.40	355.13	13.75	3.30
2	V1F2	66.67	164.00	41.00	346.93	12.57	3.00
3	V1F3	71.33	162.67	45.27	362.00	13.80	3.30
4	V2F1	65.33	161.00	52.67	383.80	15.08	3.60
5	V2F2	68.00	161.00	46.97	359.07	14.00	3.37
6	V2F3	70.00	161.00	56.40	367.87	15.10	3.60
7	V3F1	65.33	165.67	36.33	362.00	12.49	3.00
8	V3F2	69.67	163.33	37.53	362.13	10.94	2.63
9	V3F3	70.67	163.33	35.40	391.27	8.87	2.13
10	V4F1	71.00	162.33	38.80	361.73	10.33	2.50
11	V4F2	70.67	162.67	37.00	336.60	8.29	2.00
12	V4F3	67.00	161.33	38.03	378.73	10.29	2.47
Mean		68.36	162.92	42.57	363.94	12.13	2.91
CD (0.05) Interaction		6.55	4.33	7.82	54.53	1.08	0.27
V1		67.56	164.44	43.89	354.69	13.37	3.20
V2		67.78	161.00	52.01	370.24	14.73	3.52
V3		68.56	164.11	36.42	371.80	10.77	2.59
V4		69.56	162.11	37.94	359.02	9.64	2.32
CD (0.05) Variety		3.78	2.50	4.52	31.48	0.62	0.15
F1		66.58	163.92	43.30	365.67	12.91	3.10
F2		68.75	162.75	40.63	351.18	11.45	2.75
F3		69.75	162.08	43.78	374.97	12.02	2.88
CD (0.05) Fertilizer		3.28	2.17	3.91	27.26	0.54	0.13
CV (%) Error		5.66	1.57	10.85	8.85	5.26	5.40

Table 236: Response of promising genotypes (AVT-II entries) of winged bean to different levels of management at Cooch Behar.

S.No.	Treatments	Green pod yield (q/ha)	Average green pod yield (g/plant)	Pod length (cm)	No of seed/pod	100-Seed Weight (g)	Days to 50% flowering	Seed yield (q/ha)
1	V1F1	31.48	84.44	15.50	8.72	38.07	65.00	9.36
2	V1F2	29.91	126.67	15.33	8.19	39.70	64.67	9.68
3	V1F3	38.25	96.67	15.33	9.33	36.73	66.33	10.11
4	V2F1	50.37	115.56	16.13	9.80	36.87	65.00	15.94
5	V2F2	45.18	136.67	15.03	8.47	38.13	65.00	16.28
6	V2F3	50.69	106.67	15.47	9.33	36.43	66.67	16.38
7	V3F1	45.81	124.44	14.61	8.13	37.87	64.33	10.64
8	V3F2	37.46	125.56	14.60	8.60	37.20	64.67	11.81
9	V3F3	38.88	97.78	15.87	9.33	37.67	66.67	12.98
Mean		40.89	112.72	15.32	8.88	37.63	65.37	12.57
Variety								
V1		33.21	102.59	15.39	8.75	38.17	65.33	9.72
V2		48.74	119.63	15.54	9.20	37.14	65.56	16.20
V3		40.72	115.93	15.02	8.69	37.58	65.22	11.81
Fertilizer								
F1		42.55	108.15	15.41	8.89	37.60	64.78	11.98
F2		37.52	129.63	14.99	8.42	38.34	64.78	12.59
F3		42.60	100.37	15.56	9.33	36.94	66.56	13.16
CD (.05)								
Variety		NS	NS	NS	NS	NS	NS	1.829
Fertilizer		NS	NS	NS	NS	NS	NS	NS
Interaction		NS	NS	NS	NS	NS	NS	NS
CV (%) Error		35.64	36.51	9.11	14.20	2.94	2.86	14.43

Table 237: Response of promising genotypes (AVT-II) of winged bean at Rahuri.

S. No	Treatment	Seed yield (q/ha)	Green pod Yield (q/ha)	Days to 50% Flow.	Pod length (cm)	Days to Maturity	No. of seeds/pod	100 Seed weight (g)
1	V1 S1 F1	17.66	122.46	77.33	18.10	178.67	12.00	30.00
2	V1 S1 F2	16.93	146.92	76.67	18.47	180.33	11.67	30.00
3	V1 S1 F3	16.52	132.37	78.00	16.60	178.67	13.00	29.00
4	V2 S1 F1	15.77	55.65	81.67	17.53	181.33	12.00	29.50
5	V2 S1 F2	16.79	98.04	80.00	18.63	177.33	11.00	30.00
6	V2 S1 F3	16.62	71.91	82.33	17.37	184.00	13.67	32.00
7	V3 S1 F1	16.02	110.54	80.00	15.53	179.00	12.00	30.50
8	V3 S1 F2	17.81	80.80	79.67	15.00	178.33	10.33	30.00
9	V3 S1 F3	15.63	105.07	78.33	16.77	176.33	11.00	33.00
10	V1 S2 F1	18.34	143.34	76.33	13.50	174.67	11.67	29.00
11	V1 S2 F2	16.05	137.25	80.67	16.37	175.67	13.00	31.00
12	V1 S2 F3	17.63	101.92	75.00	15.20	173.00	10.67	28.00
13	V2 S2 F1	14.34	49.03	81.67	18.40	181.33	13.33	26.83
14	V2 S2 F2	18.10	84.36	85.67	18.13	184.33	11.33	30.50
15	V2 S2 F3	14.11	57.68	81.00	18.70	183.67	12.67	28.50
16	V3 S2 F1	10.59	42.95	79.33	17.53	181.00	12.00	28.50
17	V3 S2 F2	15.44	65.10	79.00	17.97	187.00	12.33	28.50
18	V3 S2 F3	15.07	85.17	82.00	17.57	185.33	11.33	31.00
19	V1 S3 F1	16.51	164.21	78.00	17.27	179.33	11.00	33.50
20	V1 S3 F2	20.45	198.86	79.00	17.27	181.67	14.33	34.17
21	V1 S3 F3	17.52	194.19	79.67	17.70	181.00	11.00	30.00
22	V2 S3 F1	16.17	153.91	85.00	18.13	184.33	10.67	29.00
23	V2 S3 F2	16.24	155.29	82.67	20.30	181.33	10.67	28.00
24	V2 S3 F3	16.25	100.40	80.67	21.70	184.67	11.00	22.50
25	V3 S3 F1	15.64	108.54	78.33	17.80	178.00	11.33	31.50
26	V3 S3 F2	16.36	132.89	82.67	15.80	178.00	12.00	32.00
27	V3 S3 F3	16.25	120.13	81.67	16.60	175.00	11.67	22.50
Mean		16.33	111.81	80.09	17.40	180.12	11.80	29.59
S: Spacing								
S1		16.64	102.64	79.33	17.11	179.33	11.85	30.44
S2		15.52	85.20	80.07	17.04	180.67	12.04	29.09
S3		16.82	147.60	80.85	18.06	180.37	11.52	29.24
CD (0.05)		0.92	9.85	NS	NS	1.15	NS	0.12
V-Varieties								
V1		17.51	149.06	77.85	16.72	178.11	12.04	30.52
V2		16.04	91.81	82.30	18.77	182.48	11.81	28.54
V3		15.42	94.58	80.11	16.73	179.78	11.56	29.72
CD(0.05) Varieties		0.92	9.85	1.64	1.23	1.15	0.58	0.12
F: Fertilizer								
F1		15.67	105.63	79.74	17.09	179.74	11.78	29.81
F2		17.13	122.17	80.67	17.55	180.44	11.85	30.46
F3		16.18	107.65	79.85	17.58	180.19	11.78	28.50
CD(0.05)		0.92	9.85	NS	NS	NS	NS	0.12
CD(0.05)		2.76	29.56	4.91	3.68	3.44	1.75	0.37
Interaction								
CV (%) Error		10.33	16.13	3.74	12.91	1.17	9.07	0.77

Table 238: Response of different traits in amaranth to Sulphur fertilization at Ranichauri.

S. No.	Treatment	Plant height (cm)	Inflorescence length (cm)	10 ml seed weight (g)	Seed yield (q/ha)	Straw yield (q/ha)
1	F0V1	197.97	43.87	8.83	7.20	40.17
2	F0V2	204.60	51.30	9.47	8.53	47.10
3	F1V1	210.97	60.20	10.00	12.63	65.40
4	F1V2	217.53	61.83	10.77	16.40	72.60
5	F2V1	216.83	56.00	11.00	13.10	65.13
6	F2V2	230.50	63.27	11.30	16.30	71.83
7	F3V1	205.63	56.70	9.83	10.30	43.70
8	F3V2	213.67	55.17	10.20	11.80	57.60
Mean		212.21	56.04	10.18	12.03	57.94
Fertilizer						
F0		201.28	47.58	9.15	7.87	43.63
F1		214.25	61.02	10.38	14.52	69.00
F2		223.67	59.63	11.15	14.70	68.48
F3		209.65	55.93	10.02	11.05	50.65
Variety						
V1		207.85	54.19	9.92	10.81	53.60
V2		216.58	57.89	10.43	13.26	62.28
CD (0.05)						
Fertilizer		8.16	8.99	NS	2.22	10.06
Variety		NS	NS	NS	0.95	4.92
Factor(V)at same level of F		NS	NS	NS	NS	NS
Factor(F)at same level of V		NS	NS	NS	NS	NS
CV(%) Error						
Main plot		2.67	11.14	12.42	12.78	12.06
Sub plot		6.99	7.66	6.03	8.26	8.88

Table 239: Yield and economics of different traits in amaranth to Sulphur fertilization at Ranichauri

S. No.	Treatments	Mean of 2018& 2019		Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net profit (Rs./ha)	B:C ratio
		Seed yield (q/ha)	Straw yield (q/ha)				
1	F0V1	8.0	40.7	11832	48130	36298	3.1
2	F0V2	9.2	47.8	11832	55310	43478	3.7
3	F1V1	13.2	66.7	15276	79080	63804	4.2
4	F1V2	16.8	74.1	15276	98810	83534	5.5
5	F2V1	13.6	66.4	16436	81280	64844	3.9
6	F2V2	16.4	73.3	16436	96650	80214	4.9
7	F3V1	10.8	48.3	14416	63660	49244	3.4
8	F3V2	12.9	60.6	14416	76620	62204	4.3

Table 240: Effect of Different levels of Management on Grain Amaranth genotypes at Bengaluru.

S. No.	Treatments	Plant Height (cm)	Panicle Length (cm)	Grain yield (q/ha)	Seed volume (g/10 ml)	Cost of Cultivation	Gross returns	Net returns	B:C ratio
1	V1F1	95.27	37.20	11.16	8.33	25256	55787	30531	1.21
2	V1F2	109.60	48.53	13.38	8.00	26588	66915	40327	1.52
3	V1F3	122.00	53.33	15.83	9.00	27898	79150	51252	1.84
4	V2F1	99.67	30.07	11.25	9.00	25256	56241	30985	1.23
5	V2F2	114.67	36.47	15.05	8.00	26588	75229	48641	1.83
6	V2F3	120.87	39.93	16.46	8.33	27898	82305	54407	1.95
7	V3F1	95.00	48.07	11.06	8.67	25256	55281	30025	1.19
8	V3F2	105.00	50.80	13.54	9.67	26588	67684	41096	1.55
9	V3F3	115.00	58.33	14.54	8.00	27898	72702	44804	1.61
Mean		108.56	44.75	13.58	8.56	26581	67922	41341	1.55
A Variety									
V1		108.96	46.36	13.46	8.44	26581	67284	40703	1.52
V2		111.73	35.49	14.25	8.44	26581	71258	44678	1.67
V3		105.00	52.40	13.04	8.78	26581	65223	38642	1.45
B Fertilizer									
F1		96.64	38.44	11.15	8.67	25256	55770	30514	1.21
F2		109.76	45.27	13.99	8.56	26588	69943	43355	1.63
F3		119.29	50.53	15.61	8.44	27898	78052	50154	1.80
CD (0.05)									
Variety		NS	NS	NS	NS		NS	NS	NS
Fertilizer		NS	NS	1.50	NS		7518	7518.	0.28
F at same level of V		13.07	13.07	NS	0.79		NS	NS	NS
V at same level of F		15.72	15.72	NS	0.74		NS	NS	NS
CV(%) Error									
Variety Main Plot		8.83	8.83	17.32	3.89		17.31	28.43	28.27
Fertilizer Sub plot		5.78	5.78	10.65	4.78		10.66	17.51	17.11

Table 241: Spine gourd equivalent yield & economics to different intercrop systems at Ambikapur.

Treatments	Spine gourd Equivalent Yield (q/ha)		Cost of Cultivation (Rs./ha)		Gross Returns (Rs./ha)		Net Returns (Rs./ha)		B:C Ratio	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
Spine gourd Sole	49.63	52.66	147700	149000	744375	789900	596675	640900	4.0	4.3
Spine gourd + Tomato	75.83	79.62	149770	150720	1137395	1194150	987626	1043430	6.6	6.9
Spine gourd + Brinjal	88.75	93.84	149350	150700	1331224	1407600	1181874	1256900	7.9	8.3
Spine gourd + Chilli	70.33	74.86	149365	150715	1054896	1122900	905531	972185	6.1	6.4
Spine gourd + Okra	66.46	76.64	151050	152400	996849	1149600	845799	997200	5.6	6.5
SEm±	0.73	1.28	-	-	-	-	-	-	-	-
CD (P=0.05)	2.10	3.71	-	-	-	-	-	-	-	-
CV (%) Error	5.17	8.47	-	-	-	-	-	-	-	-

Table 242: Growth and yield of grain amaranth as influenced by levels of phosphorous fertilizer and bio fertilizers at Bengaluru.

