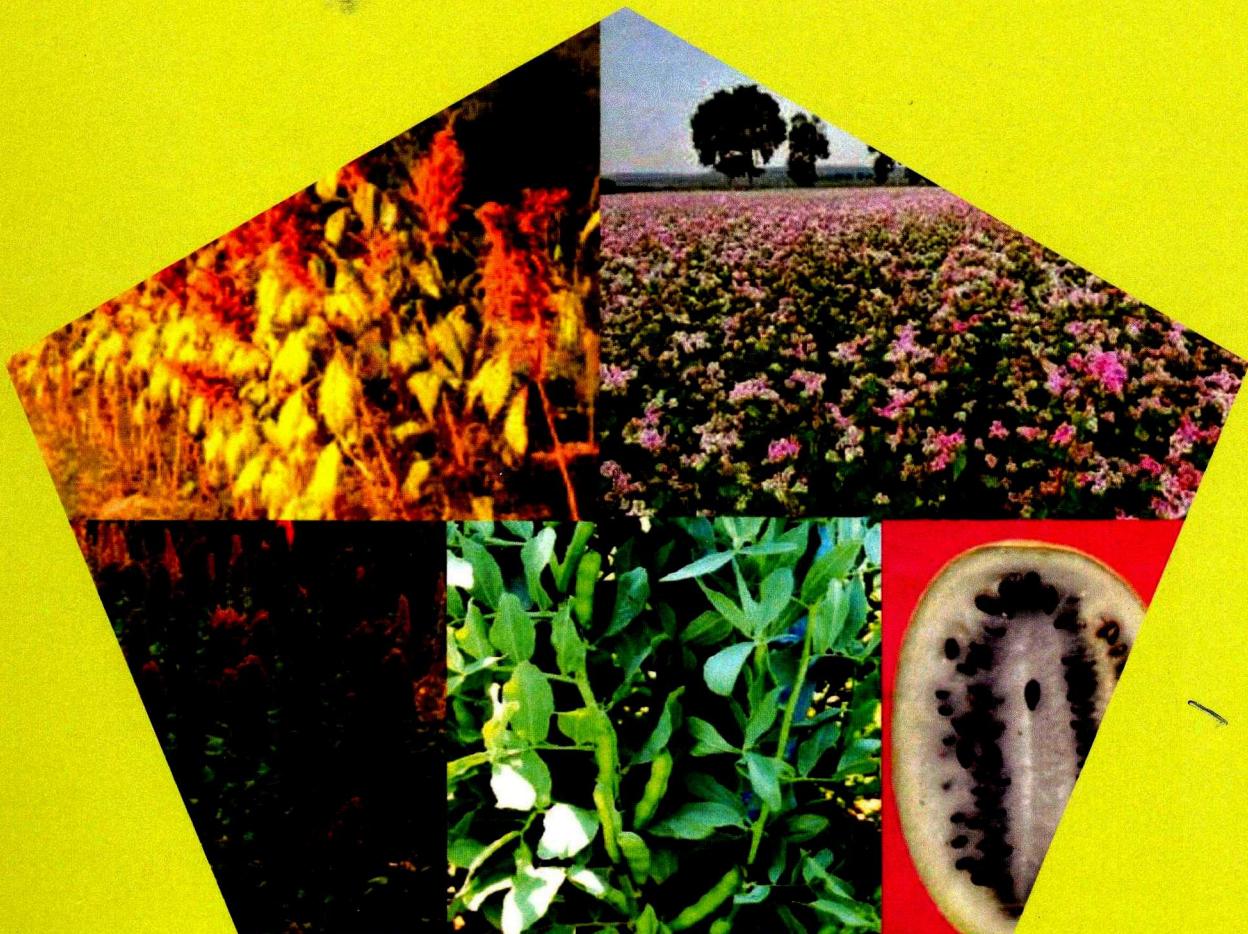


All India Coordinated Research Network on Potential Crops

Progress Report

RABI 2016-17



ICAR-National Bureau of Plant Genetic Resources
Pusa Campus, New Delhi - 110012

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**ALL INDIA COORDINATED RESEARCH
NETWORK ON POTENTIAL CROPS**

PROGRESS REPORT

RABI 2016-17

Compiled by

S.K. Yadav

S.K. Kaushik

M.C. Singh

S.P. Singh

M. Khabiruddin

H.L. Raiger

B.S. Phogat

Kuldeep Singh



ICAR-NBPGR, PUSA CAMPUS, NEW DELHI 110 012

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For further information please contact

Dr. BS Phogat
Network Coordinator
All India Coordinated Research Network on Potential Crops
NBPGR, New Delhi 110012
Telefax: 011-25841835
E-mail: B.phogat@icar.gov.in; bsphogat9@gmail.com;

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PREAMBLE

It is a well known fact that food and nutritional security on sustainable basis are the major challenges of the 21st Century. Crops of minor economic importance have been used, in reality, by the local populations over generations and are being maintained by the indigenous farming communities in the most vulnerable areas. Occurrence of genetic resources of these species is extremely important as they contribute significantly towards the well being and livelihoods of the rural households because they have comparative advantages in providing better food, are affordable by the poor and more available both in time and space. They also contribute to the diversity and stability of agro-ecosystems. These species often play a strategic role in fragile ecosystems such as those of arid and semi-arid lands, mountains, tropical regions and coastal regions. Most of these species can be successfully grown in vulnerable, marginal, degraded and wastelands with minimal inputs.

Recognizing the need for organized research effort on less common, under exploited crops, the All India Coordinated Research Project on Utilized and Under Exploited Plants was initiated during 1982 by ICAR. The Project was later redesignated as AICRP on Underutilized Crops and recently rechristened as AICRN on Potential Crops. Potential Crops constitute those plant species that occur as life support species in extreme environmental conditions or threatened habitats, having appropriate genetic make up to survive under such adverse situations and also possess promising nutritional or industrial utility for a variety of purposes for the present as well as future needs of human kind. Based on regional importance, area covered, specific adaptive advantage and future potential, crops have been prioritized for research in the hill and plain areas of the country. These include food and fodder crops, energy and industrial plants and species suitable for problematic areas.

At present, the network is conducting research on 14 crops of food, fodder and industrial value through 14 main, 9 cooperating and 15 voluntary centres located in diverse agro-climatic zones of the country. So far, 41 varieties in different crops have been released/ identified in this programme, besides identifying desirable genetic donors and accumulating indigenous and exotic germplasm collections.

Planned multilocational evaluation of the germplasm and breeding lines is a continuous process for developing high yielding superior genotypes and their improved production technologies suitable for various agro-ecological situations representing high mountains to the desert plains. Quality analysis of selected germplasm and breeding lines are also undertaken to facilitate crop improvement programme.

The present report embodies results of research work undertaken on PGR Management, Crop Improvement, Crop Production, Crop Protection and Quality Evaluation aspects in Potential Crops at different centres during rabi 2016-17. The compiled report is an outcome of the concerted efforts made by the scientists of AICRN, cooperating 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 Mahapatra, Secretary, DARE and Director General, ICAR; Dr.AK Singh, DDG (Crop Science), ICAR; Dr. DK Yadava, ADG (Seeds), ICAR and Dr. Kuldeep Singh, Director, NBPGR. I express my sincere thanks to Drs.SK Yadav, SK Kaushik, MC Singh, SP Singh, M Khabiruddin and HL Raiger, the Principal Investigators for PGR management, Crop Improvement, Crop Production, Crop Protection, Quality Analysis and Documentation and Database Management, respectively for compilation of results and preparation of the report.

I wish to record my appreciation for Mr. Pankaj Kumar for neatly typing the report.

B.S. Phogat
Network Coordinator

II PLANT GENETIC RESOURCES MANAGEMENT

During the period April 1, 2017 to September 30, 2017, a total of 271 accessions were introduced, 462 accessions were supplied, 975 accessions were evaluated (Hills 50 and Plains -925) and 48 accessions were conserved in National Gene Bank (46 new and 2 regenerated).

2.1 GERMPLASM INTRODUCTION

During the period under report 271 accessions were introduced from USA viz., Chenopodium (266) and Lamb's Quarters (5).

2.2 GERMPLASM EVALUATION

2.2.1. Hills

Multilocation germplasm evaluation was planned to be conducted in faba bean (Repeated set) at Palampur during Rabi 2016-17. A total of 50 accessions were evaluated in Randomized Block Design with standard checks.

2.2.1.1 Faba bean (*Vicia faba*)

Germplasm screening nursery consisting of 50 accessions supplied by CCS HAU, Hisar was evaluated at UUHF, Ranichauri and CSKHPKV, Palampur. The results were received from Palampur. The checks used were Vikrant and PRT-12. The list of promising lines including range and mean for all the descriptors has been presented in Tables 1 to 3.

At CSK HPKV Palampur, a set of 50 accessions of faba bean was evaluated for eight descriptors. The promising lines and statistical parameters are given in Table 2 & 3. The genotypes HB-24, HB-26 and HB-38 (86 days) were early in flowering than the best check PRT-12 (88.8 days), while genotypes HB-33 and HB-48 (143.0 days) were early in maturity and better than the best check Vikrant (147.4 day). The genotype DFB-10-1 had maximum plant height (47.6 cm) followed by NDF-4 (45.6 cm) as compared to the best check Vikrant (38.9 cm). More number of seeds per pod were observed in HB-39 (6.4) followed by HB-80 (5.4) and were better than the check PRT-12 (3.24). The genotypes EC 628955 showed bold seeds having 100 seed weight (37.7 g) followed by IC 263610 (35.51 g) and were significantly better than check PRT-12 (26.3 g). None of the genotypes were found superior than the best check Vikrant (902 g) for seed yield per plant.