S.No.	Treatments	Plant height (cm)	Panicle length (cm)	Grain yield (q/ha)	Grain yield advantage (q/ha)	Agronomic efficiency of P	10 ml seed weight (g)	Cost of cultivation	Gross return	Net return	B:C ratio
1	V1S1	90.00	30.00	10.41	0.00	0.00	8.00	27589	52033	24444	0.89
2	V1S2	95.00	36.67	12.70	2.29	11.45	8.33	28864	63483	34619	1.20
3	V1S3	111.00	43.00	15.29	4.88	16.28	8.67	29589	76450	46861	1.58
4	V1S4	113.33	45.00	17.29	6.88	34.42	8.67	29364	86450	57086	1.94
5	V1S5	115.00	46.67	18.70	8.29	27.63	9.00	27589	93483	65894	2.39
6	V1S6	103.33	38.33	13.45	3.04	0.00	8.67	27986	67233	39247	1.40
7	V1S7	120.00	45.67	18.11	7.70	19.26	8.00	30856	90550	59694	1.93
8	V2S1	100.00	47.33	9.61	0.00	0.00	8.67	27589	48033	20444	0.74
9	V2S2	105.00	53.00	11.22	1.61	8.05	8.33	28864	56083	27219	0.94
10	V2S3	108.33	58.33	12.62	3.01	10.04	8.67	29589	63100	33511	1.13
11	V2S4	118.33	61.67	15.40	5.79	28.97	8.67	29364	77000	47636	1.62
12	V2S5	123.33	65.47	16.47	6.87	22.89	9.33	27589	82367	54778	1.99
13	V2S6	111.67	51.67	11.89	2.28	0.00	8.67	27986	59443	31457	1.12
14	V2S7	120.00	59.00	16.07	6.46	16.15	8.67	30856	80333	49477	1.60
Mean		109.60	48.70	14.23	4.22	13.94	8.60	28834	71146	42312	1.46
A	Genotypes										
	V1	106.81	40.76	15.13	4.73	15.58	8.48	28834	75669	46835	1.62
	V2	112.38	56.64	13.32	3.72	12.30	8.71	28834	66623	37789	1.31
B	Phosphorous levels										
	S1	95.00	38.67	10.01	0.00	0.00	8.33	27589	50033	22444	0.81
	S2	100.00	44.83	11.96	1.95	9.75	8.33	28864	59783	30919	1.07

S.No.	Treatments	Plant height (cm)	Panicle length (cm)	Grain yield (q/ha)	Grain yield advantage (q/ha)	Agronomic efficiency of P	10 ml seed weight (g)	Cost of cultivation	Gross return	Net return	B:C ratio
	S3	109.67	50.67	13.96	3.95	13.16	8.67	29589	69775	40186	1.36
	S4	115.83	53.33	16.35	6.34	31.69	8.67	29364	81725	52361	1.78
	S5	119.17	56.07	17.59	7.58	25.26	9.17	27589	87925	60336	2.19
	S6	107.50	45.00	12.67	2.66	0.00	8.67	27986	63338	35352	1.26
	S7	120.00	52.33	17.09	7.08	17.70	8.33	30856	85442	54586	1.77
CD(.05)											
	Varieties	9.21	13.33	1.07	0.75	2.49	1.25		5354	5354	0.18
	Fertilizers	8.59	5.87	0.70	0.70	3.16	0.46		3513	3513	0.12
	CD(.05) AB	12.15	8.30	0.99	0.99	4.48	0.65		4969	4969	0.17
	CD(.05) (ABW)	3.57	8.77	2.83	2.74	1.25	3.76		2610	2610	13.35
CV(%) Error											
	Main Plot	6.33	20.61	5.67	13.36	13.43	10.92		6	10	9.48
	Sub plot	6.58	10.11	4.14	13.97	19.06	4.46		4	7	7.04

NOTE: V₁: Suvarna V₂: KBGA-4

S1- Control (Recommended dose of NK&S), S2- 20 kg P₂O₅/ha + Recommended dose of NK&S

S3- 30 kg P₂O₅/ha + Recommended dose of NK&S, S4- 20 kg P₂O₅/ha + PSB @ 2.5 kg/ha + VAM @ 2.5 kg/ha soil application +RD of NK&S,

S5- 30 kg P₂O₅/ha + PSB @ 2.5 kg/ha + VAM @ 2.5 kg/ha soil application + RD of NK&S, S6- PSB @ 2.5 kg/ha + VAM @ 2.5 kg/ha soil application alone + RD of NK&S, S7- Recommended dose of fertilizer (NPKS)

Table 243: Interaction effect of different spacing and fertilizer dosage on green fodder yield (q/ha) of Pillipesara at 50% flowering stage at Bhubaneswar.

Spacing	F1	F2	Mean	B:C Ratio
S1	141.36	165.74	153.55	1.61
S2	123.46	129.63	126.54	1.47
Avg.	132.41	147.69		
CD (0.05)Spacing(Main Plot)			24.37	
CD (0.05)Fertilizer (Sub Plot)			24.37	
CD (0.05)Spacing x fertilizer			34.47	

Table 244: Proximate Composition Analysis parameters of Pillipesara as affected by different treatments at Bhubaneswar.

Parameters	Values (as % DM basis)			
	T1-S1F1	T2-S1F2	T3-S2F1	T4-S2F2
Moisture	8.46	8.14	7.92	7.22
Crude Protein	8.76	9.25	9.99	8.30
Ether extract	0.78	0.62	0.79	0.71
Crude fiber	26.68	23.99	28.78	22.26
Total Ash	19.69	24.16	14.95	26.84
Acid insoluble Ash	14.33	19.01	9.13	21.36
M.E (K cal/kg)	1163	1198	1172	1148

4.2 CROP PROTECTION

Two experiments, namely screening of germplasm, IVT and AVT entries against major insect-pests and diseases in grain amaranth and buckwheat crops and integrated pest management in grain amaranth crop were formulated to be conducted at 3 locations i.e. Bengaluru, Mettupalayam and Shimla during *kharif* 2019. The results of trials were received from all the centres. Centre wise details of crop protection experiments allotted/conducted on different potential crops during *kharif* 2019 are given in Table 245.

Experiment 1: Screening of germplasm, IVT and AVT entries against major insect-pests and diseases

This experiment was planned in order to identify the sources of resistance in IVT, AVT entries and germplasm against major insect-pests and diseases on grain amaranth and buckwheat at different locations. The details of results have been given below:

Grain amaranth

Insect-pests

At Mettupalayam and Shimla locations, no insect-pests or diseases incidence was reported in any germplasm/ varietal trials entries during *Kharif* 2019. At Bengaluru location, various trials were conducted to evaluate grain amaranth germplasm, IVT and AVT entries against major insect-pests and diseases. Seven IVT entries of grain amaranth along with 5 checks were screened against stem weevil insect, sucking insect-pests (aphid) and defoliators (leaf eating caterpillars) (Table 246). Incidence of stem weevil, sucking insect pests and defoliators was recorded in almost all the entries. The stem weevil incidence was lower in all entries screened compared to check entries and population ranged from 0.33 to 1.00 per plant. Sucking insect-pests population ranged from 0.33 to 2.00 per six leaves per plant while defoliators population ranged from 0.33 to 1.67 per plant. Overall, two IVT entries namely VL-110 and VL-115 were found promising against sucking insect pests and defoliators.

Three AVT entries of grain amaranth along with 4 checks were screened for major insect pests during *Kharif* 2019 (Table 247). The results revealed that the entries screened showed lesser incidence of stem weevil compared to check entries. Similarly, the sucking insect-pests incidence was also lower and population ranged from 0.33 to 1.67 per plant in the trial. The

defoliators population ranged from 0.33 to 1.67 per plant. AVT entry namely SKGA-110 was found promising.

Fifty-seven genotypes of grain amaranth germplasm (GP-2) along with check were screened against major insect pests of grain amaranth (Table 248). The stem weevil population was recorded less in almost all the germplasm lines and population ranged from 0.00 to 0.33 per plant. The sucking insect-pests population ranged from 0.00 to 1.67 per six leaves per plant. The defoliators population ranged from 0.00 to 1.33 per plant.

Forty-six grain amaranth germplasm (GP-1) were screened against major insect pests of grain amaranth during *kharif* 2019 (Table 249). The stem weevil population was recorded less in almost all the germplasm and population ranged from 0.00 to 0.33 per plant. The sucking insect-pests population ranged from 0.00 to 1.67 per six leaves per plant. The defoliator's population ranged from 0.00 to 1.00 per plant.

Diseases

At Bengaluru, seven IVT entries of grain amaranth along with 5 checks were screened against various diseases (Table 250). All the entries screened recorded zero per cent incidence of leaf spot and leaf rust except few check varieties like GA-2, KBGA-4 and BGA 4-9 where leaf spot disease incidence was recorded 1.37 per cent in BGA 4-9 while leaf rust incidence was recorded from 0.67 to 4.17 per cent. Similarly, incidence of phyllody was also zero per cent in all IVT entries except check variety GA-2 which recorded 0.67 per cent disease incidence. Among the three AVT entries screened against various diseases along with 5 checks (Table 251), per cent incidence of leaf spot disease ranged from 0.46 to 2.78 while leaf rust incidence was noticed only in SKGPA-110, BGA 4-9 (C) and KBGA-4 (C). However, zero incidence of phyllody was recorded in all genotypes except KBGA-14 and GA-2 where incidence recorded was 1.39 and 1.85 per cent respectively. It was concluded that AVT entry namely SKGPA-87 was promising.

Among the fifty-eight germplasm accessions and checks (GP-2) screened under natural conditions, all entries have recorded zero per cent incidence of leaf spot disease except accession no. IC 21802 which recorded 8.33% disease incidence (Table 252). Similarly, all the germplasm evaluated recorded zero per cent leaf rust disease incidence. However, Phyllody was also not noticed in almost all genotypes except accessions number SKGPA 146, SKGPA 156, SKGPA

158 and GA-2 (check) where phyllody incidence was recorded 4.16, 4.16, 4.16 and 8.33 per cent, respectively.

Another set of fifty-two germplasm (GP-1) was screened under natural conditions. All the germplasm entries recorded 0 per cent incidence of leaf spot disease except accession no. IC 35491, IC 35545, IC 35549 and IC 35554 which recorded 4.16, 8.33, 4.16 and 4.16 per cent disease incidence, respectively (Table 253). Similarly, all the germplasm entries evaluated recorded zero percent leaf rust disease incidence. However, phyllody was also not noticed in almost all the entries except accessions number IC 35498 and IC 35554 which recorded 8.33 and 4.16 per cent disease respectively.

Buck wheat

Diseases

At Shimla, 7 IVT, 5 AVT-I and 2 AVT-II entries along with 4 checks were evaluated against powdery mildew disease incidence. Out of these, 4 IVT entries namely IC 24300, IC 26755, NIC 8817 and EC 125940, 2 AVT-I entries namely IC318859 and IC108508 and 2 AVT-II entries namely Sangla B-464 and IC 341589 were found free of powdery mildew disease incidence (Table 254). Out of 75 germplasm accessions evaluated along with 4 checks against powdery mildew disease incidence, 47 entries were found free of disease incidence. However, 10-20 per cent powdery mildew disease incidence was noticed on 28 genotypes (Table 255). It is further to note that 25 genotypes out of 75, namely IC 9879, IC 13140, IC 13144, IC 13191, IC 13410, IC 13411, IC 13412, IC 14253, IC 16556, IC 18751, IC 24300, IC 26589, IC 26590, IC 26594, IC 37282, IC37295, IC 37296, IC 37303, IC 42427, IC 47458, IC 49661, IC 49663, IC 49668, IC 49671 and EC 104035 were also evaluated during *kharif* 2018 against powdery mildew disease at Shimla location. Based on 2 years data on the disease reaction it was concluded that 14 genotypes namely IC 13140, IC 13410, IC 13412, IC 16556, IC 24300, IC 26590, IC 26594, IC 37282, IC 37296, IC 37303, IC 42427, IC 49661, IC 49663 and EC 104035 recorded zero per cent incidence of powdery mildew disease in both the years.

Experiment 2: Integrated pest management in grain amaranth crop

Seven insecticides namely Imidacloprid 17.8% SL @ 20g a.i./ha, Thiamethoxam 25% WDG @ 25 g a.i./ha, Acephate 75 WP% @ 300 g a.i./ha, Acetamiprid 20% WP @ 20 g a.i./ha,

Neem Formulation (Azadiractin) 1500 ppm @ 1500 ml/ha, Neem seed kernel extract (NSKE) 5% @ 5 ml/liter of water and Neem oil @ 2 ml/liter of water along with control were evaluated against sucking insect-pests of grain amaranth at Bengaluru location (Table 256). Pre-treatment observation counts of leafhoppers revealed that there were no significant differences among the treatments. Thiomethoxam 25 WDG sprayed plot recorded significantly lowest population of leaf hoppers (1.33) and was at par with the plots sprayed with Acephate 75 WP (1.40), Acetamaprid 20 WP (1.47), NSKE and Neem oil (1.53) during 1 day after spray (DAS). Similarly, Thiomethoxam 25 WDG sprayed plot recorded significantly lowest population of leaf hoppers (0.40) and was at par with the plots sprayed with Acephate (0.47) during 3 DAS. Imidachloprid 17.8 SL and Acephate 75 WP sprayed plots recorded lowest population of leaf hoppers (0.33 each) and was at par with Thiomethoxam 25 WDG and Acetamiprid 20 WP treated plot (0.40 each), Neem oil (0.47) and NSKE (0.53) during 7 DAS. Similarly, Imidachloprid 17.8 SL sprayed plot recorded lowest population of leaf hopper (0.07) and was at par with Acephate 75 WP and Acetamaprid 20 WP (0.20), thiomethoxam 25 WDG and NSKE 5% (0.33) and Neem oil (0.40) during 10 DAS. Significantly higher yield (19.54 q/ha) was recorded under Acephate75 WP% @ 300 g a.i./ha followed by Neem seed kernel extract (NSKE) 5% @ 5 ml/liter of water and Imidacloprid 17.8% SL @ 20g a.i./ha. The cost benefit ratio was also highest under Acephate75 WP 75% @ 300 g a.i./ha (1:3.19) followed by Imidacloprid 17.8% SL @ 20g a.i./ha (1:3.05) and Neem seed kernel extract (NSKE) 5% @ 5 ml/liter of water (1:2.97).