Table1. Experimental details of germplasm evaluation in faba bean at Palampur 2016-17 (Hills)

Details	Palampur
No. of accessions	50
Checks	VIKARANT, PRT-12
Design	Randomized Block Design
Plot size	3mx30cm
Spacing	30X10 cm
No. of Rows	1
No. of Blocks	5
Date of sowing	24.11.16
Date of harvesting	-----

Table 2: Evaluation of germplasm in fababean at Palampur Rabi 2016-17 (Hills)

S. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Pod Length cm	Pod width cm	Seeds /pod	100-seed weight(g)	Seed yield/ plant(g)
1	HB-63	90	148	39.1	4.4	0.6	2.0	31.3	160
2	HB-19	92	148	35.9	4.0	0.6	1.6	27.5	90
3	HB-64	91	149	40.6	3.6	0.7	1.8	25.3	150
4	IC-243770	92	146	36.8	4.3	0.6	1.6	32.95	140
5	DFB-10-3	89	146	43.5	4.2	0.7	2.2	25.4	200
6	HB-53	90	149	33.8	4.0	0.7	1.6	30.01	160
7	EC-628938	91	150	35.6	4.6	0.6	1.2	26.7	140
8	EC-247782	90	146	34.1	4.4	0.6	2.0	25.08	100
9	EC-628957	94	146	39.8	4.0	0.7	1.4	27.41	140
10	IC-598958	94	148	35.9	4.0	0.7	2.2	22.05	150
11	HB-50	95	145	24.5	4.1	0.3	2.0	28.5	130
12	DFB-9-1	92	145	34.6	4.0	0.5	2.2	24.9	140
13	IC-263610	93	147	35.6	4.4	0.4	2.0	35.51	180
14	RFB-3	89	147	38.3	4.5	0.3	2.4	30.11	140
15	EC-10845	91	146	29.5	4.2	0.4	2.2	31.06	140
16	EC-628955	87	146	36.3	4.7	0.4	2.4	37.7	120
17	HB-24	86	147	35.7	4.3	0.4	2.4	31.4	120
18	EC-243626	89	144	37.3	4.4	0.3	2.0	29.95	100
19	RFB-13-2	87	148	35.8	4.7	0.4	1.8	30.62	120

S. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Pod Length cm	Pod width cm	Seeds /pod	100-seed weight(g)	Seed yield/ plant(g)
20	NDF-9	91	149	30.2	4.7	0.5	2.0	28.32	160
21	HB-26	86	146	31.4	4.2	0.3	3.0	24.31	120
22	HB-18	87	148	33.3	5.2	0.5	2.4	23.4	100
23	RMDFB-1	91	147	34.5	4.8	0.4	1.8	28.2	140
24	EC-25085	92	144	37.6	4.6	0.4	2.0	27.29	160
25	HB-33	90	143	34.2	4.7	0.5	2.2	31.84	200
26	HB-40	92	144	31.8	3.9	0.4	3.0	26.3	220
27	HB-3	89	146	29.4	3.3	0.5	2.8	25.8	180
28	NDFB-14	91	146	39.6	5.7	0.5	2.8	31.06	140
29	IC-331499	90	145	41.2	5.3	0.5	2.2	27.12	140
30	NDF-12-1	91	145	38.4	4.9	0.6	2.5	24.82	160
31	EC-243624	88	149	37.8	4.1	0.6	1.8	27.41	160
32	NDF-11	91	146	34.6	5.0	0.7	1.4	26.06	140
33	DFB-10-1	91	144	47.6	5.2	0.6	2.6	30.02	120
34	HB-20	90	148	44.2	4.4	0.6	2.8	30.5	100
35	RFD-10	89	149	40.7	5.1	0.6	2.6	28.5	100
36	IC-329612	87	146	36.2	4.4	0.6	2.6	27.7	150
37	RFB-7	87	146	38.2	4.7	0.5	3.2	23.7	160
38	RFB-8	89	145	41.6	4.7	0.5	3.8	28.4	160
39	HB-38	86	147	42.6	4.5	0.6	3.4	29.1	140

S. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Pod Length cm	Pod width cm	Seeds /pod	100-seed weight(g)	Seed yield/ plant(g)
40	NDB-13	91	148	40.6	4.5	0.5	3.0	26.75	200
41	DFB-9-2	96	144	33.3	4.2	0.6	4.0	24.36	200
42	NDF-13-2	94	146	41.6	4.5	0.6	4.4	22.4	210
43	EC-10719	90	145	27.5	4.4	0.6	4.2	30.1	220
44	EC-354951	95	146	41	4.1	0.7	4.0	29.8	150
45	HB-40	92	147	44.6	4.8	0.6	5.2	26.2	140
46	RFB-9	92	146	40.3	3.7	0.6	4.4	24.2	200
47	NDF-4	88	146	45.6	4.7	0.5	4.6	28.1	140
48	HB-39	94	144	43.1	3.9	0.5	6.4	30.06	150
49	HB-80	91	144	45.1	4.7	0.6	5.4	24.4	120
50	HB-48	93	143	35.4	4.9	0.6	4.0	28.5	200
	VIKARANT	92.2	147.4	38.9	4.46	0.52	3.2	26.05	902
	PRT-12	88.8	147.8	35.84	4.7	0.5	3.24	26.3	896
	Minimum	86.00	143.00	24.50	3.30	0.30	1.20	22.05	100
	Maximum	96.00	150.00	47.60	5.70	0.70	6.40	37.70	902
	Mean	90.52	146.31	37.32	4.46	0.53	2.77	27.89	190
	CD (0.05)	-	-	-	-	-	-	-	-
	CV (%) Error	-	-	-	-	-	-	-	-
	CV (%) Phen.	2.45	1.70	4.80	0.45	0.11	1.12	3.14	0.18

Table 3: Promising lines in faba bean germplasm for various characters at Palampur Rabi 2016-17 (Hills)

S. No	Characters	Range		Promising lines	value of Best check
		Min	Max		
1	Days to 50% flowering	86.00	96.00	HB-24 (86), HB-26 (86), HB-38 (86)	PRT-12 (88.8)
2	Days to 80% maturity	143.00	150.00	HB-33 (143), HB-48 (143), EC-243626 (144), EC-25085 (144)	Vikrant (147.4)
3	Plant height (cm)	24.50	47.60	DFB-10-1 (47.6), NDF-4 (45.6), HB-80 (45.1), HB-40 (44.6), HB-20 (44.2)	Vikrant (38.9)
4	Pod Length (cm)	3.30	5.70	NDFB-14 (5.7), IC-331499 (5.3), DFB-10-1 (5.2), HB-18 (5.2)	PRT-12 (4.7)
5	Pod width (cm)	0.30	0.70	EC-354951 (0.70), DFB-10-3 (0.70), IC-598958 (0.70), HB-64 (0.70)	Vikrant (0.52)
6	Seeds per pod	1.20	6.40	HB-39 (6.4), HB-80 (5.4), HB-40 (5.2), NDF-4 (4.6)	PRT-12 (3.24)
7	100-seed weight(g)	22.05	37.70	EC-628955 (37.70), IC-263610 (35.51), IC-243770 (32.95), HB-33 (31.84)	PRT-12 (26.3)

2.3.2 Plains

A total of 149 germplasm accessions comprising Grain amaranth (70), Faba bean (50), Chenopodium (14) and Kalingada (15) were evaluated during Rabi 2016-17. The germplasm evaluation experiments were conducted in Augmented Block Design/Randomized Block Design with standard check cultivars.

2.3.2.1 Grain Amaranth (*Amaranthus spp.*)

Germplasm screening nursery, consisting of 70 genotypes (New set of accessions) supplied by S.K. Nagar (20) and Aloka (50), was planned to be evaluated at eight lactations, namely, MPKV Rahuri, SDAU S.K. Nagar, BAU Ranchi, IGKV Ambikapur, OUA&T Bhubaneswar, NDUA&T Faizabad, RAU Mandor and NBPGR New Delhi. The results were received from all the centres. The information on experimental details and data on different descriptors and list of promising accessions for all descriptors and genotypes better than best check for yield contributing parameters at different locations have been presented in Table 4 to 14.

At IGKV Ambikapur, a set of 83 accessions along with four checks viz. GA-2, RMA-7, BGA-2, and Suvarna were evaluated for six quantitative characters. The promising lines and statistical parameters are given in Table 5, 13 & 14. The experiment was planned in Augmented Block Design at a row-plant spacing of 45x15 cm. The early flowering genotypes were SKGPA-145 (60.0 days) and SKGPA-144 (61.0 days) found better than the best check GA-2 (72.0 days). The genotypes SKGPA-146 (53.0 cm) and SKGPA-151 (53.0 cm) were of dwarf size and better than the check RMA-7 (58.8 cm). The maximum plant height was observed in IC 35618 (117.20 cm) followed by IC 955588 (117.20 cm) which were significantly higher than the best check BGA-2 (97.60 cm). The inflorescence length was higher in SKGPA-156 (62.20 cm) and IC 35625 (60.20 cm) performing better than the best check GA-2 (53.30 cm). None of the genotypes under experiment were found superior than the best check RMA-7 for seed yield per plant (19.60 g) and 10 ml seed weight (8.80 g)

At OUA&T Bhubaneswar, a set of 80 accessions along with four checks viz. GA-2, RMA-7, BGA-2, and Suvarna were evaluated for six quantitative characters. The promising lines and statistical parameters are given in Table 6, 13 & 14. The

experiment was planned in Augmented Block Design at a row-plant spacing of 45x15 cm. Mean plant height ranged from 73.0 cm to 135.00 cm. The genotype SKGPA-162 (73.80 cm) and SKGPA-163 (77.60 cm) have dwarf plants batten than the check Suvarna (107.28 cm), while the genotype IC 35554 (135.00 cm) and IC 35617 (131.20 cm) showed the maximum plant height and were better than the check GA-2 (123.84 cm). The mean flowering time was earliest in the genotypes SKGPA-144, SKGPA-145 and SKGPA-146 (39.0 days) and were better than the check GA-2 (49.40 days). On the basis of mean calculated for days to 80% maturity the genotypes IC 35618, IC 35625, SKGPA-144 and SKGPA-145 (86.00 days) were better than the best check GA-2 (92.60 days).

At NBPGR New Delhi, a set of 20 accessions along with four checks viz. GA-2, RMA-7, BGA-2, and Suvarna were evaluated for twelve quantitative characters. The promising lines and statistical parameters are given in Table 7, 13 & 14. The experiment was planned in Randomized Block Design at a row-plant spacing of 45x15 cm. The early flowering genotypes in Delhi condition were SKGPA-146 (58.67 days) followed by SKGPA-144 (59.00 days) and SKGPA-145 (59.00 days) which were better than the best check GA-2 (71.33 days), while the early maturing genotypes better than the best check BGA-2 (127.33 days) were SKGPA-145 (123.61 days) and SKGPA-148 (123.67 days). The longest petiole was recorded in SKGPA-157 (11.10 cm) and maximum length of inflorescence in SKGPA-153 (52.05 cm) followed by SKGPA-155 (48.86 cm) which were better than the best check RMA-7 (9.68 cm) and GA-2 (44.73 cm), respectively. The dwarf sized plants were observed in SKGPA-160 (57.30 cm) and was better than the best check RMA-7 (76.60 cm), while maximum plant height was recorded in SKGPA-153 (120.27 cm) and was better than the best check BGA-2 (109.80 cm). More number of branches were observed in genotypes SKGPA-152 (5.10) and was better than the best check RMA-7 (4.77). The seed yield per plant was maximum in the genotypes SKGPA-155 (59.36 g) followed by SKGPA-148 (55.00 g) and SKGPA-149 (53.33 g) which were better than the best check RMA-7 (48.00 g).

At NDUA&T Faizabad, a set of 20 accessions along with four checks viz. GA-2, RMA-7, BGA-2, and Suvarna were evaluated for five quantitative characters. The promising lines and statistical parameters are given in Table 8, 13 & 14. The experiment was planned in Augmented Block Design in four blocks at row-plant

spacing of 45x15 cm. At Faizabad the plant height ranged from 70.0 cm to 110 cm in which the dwarf genotype SKGPA-149 (70.0 cm) followed by SKGPA-150 (75.0 cm) and the maximum plant height in genotypes SKGPA-158 (110.0 cm) and SKGPA-162 (110.0 cm) were found better than the best check Suvarna (83.90 cm) and GA-2 (87.88 cm), respectively. The germplasm showed diversity for days to maturity ranging from 114.0 days to 140.0 days. The early flowering genotypes were SKGPA-149 (35.0 days) followed by SKGPA-151 and SKGPA -163 (37.0 days), while the early maturing genotypes SKGPA-149 (114.0 days) followed by SKGPA-156 (115.0 days) were found better than the best check GA-2 (42.0 days and 120 days respectively). Mean inflorescence length was found maximum in SKGPA-147 (42.0 cm) and was better than the check Suvarna (39.65 cm). The maximum seed yield per plant was recorded maximum in SKGPA-156 (17.0 g) followed by SKGPA-151 (16.60 g) and were better than the best check (13.85 g).

At ARS Mandor, a set of 78 accessions along with four checks viz. GA-2, RMA-7, BGA-2, and Suvarna were evaluated for five quantitative characters. The promising lines and statistical parameters are given in Table 9, 13 & 14. The experiment was planned in Augmented Block Design at row-plant spacing of 50x15 cm. The early maturing genotypes were IC 33542, IC 33541 and IC 35696 (121.0 days) which were better than the check BGA-2 (124.60 days). The mean seed yield per plant was found maximum in IC 95292 (7.1 g) followed by IC 33548 (6.9 g) and were better than best check RMA-7 (3.6 g). Seed weight of 10 ml volume was maximum in IC 95290 (6.11 g). Mean plant height was minimum in IC 33539 (54.0 cm) and IC 21930 (55.0 cm) better than the best check RMA-7 (110.60 cm), while maximum height was found in IC 35623 (127.40 cm) followed by IC 21922 (116.0 cm) and were better than the check GA-2 (115.30 cm).

At MPKV Rahuri, a set of 70 accessions along with four checks viz. GA-2, RMA-7, BGA-2, and Suvarna were evaluated for eight quantitative characters. The promising lines and statistical parameters are given in Table 10, 13 & 14. The experiment was planned in Augmented Block Design at row-plant spacing of 45x15 cm. The genotypes found early in flowering were IC 93945 and IC 35755 (40.0 days), while early maturing genotypes were IC 35621 (93.0 days) followed by SKGPA-161 (95.0 days) found better than the check GA-2 (52.20 and 111.40 days respectively). Mean plant height ranged from 60.70 cm to 163.40 cm. The promising

genotypes for dwarf character are IC 35547 (60.70 cm) and IC 35550 (66.20 cm) better than the best check RMA-7 (132.16 cm), while for more tall character are IC 35539 (163.40 cm) and SKGPA-155 (161.20 cm) which were better than the check Suvarna (160.08 cm). The more inflorescences length was observed in IC 35757 (97.60 cm) better than the check RMA-7 (94.32 cm), while longest petiole was observed in IC 35554 (19.50 cm) followed by IC 35542 (18.20 cm) better than the best check Suvarna (14.46 cm). The highest seed yield per plant was found in SKGPA-147 (28.67 g) better than the best check GA-2 (26.22 g). The seed weight on 10 ml volume basis was found maximum in IC 93942 (7.90 g), IC 35543 (7.80 g) and SKGPA-155 (7.80 g) which were better than the best check GA-2 (6.36 g).

At BAU Ranchi, a set of 60 accessions along with five checks viz. GA-1, GA-2, RMA-7, BGA-2, and Suvarna were evaluated for five quantitative characters. The promising lines and statistical parameters are given in Table 11, 13 & 14. The experiment was planned in Augmented Block Design in five blocks at row-plant spacing of 45x15 cm. The genotypes IC 21927 (72.0 days) and IC 35623 (73.0 days) were the earliest in flowering and better than the best check GA-2 (81.4 days). The early maturing genotypes were IC 35622 (126.0 days) followed by IC 21923 (127.0 days) and IC 35610 (129.0 days) were better than the best check GA-1 (144.0 days). The mean plant height ranged from 11.0 cm to 181.6 cm. The genotypes IC 35759 (11.0 cm) and IC 35552 (12.0 cm) were found to be shortest and better than the check BGA-2 (38.6 cm). No genotypes were superior than the check Suvarna (181.6 cm) for tall plants. Mean inflorescences length was maximum in IC 35621 (25.6 cm) followed by IC 35623 (24.20 cm) better than the check Suvarna (20.2 cm). The mean seed weight was maximum in IC 21930 (11.60 g) followed by IC 95596 (10.2 g) better than the check GA-2 (9.5 g). Highest grain yield per plant was observed in the genotypes IC 95295, IC 35625 and IC 95293 (11.0 g) and were better than the check Suvarna (9.40 g).

At SDAU S.K. Nagar, a set of 107 accessions along with four checks viz. GA-2, RMA-7, BGA-2, and Suvarna were evaluated for eight quantitative characters. The promising lines and statistical parameters are given in Table 12, 13 & 14. The experiment was planned in Augmented Block Design at row-plant spacing of 45x15 cm. The genotypes SKGPA-147 (48.0 days) and IC 35541 (48.0 days) were the earliest in flowering and better than the best check GA-2 (63.13 days). The early

maturing genotypes were SKGPA-145 (95.0 days) followed by SKGPA-146 (96.0 days) and SKGPA-144 (97.0 days) were better than the best check GA- (116.0 days). The mean plant height ranged from 79.60 cm to 158.0 cm. The genotypes IC 35541 (79.6 cm) and IC 35668 (88.0 cm) were found to be shortest and better than the check BGA-2 (133.0 cm), while the genotypes SKGPA-148 (158.8 cm) was better than the best check RMA-7 (157.06 cm). Mean inflorescences length was maximum in IC 21923 (69.2 cm) and SKGPA-151 (69.0 cm) were better than the check RMA-7 (56.65 cm). The mean seed weight was maximum in IC 95290 (7.80 g) and IC 35771 (7.73 g) were better than the best check GA-2 (6.34 g). The maximum petiole length was found in IC 35549 (11.40 cm) followed by IC 95297 (10.10 cm) were better than the check RMA-7 (6.98 cm).

In grain amaranth 80 genotypes were screened at eight locations during Rabi 2016-17. Based on mean values over locations, promising genotypes the range, along with characters are presented in (Table 13). The early flowering (No. of days) genotypes were SKGPA-144 (48.7), SKGPA-145 (50.0) SKGPA-146 (51.9), and SKGPA-147 (152.2) and were better than the best check GA-2 (61.6 days). In early maturing (No. of days) genotypes were IC 35621 (109.0), IC 93941 (109.8), IC 95290 (110.0), IC 35541(110.2), IC 35610 (110.4), IC 95283 (110.4) and were better than the best check GA-2 (121.6 days). Genotypes SKGPA 154 (19.92), SKGPA 147 (19.90), SKGPA 148 (19.25), SKGPA 155 (19.19) recorded more seed yield per plant (g) than the best check RMA-7 (18.81 g). Average of 10 ml seed weight (g) was maximum in IC 35771 (7.30) followed by IC 95290 (7.18) and IC 95297 (7.16) and was better than the check GA-2 (6.93 g).

2.3.2.2 Faba bean (*Vicia faba*)

Germplasm screening nursery, consisting of 50 genotypes (Repeat accessions of Rabi 2015-16) supplied by CCS HAU Hisar was planned to be evaluated at six locations viz., NBPGR New Delhi, NDUA&T Faizabad, CCS HAU Hisar, IGKV Ambikapur, BAU Ranchi and PAU Ludhiana. The results were received from all locations. The information on experimental details, list of promising accessions for all descriptors and genotypes better than best check for yield contributing parameters at different locations have been presented in Tables 15 to 25

At IGKV Ambikapur, a set of 51 accessions along with one check Vikrant were evaluated for eight quantitative characters. The promising lines and statistical parameters are given in Table 16, 24 & 25. The experiment was planned in plot size 4.0x0.60 m² in Augmented Block Design at a row-plant spacing of 30x10 cm. The early flowering genotypes were HB-8, HB-21 and HB-31 (51.0 days) found better than the best check Vikrant (56.0 days). More number of branches per plant was observed in HB-8 (3.00) and EC 117744 (3.00) better than the check Vikrant (2.4). The genotypes EC 628925 (73.60 cm) and HB-15 (73.60 cm) recorded the maximum plant height which was significantly higher than the best check Vikrant (62.0 cm). The genotypes superior than the best check Vikrant (6.8) for more number of pods per plant are HB-19 and EC 117744 (11.0) followed by HB-5 (10.0). More number of seeds per pods were found in HB-2 (3.20) and EC 25085 (3.20) superior than the check Vikrant (2.60). The mean 100 seed weight was maximum in HB-5 (29.35 g) and EC 363781 (29.30 g) followed by HB-24 (27.40 g) and were better than the best check Vikrant (21.75 g). The grain yield per plot was higher in genotypes EC 331564 (370 g) followed by HB-1 (342) and HB-15 (334) which were significantly superior than the best check Vikrant (210.0 g).

At NBPGR New Delhi, a set of 51 accessions along with three checks viz., Vikrant, HFB-1 and PRT-12 were evaluated for ten quantitative characters. The promising lines and statistical parameters are given in Table 17, 24 & 25. The experiment was planned in plot size 3.0x0.90 m² in Augmented Block Design at a row-plant spacing of 30x10 cm. The early flowering genotypes were EC 25085 (68.0 days) followed by NDF-8 (69.0 days) and were better than the best check PRT-12 (69.7 days). The maturity of genotypes ranged from 123.0 days to 136.0 days. The early maturing genotypes were EC 25085 (123.0 days) followed by EC 628925 (125.0 days) which were better than the check HFB-1 (127.83 days). More number of branches were observed in HB-60 (8.2) and EC 32976 (8.0) better than the check HFB-1 (1.62). The genotypes EC 32976 (80.6 cm) and EC 32923 (79.0 cm) recorded the maximum plant height which was significantly higher than the best check Vikrant (69.3 cm). The genotypes superior than the best check PRT-12 (51.32 mm) for maximum pod length are HB-5 (64.57 mm) followed by HB-191 (62.57 mm). More number of seeds per pods in NDF-8, EC 117744 and HB-37 (4.0) were found superior than the check PRT-12 (3.53). The mean 100 seed weight was maximum

in EC 3279 (29.65 g) followed by NDF-8 (29.52 g) and were better than the best check Vikrant (25.15 g). The seed yield per plant was maximum in genotypes HB-71 (230 g) followed by NDF-8 (150 g) and EC 343691 (130 g) which were significantly superior than the best check Vikrant (91.0 g). More number of pods per plant were recorded in NDF-8 (34.8) and HB-71 (33.80) superior than the best check Vikrant (24.64).