Six insecticides namely Indoxacarb 15.8% EC@ 50 g a.i./ha, Spinosad45% SC @ 75 g a.i./ha, Profenophos 50% EC@ 750 g a.i./ha, Chlorpyrifos 20% EC @ 500 g a.i./ha, *Bacillus thuringiensis*- K @ 1 kg/ha and Emamectin benzoate 5% SG @ 11 g a.i./ha along with control were evaluated against defoliator insect-pests at Bengaluru location (Table 257). Pre-treatment observation counts of dofoliators revealed that there were no significant differences among the treatments. Indoxacarb 15.8% EC and Profenophos 50% EC sprayed plot recorded significantly lowest population of defoliators (1.00) over rest of the treatments during 1 DAS. Emamectin benzoate 5 SG sprayed plot recorded significantly lowest population of defoliators (0.27) and was at par with Profenophos 50 EC and Indoxacarb 15.8 EC sprayed plots (0.4) during 3 DAS. Similarly, Emamectin benzoate 5 SG sprayed plot recorded significantly lowest population of defoliators (0.13) and was at par with plots sprayed with Indoxacarb 15.8 EC (0.27) and

Profenophos 50 EC (0.33) during 7 DAS. Defoliators were totally absent in Emamectin benzoate treated plot and was at par with Spinosad 45 SC (0.07), Profenophos 50 EC (0.13), Chlorpyrifos 20 EC (0.20) and *Bacillus thuringiensis* (0.27) during 10 DAS. The data revealed that grain yield was almost 20% higher under the treatment *i.e.* Profenophos 50% EC@ 750 g a.i./ha and Emamectin benzoate 5% SG @ 11 g a.i./ha while 18% higher yield under the treatment *i.e.* Spinosad45% SC @ 75 g a.i./ha over the control. The cost benefit ratio was highest under the treatment *i.e.* Spinosad45% SC @ 75 g a.i./ha (1:2.98) followed by Profenophos 50% EC@ 750 g a.i./ha (1:2.96) and Emamectin benzoate 5% SG @ 11 g a.i./ha (1:2.96).

Six fungicides namely Tebuconazole 25.9% EC @ 125 g a.i./ha, Hexaconazole 5% EC @ 50 g a.i./ha, Propiconazole 25% EC @ 125 g a.i./ha, Carbendazim 50% WP @ 250 g a.i./ha, *Trichoderma viridae* 1% WP @ 2.5 kg/ha for soil as well as foliar treatment and *Trichoderma harzianum* 1% WP @ 5 kg/ha for soil as well as foliar treatment along with control were evaluated against major diseases of grain amaranth crop at Bengaluru location (Table 258). Leaf spot and leaf rust per cent disease incidence was significantly lower under the treatment *i.e.* *Trichoderma viridae* 1% WP @ 2.5 kg/ha for soil as well as foliar treatment (2.55 and 2.42, respectively) followed by Propiconazole 25% EC @ 125 g a.i./ha (2.75 and 0.87, respectively) and Tebuconazole 25.9% EC @ 125 g a.i./ha (3.25 and 2.42). However, per cent disease incidence of phyllody is almost similar between the treatments as there is no much variation in the disease incidence. Significantly higher grain yield was recorded in Propiconazole 25% EC @ 125 g a.i./ha (18.90 q/ha) which is at par with Carbendazim 50% WP @ 250 g a.i./ha (17.80 q/ha) and *Trichoderma viridae* 1% WP @ 2.5 kg/ha for soil as well as foliar treatment as compared to control. The cost benefit ratio was highest under the treatment *Trichoderma viridae* 1% WP @ 2.5 kg/ha for soil as well as foliar treatment (1:3.00) followed by Propiconazole 25% EC @ 125 g a.i./ha (1:2.98).

Table 245: Centre wise details of crop protection experiments allotted on different potential crops during *kharif* 2019

Sr. No.	Experiments	Crops	Bengaluru	Mettupalayam	Shimla	Total
1	Screening of germplasm, IVT and AVT entries against major insect pests and diseases of potential crops	Grain amaranth	1	1	1	3
		Buckwheat	-	-	1	1
2	Integrated pest management in potential crop	Grain amaranth	1	-		1
	No. of trial allotted/ (conducted)		2 (2)	1 (1)	2 (2)	5 (5)

Table 246: Screening of IVT entries against major insect-pests at Bengaluru

Sr. No.	Genotype	Insect-pests incidence/ plant		
		Stem weevil	Sucking insects (aphids)	Defoliators (leaf eating caterpillars)
1.	SKGPA-92	0.67	0.67	0.67
2.	SKGPA-73	0.33	1.00	1.33
3.	SKGPA 61	0.33	0.67	1.33
4.	SKNA 808	0.33	0.67	1.00
5.	VL-110	0.33	0.33	0.33
6.	VL-115	0.33	0.33	1.00
7.	KBGA-15	1.00	2.00	1.67
8.	Suvarna (c)	0.67	1.33	1.33
9.	GA-2 (c)	1.00	0.67	1.00
10.	BGA-2 (c)	0.67	0.33	1.00
11.	BGA-4-9 (c)	1.00	0.67	1.67
12.	KBGA-4 (c)	0.67	1.33	1.33

Table 247: Screening of AVT-I & II entries of grain amaranth against major insect-pests at Bengaluru

Sr. No.	Genotype	Incidence of insect-pests/ plant		
		Stem weevil	Sucking insects (aphid)	Defoliators (leaf eating caterpillar)
1	SKGPA-87	0.33	0.67	0.67
2	SKGPA-110	0.33	0.33	0.33
3	KBGA-14	0.67	0.33	1.00
4	GA-2 (c)	1.00	1.00	1.67
5	Suvarna (c)	1.33	0.67	1.33
6	BGA-2 (c)	1.00	0.67	1.33
7	BGA-4-9 (c)	1.33	1.00	1.67
8	KBGA-4(c)	1.00	1.67	1.33

Table 248: Screening of grain amaranth Germplasm (GP-2) against major insect pests at Bengaluru

Sr. No.	Acc. No.	Insect-pests incidence/ plant		
		Stem weevil	Sucking insects (aphid)	Defoliators (leaf eating caterpillar)
1	IC001491	0.00	0.00	0.33
2	IC001493	0.33	0.00	0.00
3	IC5527	0.00	1.00	0.67
4	IC5564	0.33	0.00	1.00
5	IC5994	0.00	0.00	0.00
6	IC6646	0.00	0.00	1.00
7	IC21789	0.00	0.00	0.00
8	IC21790	0.00	0.00	0.00
9	IC21790A	0.67	1.33	0.67
10	IC21792	0.00	0.00	0.67
11	IC21793	0.00	0.00	0.00
12	IC21802	0.00	0.00	0.00
13	IC21802A	0.00	0.00	0.00
14	IC21803	0.67	0.00	1.00
15	IC21804	0.00	1.67	1.00
16	IC21805	0.33	0.00	0.00
17	IC21806	0.00	0.00	0.00
18	IC21940	0.00	0.00	0.00

Sr. No.	Acc. No.	Insect-pests incidence/ plant		
		Stem weevil	Sucking insects (aphid)	Defoliators (leaf eating caterpillar)
19	IC21941	0.33	1.00	0.67
20	IC21943	0.67	1.33	1.00
21	IC21965	0.00	0.00	0.67
22	IC21970	0.00	0.00	0.67
23	IC32179	0.00	0.00	0.00
24	IC32189	0.00	0.00	0.00
25	IC32191	0.33	0.00	0.00
26	IC32192	0.33	1.00	0.67
27	IC32196	0.00	0.00	0.00
28	IC33861	0.00	1.00	0.00
29	IC35196	0.00	0.00	0.00
30	IC35361	0.33	0.00	0.67
31	IC35362	0.00	0.33	0.00
32	IC35363	0.00	0.00	0.00
33	IC35364	0.00	0.00	0.00
34	IC35365	0.67	1.33	1.00
35	IC35366	0.33	0.00	0.00
36	IC35371	0.00	0.00	0.00
37	SKGPA144	0.33	0.00	0.00
38	SKGPA145	0.00	0.00	0.00
39	SKGPA146	0.00	0.33	0.33
40	SKGPA147	0.00	0.00	0.00
41	SKGPA148	0.00	0.00	0.00
42	SKGPA149	0.33	1.00	0.67
43	SKGPA150	0.67	1.33	1.00
44	SKGPA152	0.00	0.00	0.67
45	SKGPA153	0.00	0.00	0.00
46	SKGPA154	0.33	1.00	1.33
47	SKGPA155	0.33	1.00	0.67
48	SKGPA156	0.00	0.00	0.00
49	SKGPA157	0.33	0.00	0.00
50	SKGPA158	0.00	0.33	0.33
51	SKGPA159	0.00	0.00	0.67
52	SKGPA160	0.00	0.00	0.00

Sr. No.	Acc. No.	Insect-pests incidence/ plant		
		Stem weevil	Sucking insects (aphid)	Defoliators (leaf eating caterpillar)
53	SKGPA161	0.00	0.00	0.00
54	SKGPA162	0.33	1.00	0.67
55	SKGPA163	0.33	0.00	0.00
56	KBGA-4	0.00	1.00	0.00
57	SKGPA-95	0.00	0.33	0.33
	GA-2 (c)	0.05	0.05	0.15
	Suvarna (c)	0.17	1.00	0.50
	BGA-2 (c)	0.25	0.92	0.67
	BGA 4-9 (c)	0.00	1.11	0.89
	KBGA-1 (c)	0.00	1.01	1.22

Table 249. Screening of grain amaranth germplasm (GP 1) against insect pests at Bengaluru

Sr. No.	Accession No.	Insect-pests incidence/ plant		
		Stem weevil	Sucking insects (aphid)	Defoliators (leaf eating caterpillar)
1	IC35481	0.00	1.00	0.67
2	IC35482	0.00	0.00	0.00
3	IC35483	0.00	1.00	0.00
4	IC35484	0.00	0.00	0.67
5	IC35485	0.00	1.33	0.00
6	IC35486	0.00	0.00	0.33
7	IC35488	0.00	0.00	0.00
8	IC35489	0.00	0.00	0.00
9	IC35490	0.33	0.00	1.00
10	IC35491	0.00	0.00	0.67
11	IC35493	0.00	1.33	0.33
12	IC35495	0.00	0.00	0.00
13	IC35496	0.33	1.00	0.67
14	IC35497	0.00	0.00	0.00
15	IC35498	0.00	1.00	1.00
16	IC35501	0.33	0.00	0.00
17	IC35502	0.00	0.00	0.33
18	IC35503	0.00	1.00	0.33
19	IC35504	0.33	0.00	0.00

Sr. No.	Accession No.	Insect-pests incidence/ plant		
		Stem weevil	Sucking insects (aphid)	Defoliators (leaf eating caterpillar)
20	IC35505	0.00	0.00	0.00
21	IC35511	0.33	0.00	0.33
22	IC35518	0.00	1.33	0.00
23	IC35519	0.00	0.33	0.00
24	IC35520	0.33	0.00	0.00
25	IC35521	0.00	1.67	0.00
26	IC35523	0.33	1.00	0.67
27	IC35524	0.67	1.33	1.00
28	IC35527	0.00	0.00	0.67
29	IC35529	0.00	1.33	0.33
30	IC35530	0.33	0.00	0.33
31	IC35531	0.33	1.00	0.67
32	IC35533	0.00	0.00	0.33
33	IC35537	0.00	1.67	0.33
34	IC35538	0.00	0.00	0.00
35	IC35539	0.00	0.00	0.33
36	IC35541	0.33	1.67	1.00
37	IC35542	0.00	0.33	0.00
38	IC35545	0.00	0.00	0.00
39	IC35548	0.33	0.00	0.00
40	IC35549	0.67	1.33	1.00
41	IC35551	0.00	0.00	0.00
42	IC35552	0.33	1.00	1.00
43	IC35554	0.33	1.00	0.67
44	IC35560	0.00	0.00	0.00
45	KBGA-4	0.33	0.00	0.00
46	KBGA-15	0.00	0.00	0.33
	GA-2 (c)	0.05	0.05	0.15
	Suvarna (c)	0.17	1.00	0.50
	BGA-2 (c)	0.25	0.92	0.67
	BGA 4-9 (c)	0.00	1.11	0.89
	KBGA-1 (c)	0.00	1.01	1.22

Table 250: Screening of IVT entries of grain amaranth against disease incidence at Bengaluru