At NDUA&T Faizabad, a set of 50 accessions along with two checks Vikrant and HFB-1 were evaluated for seven quantitative characters. The promising lines and statistical parameters are given in Table 18, 24 & 25. The experiment was planned in plot size 4.0×0.60 m² in Augmented Block Design at a row-plant spacing of 30x10 cm. The early flowering genotypes were HB-82, EC 32976 (57.0 days) followed by HB-33 (58.0 days) and were better than the best check Vikrant (62.0 days). The maturity of genotypes ranged from 42.0 days to 105.0 days. The early maturing genotypes were HB-3, EC 243596 and HB-15 (138.0 days) which were better than the check HFB-1 (145.4 days). More number of branches were observed in HB-79 (5.8) followed by EC 628940 (5.0) better than the check HFB-1 (4.40). The genotypes EC 117744, EC 243036 and NDF-14 (105.0 cm) recorded the maximum plant height which was significantly higher than the best check Vikrant (92.6 cm). More number of seeds per pods in EC 351587 (4.2) followed by EC 343691 (4.0) were found superior than the check Vikrant (3.30). The mean 100 seed weight was maximum in HB-71 (32.80 g) followed by EC 243596 (28.10 g) and were better than the best check HFB-1 (25.8 g). The seed yield per plant was maximum in genotypes EC 25192 (31.5 g) followed by EC 363781 (31.0 g) and HB-71 (30.0 g) which were significantly superior than the best check Vikrant (27.0 g).

At CCS HAU Hisar, a set of 50 accessions along with two checks Vikrant and HFB-1 were evaluated for eleven quantitative characters. The promising lines and statistical parameters are given in Table 19, 24 & 25. The experiment was planned in plot size 3.0×0.90 m² in Augmented Block Design at a row-plant spacing of 30x10 cm. The significantly superior genotypes for early flowering were HB-33 (32.0 days) followed by HB-28 (34.0 days) and HB-24 (35.0 days) and better than the best check HFB-1 (48.0 days). The maturity of genotypes ranged from 135.0 days to 177.0 days. The early maturing genotypes were HB-28 and HB-3 (135.0 days) followed by HB-79 (137.0 days) which were better than the check HFB-1 (150.0

days). More number of branches were observed in EC 591784 and HB-15 (7.0) and were better than the check HFB-1 (5.0). The genotypes HB-21 (140.3 cm) followed by HB-90 (135.40 cm) recorded the maximum plant height which was significantly higher than the best check HFB-1 (109.6 cm). The genotypes superior than the best check HFB-1 (63.0) for more number of pods per plant are EC 591784 (82.0) followed by EC 32976 (81.0). Average 100 seed weight was maximum in HB-5 (30.3 g) followed by HB-82 (29.7 g) and HB-3 (29.1g) were better than the best check HFB-1 (26.7 g). The mean seed yield per plant was maximum in genotypes EC 32976 (68.2 g) followed by HB-15 (62.50 g) and HB-37 (62.10 g) which were significantly superior than the best check HFB-1 (49.50 g).

AT CCS HAU Hisar 30 genotypes of vegetable type were grown during rabi 2016-17. The crop was grown in Augmented Block Design along with one check Pusa Sumit at a row - plant spacing of 30 cmx10 cm. The promising lines and statistical parameters are given in Table 21, 24 & 25. The significantly superior genotypes for early flowering were ET-3103 (53.0 days) followed by ET-3137 (55.7 days) and ET4101 (56.3 days) better than the best check Pusa Sumit (60.6 days). The early maturing genotypes were ET-3103 (141.7 days) followed by ET-3131 (151.7 days) which were better than the check Pusa Sumit (155.0 days). The genotypes ET-3131 (141.7 cm) followed by ET-3125 (139.2 cm) recorded the maximum plant height which was significantly higher than the best check Pusa Sumit (128.8 cm). The genotypes superior than the best check Pusa Sumit (20.7) for more number of pods per plant are ET-3117 (66.3) followed by ET-4103 (53.3). Average 100 seed weight was maximum in ET-1119 (111.2 g) followed by ET-2112 (103.8 g) and ET 5121 (91.1 g) were better than the best check Pusa Sumit (60.2 g). The mean seed yield per plant was maximum in genotypes ET 1119 (166.8 g) followed by ET 2112 (148.7 g) and ET 3117 (126.10 g) which were significantly superior than the best check Pusa Sumit (36.2 g).

At PAU Ludhiana, a set of 50 accessions along with two checks Vikrant and PRT-12 were evaluated for nine quantitative characters. The promising lines and statistical parameters are given in. The promising lines and statistical parameters are given in Table 22, 24 & 25. The experiment was planned in plot size 3.0x0.30 m² in Randomized Block Design at a row-plant spacing of 30x10 cm. The significantly superior genotypes for early flowering were NDFB-13 and RFB-3 (59.0 days)

followed by DFB-10-2 (60.0 days) and were better than the best check Vikrant (63.7 days). The maturity of genotypes ranged from 136.0 days to 146.0 days. The early maturing genotypes were EC 25085 (136.0 days) followed by NDFB-13 (139.0 days) which were better than the check PRT-12 (142.0 days). More number of branches were observed in NDFB-13 (6.7) followed by HB-53 (6.3) and were better than the check Vikrant (4.5). Average plant height of genotypes ranged from 52.0 cm to 85.5 cm. The maximum plant height was observed in genotypes were EC 628957 and EC 628955 (85.0 cm) followed by NDFB-14 (80.5 cm) which were better than the check Vikrant (69.1 cm). The genotypes superior than the best check Vikrant (49.8) for more number of pods per plant are NDFB-13 and RFB-3 (80.0) followed by EC 628955 (78.3). The 100 seed weight was maximum in EC 25085 (32.1 g) followed by HB-40 (32.0 g) and DFB-9-1 (30.5 g) were better than the best check Vikrant (26.8 g). The mean seed yield per plant was maximum in genotypes NDFB-13 and RFB-3 (900 g) followed by NDFB-13-2 (850 g) which were significantly superior than the best check Vikrant (522.22 g).

At BAU Ranchi, a set of 50 accessions along with four checks Vikrant, HFB-1, Pusa Sumit and PRT-12 were evaluated for ten quantitative characters. The promising lines and statistical parameters are given in. The promising lines and statistical parameters are given in Table 23, 24 & 25. The experiment was planned in plot size 4.0x0.30 m² in Augmented Block Design at a row-plant spacing of 30x10 cm. Average number of days for flowering ranged from 49.0 days to 65.0 days. The promising genotypes were EC 628942 (49.0 days) followed by HB-61 (50.0 days) and were better than the best check HFB-1 (54.4 days). The maturity of genotypes ranged from 112.0 days to 148.0 days. The early maturing genotypes were HB-79 (112.0 days) followed by HB-21 and HB-2 (113.0 days) which were better than the check Pusa Sumit (115.0 days). More number of branches were observed in HB-33 (4.6) followed by EC 3279 (4.4) and were better than the check Vikrant (3.3). Average plant height of genotypes ranged from 42.2 cm to 93.6 cm. The maximum plant height was observed in genotypes were HB-24 (93.6 cm) followed by HB-3 (90.8 cm) which were better than the check Vikrant (79.4 cm). The genotypes superior than the best check Vikrant (22.8) for more number of pods per plant are HB-33 (34.0) followed by EC 343691 (28.6) and HB-24 (27.0). The 100 seed weight was maximum in EC 243793 (38.4 g) followed by HB-78 (37.20 g) were better than

the best check Pusa Sumit (35.98 g). The mean seed yield per plant was maximum in genotypes Hb-24 (20.60) followed by EC 3279 (18.70 g) and EC 243793 (18.6 g). which were significantly superior than the best check Vikrant (12.62).

In Fababean 51 genotypes were screened at six different locations during Rabi 2016-17. Based on mean over locations, promising genotype, range, along with characters are presented in (Table 24). On the basis of average over the locations the early maturing (No. of days) genotypes were EC 628925 (131.7), HB 79 (131.8), NDF 12 (132.0) and HB 61(132.5) were better than the best check HFB-1 (136.1 days). The average pod length (mm) was maximum in genotype HB 5 (5.34) followed by EC 243793 (5.32), NDFB 14 (5.30) and HB 21 (5.25) and were better than the best check HFB-1 (5.01 days). None of the genotypes recorded more seed yield per plant (g) than the best check Vikrant (136.6 g). Average of 100 seed weight (g) was maximum in HB 5 (30.24), HB 71 (29.43), NDFB 14 (28.70) and EC 3279 (28.50) and was better than the check PRT-12 (27.79 g).

2.3.2.3 Chenopods (*Chenopodium* spp.)

Twenty five genotypes were planned for screening at ten locations viz. OUA&T Bhubaneswar, NBPGR New Delhi, CCS HAU Hisar, PAU Ludhiana, SDAU S.K. Nagar, MPKV Rahuri, IGKV Ambikapur, ARS Mandor, UAS Bangalore and BAU Ranchi, Data were received from five centres viz., OUA&T Bhubaneswar, NBPGR New Delhi, CCS HAU Hisar, PAU Ludhiana and SDAU S.K. Nagar. The details of experiments, promising lines and mean and range for all the descriptors have been presented in Tables 26 to 33.

At OUA&T Bhubaneswar, a set of 25 accessions were evaluated for six quantitative characters. The promising lines and statistical parameters are given in Table 27, 32 & 33. The experiment was planned in plot size 2.5x0.60m² in Augmented Block Design at a row-plant spacing of 30x15 cm. The superior genotypes for early flowering were EC 507747, EC 507744 and EC 507746 (34.0 days). The range was 34.0 days to 41.0 days. The maturity of genotypes ranged from 91.0 days to 97.0 days. The early maturing genotypes were IC 7959 (91.0 days) followed by EC 507744 and EC 507739 (93.0 days). Average plant height of genotypes ranged from 61.3 cm to 159.8 cm. The maximum plant height was

observed in genotypes were EC 507749 (159.8 cm) followed by EC 359444 (158.0 cm) and EC 507742 (134.5 cm). The maximum inflorescences length was recorded in EC 359444 (86.0 cm) followed by IC 7958 (78.0 cm). Average yield of 5 plants was found maximum in genotypes EC 507747 (94.63 g) followed by EC 507742 (58.32 g). The average seed weight of 10 ml volume seeds is maximum in the genotypes IC 7961 (7.16 g) followed by IC 7959 (7.14 g).

At NBPGR New Delhi, a set of 13 accessions were evaluated for seven quantitative characters. The promising lines and statistical parameters are given in Table 28, 32 & 33. The experiment was planned in plot size 3.0x0.30m² in Randomized Block Design in four replications at row-plant spacing of 30x15 cm. The superior genotypes for early flowering were IC 411825 (56.50 days) followed by EC 507739 and EC 507740 (57.0 days). The range was 56.50 days to 60.75 days. The maturity of genotypes ranged from 116.75 days to 121.50 days. The early maturing genotypes were EC 507739 (116.75 days) followed by IC 411825 (117.25 days) and EC 507740 (118.25 days). Average plant height of genotypes ranged from 129.55 cm to 153.30 cm. The maximum plant height was observed in genotypes were EC 507738 (153.30 cm) followed by EC 507748 (150.28 cm) and IC 411824 (148.99 cm). The maximum inflorescences length was recorded in EC 507738 (25.83 cm) followed by EC 507749 (25.45 cm). Average seed yield per plant was found maximum in genotypes EC 507738 (28.00 g) followed by EC 507744 (25.50 g) and IC 411825 (24.50 g). The average seed weight of 10 ml volume seeds is maximum in the genotypes EC 507746 (5.66 g) followed by IC 507739 (5.62 g).

At CCS HAU Hisar, a set of 25 accessions were evaluated for eight quantitative characters. The promising lines and statistical parameters are given in Table 29, 32 & 33. The experiment was planned in plot size 2.4x2.4m² in Randomized Block Design in two replications at row-plant spacing of 30x15 cm. The superior genotypes for early flowering were EC 507749 (32.40 days) followed by EC 411825 (35.1 days) and EC 507739 (35.30 days). The range was 32.40 days to 94.40 days. The maturity of genotypes ranged from 134.40 days to 194.80 days. The early maturing genotypes were EC 507739 (134.40 days) followed by EC 507749 (134.60 days) and EC 507742 (136.40 days). Average plant height of genotypes ranged from 68.2 cm to 224.50 cm. The maximum plant height was observed in genotypes were IC 7961 (224.50 cm) followed by EC 359494 (221.20

cm) and IC 7960 (174.30 cm). The maximum inflorescences length was recorded in EC 411825 (35.90 cm) followed by EC 507744 (35.50 cm). Average seed yield per plant was found maximum in genotypes EC 411825 (12.0 g) followed by EC 507740 (10.60 g) and EC 507741 (9.20 g). The average seed weight of 10 ml volume seeds is maximum in the genotypes EC 507744 and EC 411825 (8.30 g) followed by EC 322024 (8.20 g).

At PAU Ludhiana, a set of 13 accessions were evaluated for eight quantitative characters. The promising lines and statistical parameters are given in Table 30, 32 & 33. The experiment was planned in plot size 2.4x2.4m² in Randomized Block Design in two replications at row-plant spacing of 30x15 cm. The superior genotypes for early flowering were EC 507748 and IC 411825 (70.0 days) followed by EC 507746 (71.0 days). The range was 70.0 days to 85.0 days. The maturity of genotypes ranged from 124.0 days to 143.00 days. The early maturing genotypes were EC 507739 (124.0 days) followed by EC 507738 (134.50 days) and IC 411824 (124.50 days). Average plant height of genotypes ranged from 60.25 cm to 87.0 cm. The maximum plant height was observed in genotypes were EC 507742 (87.0 cm) followed by EC 507746 (85.65 cm) and EC 507741 (85.65 cm). The maximum inflorescences length was recorded in IC 411824 (20.0 cm) followed by EC 507747 (18.85 cm). Average seed yield per plot was found maximum in genotypes EC 507746 (650.0 g) followed by EC 507741 (600.0 g) and EC 507742 (550.0 g). The average seed weight of 10 ml volume seeds is maximum in the genotypes EC 507746 (8.60 g) followed by EC 507747 (8.40 g).

At SDAU S.K. Nagar, a set of 13 accessions were evaluated for six quantitative characters. The promising lines and statistical parameters are given in Table 31, 32 & 33. The experiment was planned in Randomized Block Design in two replications at row-plant spacing of 30x15 cm. The superior genotypes for early flowering were IC 411825 (46.0 days) and followed by EC 507740 (46.33 days) and EC 507739 (48.0 days). The range was 46.0 days to 57.0 days. The maturity of genotypes ranged from 104.67 days to 116.33 days. The early maturing genotypes were EC 507740 (104.67 days) followed by IC 411825 (106.67 days) and EC 507739 (107.00 days). Average plant height of genotypes ranged from 10.80 cm to 114.40 cm. The maximum plant height was observed in genotypes were EC 507747 (114.40 cm) followed by EC 507749 (113.60 cm) and EC 507741 (113.20 cm). The

maximum inflorescences length was recorded in IC 411824 (42.60 cm) followed by IC 411825 (37.67 cm). Average seed yield per plant was found maximum in genotypes IC 411824 (15.8 g) followed by IC 411825 (13.0 g) and EC 507749 (12.53 g). The average seed weight of 10 ml volume seeds is maximum in the genotypes EC 507739 (6.54 g) followed by EC 507744 (6.53 g) and EC 507747 (6.50 g).

In Chenopodium 22 genotypes were screened at five different locations during Rabi 2016-17. Based on mean over locations, promising genotype, range, along with characters are presented in Table 32. The early flowering (No. of days) genotypes were IC 7960 (37.6), IC 7213 (42.1), IC 7958 (44.70) and IC 7959 (47.6). The early maturing (No. of days) genotypes were IC 411825 (111.4), IC 411824 (113.8), EC 507739 (115.0) and IC 7960 (117.5). Genotypes EC 507741 (13.8), EC 507747 (13.5) and IC 411825 (12.9) recorded more seed yield per plant (g) over the locations. Average of 10 ml seed weight (g) was maximum in IC 7961 (7.45) followed by IC 7958 (7.23) and IC 7960 (7.19).

2.3.2.4 Kalingada

Fifteen genotypes were planned for screening at OUA&T Bhubaneswar. Data were received and the promising lines and mean and range for all the descriptors have been presented in Tables 34 & 35. At OUA&T Bhubaneswar, the superior genotypes for early fruit maturity were SKGPK-12, SKGPK-10 and SKGPA-15 (30 days) and were better than the best check GK-1 (35.0 Days). The days to first fruiting ranged from 30.0 to 41.0 days in the genotypes. Mean fruit diameter was recorded maximum in SKGPK-5 (38.0 cm) followed by SKGPK-1 and SKGPK-4 (31.2) and better than the best check GK-1 (25.8 cm). Average fruit weight of genotypes ranged from 86.0 g to 610.0 g. The maximum fruit weight observed in genotypes were SKGPK-1 (610.0 g) followed by EC 507746 and EC 507741 (85.65 g) and were superior than the best check GK-1 (519.0 g). More number of fruits per plant were found in the genotype SKGPK-4 (4.0) which was better than the check SKNK-1102 (2.0). 100 seed weight ranged from 6.86 g to 7.46 g and none of the genotypes were superior than the best check SKNK-1102 (7.46 g). The mean single fruit seed weight was significantly superior in the genotypes SKGPK-8 (120.0 g) followed by SKGPK-9 (130.0 g) than the best check SKNK-1102 (35.0 g).

Table 4: Experimental Details of Germplasm Evaluation in Grain amaranth Rabi 2016-17 (Plains)

S. No	Items	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar
1	No. of Acc.	83	80	20	20	78	70	60	80
2	No. of Checks	4	4	4	4	4	5	5	4
3	No. of Replication	-	-	3	1	1	-	-	-
4	Design	ABD	ABD	RBD	ABD	ABD	ABD	ABD	ABD
5	No. of Block	-	5	-	4	-	-	5	
6	Number of Rows	-	2	1	2	-	2	1	1
7	Row Length (m)	-	-	3.0	4	-	3.90m		4m
8	Row spacing (cm)	45 cm	45 cm	45 cm	45 cm	50 cm	45 cm	45 cm	45 cm
9	Plant spacing (cm)	15 cm	15 cm	15 cm	15 cm	15 cm	15 cm	15 cm	15 cm
10	NPKS (kg/ha)		60:40:20	60:40:0	-	60:40:20	40:20:20:20	60:40:20:20	-
11	Plot size (m ²)	4.0X0.90	2.5x0.9	3.0x0.45	4.0×0.9	4.0x1.0	3.90x0.90	4.0x0.45	-
12	Sowing Date	9/12/2016	5/12/2016	28/11/2016	23/11/2016	8/12/2016	30/11/2016	15/12/2016	08/12/2016
13	Harvesting period	-	-	1/4/2017 - 7/4/2017	10/4/2017	-	03/02/2017 - 12/04/2017	15/4/2017 - 15/5/2017	12/04/2017

Table 5: Evaluation of germplasm in Grain Amaranth at Ambikapur Rabi 2016-17 (Plains)

S.N.	Genotypes	Days to 50% flowering	Plant height (cm)	Lateral Spikelet length (cm)	Inflorescence length (cm)	Seed yield/plant g)	10 ML seed weight (g)
1	IC 21922	73.00	104.00	29.40	56.40	16.50	5.45
2	IC 21923	75.00	93.80	32.20	56.20	16.70	6.20
3	IC 21925	76.00	99.00	28.20	47.60	16.90	6.55
4	IC 21927	78.00	107.40	26.40	49.60	17.00	6.00
5	IC 21930	76.00	102.60	32.80	58.40	17.10	5.45
6	IC 21935	79.00	100.80	26.60	49.00	17.20	6.35
7	IC 35534	75.00	84.20	26.60	54.20	17.30	6.85
8	IC 35539	76.00	86.40	29.00	49.20	16.40	6.20
9	IC 35541	74.00	73.40	28.00	44.00	17.00	5.45
10	IC 35542	77.00	114.00	27.60	53.80	16.80	5.40
11	IC 35543	69.00	104.40	27.20	50.40	16.90	6.80
12	IC 35545	68.00	105.40	22.00	44.00	16.80	5.95
13	IC 35546	64.00	92.80	23.60	51.20	17.10	6.60
14	IC 35547	66.00	88.20	32.20	39.40	17.90	6.70
15	IC 35548	67.00	67.00	21.00	45.20	17.50	6.40
16	IC 35549	66.00	79.60	23.20	44.00	17.60	5.70
17	IC 35550	66.00	72.60	25.00	49.20	16.90	5.55
18	IC 35551	63.00	84.00	26.40	49.60	17.20	5.80
19	IC 35552	62.00	88.60	28.40	54.60	17.50	5.85
20	IC 35553	64.00	94.40	22.00	53.00	16.90	4.90