Sr. No.	Accession No.	% disease incidence		
		Leaf spot	Leaf rust	Phyllody
1	SKGPA-92	0.00	0.00	0.00
2	SKGPA-73	0.00	0.00	0.00
3	SKGPA 61	0.00	0.00	0.00
4	SKNA 808	0.00	0.00	0.00
5	VL-110	0.00	0.00	0.00
6	VL-115	0.00	0.00	0.00
7	KBGA-15	0.00	0.00	0.00
8	Suvarna (c)	0.00	0.00	0.00
9	GA-2 (c)	0.00	2.08	0.67
10	BGA-2 (c)	0.00	0.00	0.00
11	BGA-4-9 (c)	1.37	4.17	0.00
12	KBGA-4 (c)	0.00	0.67	0.00

Table 251: Screening of AVT-I and II entries of grain amaranth genotypes against disease incidence at Bengaluru

Sr. No.	Genotype	% disease incidence		
		Leaf spot	Leaf rust	Phyllody
1	SKGPA-87	0.92	0.00	0.00
2	SKGPA-110	2.78	0.92	0.00
3	KBGA-14	0.92	0.00	1.39
4	GA-2 (c)	0.00	0.00	1.85
5	Suvarna (c)	0.00	0.00	0.00
6	BGA-2 (c)	0.92	0.00	0.00
7	BGA-4-9 (c)	0.46	2.31	0.00
8	KBGA-4(c)	0.00	1.85	0.00

Table 252: Screening of grain amaranth Germplasm (GP-2) against diseases at Bengaluru

Sr. No.	Acc. No.	% disease incidence		
		Leaf spot	Leaf rust	Phyllody
1	IC001491	0.00	0.00	0.00
2	IC001493	0.00	0.00	0.00
3	IC5527	0.00	0.00	0.00
4	IC5564	0.00	0.00	0.00
5	IC5994	0.00	0.00	0.00
6	IC6646	0.00	0.00	0.00
7	IC21789	0.00	0.00	0.00
8	IC21790	0.00	0.00	0.00
9	IC21790A	0.00	0.00	0.00
10	IC21792	0.00	0.00	0.00
11	IC21793	0.00	0.00	0.00
12	IC21795	0.00	0.00	0.00
13	IC21802	8.33	0.00	0.00
14	IC21802A	0.00	0.00	0.00
15	IC21803	0.00	0.00	0.00
16	IC21804	0.00	0.00	0.00
17	IC21805	0.00	0.00	0.00
18	IC21806	0.00	0.00	0.00
19	IC21940	0.00	0.00	0.00
20	IC21941	0.00	0.00	0.00
21	IC21943	0.00	0.00	0.00
22	IC21965	0.00	0.00	0.00
23	IC21970	0.00	0.00	0.00
24	IC32179	0.00	0.00	0.00
25	IC32189	0.00	0.00	0.00
26	IC32191	0.00	0.00	0.00
27	IC32192	0.00	0.00	0.00
28	IC32196	0.00	0.00	0.00
29	IC33861	0.00	0.00	0.00
30	IC35196	0.00	0.00	0.00
31	IC35361	0.00	0.00	0.00
32	IC35362	0.00	0.00	0.00
33	IC35363	0.00	0.00	0.00
34	IC35364	0.00	0.00	0.00
35	IC35365	0.00	0.00	0.00
36	IC35366	0.00	0.00	0.00
37	IC35371	0.00	0.00	0.00
38	SKGPA144	0.00	0.00	0.00

Sr. No.	Acc. No.	% disease incidence		
		Leaf spot	Leaf rust	Phyllody
39	SKGPA145	0.00	0.00	0.00
40	SKGPA146	0.00	0.00	4.16
41	SKGPA147	0.00	0.00	0.00
42	SKGPA148	0.00	0.00	0.00
43	SKGPA149	0.00	0.00	0.00
44	SKGPA150	0.00	0.00	0.00
45	SKGPA152	0.00	0.00	0.00
46	SKGPA153	0.00	0.00	0.00
47	SKGPA154	0.00	0.00	0.00
48	SKGPA155	0.00	0.00	0.00
49	SKGPA156	0.00	0.00	4.16
50	SKGPA157	0.00	0.00	0.00
51	SKGPA158	0.00	0.00	4.16
52	SKGPA159	0.00	0.00	0.00
53	SKGPA160	0.00	0.00	0.00
54	SKGPA161	0.00	0.00	0.00
55	SKGPA162	0.00	0.00	0.00
56	SKGPA163	0.00	0.00	0.00
57	KBGA-4	0.00	0.00	0.00
58	SKGPA-95	0.00	0.00	0.00
	GA-2 (c)	0.00	0.00	2.08
	Suvarna (c)	0.00	0.00	0.00
	BGA-2 (c)	0.00	0.00	0.00
	BGA 4-9 (c)	0.00	0.00	0.00
	KBGA-1 (c)	0.00	0.00	0.00

Table 253. Screening of grain amaranth germplasm (GP 1) against diseases at Bengaluru

Sr. No.	Accession	% disease incidence		
		Leaf spot	Leaf rust	Phyllody
1	IC35481	0.00	0.00	0.00
2	IC35482	0.00	0.00	0.00
3	IC35483	0.00	0.00	0.00
4	IC35484	0.00	0.00	0.00
5	IC35485	0.00	0.00	0.00
6	IC35486	0.00	0.00	0.00
7	IC35488	0.00	0.00	0.00
8	IC35489	0.00	0.00	0.00
9	IC35490	0.00	0.00	0.00
10	IC35491	4.16	0.00	0.00
11	IC35493	0.00	0.00	0.00

Sr. No.	Accession	% disease incidence		
		Leaf spot	Leaf rust	Phyllody
12	IC35495	0.00	0.00	0.00
13	IC35496	0.00	0.00	0.00
14	IC35497	0.00	0.00	0.00
15	IC35498	0.00	0.00	8.33
16	IC35501	0.00	0.00	0.00
17	IC35502	0.00	0.00	0.00
18	IC35503	0.00	0.00	0.00
19	IC35504	0.00	0.00	0.00
20	IC35505	0.00	0.00	0.00
21	IC35511	0.00	0.00	0.00
22	IC35518	0.00	0.00	0.00
23	IC35519	0.00	0.00	0.00
24	IC35520	0.00	0.00	0.00
25	IC35521	0.00	0.00	0.00
26	IC35523	0.00	0.00	0.00
27	IC35524	0.00	0.00	0.00
28	IC35527	0.00	0.00	0.00
29	IC35529	0.00	0.00	0.00
30	IC35530	0.00	0.00	0.00
31	IC35531	0.00	0.00	0.00
32	IC35533	0.00	0.00	0.00
33	IC35537	0.00	0.00	0.00
34	IC35538	0.00	0.00	0.00
35	IC35539	0.00	0.00	0.00
36	IC35541	0.00	0.00	0.00
37	IC35542	0.00	0.00	0.00
38	IC35545	8.33	0.00	0.00
39	IC35548	0.00	0.00	0.00
40	IC35549	4.16	0.00	0.00
41	IC35551	0.00	0.00	0.00
42	IC35552	0.00	0.00	0.00
43	IC35554	4.16	0.00	4.16
44	IC35560	0.00	0.00	0.00
45	KBGA-4	0.00	0.00	0.00
46	KBGA-15	0.00	0.00	0.00
	GA-2 (c)	0.00	0.00	2.08
	Suvarna (c)	0.00	0.00	0.00
	BGA-2 (c)	0.00	0.00	0.00
	BGA-4-9 (c)	0.00	0.00	0.00
	KBGA-1 (c)	0.00	0.00	0.00

Table 254. Screening of buckwheat IVT, AVT-I & II entries against powdery mildew disease at Shimla

Sr. No.	Acc. No.	R ₁	R ₂	R ₃	Total	Mean
	IVT					
1	IC 24300	0	0	0	0	0.00
2	IC 26755	0	0	0	0	0.00
3	IC 37296	20	10	10	40	13.33
4	IC 42412	10	10	10	30	10.00
5	IC 329195	10	0	10	20	6.67
6	NIC 8817	0	0	0	0	0.00
7	EC 125940	0	0	0	0	0.00
	AVT-I					
8	IC 329199	20	10	10	40	13.33
9	IC 318859	0	0	0	0	0.00
10	IC 108508	0	0	0	0	0.00
11	IC 37269	10	10	20	40	13.33
12	SANGLA B-444	0	0	0	0	0.00
	AVT-II					
13	SANGLA B-464	0	0	0	0	0.00
14	IC 341589	0	0	0	0	0.00
	HIMPRIYA(c)	0	0	0	0	0.00
	PRB-1(c)	0	0	0	0	0.00
	SHIMLA B-1(c)	0	0	0	0	0.00
	VL-7(c)	10	10	0	20	6.67

Table 255. Screening of buckwheat germplasm against powdery mildew disease at Shimla

Sr. No.	Accessions	Disease incidence (%)	Sr. No.	Accessions	Disease incidence (%)
1	IC 16552	0	13	IC 46160	0
2	IC 16580	0	14	IC 47929	10
3	IC 18757	0	15	IC 49160	0
4	IC 22426	10	16	IC 49655	0
5	IC 24301	0	17	IC 49663	0
6	IC 25999	0	18	IC 202266	10
7	IC 26552	10	19	IC 202293	10
8	IC 26583	0	20	IC 202465	0
9	IC 26597	10	21	EC 18173	0
10	IC 26600	0	22	EC 218739	0
11	IC 26755	0	23	EC 286380	0
12	IC 42458	0	24	EC 286382	20

Sr. No.	Accessions	Disease incidence (%)	Sr. No.	Accessions	Disease incidence (%)
25	EC 321800	0	53	IC 13144	10
26	EC 323724	0	54	IC 13191	10
27	EC 216630	10	55	IC 13410	0
28	EC 125940	0	56	IC 13411	20
29	IC 37304	10	57	IC 13412	0
30	IC 278957	0	58	IC 14253	10
31	IC 299059	20	59	IC 16556	0
32	IC 37284	0	60	IC 18751	10
33	IC 18049	0	61	IC 24300	0
34	IC 49659	0	62	IC 26589	20
35	IC 79238	0	63	IC 26590	0
36	IC 107285	10	64	IC 26594	0
37	IC 107966	0	65	IC 37282	0
38	IC 107982	0	66	IC 37295	10
39	IC 108501	10	67	IC 37296	20
40	IC 258239	10	68	IC 37303	0
41	IC 188669	10	69	IC 42427	0
42	IC 412489	0	70	IC 47458	10
43	IC 421601	0	71	IC 49661	0
44	IC 216622	0	72	IC 49663	0
45	IC 266743	10	73	IC 49668	10
46	IC 340829	10	74	IC 49671	20
47	IC 329950	0	75	EC104035	0
48	IC 319588	0		Himpriya (c)	2
49	IC 521297	0		VL-7 (c)	8
50	IC 319581	0		Shimla B-1 (c)	0
51	IC 9879	10		PRB-1 (c)	0
52	IC 13140	0			

Table 256: Evaluation of different insecticides against sucking insect pests of grain amaranth at Bengaluru

Sr. No	Treatments	No. of leaf hoppers/plant					Grain yield (q/ha)	Cost: Benefit Ratio
		Pre-Treatment	1 DAS	3 DAS	7 DAS	10 DAS		
T ₁	Imidacloprid 17.8% SL @ 20 g a.i./ha	2.80	1.73	0.67	0.33	0.07	18.62	1:3.05
T ₂	Thiamethoxam 25% WDG @ 25 g a.i./ha	2.40	1.33	0.40	0.40	0.33	17.70	1:2.92
T ₃	Acephate 75 WP% @ 300 g a.i./ha	2.40	1.40	0.47	0.33	0.20	19.54	1:3.19
T ₄	Acetamiprid 20% WP @ 20 g a.i./ha	2.40	1.47	0.47	0.40	0.20	17.16	1:2.83
T ₅	Neem Formulation (Azadiractin) 1500 ppm @ 1500 ml/ha formulation	2.60	1.67	0.80	0.73	0.47	17.18	1:2.75
T ₆	Neem seed kernel extract (NSKE) 5% @ 5 ml/litre of water	2.40	1.53	0.67	0.53	0.33	18.64	1:2.97
T ₇	Neem oil @ 2 ml/litre of water	2.40	1.53	0.67	0.47	0.40	17.94	1:2.88
T ₈	Control	2.87	2.93	3.07	3.20	3.27	15.49	1:2.74
S.Em ±		0.12	0.08	0.07	0.09	0.13	0.85	
C.D @ 5%		0.47 (NS)	0.25(*)	0.22(*)	0.27 (*)	0.39 (*)	2.53	
CV (%)		4.69	4.82	8.01	10.69	18.83	12.56	

Table 257. Evaluation of different insecticides against defoliator insect-pests of grain amaranth at Bengaluru

Sr. No.	Treatments	No. of leaf eating caterpillars/plant					Grain yield (q/ha)	Cost: Benefit Ratio
		Pre-Treatment	1 DAS	3 DAS	7 DAS	10 DAS		
T ₁	Indoxacarb 15.8% EC @ 50 g a.i./ha	2.13	1.00	0.40	0.27	0.13	16.06	1:2.56
T ₂	Spinosad 45% SC @ 75 g a.i./ha	2.27	1.20	0.60	0.40	0.07	16.21	1:2.98
T ₃	Profenophos 50% EC @ 750 g a.i./ha	2.00	1.00	0.40	0.33	0.13	18.58	1:2.96
T ₄	Chlorpyrifos 20% EC @ 500 g a.i./ha	2.00	1.40	0.80	0.40	0.20	17.50	1:2.80
T ₅	<i>Bacillus thuringiensis</i> - K @ 1 kg/ha	1.93	1.80	1.33	1.07	0.27	16.58	1:2.71
T ₆	Emamectin benzoate 5% SG @ 11 g a.i./ha	2.20	1.00	0.27	0.13	0.00	16.50	1:2.96
T ₇	Control	1.93	2.20	2.13	2.33	2.27	15.40	1:2.73
S.Em ±		0.08	0.04	0.08	0.08	0.10	1.42	
C.D @ 5%		0.26 (NS)	0.13 (*)	0.24 (*)	0.24 (*)	0.31 (*)	4.52	
CV (%)		4.00	3.15	8.99	10.71	22.53	11.48	

Table 258. Evaluation of different fungicides against major diseases of grain amaranth at Bengaluru

Sr. No.	Treatments	% Disease Incidence			Grain yield (q/ha)	Cost: Benefit Ratio
		Leaf spot	Leaf rust	Phyllody		
1.	Tebuconazole 25.9% EC @ 125 g a.i./ha	3.25	2.42	4.28	17.59	1:2.90
2.	Hexaconazole 5% EC @ 50 g a.i./ha	3.42	2.58	4.70	16.89	1:2.76
3.	Propiconazole 25% EC @ 125 g a.i./ha	2.75	0.87	4.33	18.90	1:2.98
4.	Carbendazim 50% WP @ 250 g a.i./ha	4.17	2.42	3.26	17.80	1:2.89
5.	<i>Trichoderma viridae</i> 1% WP @ 2.5 kg/ha for soil as well as foliar treatment	2.55	2.37	3.58	17.23	1:3.00
6.	<i>Trichoderma harzianum</i> 1% WP @ 5 kg/ha for soil as well as foliar treatment	3.30	1.42	3.25	16.18	1: 2.90
7.	Control	5.70	4.22	4.18	14.95	1:2.91
S.Em ±		0.17	0.15	0.17	1.12	
C.D @ 5%		0.52	0.46	0.55	2.86	

V. QUALITY ANALYSIS

Grain amaranth trials entries received from Bengaluru and Shimla centres were analysed for oil and protein contents at New Delhi and Hisar centres, respectively. Winged bean entries received from Ranchi centre were analysed for quality traits i.e. protein and oil contents at New Delhi centre. Adzuki bean IVT entries were supplied and analysed at Palampur centre.

5.1 Initial and Advanced Varietal Trials entries of grain amaranth (Bengaluru)

Grain amaranth trials entries along with five checks were analysed for oil and protein contents (Table 259). Among IVT entries, protein and oil contents ranged from 11.65 to 13.65% and 7.38 to 8.42%, respectively. Entries VL-115 (13.65%), SKNA808 (13.56%) and SKGPA61 (13.39%) had higher protein content than best check Suvarna (12.98%). Entry VL-110 had higher oil content (8.42%) than best check GA-2 (8.18%). AVT-I entry SKGPA 87 had higher protein (12.86%) as well as oil content (8.93%).

Table 259: Quality analysis of grain amaranth entries

IVT			AVT-I		
Entries	Protein (%)	Oil (%)	Entries	Protein (%)	Oil (%)
SKGPA 61	13.39	7.75	SKGPA 87	12.86	8.93
SKNA 808	13.56	7.69	SKGPA 110	12.34	7.60
VL-110	12.95	8.42	AVT-II		
VL-115	13.65	8.00	KBGA-14	12.43	7.58
Checks			Checks		
GA 2	11.73	8.18	GA 2	11.73	8.18
Suvarna	12.98	8.00	Suvarna	12.58	8.00
BGA 2	11.90	8.07	BGA 2	11.90	8.07
BGA 4-9	11.93	7.38	BGA 4-9	11.75	7.38
KBGA 4	11.65	7.44	KBGA 4	11.88	7.44
Mean	12.64	7.88	Mean	12.18	7.89

5.2 Initial and Advanced Varietal Trials entries of grain amaranth (Shimla)

Seeds of the entries were analysed for oil and protein contents (Table 260). Five IVT entries IC 326896 (12.14%), IC 341551 (12.06%), IC 38758 (12.06%), IC 583640-1 (11.97%) and IC 38378 (11.92%) had higher protein content than best check Annapurna (11.78%). Entry IC 258250 had higher oil content (7.78%) in comparison to best check Annapurna (7.51%). AVT-I entry IC 326898 (12.35%) also had higher protein content than best check. Among AVT-II entries, IC 361853 had both, higher protein (12.14%) and oil (7.91%) content in comparison to check Annapurna whereas entry IC341505 had higher oil content.

Table 260: Quality analysis of grain amaranth entries

Trial	Entries/checks	Protein (%)	Oil (%)
IVT	IC 258250	11.30	7.78
	IC 341551	12.06	6.97
	IC 583640-1	11.97	6.78
	IC 38758	12.06	6.90
	IC 38378	11.92	6.85
	IC 326896	12.14	7.41
AVT-I	IC 37156	11.40	7.14
	IC 313273	11.54	7.10
	IC 326898	12.35	6.95
AVT-II	IC 361299	11.21	7.38
	IC 341505	11.35	7.68
	IC 361853	12.14	7.91
Checks	Annapurna	11.78	7.51
	Durga	11.49	7.05
	Mean	11.77	7.24

5.3 Advanced Varietal Trials entries of Winged bean (Ranchi)

Two AVT-I entries along with three checks were analysed for protein and oil content. Protein content ranged from 24.68 to 27.31% whereas oil content ranged from 24.63 to 26.32%

(Table 252). Both entries PWB-17-1 and PWB-17-9 had protein content higher than the best check AKWB-1 (26.52%).

Five AVT-II entries along with three checks were analysed for protein and oil content. Protein and oil content ranged from 24.86 to 30.37% and 25.26 to 26.29%, respectively (Table 261). RWB-13 had significantly higher protein content i.e. 30.37% than the best check AKWB-1 (28.53%).

Table 261: Quality analysis of winged bean AVT-I & II entries

Entries	Protein (%)	Oil (%)	Entries	Protein (%)	Oil (%)
AVT-I			AVT-II		
PWB-17-1	27.22	24.86	RWB-11	28.09	25.37
PWB-17-9	27.31	24.63	RWB-13	30.37	25.81
AKWB-1 (c)	26.52	25.10	RWB-15	24.77	25.52
IWB-1(c)	26.43	26.32	RWB-18	27.74	25.26
RMDWB-1(c)	24.68	26.18	RWB-19	28.79	25.26
Mean	26.43	25.41	AKWB-1(c)	28.53	26.08
CD (0.05)	0.55	0.23	IWB-1(c)	28.23	25.32
			RMDWB-1(c)	24.86	26.29
			Mean	27.67	25.61
			CD (0.05)	0.40	0.25

5.4 Initial Varietal Trial entries of Adzuki bean (Palampur)

Twelve adzuki bean IVT entries were analysed for crude protein, total phenol and antioxidant activity (Table 262). Protein content ranged from 20.22 to 23.72%. Entries IC 341943 (23.72%), had higher protein content than best check HPU-51 (23.62%).

Total phenol content varied from 635.03 to 956.54 mg/100g. Check Local Totru had highest phenol content with a value of 988.80 mg/100g.

Antioxidant activity of the entries was calculated by finding out the half maximal inhibitory concentration (IC₅₀). IC₅₀ is a quantitative measure that indicates how much of a particular inhibitory substance is needed to inhibit, in vitro, a given biological process or biological component by 50%. The lower the value of IC₅₀, the more potent the molecule is. In the present

study Catechin is used as the standard component. IC₅₀ value of entries ranged from 0.73-1.36 µg/ml. Entries EC 340254 (0.73 µg/ml), IC 341945 (0.75 µg/ml), IC 341943 (0.78 µg/ml) and EC 030270 (0.78 µg/ml) had lower IC₅₀ values indicating better antioxidant activity.

Two entries i.e. IC 341943 and IC 341945 had higher protein content (23.72 and 22.57%), as well as antioxidant activity with IC₅₀ values (0.78 and (0.75 µg/ml).

Table 262: Variation of crude protein, total phenols and antioxidant activity in adzuki bean entries

Sr. No.	Entries	Crude protein (%)	Total Phenols (mg/100g)	IC ₅₀ value (µg/ml)
1.	EC030270	21.56	834.86	0.78
2.	EC120460	20.31	817.59	0.93
3.	EC187896	21.76	656.08	0.89
4.	EC340254	20.56	635.03	0.73
5.	EC340283	21.00	946.03	1.26
6.	IC016761	21.55	674.55	1.35
7.	IC089957	21.37	928.58	0.94
8.	IC341937	20.22	646.27	1.25
9.	IC341943	23.72	850.87	0.78
10	IC341945	22.57	956.54	0.75
11	IC341949	23.36	694.78	1.36
12	IC485382	21.77	684.49	1.22
13	Local Totru (C)	22.31	988.80	0.89
14	HPU-51(C)	23.62	715.96	1.23
	Mean	21.65	785.56	1.02

VI. SUMMARY

A total of 173 experiments were planned to be conducted during Kharif 2019 which included germplasm evaluation (81), crop improvement (55), crop production (17), crop protection (5) and quality aspects (15). These were allotted to AICRN (PC) SAU based main centres, voluntary centres and cooperating centres in different agro-climatic zones of the country. Out of these, 139 trials were conducted. A summary of research achievements is given below:

6.1 PLANT GENETIC RESOURCES MANAGEMENT

6.1.1 Exploration and Collection of Germplasm

During the period April 2019 to March 2020, a total of 89 accessions of different Potential Crops were collected through 11 explorations undertaken in different parts of the country.

6.1.2 Germplasm Introduction and Quarantine

A total of 98 accessions were imported from Lebanon.

6.1.3 Germplasm Evaluation (Hills and Plains)

A total of 771 accessions of different crops were evaluated in hills (296 acc.) and plains (475 acc.) during Kharif 2019. Crop-wise number of accessions, locations and promising accessions have been given in Table 263.

Table 263. Performance of germplasm accessions in different crops during Kharif 2019.

Crop/ trait	Entries	Locations	Promising accessions	Best Check
Hills				
Grain amaranth				
Days to 50 % flowering	25	4 (Almora, Ranichauri, Sangla, Shimla)	IC340971 (43.00), IC583610 (43.50), IC583624 (43.50), IC340825 (44.00), IC406563 (44.50), IC444141 (44.50)	VL 44 (52.00)
Inflorescence Length (cm)			EC289378 (87.17), IC436948 (79.83), EC223672 (76.50),	Durga (62.27)
Buckwheat				
Days to 50 % flowering	75	3 (Almora, Ranichauri, Shimla)	IC010728 (29.00), IC258239 (31.00)	VL-7 (32.30)
No. of Inflorescence/ plant			IC010728 (66.67)	Local check (60.07)
<i>Chenopodium album</i>				
Days to 50 % flowering	25	3 (Ranichauri, Sangla, Shimla)	IC415494 (51.33), IC341695 (52.33), IC583623 (54.50)	Him Bathua (55.64)
Inflorescence Length (cm)			IC469275 (57.85), IC583623 (51.55), IC109732 (50.97), IC108088 (50.90), IC341695 (48.30), IC583587 (46.55), NIC22516 (46.43)	NIC 22503 (39.92)
Seed volume weight (g/10ml)			IC582942 (6.10), NIC22488 (5.99), IC328877 (5.98)	PRC 9801 (5.83)
<i>Chenopodium quinoa</i>				
Days to 50 % flowering	25	3 (Ranichauri, Sangla, Shimla)	EC896201 (33.00), EC896209 (38.00), EC896276 (38.00), EC896271 (40.00), EC896229 (41.00), EC896271 (44.00), EC896070 (48.50)	Him Bathua (53.63)
Days to 80% maturity			EC896074 (98.00), EC896092 (100.50), EC896271 (102.00), EC896233 (102.00), EC896039 (103.50)	Him Bathua (110.15)
Inflorescence Length (cm)			EC896229 (63.00), EC896267 (61.00)	PRC9801 (51.81)

Crop/ trait	Entries	Locations	Promising accessions	Best Check
Adzuki bean				
Days to 50 % flowering	50	3 (Palampur, Pasighat, Shimla)	EC340281 (51.67), EC015257 (52.33), EC057459 (52.33), EC120466 (52.33), EC340265 (52.67)	Local-Totru (54.35)
Number of seeds/ Pod			IC000293 (9.77), IC341959 (9.27), EC000271 (9.23), IC341941 (9.17), EC057959 (9.17), EC340266 (9.10), EC340263 (9.00)	HPU-51 (8.28)
100 seed weight (g)			IC469174 (12.00), EC340271 (11.89), EC000262 (11.14), EC340273 (11.06)	HPU-51 (10.42)
Job's Tear				
Seed yield / plant (g)	50	4 (Lamphalpat, Pasighat, Ranichauri, Shillong)	IC-521338 (158.5), IC-89392 (109.0), IC-416897 (108.6), IC-540279, (72.3), IC-416868 (72.2)	No Check
100 Seed weight (g)			IC-89390 (12.2), IC-540222 (12.0)	No Check
Days to 50 % flowering			IC-540173 (91.0) IC-12703 (94.0)	No Check
Perilla				
Seed yield/ plant (g)	21	3 (Lamphelpat, Ranichauri, Shillong))	IC615369 (34.93), IC615384 (31.84), IC615385 (31.51), IC615383 (30.07), IC615389 (29.15)	IC615391 (24.42)
Days to 50 % flowering			IC615385 (114.00), IC615384 (115.00), IC615383 (115.33), IC615387 (116.33)	IC615391 (127.67)
Days to 80% maturity			IC615384 (160.33), IC615385 (160.67), IC615383 (161.00)	IC615391 (170.67)
Plains				
Grain Amaranth				
Seed yield/ plant (g)	50	2 (Bengaluru, Mettupalayam)	IC21792 (65.00), KBGA-15 (60.00), KBGA-4 (58.00), SKGPA161 (45.00), SKGPA157 (39.20), SKGPA152 (36.80), IC33861 (36.70), IC32179 (36.40), IC21790A (35.80)	Suvarna (8.30)
Days to 80% maturity			SKGPA146 (80.50), IC21799 (88.00), IC001491 (88.00), IC35362 (88.00), KBGA-4 (88.00), SKGPA144 (88.50)	GA-2 (90.00)