S.N.	Genotypes	Days to 50% flowering	Plant height (cm)	Lateral Spikelet length (cm)	Inflorescence length (cm)	Seed yield/ plant g)	10 ML seed weight (g)
21	IC 35554	71.00	95.00	24.20	48.20	17.00	6.10
22	IC 35610	79.00	102.40	25.20	52.00	17.10	5.75
23	IC 35611	82.00	114.00	29.60	53.20	18.00	6.05
24	IC 35612	77.00	100.00	22.20	48.00	17.80	6.30
25	IC 35614	76.00	96.80	25.00	51.80	17.70	6.55
26	IC 35617	77.00	104.00	23.20	47.20	18.20	7.25
27	IC 35618	75.00	117.20	30.00	56.20	18.30	7.50
28	IC 35621	82.00	87.00	30.60	56.00	18.70	7.10
29	IC 35622	83.00	98.20	23.20	50.80	19.00	6.50
30	IC 35623	84.00	104.00	16.40	40.80	18.80	6.50
31	IC 35624	83.00	93.80	28.00	53.20	18.40	5.70
32	IC 35625	85.00	99.00	32.20	60.20	18.50	6.35
33	IC 35668	83.00	107.40	24.80	48.80	18.10	6.75
34	IC 35692	76.00	102.60	26.00	48.40	18.70	6.30
35	IC 35696	82.00	100.80	24.00	48.00	19.00	6.65
36	IC 35755	77.00	84.20	22.00	44.40	18.40	6.00
37	IC 35757	75.00	86.40	32.80	53.80	18.60	5.95
38	IC 35758	76.00	73.40	26.60	50.40	18.90	6.05
39	IC 35761	66.00	114.00	26.60	44.00	16.90	6.40
40	IC 35766	66.00	104.40	29.00	51.20	16.80	5.70

S.N.	Genotypes	Days to 50% flowering	Plant height (cm)	Lateral Spikelet length (cm)	Inflorescence length (cm)	Seed yield/ plant g)	10 ML seed weight (g)
41	IC 35770	63.00	105.40	28.00	39.40	17.10	5.55
42	IC 35771	62.00	92.80	27.60	45.20	17.90	5.80
43	IC 35775	64.00	88.20	27.20	44.00	17.50	5.85
44	IC 35776	71.00	67.00	22.00	49.20	17.60	4.90
45	IC 81711	79.00	79.60	23.60	49.60	16.90	6.10
46	IC 93941	82.00	72.60	32.20	54.60	17.20	5.75
47	IC 93942	77.00	84.00	21.00	53.00	17.50	6.05
48	IC 93945	76.00	88.60	23.20	48.20	16.90	6.30
49	IC 95283	77.00	94.40	25.00	52.00	17.00	6.55
50	IC 95290	75.00	95.00	26.40	53.20	17.10	7.25
51	IC 95292	82.00	102.40	28.40	48.00	18.00	7.50
52	IC 95293	83.00	114.00	22.00	51.80	17.80	7.10
53	IC 95295	84.00	100.00	24.20	47.20	17.70	6.50
54	IC 95297	83.00	96.80	25.20	56.20	18.20	6.50
55	IC 95299	85.00	104.00	29.60	56.00	18.30	5.70
56	IC 95588	83.00	117.20	22.20	50.80	18.70	6.35
57	IC 95595	76.00	87.00	25.00	40.80	19.00	6.75
58	IC 95596	82.00	98.20	23.20	53.20	18.80	6.30
59	IC 95597	77.00	76.80	30.00	60.20	18.40	6.65
60	IC 95598	75.00	104.00	30.60	48.80	18.50	6.00
64	SKGPA-144	61.00	67.60	19.00	53.00	17.50	5.89

S.N.	Genotypes	Days to 50% flowering	Plant height (cm)	Lateral Spikelet length (cm)	Inflorescence length (cm)	Seed yield/ plant g)	10 ML seed weight (g)
65	SKGPA-145	60.00	62.00	19.20	49.40	17.60	6.21
66	SKGPA-146	63.00	53.00	12.80	39.60	17.40	6.56
67	SKGPA-147	64.00	66.80	22.60	53.00	17.30	6.89
68	SKGPA-148	77.00	67.80	19.20	54.80	17.80	6.76
69	SKGPA-149	69.00	54.20	16.00	42.60	17.60	5.78
70	SKGPA-150	75.00	73.40	20.60	55.80	17.70	5.45
71	SKGPA-151	76.00	53.80	20.80	56.80	17.20	5.89
72	SKGPA-152	74.00	74.00	18.60	56.00	17.40	5.89
73	SKGPA-153	77.00	76.00	20.80	57.60	17.50	6.23
74	SKGPA-154	69.00	61.40	18.40	48.80	17.60	6.32
75	SKGPA-155	68.00	55.40	15.60	42.80	17.70	5.46
76	SKGPA-156	64.00	80.20	18.80	62.20	17.30	6.24
77	SKGPA-157	66.00	66.80	17.00	51.20	17.50	5.67
78	SKGPA-158	67.00	67.20	18.80	53.20	17.40	6.45
79	SKGPA-159	66.00	75.40	22.80	58.20	17.80	7.10
80	SKGPA-160	66.00	61.20	16.00	45.40	17.60	6.11
81	SKGPA-161	63.00	56.80	16.60	44.80	17.50	6.30
82	SKGPA-162	62.00	62.80	18.20	51.40	17.70	6.20
83	SKGPA-163	64.00	66.80	17.20	55.00	17.80	7.23

S.N.	Genotypes	Days to 50% flowering	Plant height (cm)	Lateral Spikelet length (cm)	Inflorescence length (cm)	Seed yield/ plant g)	10 ML seed weight (g)
	BGA-2	77.50	97.60	20.30	52.20	18.15	6.88
	GA-2	72.00	79.80	18.90	53.30	18.10	6.48
	RMA-7	77.00	58.80	14.20	41.60	19.60	8.80
	SUVARNA	78.50	86.10	21.60	45.70	18.65	7.39
	Minimum	60.00	53.00	12.80	39.40	16.40	4.90
	Maximum	85.00	117.20	32.80	62.20	19.60	8.80
	Mean	73.35	87.14	24.05	50.37	17.69	6.28
	CV (%) phen.	9.69	19.80	19.93	10.22	3.87	9.91

Table 6: Evaluation of germplasm in Grain Amaranth at Bhubaneswar Rabi 2016-17 (Plains)

S. No	Accession No	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Inflorescence Length (cm)	5 Plant yield (g)	Grain yield (kg/plot)	Seed Vol. Wt. (g/10ml)
1	SKGPA 144	39	86	88.00	34.60	57.87	0.158	7.83
2	SKGPA 145	39	86	78.20	34.40	51.31	0.151	7.91
3	SKGPA 146	39	89	94.40	39.80	48.28	0.198	7.19
4	SKGPA 147	43	86	118.80	35.20	30.70	0.131	7.82
5	SKGPA 148	49	88	98.20	35.40	29.26	0.129	7.7
6	SKGPA 149	47	90	93.00	34.60	27.91	0.188	7.64
7	SKGPA 150	49	88	102.40	36.80	32.14	0.212	7.71
8	SKGPA 151	47	90	105.80	38.60	26.48	0.206	7.15
9	SKGPA 152	49	88	101.40	31.00	53.17	0.183	7.65
10	SKGPA 153	49	92	102.40	35.60	34.38	0.134	7.72
11	SKGPA 154	47	88	94.00	39.20	49.68	0.230	7.58
12	SKGPA 155	47	90	104.40	42.60	40.09	0.200	7.48
13	SKGPA 156	47	88	91.20	32.00	40.05	0.160	7.25
14	SKGPA 157	47	88	94.60	33.60	23.59	0.124	7.31
15	SKGPA 158	47	90	90.00	36.60	31.58	0.162	7.62
16	SKGPA 159	47	88	102.80	32.80	31.46	0.201	7.56
17	SKGPA 160	49	90	99.60	36.20	27.05	0.167	7.25
18	SKGPA 161	49	88	91.20	33.80	39.41	0.139	7.63
19	SKGPA 162	47	86	73.80	33.60	36.33	0.136	7.31

S. No	Accession No	Days to 50% flowering	Days to 80 % maturity	Plant height (Cm)	Inflorescence Length (cm)	5 Plant yield (g)	Grain yield (kg/plot)	Seed Vol. Wt. (g/10ml)
20	SKGPA 163	47	86	77.60	32.60	23.92	0.154	7.16
21	IC 21922	45	86	113.20	42.60	44.12	0.104	7.21
22	IC 21923	45	87	123.00	49.00	66.56	0.177	7.45
23	IC 21927	47	88	110.00	38.00	47.21	0.147	7.15
24	IC 21930	43	86	110.80	50.00	25.65	0.146	7.27
25	IC 21935	43	87	121.20	49.60	52.65	0.103	7.33
26	IC 35541	49	86	100.40	36.80	37.74	0.078	7.17
27	IC 35542	49	87	111.80	44.60	44.15	0.094	7.36
28	IC 35543	49	86	94.20	31.60	57.35	0.097	7.28
29	IC 35546	42	86	96.20	33.20	28.85	0.129	7.06
30	IC 35554	45	90	135.00	51.20	36.09	0.156	7.29
31	IC 35610	41	88	110.00	42.20	28.66	0.119	7.08
32	IC 35611	41	90	104.80	39.40	9.93	0.130	7.31
33	IC 35612	43	94	112.60	39.00	55.52	0.176	7.11
34	IC 35614	43	88	119.00	47.00	37.30	0.137	7.25
35	IC 35617	43	90	131.20	47.80	57.83	0.148	7.44
36	IC 35618	43	86	122.60	44.60	68.81	0.219	7.36
37	IC 35621	43	86	119.40	47.20	51.77	0.172	7.21
38	IC 35625	45	86	108.00	36.80	67.03	0.187	7.19
39	IC 35692	43	89	102.00	42.40	54.00	0.154	7.24

S. No	Accession No	Days to 50% flowering	Days to maturity	Plant height (Cm)	Inflorescence Length (cm)	5 Plant yield (g)	Grain yield (kg/plot)	Seed Vol. Wt. (g/10ml)
40	IC 35696	45	86	82.40	31.60	19.45	0.109	7.08
41	IC 35755	45	90	98.60	37.80	53.62	0.154	7.34
42	IC 25757	45	88	84.80	31.20	43.98	0.124	7.23
43	IC 35759	43	88	93.20	44.80	25.19	0.105	7.07
44	IC 35761	47	89	107.40	44.20	64.08	0.164	7.23
45	IC 35766	45	88	97.20	42.20	46.21	0.146	7.43
46	IC 35770	43	90	89.00	39.80	44.19	0.124	7.31
47	IC 35771	43	86	105.80	38.20	63.00	0.183	7.28
48	IC 35775	47	89	111.80	45.20	60.96	0.161	7.35
49	IC 35776	45	88	91.40	37.00	37.35	0.077	7.08
50	IC 93941	47	86	97.60	33.60	18.79	0.059	7.43
51	IC 93942	47	88	102.00	45.00	43.58	0.144	7.25
52	IC 95283	45	90	114.20	36.60	11.48	0.051	7.22
53	IC 95290	47	86	104.80	41.60	35.65	0.106	7.29
54	IC 95292	49	90	99.80	33.00	36.79	0.117	7.16
55	IC 95293	47	90	116.40	40.40	40.07	0.120	7.33
56	IC 95295	41	88	109.20	43.00	33.88	0.084	7.15
57	IC 95297	41	86	95.40	44.00	34.48	0.074	7.26
58	IC 95299	47	88	94.40	39.00	36.18	0.066	7.31
59	IC 95588	51	90	109.60	39.80	39.58	0.110	7.12