Crop/ trait	Entries	Locations	Promising accessions	Best Check
Winged bean (2nd year)				
Seed Yield/ plant (g)	50	5 (Ambikapur, Cooch behar, Faizabad, Rahuri, Ranchi)	EC 178319 (47.15), EC 178335 (47.09), EC 178293 (39.79), RWBGP-22 (39.67), EC 178311 (39.31), RWBGP-13 (39.09), RWBGP-6 (38.48), EC 178336 (35.27)	RMDWB-1 (31.05)
Days to 50% flowering			RWBGP-3 (71.00), RWBGP-24 (72.67), RWBGP-5 (72.67), RWBGP-23 (73.67)	IWB-1 (75.00)
Winged bean (1st year)				
Seed yield/plant (g)	50	5 (Ambikapur, Cooch behar, Faizabad, Rahuri, Ranchi)	RWBGP-25 (27.13), RWBGP-01 (26.27)	IWB-1 (24.36)
No. of seeds/pod			RWBGP-08 (12.13), RWBGP-13 (12.13)	IWB-1 (12.00)
Pillipesara				
Days to 80% maturity	50	1 (Bhubaneswar)	IC 553544 (80.0), IC 553530 (86.0)	-
No. of pods/plant			IC 553517 (4.8), IC 553547 (4.2), IC 553544 (3.8)	-
No. of seeds/pod			IC 553547 (10.8), IC 553518 (10.8), IC 550538 (10.4)	-
Kalingada				
No. of fruits/plant	50	1 (Mandor)	CAZJK 49 (5.33), CAZJK 47 (4.75), CAZJK 50 (4.60)	GK 2 (3.77)
Fruit yield/ha (q)			CAZJK 45 (54.00), CAZJK 36 (52.17), CAZJK 32 (52.00), CAZJK 12 1(51.00), CAZJK 50 (48.47), CAZJK 44 (48.42)	CAZJK 13-2 (38.23)
100 Seed weight (g)			CAZJK 45 (54.00), CAZJK 36 (52.17), CAZJK 32 (52.00), CAZJK 12 (51.00), CAZJK 50 (48.47), CAZJK 44 (48.42)	CAZJK 13-2 (38.23)

6.1.4 Germplasm Conservation

A total of 303 accessions of 6 crops were conserved in the National Gene Bank and 222 accessions were cryopreserved.

6.1.5 Seed Supply

The seed and planting material of potential crops were supplied to NARS users. Based on indents, a total of 883 accessions of various potential crops were supplied under Material Transfer Agreement.

6.2 CROP IMPROVEMENT

A total of 47 varietal evaluation trials were conducted on 9 potential crops during Kharif 2019 in different agro-climatic zones of the country in order to identify improved varieties. Details of trials, entries, number of locations and highest yielding entries are given in Table 264.

Table 264: Best genotypes in different trials conducted at multi-location during Kharif 2019.

Crop	Trials	Entries	Locations	Yield (q/a)	
				Top Yelder	Best Check
Hills					
Amaranth	IVT	8	4	IC 326896 (16.09)	Durga (14.31)
	AVT-I	5	4	IC 313273 (14.50)	Annapurna (12.25)
	AVT-II	3	4	IC 362199 (14.25)	Annapurna (12.25)
Buckwheat	IVT	7	3	IC 26755 (4.54)	PRB-1 (4.71)
	AVT-I	5	3	IC 318859 (4.89)	PRB-1 (4.78)
	AVT-II	2	3	IC 341589 (5.20)	PRB-1 (4.78)
<i>C. quinoa</i>	AVT-I	13	2	IC 363733 (7.26)	Trial Mean (4.02)
Adzuki bean	IVT	12	3	EC 030270 (13.41)	HPU-51 (8.44)
	AVT-I	2	3	IC 341939 (13.66)	HPU-51 (8.51)
	AVT-II	4	3	ADHP-7 (12.20)	HPU-51 (8.51)
Perilla	IVT	8	4	IC615382 (16.99)	Thoiding local (7.80)
Plains					
Amaranth	IVT	6	2	SKNA 808 (15.71)	Suvarna (15.27)
	AVT-I	2	2	SKGPA-87 (13.90)	Suvarna (15.67)
	AVT-II	1	2	KBGA-14 (15.79)	Suvarna (15.67)
Winged bean	IVT (Seed)	14	4	RWB-25 (16.28)	RMDWB-1 (13.57)
	IVT (Pod)	14	4	RWB-20 (158.00)	RMDWB-1 (136.84)
	AVT-I (Seed)	2	4	PWB-17-1 (16.23)	RMDWB-1 (14.35)
	AVT-I (Pod)	2	4	PWB-17-9 (151.12)	RMDWB-1 (147.26)
	AVT-II (Seed)	5	4	RWB-11 (16.16)	RMDWB-1 (14.35)

	AVT-II (Pod)	5	4	RWB-15 (167.67)	RMDWB-1 (147.26)
Kalingada	IVT (Seed)	2	1	SKNK 1703 (0.72)	GK 1 (1.00)
	IVT (Fruit)	2	1	SKNK 1703 (22.27)	SKNK 1102 (24.66)
	AVT-I (Seed)	3	1	SKNK 1407 (1.18)	GK 1 (1.00)
	AVT-I (Fruit)	3	1	CAZJK 48 (35.26)	SKNK 1102 (24.66)
	AVT-II(Seed)	3	1	SKNK 1302 (0.83)	GK 1 (1.00)
	AVT-II (Fruit)	3	1	SKNK 1302 (29.90)	SKNK 1102 (24.66)
Kankoda	AVT-I (Fruit)	3	3	ASG 18-1 (36.76)	RMDSG-3 (34.71)
Pillipesara	AVT-I (Seed)	20	2	IC 550557 (1.36)	Trial Mean (0.91)
	AVT-I (Fodder)	20	1	IC 550538 (158.54)	Trial Mean (145.55)

6.3 CROP PRODUCTION AND PROTECTION

6.3.1 Crop Production

Ten agronomic experiments were conducted at 9 locations during Kharif 2019. These comprised of studies on grain amaranth, spine gourd, kalingada, winged bean, and pillipesara. Experiment wise major findings are presented in Table 265.

Table 265. Findings of agronomic experiments on potential crops during Kharif 2019

Sr. No.	Experiment	Findings
1	Response of promising genotypes (AVT-II entries) of Kalingada to different levels of management	The experiment vitiated due to heavy and continuous rainfall at flowering and fruit development stage during August, 2019, hence, will be repeated in the next crop season.
2	Response of promising genotypes (AVT-II entries) of winged bean to different levels of management	At Ambikapur, among various treatment combinations, genotype IWB-1 with RDF recorded maximum seed yield (18.40 q/ha); genotype AKBW-1 with 75% RDF recorded maximum pod yield (142.36 q/ha), however, treatment combinations were statistically at par for both seed and pod yields. At Ranchi, significant interaction effects of different treatment combinations were observed. Among various treatment combinations, genotype RWB-13 with 125% RDF recorded maximum seed yield (15.10 q/ha).
3	Response of grain amaranth to Sulphur fertilization	Cultivar PRA-3 produced highest seed yield and B:C ratio of 5.5 with the application of sulphur @ 20 kg/ha along with RDF (NPK 60:40:20) followed by RDF + Sulphur @ 40 kg/ha.
4	Effect of different levels of management on grain amaranth genotypes	Genotypes failed to significantly influence plant height, panicle length, grain yield and economics. 125% RDF (F3) recorded statistically superior seed yield (15.61 q/ha), highest gross return (Rs. 78052.13), highest Net return (Rs.

		50154.13) and B: C ratio (1.80).
5	To determine optimum time of sowing of Pillipesara in Eastern region	At Bhubaneswar centre genotypes IC 550522 and IC 550525 did not germinate. Therefore, the data is incomplete. Hence, the trial will be repeated.
6	Effect of spacing and fertilizers on different genotypes of Pillipesara	The experiment was not conducted as it was concluded last year with the results that spacing of 30 x 10 cm recorded highest seed yield of 1.54 q/ha followed by 30 x 15 cm (1.47 q/ha) which remained at par with each other. Among fertility levels, 125% RFD (25-50-25 NPK kg/ha) recorded highest yield of 1.46 q/ha followed by RFD @ 20-40-20 NPK Kg/ha (1.40 q/ha) and were statistically at par. However, a combination of RFD and 30 x 10 cm spacing resulted in highest seed yield of Pillipesara (1.64 q/ha).
7	Response of promising genotypes (AVT-II entries) of spine gourd to different inter-crop systems	Spine gourd + brinjal intercropping system resulted in highest yield (q/ha) & economics during both the years of experimentation, hence, can be recommended for higher productivity and profitability of spine gourd cultivation.
8	Phosphorus use efficiency in grain amaranth	Significantly higher gross returns, net returns and B:C ratio were recorded with application of 30 kg P ₂ O ₅ /ha + PSB @ 2.5 kg/ha + VAM @ 2.5 kg/ha soil application + RD of NK&S (Rs. 87925/ha, Rs.60336/ha and 2.19), respectively.
9	Effect of genotypes spacing and fertilizers doses on fodder value and quality parameters in Pillipesara	Among various treatment combinations, spacing at 30 cm x 10 cm with a fertilizer dose of 15-30-15 NPK/ha (T2) recorded an average of highest values of M.E (Metabolizable Energy) (1196), Crude Protein (8.47 %), ether extract (0.90 %) and lower value of Crude fiber (23.65 %) than other treatment combinations. The same treatment has been found to be suitable for fodder production and nutrition value in Pillipesara.
10	Effect of time of sowing and spacing on Grain Amaranth in hilly region of Uttarakhand	Experiment failed due to long dry spell after sowing. The seeds germinated in all the treatments at the same time after rainfall. The trial will be repeated.
11	Effect of different post emergent weedicides on growth and yield of Grain amaranth in plains	Experiment failed due to heavy rainfall after treatment application.

6.3.2 CROP PROTECTION

In crop protection, two experiments, namely screening of germplasm, IVT and AVT entries against major insect-pests and diseases in grain amaranth and buckwheat crops and integrated pest management in grain amaranth crop were formulated to be conducted at 3 locations i.e. Bengaluru, Mettupalayam and Shimla during *kharif* 2019. The summary of experiment and crop wise detail of results (Table 266) are given as under:

Table 266: Promising accessions/entries/IPM treatments of grain amaranth and buck wheat against major pests

Sr. No	Experiments	Crops	Insect pest/ Diseases	Promising accession/ entries/IPM treatments
1	Screening of germplasm, IVT, AVT-I and AVT-II entries against major insect pests and diseases	Grain amaranth	Insect pests (stem weevil, aphids, leaf eating caterpillar)	Bengaluru IVT - 2 (VL-110 and VL-115) AVT - 1 (SKGP-110) 52-68 germplasm accessions
			Diseases (leaf spot, leaf rust, phyllody)	IVT - 7 (SKGPA-61, SKGPA-73, SKGPA-92, SKNA-808, VL-110, VL-115 and KBGA-15) AVT - 1 (SKGP-87) 98-104 germplasm accessions
		Buck wheat	Powdery mildew disease	Shimla IVT - 4 entries (IC24300, IC26755, NIC8817 and EC125940) AVT-I - 2 entries (IC 318859 and IC 108508) AVT-II - 2 entries (Sangla B-464 and IC 341589) 47 germplasm accessions
2.	Integrated pest management (IPM) in potential crop against major pests	Grain Amaranth	Sucking insect pests	Acephate 75% WP @ 300g a.i./ha followed by Imidacloprid 17.8% SL @ 20 g a.i./ha and Neem seed kernel extract (NSKE) 5% @ 5 ml/litre of water
			Defoliator insect pests	Spinosd 45% SC @ 75g a.i./ha followed by Profenophos 50% EC @ 750 g a.i./ha and Emamectin benzoate 5% SG @ 11 g a.i./ha
			Diseases (leaf spot, leaf rust and phyllody)	<i>Trichoderma viridae</i> 1% WP @ 2.5 kg/ha for soil as well as foliar treatment followed by Propiconazole 25% EC @ 125g a.i./ha

6.4 QUALITY ANALYSIS

Grain amaranth trials entries received from Bengaluru and Shimla centres were analysed for oil and protein contents at New Delhi and Hisar centres, respectively. Winged bean entries received from Ranchi centre were analysed for quality traits i.e. protein and oil contents at New Delhi centre. Adzuki bean IVT entries were supplied and analysed at Palampur centre. The summary of results (Table 267) are given as under:

Table 267: Quality analysis and promising accessions of potential crops

Crop	Trials	Entries	Promising accessions	Best Check
Grain Amaranth (Shimla)				
Protein (%)	IVT	6	IC 326896 (12.14), IC 341551 (12.06), IC 38758 (12.06), IC 583640-1 (11.97) and IC 38378 (11.92)	Annapurna (11.78%)
	AVT-I	3	IC 326898 (12.35)	
	AVT-II	3	IC 361853 (12.14)	
Oil (%)	IVT	6	IC 258250 (7.78)	Annapurna (7.51%)
	AVT-II	3	IC 361853 (7.91) and IC 341505 (7.68)	
Adzuki bean (Palampur)				
Crude protein (%)	IVT	12	IC 341943 (23.72)	HPU-51 (23.62)
IC ₅₀ value (µg/ml)			EC 340254 (0.73), IC 341945 (0.75), IC 341943 (0.78) and EC 030270 (0.78)	Local Totru (0.89)
Grain Amaranth (Bengaluru)				
Protein (%)	IVT	4	VL-115 (13.65), SKNA 808 (13.56) and SKGPA 61 (13.39)	Suvarna (12.98)
	AVT-I	2	SKGPA 87 (12.86)	Suvarna (12.58)
Oil (%)	IVT	4	VL-110 (8.42)	GA-2 (8.18)
	AVT-I	2	SKGPA 87 (8.93)	GA-2 (8.18)
Winged bean (Ranchi)				
Protein (%)	AVT-I	2	PWB 17-1 (27.22), PWB 17-9 (27.31)	AKWB-1 (26.52)
	AVT-II	5	RWB-13 (30.37)	AKWB-1 (28.53)

VII. CENTRE REPORT

7.1 IGKV, Ambikapur

1. Hybridization Programme

Crosses attempt in spine gourd	
1. AJSG-1 X INDIRA KANKODA-1 (IK-1)	12. AMBIKA13-5 X AJSG-2
2. AJSG-1 X CHHATTISGARH KANKODA-2 (CHK-2)	13. AMBIKA13-6 X IK-1
3. AJSG-1 X AJSG-2	14. AMBIKA13-6 X CHK-2
4. RMDSG-3 X IK-1	15. AMBIKA13-6 X AJSG-2
5. RMDSG-3 X CHK-2	16. NDM-2 X IK-1
6. RMDSG-3 X AJSG-2	17. NDM-2 X CHK-2
7. RMDSG-4 X IK-1	18. NDM-2 X AJSG-2
8. RMDSG-4 X CHK-2	19. NDM-5 X IK-1
9. RMDSG-4 X AJSG-2	20. NDM-5 X CHK-2
10. AMBIKA13-5 X IK-1	21. NDM-5 X AJSG-2
11. AMBIKA13-5 X CHK-2	
Crosses attempt in winged bean	
1 IWB-1X RWB-21	4 IWB-2 X RWB-24
2 AKWB-1 X AWB 18-2	5 IWB-1 X AKWB-1
3 RMDWB-1 X RWB-17	

2. Seed Production

Sr. No.	Crop	Variety	Seeds produced
1	Spine gourd	Indira Kankoda -1	2000 plant, 100 tuber
		RMDSG-3	2000 plant, 50 tuber
		Chhattisgarh Kankoda-2	1000 plant, 50 tuber
2	Winged bean	IWB-1	20 kg
		IWB-2	20 kg

3. Extension Activities

Conducted nine FLDs of kankoda, winged bean and grain amaranth crops at the fields of following farmers

- a. Shri Amal Sai, Village - Podipa (Surajpur)
- b. Shri Gopal Village - Balsedi (Surajpur)
- c. Shri Tuleshwar Toppo Village - Udaypur (Surguja)

Popularization of crops

- a. Conducted two training programs on improved cultivation practices of potential crops Kankoda and winged bean at Village-Kalyanpur, Distt. Surajpur, C.G., beneficiary-30, and at village- Padauli, Distt. Surguja, C.G., beneficiary-30.

4. Station Trials

Multi Location Trial on Winged bean: Seven genotypes along with two checks were evaluated at three locations. Among these, none of the genotypes were found promising over both checks RWB-13 (24.38 q/ha) and PWB-17-14 (24.11 q/ha) in terms of seed yield.

Multi Location Trial on Spine gourd: Five genotypes along with two checks of spine gourd were evaluated at four locations. Among these, one genotype ASG 18-1 (43.40 q/ha) was found promising over both the checks Indira Kankoda-1 (38.69 q/ha) and RMDSG-3 (40.85 q/ha) in terms of fruit yield.

7.2 UAS, Bengaluru

1. Station Trial: The promising grain amaranth genotype KBGA-15, has been accepted for Farm Trial in two agro-climatic zones i.e. Zone V (Eastern Dry Zone) and VI (Southern Dry Zone) of Karnataka. From the experiments conducted during the year, the grain amaranth genotypes KBGA-15 (22.60 q/ha) and SKNA 808 (22.42 q/ha) in IVT, KBGA-14 (22.52 q/ha) in AVT I and II and IC 21970 (122g/plant), SKGPA-144 (108 g/plant) SKGPA 154 (82 g/plant), IC35496 (90g/plant) and IC35504 (85g/plant) in germplasm evaluation have been found promising.

2. Seed Production: Seed of following varieties/ advanced entries of potential crop was produced on the experimental farm at UAS, Bengaluru

Sr. No.	Crop	Variety/ entry	Seeds produced (kg)
1	Grain Amaranth	Suvarna	150.00
		KBGA-1	25.00
		KBGA-4	55.00
		KBGA-15	45.00
2	Quinoa	GKVK-1	130.00
3	Winged bean	KBWB-1	8.00
Total			413.00

3. Front Line Demonstrations on Grain amaranth: Conducted 10 FLDs on grain amaranth in Chikkaballapur thaluka.
4. Popularization of Grain Amaranth and TSP Programmes: Popularization of Grain Amaranth as mixed crop in Finger Millet under TSP programme in tribal areas of Chamarajanagar District. Under TSP 200 tribal farmers were given 200 g of Grain Amaranth TL seeds to grow Grain Amaranth as mixed crop in Finger millet. Three training Programmes were conducted under TSP for tribal farmers on Grain Amaranth cultivation and utilization. The varietal technology demonstrations were conducted on Grain Amaranth (Suvarna, KBGA-4 & KBGA-15), Winged Bean (KBWB-1) and Quinoa as part of University Krishi Mela 2019 programme.

7.3 OUA&T, Bhubaneswar

1. Acclimatization and palatability studies in *Vigna glabrescens*

Experimental details: Genotype (EC 528995), Spacing: 45 x 15 cm, Plot size: 3.0 m x 30.0 m (1120 plants), Fert. Dose: 20:40:20 NPK kg/ha, DOS: 14.07.2019, Date of harvest: 20.01.2020 (189 days)

Observations:

Sr. No.	Observations	Observed Values
1.	Date of sampling	:
	1 st date of sampling (vegetative stage)	9.10.2019 (97 days)
	2 nd date of sampling (Flowering stage)	31.10.2019 (110 days)
	3 rd date of sampling (maturity stage)	18.10.2019 (170 days)
2.	Days to germination from sowing (days)	: 6 days
3.	Days to initiation of flowering	: 97 days
4.	Days to 50% of flowering	: 110 days
5.	Days to maturity	: 189 days

Observed values of samples at the time of sampling

Time of sampling	Plant Height (cm)	No. of branches/ plant	No. of leaves/ plant	Total Fresh weight (above ground)/ plant (g)	Total Dry weight (above ground)/ plant (g)	Reduction in dry weight (%)	Increase in dry weight (%) over other samples
Veg. stage	101.0	7.2	57.0	338.0	35.48	89.5	Dry wt. at flowering stage was 71.9% higher to 1 st date and 16.4% over 3 rd date
Flowering stage	109.0	7.3	66.0	556.7	61.0	89.0	
Maturity stage	113.0	8.2	60.4	494.0	52.4	89.4	

Observed values of plant characters at the time of harvesting

Sr. No.	Observation	Observed Values
1.	Plant Height (cm)	: 102.0
2.	No. of branches/ plant	: 8.2
3.	No. of clusters/ plant	: 29.6
4.	No. of pods/cluster	: 4.0
5.	No. of pods/ plant	: 53.2

Sr. No.	Observation		Observed Values
6.	Length of pod (cm)	:	7.6
7.	No. of seeds/ pod	:	10.8
8.	100 SW(g)	:	6.82
9.	Max. Length of root(cm)	:	64.6
10.	No. of nodules/plant	:	58.6
11.	Plot yield (kg) 1120 plants	:	5.850
12.	Seed yield/plant (g)	:	5.22
13.	Seed yield (kg/ha)	:	6.50

Quality analysis parameters and fodder values at different stages of sampling

Stage of sampling	Moisture	Crude Protein	Ether extract	Crude fibre	Total ash	Acid insoluble ash
Vegetative stage (D1)	9.67	18.29	0.71	19.92	16.00	7.45
Floweringstage (D2)	11.31	18.21	0.84	19.58	15.61	6.56
Pod formationstage (D3)	8.71	15.77	0.52	21.33	14.07	5.15

Average of fodder values at flowering stage of sampling (above ground portion) over years (2016 - 2019)

Sr. No.	Parameter		Lab. Values (% based on dry matter basis)			
			2016	2018	2019	Mean
1.	Moisture	:	9.00	9.16	11.31	9.82
2.	Crude Protein	:	18.81	18.82	18.21	18.61
3.	Ether Extract	:	1.90	1.66	0.84	1.47
4.	Crude fibre	:	26.71	17.10	19.58	21.13
5.	Total Ash	:	7.23	17.27	15.61	13.37
7.	Nitrogen Free Extract	:	45.35	-	-	45.35
6.	Acid Insoluble Ash	:	-	10.72	6.56	8.64

Results: The fresh and dry weights/plant of the above ground plant parts were higher when collected at flowering stage in all the years whereas the crude protein content of the samples (leaves and stems) were found higher when the samples were collected in vegetative stage. Therefore, the total fodder values of the above the ground portions were found quantitatively higher in plant parts when collected/ harvested at flowering stage.

The average crude protein values of the fodder samples collected at the time of flowering stage varied between 18.21 to 18.82 with an average value of 18.61. Similarly, the total ash values of the test samples ranged between 7.23 to 17.27, crude fibre from 17.10 to 26.71 with an average of 21.13. The analyzed fodder values over the years revealed that *Vigna glabrescens* could be recommended as a good substitute fodder in Odisha conditions.

2. Adaptability studies in Chia (*Salvia hispanica*)

Expt. Details: Single genotype, spacing: 45 x 10 cm, Fert. Dose: 40:20:20 NPK kg/ha, DOS: 31.08.2019, Date of harvest: 09.12.2019.

Observations recorded are as under:

Sr. No.	Observation	:	Observed Values
1.	Days to germination from sowing (days)	:	6 days
2.	Days to 50% flowering	:	10.11.2019 (71 days)
3.	Days to harvest	:	09.12.2019 (100 days)
5.	Plant Height (cm)	:	110.6
6.	No. of primary branches/ plant	:	13.6
7.	No. of secondary branches/ plant	:	15.0
8.	Length of main inflorescence (cm)	:	19.4
9.	Length of primary inflorescence (cm)	:	9.06
10.	Length of secondary inflorescence (cm)	:	3.0
11.	Length of leaf (cm)	:	7.24
12.	Breadth of leaf (cm)	:	4.00
13.	10 ml seed weight (g)	:	6.07
14.	Plot yield (g) 92 plants at the time of harvest	:	330.1
15.	Seed yield /plant (g)	:	3.59

Results: The plants matured in 100 days with an average height of 110 cms. The growth of the plants was not uniform in the field when seeds were directly sown. The stems were very succulent and adventitious roots appeared from the basal portions of the stem. It was also

observed that the growth of the plants was uniform when plants were transplanted. This crop needs to be tested in large plots at Bhubaneswar climatic conditions during Kharif, 2020.

7.4 CSK HPKV, Palampur

1. Breeding Program: Ten fresh crosses were attempted with HPU-51 in adzuki bean and five pods were developed successfully. Five F₂ progenies were advanced to the next generation. In case of amaranth, five fresh crosses were made between Annapurna and Durga. Six F₄₋₅ were advanced to the next generation. In case of buckwheat hybridization program Shimla B1 was used with *tataricum* buckwheat but there is no success in this program. Segregating material was advanced to the next generation at Palampur.

2. Seed Production: Seed of different varieties/ entries of potential crop was produced on the experimental farm at Palampur

S. No.	Crop	Variety/ entries	Seed produced (kg)
1	Adzukibean	HPU 51	7.00
2.	Buckwheat	Sangla B 444	1.50
		Sangla B 464	1.50
Total			10.00

5.5 CAU, Pasighat

1. Seed production:

Sr. No.	Crops	Variety	Production(Kg)
1	Adzuki bean	Quality seed	40
2	Jobs Tear	Quality seed	30

2. Extension activity: Training programme

Sr. No.	Details of training program	No of farmer participated	Dated
1	One day Training programme on production technology of Vermicompost	40.	29/8/2019
2	One day Awareness programme on cultivation of Jobs tear	35.	23/11/2019

7.6 MPKV, Rahuri

1. Seed Production: Four Kg seed of promising entry PWB-17 of winged bean was produced on the experimental farm at Rahuri.