S. No	Accession No	Days to 50% flowering	Days to maturity	Plant height (Cm)	Inflorescence Length (cm)	5 Plant yield (g)	Grain yield (kg/plot)	Seed Vol. Wt. (g/10ml)
60	IC 95595	45	90	92.80	37.40	42.81	0.123	7.27
61	IC 95596	43	92	115.80	51.60	40.36	0.140	7.18
62	IC 95597	43	88	107.20	41.40	44.61	0.135	7.03
63	IC 95598	47	88	102.20	39.40	22.15	0.062	7.07
	BGA 2	53.00	93.00	108.68	33.12	32.22	0.15	7.41
	GA 2	49.40	92.60	123.84	40.48	30.08	0.14	7.39
	RMA 7	51.80	93.40	121.96	39.88	40.42	0.29	7.26
	Suvarna	53.00	94.80	107.28	32.64	39.00	0.17	7.33
	Minimum	39.00	86.00	73.80	31.00	9.93	0.05	7.03
	Maximum	53.00	94.80	135.00	51.60	68.81	0.29	7.91
	Mean	45.69	88.46	103.46	39.19	40.09	0.14	7.33
	CD (0.05)	4.24	2.04	14.75	8.90	29.34	0.42	0.15
	CV (%) Error	3.07	0.82	4.79	9.13	31.03	84.00	0.77
	CV (%) Phen.	6.9773	2.467	12.179	13.791	33.222	31.01	2.7956

Table 7: Evaluation of germplasm in Grain Amaranth at Delhi Rabi 2016-17 (Plains)

S. No	Genotypes	Days to 50% flowering	Days to 80% maturity	leaf length (cm)	Petiole length (cm)	Stem thickness (mm)	Plant height (cm)	No. of Branches / plant	Lateral spikelet length (cm)	Inflorescence length (cm)	Seed yield/ Plant (g)	Seed volume weight (g/10ml)
1	SKGPA-144	59.00	124.67	13.49	9.39	14.87	78.13	4.69	12.41	35.17	37.01	6.97
2	SKGPA-145	59.00	123.67	12.11	8.87	12.60	80.20	4.13	11.19	31.67	39.75	7.33
3	SKGPA-146	58.67	132.00	12.57	8.65	12.97	88.07	3.80	16.05	38.90	45.40	6.98
4	SKGPA-147	61.00	131.00	14.58	8.71	14.13	101.00	3.98	15.58	48.16	38.52	7.04
5	SKGPA-148	71.33	123.67	13.92	9.81	14.51	85.60	3.67	14.69	37.81	55.00	7.10
6	SKGPA-149	70.33	135.67	14.40	10.19	14.53	89.69	4.07	16.17	48.44	53.33	7.23
7	SKGPA-150	68.00	136.00	14.90	9.33	13.99	107.90	3.60	15.59	46.53	35.75	6.71
8	SKGPA-151	71.00	130.00	11.74	7.72	12.65	88.20	2.60	12.95	38.00	35.45	7.25
9	SKGPA-152	69.33	126.00	13.03	7.95	12.71	90.20	5.10	13.81	43.63	45.92	7.22
10	SKGPA-153	70.67	129.00	14.05	9.52	12.42	120.27	3.30	15.70	52.05	28.12	6.97
11	SKGPA-154	67.33	134.33	13.45	8.70	14.31	85.47	4.00	14.03	46.42	48.30	7.25
12	SKGPA-155	73.00	134.00	13.75	8.33	12.99	100.13	2.22	16.05	48.86	59.36	6.86
13	SKGPA-156	66.67	128.33	13.51	7.59	12.87	85.07	2.00	10.40	42.62	41.11	7.27
14	SKGPA-157	72.00	134.67	12.88	11.10	14.35	89.52	4.27	12.67	46.15	35.10	7.33
15	SKGPA-158	68.67	131.67	13.23	8.59	14.64	79.00	2.33	15.71	43.05	39.57	7.38
16	SKGPA-159	67.00	131.00	11.68	9.16	12.53	72.77	2.59	12.05	39.29	40.00	7.73
17	SKGPA-160	72.00	129.67	10.66	6.50	10.98	57.30	2.72	11.61	30.85	23.36	7.39

S. No	Genotypes	Days to 50% flowering	Days to 80% maturity	leaf length (cm)	Petiole length (cm)	Stem thickness (mm)	Plant height (cm)	No. of Branches / plant	Lateral spikelet length (cm)	Inflorescence length (cm)	Seed yield/ Plant (g)	Seed volume weight (g/10 ml)	Seed volume weight (g/10ml)
18	SKGPA-161	66.33	132.67	11.29	7.75	11.37	87.13	1.80	12.72	41.42	2.00	40.67	6.64
19	SKGPA-162	66.00	127.67	11.44	7.89	9.87	75.20	3.12	16.21	47.10	2.00	28.65	7.17
20	SKGPA-163	66.33	131.33	13.22	9.37	14.38	74.33	3.06	14.19	42.23	2.67	34.58	7.51
	BGA-2	82.33	127.33	12.52	8.42	15.10	109.80	4.53	14.28	44.57	2.00	24.32	7.09
	GA-2	71.33	140.33	12.97	9.01	14.40	90.53	3.26	19.46	44.73	2.67	37.35	7.58
	RMA-7	76.00	140.00	12.39	9.68	14.27	76.60	4.77	16.73	42.87	2.00	48.00	7.24
	Suvarna	77.33	132.67	12.76	9.06	16.17	92.38	3.63	12.78	42.90	2.33	37.68	7.20
	Minimum	58.67	123.67	10.66	6.50	9.87	57.30	1.80	10.40	30.85	2.00	23.36	6.64
	Maximum	82.33	140.33	14.90	11.10	16.17	120.27	5.10	19.46	52.05	3.00	59.36	7.73
	Mean	68.78	131.14	12.94	8.80	13.48	87.69	3.47	14.29	42.64	2.31	39.68	7.18
	EMS	7.57	15.40	1.26	3.67	4.08	301.46	0.75	7.37	101.99	0.20	107.16	0.18
	SE	2.25	3.20	0.92	1.56	1.65	14.18	0.71	2.22	8.25	0.36	8.45	0.35
	CD(0.05)	4.52	6.45	1.84	3.15	3.32	28.54	1.42	4.46	16.60	0.73	17.01	0.70
	CV(%)												
	Error	4.00	2.99	8.67	21.77	14.97	19.80	24.94	18.99	23.68	19.24	26.09	5.94

Table 8: Evaluation of germplasm in Grain Amaranth at Faizabad Rabi 2016-17 (Plains)

S. No	Genotypes	Days to 50% flowering	Days to 80 % maturity	Plant height (cm)	Inflorescence length (cm)	Seed yield / plant (g)
1	SKGPA 144	40.0	125.0	75.50	34.50	10.65
2	SKGPA 145	42.0	120.0	80.00	36.00	10.50
3	SKGPA 146	45.0	125.0	85.50	37.30	12.80
4	SKGPA 147	42.0	137.0	90.00	42.00	15.50
5	SKGPA 148	48.0	125.0	85.00	38.30	16.30
6	SKGPA 149	35.0	114.0	70.00	36.00	13.00
7	SKGPA 150	38.0	118.0	75.00	35.00	15.60
8	SKGPA 151	37.0	120.0	78.00	35.50	16.60
9	SKGPA 152	40.0	125.0	80.00	35.00	14.60
10	SKGPA 153	45.0	130.0	85.00	34.00	13.20
11	SKGPA 154	38.0	125.0	90.00	33.60	12.60
12	SKGPA 155	40.0	120.0	75.50	36.00	15.50
13	SKGPA 156	45.0	115.0	80.50	37.60	17.00
14	SKGPA 157	47.0	116.0	100.00	40.30	16.40
15	SKGPA 158	38.0	117.0	110.00	35.30	13.40
16	SKGPA 159	47.0	125.0	85.40	35.00	12.67
17	SKGPA 160	48.0	140.0	88.00	41.50	15.40
18	SKGPA 161	40.0	135.0	90.50	40.50	13.50
19	SKGPA 162	42.0	125.0	110.00	38.50	12.80
20	SKGPA 163	37.0	130.0	108.00	40.60	12.64
	GA-2	42.0	120.5	87.88	37.30	13.85
	Suvarna	43.8	125.0	83.90	39.65	11.24
	Minimum	35.0	114.0	70.00	33.60	10.50
	Maximum	48.0	140.0	110.00	42.00	17.00
	Mean	41.8	124.2	86.99	37.25	13.90
	CV (%) Phen.	9.25	5.60	12.89	6.89	13.85

Table 9: Evaluation of germplasm in Grain amaranth at Mandor Rabi 2016-17 (Plains)

S. No.	Genotypes	Inflorescence Length (cm)	Days to 80% maturity	Plant height (cm)	Seed yield/plant (g)	Seed vol. wt. (g/10 ml)
1	SKGPA-144	38.2	122.0	79.2	2.7	4.87
2	SKGPA-145	39.4	122.0	75.0	2.8	4.75
3	SKGPA-146	39.8	124.0	76.2	2.9	4.16
4	SKGPA-147	52.4	126.0	108.6	1.5	4.71
5	SKGPA-148	55.0	125.0	90.0	2.3	4.12
6	SKGPA-149	45.6	126.0	78.6	2.8	4.23
7	SKGPA-150	43.6	125.0	81.2	2.7	4.63
8	SKGPA-151	48.8	123.0	74.4	2.4	4.16
9	SKGPA-152	50.6	123.0	81.6	1.9	5.23
10	SKGPA-153	55.2	124.0	97.0	3.7	4.98
11	SKGPA-154	47.8	125.0	74.0	4.3	5.31
12	SKGPA-155	46.6	124.0	87.6	2.7	4.78
13	SKGPA-156	50.2	126.0	77.4	5.6	4.81
14	SKGPA-157	44.2	122.0	75.6	3.1	4.92
15	SKGPA-158	47.2	123.0	82.6	6.6	5.11
16	SKGPA-159	53.8	123.0	79.2	3.2	6.11
17	SKGPA-160	57.4	123.0	85.8	5.1	5.18
18	SKGPA-161	56.4	124.0	98.6	6.1	5.79
19	IC 21922	61.8	126.0	116.0	5.4	5.21
20	IC 21923	50.8	125.0	89.6	2.8	4.79