2. Station Trial of Winged bean: The genotype PWB 2017-14 (19.4 q/ha.) and PWB-2017-19 (17.2q/ha.) recorded numerically highest seed yield, over the best check Indira WB-1 (16.17 q/ha.). The genotypes PWB-17-11-2 (139.9 q /ha.) recorded numerically higher green pod yield than the check RMDWB (125.9 q/ha), whereas the check IWB-1 recorded maximum 100 seed wt. (34.0 g)

7.7 BAU, Ranchi

1. Breeding Programme: Two new crosses of winged bean made during kharif 2019.

Cross combinations	No. of flowers attempted	No. of pods obtained	No. of seeds obtained
RWB-15 x IC 095231	214	41	412
RWB-19 x IC 017005-1	235	51	432

F₁ seeds of two crosses RWB-13 x IC 26949-1 and RWB-11 x IC26949-1) were harvested. The progenies will be sown for generation advancement in the next crop season and observations will be recorded with emphasis on short duration/their earliness and seed yield along with lower disease incidence and less insect infestation.

F₂ seeds of eleven crosses (85 selected plants) were harvested and will be sown during kharif-2020 for advancement and selection.

Cross combinations	Plant selected for		
	High yield/ No. of pods	Earliness/short duration	Insect reaction
HWB-1 x AKWB-1	3	2	2
AKWB-1 x BAUWB-44E	5	-	-
AKWB-1 x BAUWB-15	4	2	2
RWB-11 x BAUWB-44E	6	-	2
BAUWB-25 x BAUWB-44E	5	3	3
RWB-15 x RWB-16	4	2	2

Cross combinations	Plant selected for		
	High yield/ No. of pods	Earliness/short duration	Insect reaction
RWB-13 x BAUWB-25	2	3	2
RWB-15 x RWB-13	5	3	3
BAUWB-24 x BAUWB-8	4	2	2
BAUWB-20 x BAUWB-44E	3	1	1
BAUWB-20 x BAUWB-25	3	2	2

F₄ generation (26 selected plants) have been evaluated and observations were recorded, emphasis on short duration/their earliness and seed yield along with lower disease incidence and less insect infestation.

Cross combinations	Plant selected for		
	High yield/ No. of pods	Earliness/short duration	Insect reaction
RWB-11 x Indira	5	3	2
RWB-11-1 x Indira	6	2	1
RWB-13 x Indira	5	1	1

2. Seed Production: 120 Kg seed of variety RMDWB-1 of winged bean was produced on the experimental farm at Ranchi.

3. Front Line Demonstrations: FLDs on Winged bean using varieties AKWB-1, IWB-1, RWB-11 and RWB-13 were conducted at the fields of 17 farmers of Ranchi district (16 farmers of Villages Kangi and Biyasi, Block-Chanho, and one farmer of Okhargarha, Pithoria, Block-Kanke). Seed yield was reported 9 q/ha (AKWB-1) to 16.5 q/ha (RWB-13). Green pod yield was reported 150 q/ha (AKWB-1) to 165 q/ha (RWB-11).

4. Popularization of crops: A set of nine sampling of *Simarouba glauca* was planted each at 80 farmers of Jharkhand (farmers of Villages Kangi, Biyasi, Bagicha-toli, Chaureya, Lepser, Kullu Murto, Chutia Murto, Block-Chanho, and one farmer of Okhargarha, Pithoria, Kanke, District-Ranchi, and village Ulihatu, District- Khuti, Jharkhand). Similarly, a set of nine sampling of *Simarouba glauca* was also transplanted at KVK Garwa, KVK Pakur, KVK Dumka, KVK Jagnathpur, Jharkhand and NBPGR Regional Station Ranchi, District-Ranchi, Jharkhand.

5. Station Trial: Twenty-two genotypes of winged bean with 4 checks (AKWB-1, RMDWB-1, HWB-1 and Indira) were evaluated in the station trial. The grain yield ranged from 10 q/ha for AKWB-1 to 15.4 q/ha for RWB-34. RWB-32, RWB-33, RWB-34, RWB-11, RWB-13 and RWB-36 were significantly superior genotypes over best check. The green pod yield ranged from 120 q/ha for RMDWB-1 to 250 q/ha for RWB-36.

7.8 VCSG UHF, Ranichauri

1. Chia adaptability experiment: The crop being very long duration exhibits good germination and uniform growth of the plant in the field with good seed yield.

2. Seed Production: Seed of different varieties of potential crop was produced on the experimental farm as per details given below:

Sr. No.	Crop	Variety	Seeds produced (kg)
1	Buckwheat	PRB-1	3.00
2	Grain amaranth	PRA-3	4.00
Total			7.00

3. Front Line Demonstrations: Front line demonstrations were conducted on improved varieties of grain amaranth and buckwheat *vis-à-vis* farmer's practices during kharif 2019. The improved practices included improved variety of grain amaranth and buckwheat while farmer's practice involved local cultivar. Manual weeding was practiced under the improved package for both the group of crops. There was 34.4 and 53.3 per cent improvement under improved practice over the farmer's practice in grain amaranth and buckwheat, respectively.

4. Farmers Training: A total of 11 trainings were organized in collaboration with KVK, Tehri Garhwal, District Agriculture Department, Uttarakhand and SEWA, THDC. In total, 1035 farmers were benefitted during the trainings.

5. State Varietal Trial – I: In this station line experiment, 13 elite lines of grain amaranth were evaluated. Significant variation was observed among the entries with respect to the seed yield. Seed yield of entries varied widely from 4.5 to 9.1 q/ha. The line RD-1501/2019 was the highest yielder (9.1 q/ha) which was found significant with RD-1503/2019, RD-1505/2019, RD-1506/2019, RD-1510/2019 and RD-1511/2019. Variations in days to 50% flowering (67.7 to

75.3 days) and maturity period (127.3 to 137.3 days) were quite significant. Plant height ranged from 84.1 to 139.1 cm and inflorescence length from 21.6 to 32.6 cm.

7.9 SDAU, SK Nagar

1. Station Trial: The SSVT comprising 11 entries along with checks GK-1, SKNK-1102 and CAZJK 13-2 was laid out in Randomized Block Design with 3 replications over two locations/centre (CCI, SDAU, S.K. Nagar and ARS, SDAU, Sihori). At CCI, S.K. Nagar location, the experiment vitiated due to heavy and continuous rainfall at flowering and fruit development stage during August-2019. At ARS, Sihori location, seed yield differences due to genotypes were found significant. The Genotype SKNK-1407 recorded highest seed yield (7.18 q/ha), followed by SKNK-1301 (5.98 q/ha), SKNK-1101 (5.09 q/ha) and SKNK-1704 (5.03 q/ha) than the check SKNK-1102 (4.66 q/ha). Highest fruit yield per plant 242.78q/ha also recorded by the entry SKNK-1407 followed by SKNK-1301 (202.36 q/ha) and SKNK-1101(183.33 q/ha) than the check CAZJK-13-2 (156.30 q/ha). The highest weight showed by entry SKNK-1301 (5.94 g) followed by SKNK-1302 (5.86 g) than the check CAZJK-13-2 (5.78 g). The entry SKNK-1101 also recorded highest cotyledon ratio 62.70 per cent.

2. Training organized under TSP:One-dayawareness training program was conducted on 23/10/2019 to promote Potential Crops (Grain amaranth, Kankoda and Kalingada) and improved package of practices for their cultivation, in tribal areas of the region. Total 212 farmers from tribal area villages (Virampur, Kanpura, Padani, Gavra, Dhanpura, Goliya, Nichala godha etc.) of Taluka: Amirgadh District: Banaskantha State: Gujarat, participated in the training conducted at Centre for Crop Improvement, SDAU, Sardarkrushinagar.

3. Breeding Programme: Four new crosses of Kalingada made during kharif 2019 and twenty-eight Genotypes of Kalingada Germplasm were maintained at SDAU, SK Nagar.

4. Front Line Demonstrations:Front Line Demonstrations conducted during Kharif-2019 of Kalingada on fifty farmer's fields.

Number of trials allotted and conducted at main centers of AICRN on Potential Crops: Kharif 2019

Sr. No.	Name of centres	Allotted						Conducted						
		Germplasm evaluation	Crop Improvement	Crop Production	Crop Protection	Quality	Total	Germplasm evaluation	Crop Improvement	Crop Production	Crop Protection	Quality	Total	Percentage
1	IGKV, Ambikapur	2	3	2	-	-	7	2	3	2	-	-	7	100.00
2	UAS, Bengaluru	2	2	3	2	4	13	2	2	3	2	4	13	100.00
3	OUAT, Bhubaneswar	2	1	3	-	-	6	2	1	2	-	-	5	83.33
4	UBKV, Cooch Behar	2	-	3	-	-	5	2	-	1	-	-	3	60.00
5	ANDUAT, Faizabad	2	3	-	-	-	5	2	3	-	-	-	5	100.00
6	CCS HAU, Hisar	-	-	-	-	-	-	-	-	-	-	-	-	-
7	PAU, Ludhiana	2	-	-	-	-	2	2	-	-	-	-	2	100.00
8	AUJ, Mandor	1	1	1	-	-	3	1	1	1	-	-	3	100.00
9	TNAU, Mettupalayam	5	3	-	1	-	9	3	3	-	1	-	7	77.78
10	CSK HPKV, Palampur	6	6	-	-	3	15	6	6	-	-	3	15	100.00
11	CAU, Pasighat	3	2	-	-	-	5	3	2	-	-	-	5	100.00
12	MPKV, Rahuri	3	3	1	-	-	7	3	3	1	-	-	7	100.00
13	BAU, Ranchi	4	3	1	-	4	12	4	3	1	-	2	10	83.33
14	UUHF, Ranichauri	10	7	2	-	-	19	8	7	2	-	-	17	89.47
15	ICAR RC NEH, Shillong	2	1	-	-	-	3	2	1	-	-	-	3	100.00
16	SDAU, S.K. Nagar	1	1	1	-	-	3	1	1	1	-	-	3	100.00
	Total (A)	47	36	17	3	11	114	43	36	14	3	9	105	92.11

Annexure II

Number of trials allotted and conducted at voluntary and cooperating centers of AICRN on Potential Crops: Kharif 2019

Sr. No	Name of centres	Allotted						Conducted						
		Germplasm evaluation	Crop Improvement	Crop Production	Crop Protection	Quality	Total	Germplasm evaluation	Crop Improvement	Crop Production	Crop Protection	Quality	Total	Percentage
1	VPKAS, Almora	6	6	-	-	-	12	4	3	-	-	-	7	57.14
2	CAZRI, Jaisalmer/Jodhpur	1	1	-	-	-	2	1	0	-	-	-	1	50.00
3	UAS Dharwad	-	-	-	-	-	-	-	-	-	-	-	-	-
4	ICAR RC NEH Basar	1	-	-	-	-	1	0	-	-	-	-	0	00.00
5	ICAR RC NEH Kolasib	1	1	-	-	-	2	0	1	-	-	-	1	50.00
6	ICAR RC NEH Lamphelpat	4	1	-	-	-	5	2	1	-	-	-	3	60.00
7	ICAR RC NEH Medziphema	1	-	-	-	-	1	0	-	-	-	-	0	00.00
8	ICAR RC NEH Tadong	2	-	-	-	-	2	0	-	-	-	-	0	00.00
9	ICAR RC NEH Lembuchera	2	-	-	-	-	2	0	-	-	-	-	0	00.00
10	CIARI, Port Blair	-	-	-	-	-	-	-	-	-	-	-	0	00.00
11	ICAR-NBPGR, New Delhi	-	-	-	-	-	-	-	-	-	-	-	-	-
12	IGKV, Raipur	2	3	-	-	-	5	0	0	-	-	-	0	00.00
13	NBPGR, Akola	2	-	-	-	-	2	0	-	-	-	-	0	00.00
14	NBPGR, Jodhpur	2	-	-	-	-	2	2	-	-	-	-	2	100.00
15	NBPGR, Shimla	8	6	-	2	4	20	8	6	-	2	4	20	100.00
16	NBPGR, Shillong	-	-	-	-	-	-	-	-	-	-	-	-	-
17	NBPGR, Hyderabad	1	-	-	-	-	1	0	-	-	-	-	0	00.00
18	NBPGR, Bhowali	1	1	-	-	-	2	0	0	-	-	-	0	00.00
19	NBPGR, Thrissur	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total (B)	34	19	0	2	4	59	17	11	0	2	4	34	57.63
	Total (A+B)	81	55	17	5	15	173	60	47	14	5	13	139	80.35

List of Centres and Names of Scientists working in AICRN on Potential Crops

Sr. No.	Name	E-mail	Phone (O)	Phone (Mob)
A.	Coordinating Unit			
1.	ICAR-National Bureau of Plant Genetic Resources, Pusa, New Delhi - 110012			
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	Dr. Vinay Mahajan, Principal Scientist	vinmaha9@gmail.com ;	011-25802844	9999237696
	Dr. HL Raiger, Principal Scientist	hanuman.raiger@icar.gov.in ; drhanumanlal@yahoo.co.in ;	011-25802842	9968271997
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	Dr. MC Singh, Principal Scientist	moolchand.singh@icar.gov.in mcsingh@gmail.com	011-25802751	9958196700
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	Dr. Sandeep Kumar, Principal Scientist	kumarsandeep_boichem@rediffmail.com	011-25802893	9873235356
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1.	RMD, College of Agriculture and Research Station, IGKV, Ambikapur – 497 001, Chhattisgarh			
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2	University of Agricultural Sciences, GKVK, Bengaluru – 560 065, Karnataka			
	Dr. Niranjana Murthy, Professor (Plant Breeding, RIOF Building,	drniranjnamurthy@hotmail.com , aicrnuucrops@gmail.com ;	080-23627265	9448680139
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7	Agriculture University Jodhpur, Mandor – 342 304, Rajasthan			
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