S. No.	Genotypes	Inflorescence Length (cm)	Days to 80% maturity	Plant height (cm)	Seed yield/plant (g)	Seed vol. wt. (g/10 ml)
21	IC 21925	60.0	125.0	112.8	5.6	5.11
22	IC 21927	56.8	126.0	96.0	6.1	5.12
23	IC 21930	29.2	123.0	55.0	2.2	5.12
24	IC 21935	53.8	126.0	93.2	5.4	5.13
25	IC 33534	54.8	124.0	80.0	5.0	5.14
26	IC 33539	42.8	122.0	54.0	5.0	4.12
27	IC 33541	44.0	121.0	60.0	5.2	4.72
28	IC 33542	53.8	121.0	79.4	6.5	4.73
29	IC 33543	50.4	123.0	85.4	4.9	5.01
30	IC 33545	57.4	126.0	96.2	2.0	4.76
31	IC 33546	51.8	126.0	98.6	3.5	5.14
32	IC 33547	45.6	125.0	81.2	2.5	4.81
33	IC 33548	49.2	122.0	85.2	6.9	5.12
34	IC 33549	45.0	122.0	75.0	5.9	5.11
35	IC 33550	37.6	123.0	71.0	4.8	4.33
36	IC 33551	43.0	123.0	67.4	3.4	4.12
37	IC 33552	43.6	123.0	72.2	3.5	4.23
38	IC 33553	34.4	122.0	63.0	1.7	4.24
39	IC 33554	50.2	123.0	87.6	1.3	4.61
40	IC 35610	51.4	123.0	88.0	1.5	5.11
41	IC 35611	53.4	124.0	85.6	1.4	5.11

S. No.	Genotypes	Inflorescence Length (cm)	Days to 80% maturity	Plant height (cm)	Seed yield/plant (g)	Seed vol. wt. (g/10 ml)
42	IC 35612	50.0	125.0	86.0	1.0	4.28
43	IC 35614	55.8	122.0	112.6	1.1	5.11
44	IC 35617	51.6	123.0	102.4	2.3	4.23
45	IC 35618	48.8	121.0	93.0	1.4	4.79
46	IC 35621	49.6	121.0	96.2	1.7	4.72
47	IC 35622	46.0	121.0	87.8	1.3	4.82
48	IC 35623	65.4	124.0	127.4	1.2	4.77
49	IC 35624	45.4	123.0	92.6	1.2	4.12
50	IC 35625	46.4	122.0	86.4	3.8	4.78
51	IC 35668	46.4	123.0	74.0	5.3	4.79
52	IC 35692	56.4	122.0	85.0	1.6	4.12
53	IC 35696	45.8	121.0	87.2	4.8	4.77
54	IC 35755	47.4	121.0	70.0	1.3	5.11
55	IC 35757	38.4	122.0	70.0	1.9	4.87
56	IC 35759	36.6	122.0	69.6	1.6	4.76
57	IC 35761	45.2	121.0	72.0	3.1	5.11
58	IC 35766	39.2	121.0	78.4	2.5	4.78
59	IC 35770	43.8	122.0	86.2	4.3	5.23
60	IC 35771	44.0	122.0	84.0	1.3	5.72
61	IC 35775	58.6	125.0	102.8	6.3	5.43
62	IC 35776	52.2	123.0	81.2	3.5	6.01

S. No.	Genotypes	Inflorescence Length (cm)	Days to 80% maturity	Plant height (cm)	Seed yield/plant (g)	Seed vol. wt. (g/10 ml)
63	IC 81711	48.8	123.0	79.0	4.4	4.76
64	IC 93941	54.8	122.0	98.6	5.4	4.63
65	IC 93942	50.0	122.0	88.6	6.0	6.11
66	IC 93945	47.6	122.0	79.6	4.2	5.75
67	IC 95283	52.2	122.0	93.8	3.6	6.11
68	IC 95290	42.4	122.0	75.8	3.7	6.11
69	IC 95292	43.6	122.0	76.4	7.1	6.11
70	IC 95293	47.0	122.0	83.0	6.0	5.98
71	IC 95295	36.0	122.0	58.0	5.0	4.81
72	IC 95297	36.6	122.0	64.2	3.7	5.11
73	IC 95299	36.0	122.0	64.2	2.9	4.52
74	IC 95588	43.8	124.0	83.6	2.4	5.11
75	IC 95595	38.2	125.0	68.2	3.3	4.01
76	IC 95596	42.4	123.0	68.4	3.0	5.02
77	IC 95597	35.2	124.0	74.8	1.9	5.11
78	IC 95598	51.8	124.0	90.8	4.0	4.51
79	GA-2	59.4	126.0	115.3	2.8	4.81
80	Suvarna	42.9	125.1	111.2	1.7	4.90
81	BGA-2	44.5	124.6	110.9	2.0	4.91
82	RMA-7	52.0	125.3	110.6	3.6	5.05
Minimum		29.2	121.0	54.0	0.98	4.01
Maximum		65.4	126.0	127.4	7.14	6.11
Mean		47.7	123.2	84.6	3.47	4.93
CD (0.05)						
CV (%) Error						
CV (%) Phen.		14.78	1.26	17.57	48.58	10.53

Table 10: Evaluation of germplasm in Grain amaranth at Rahuri Rabi 2016-17 (Plains)

S. No.	Genotypes	Days to 50 % Flowering	Days to 80% maturity	Plant height (cm)	Inflorescence length (cm)	Lateral spikelet length (cm)	Stem thickness (cm)	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Seed yield (g/plant)	Seed vol. wt. (g/10 ml)
1	IC 21922	48.00	111.00	160.20	81.20	12.00	1.70	18.00	5.60	8.50	16.20	7.20
2	IC 21923	53.00	123.00	105.40	40.30	18.00	1.30	22.00	5.60	11.20	10.20	6.80
3	IC 21925	55.00	126.00	119.20	57.60	13.00	1.80	14.00	4.00	7.50	7.80	7.40
4	IC 21927	55.00	120.00	117.50	55.20	15.00	2.10	23.00	4.50	12.50	6.60	6.40
5	IC 21930	46.00	119.00	97.60	77.60	17.00	1.90	18.00	4.30	10.50	5.80	6.00
6	IC 21935	55.00	124.00	139.40	63.70	18.00	1.30	17.50	5.00	11.20	9.40	6.80
7	IC 35534	43.00	106.00	79.50	58.50	19.00	0.90	10.00	2.00	9.50	7.12	6.20
8	IC 35539	56.00	105.00	163.40	80.40	21.00	2.80	25.00	5.00	16.40	6.50	7.50
9	IC 35541	56.00	104.00	105.60	90.60	15.00	0.90	14.00	3.00	8.50	9.40	7.00
10	IC 35542	42.00	98.00	116.80	96.70	12.00	1.10	21.00	4.00	18.20	9.50	6.40
11	IC 35543	51.00	111.00	66.70	43.20	16.00	1.00	17.00	4.00	12.20	8.20	7.80
12	IC 35545	53.00	116.00	117.20	88.20	14.00	1.10	17.00	4.10	12.60	12.02	6.80
13	IC 35546	52.00	123.00	94.50	62.70	12.00	0.90	13.00	2.00	10.50	7.00	5.80
14	IC 35547	57.00	122.00	60.70	41.40	15.00	0.90	17.00	3.00	10.20	5.83	7.20
15	IC 35548	54.00	128.00	81.50	70.40	21.00	1.00	13.00	2.00	11.80	8.70	7.20
16	IC 35549	55.00	122.00	118.60	74.50	18.20	1.20	12.30	3.50	9.30	9.03	6.80
17	IC 35550	45.00	103.00	66.20	51.20	15.00	1.00	11.00	3.00	8.50	8.65	6.20

S. No.	Genotypes	Days to 50 % Flowering	Days to 80% maturity	Plant height (cm)	Inflorescence length (cm)	Lateral spikelet length (cm)	Stem thickness (cm)	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Seed yield (g/plant)	Seed vol. wt. (g/10 ml)
18	IC 35551	56.00	126.00	130.20	92.70	21.00	2.10	25.00	5.00	16.80	7.59	7.40
19	IC 35552	46.00	107.00	77.40	50.60	24.00	1.10	25.20	5.90	14.50	7.50	6.40
20	IC 35553	52.00	113.00	124.50	93.70	22.50	1.40	23.50	4.80	13.80	7.57	6.20
21	IC 35554	48.00	105.00	148.00	88.20	26.00	3.20	25.00	5.00	19.50	6.70	6.00
22	IC 35610	42.00	105.00	135.80	59.60	19.00	0.70	15.00	3.10	9.50	15.60	5.80
23	IC 35611	61.00	119.00	82.30	40.70	17.00	1.00	12.00	3.00	8.40	16.05	7.00
24	IC 35612	60.00	120.00	144.30	76.80	22.00	1.20	20.00	4.00	12.50	8.37	6.10
25	IC 35614	48.00	95.00	124.70	80.10	16.00	1.00	17.00	3.00	8.90	18.50	7.80
26	IC 35617	52.00	113.00	102.50	61.60	26.00	1.30	17.20	4.00	9.40	8.30	7.20
27	IC 35618	54.00	121.00	108.60	80.60	23.00	2.00	18.00	6.00	10.50	8.90	4.90
28	IC 35621	44.00	93.00	119.40	73.70	15.00	1.30	11.00	4.00	6.80	12.40	6.00
29	IC 35622	55.00	120.00	149.40	96.30	23.00	1.70	18.00	3.10	9.20	6.37	7.00
30	IC 35623	54.00	116.00	106.80	80.70	16.00	1.80	18.00	5.00	9.50	6.10	6.80
31	IC 35624	48.00	112.00	123.40	73.60	22.00	2.00	25.00	6.00	14.50	21.70	7.00
32	IC 35625	48.00	117.00	118.50	51.60	17.00	1.60	24.00	6.00	16.50	18.33	7.30
33	IC 35668	55.00	115.00	116.20	46.10	11.00	1.00	12.00	1.70	5.60	5.43	7.50
34	IC 35692	54.00	106.00	123.40	84.60	22.00	2.00	18.00	3.00	8.20	7.43	7.40
35	IC 35696	54.00	119.00	142.50	78.20	24.00	1.20	17.00	4.00	7.40	18.03	6.60

S. No.	Genotypes	Days to 50 % Flowering	Days to 80% maturity	Plant height (cm)	Inflorescence length (cm)	Lateral spikelet length (cm)	Stem thickness (cm)	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Seed yield (g/plant)	Seed vol. wt. (g/10 ml)
36	IC 35755	40.00	98.00	104.80	73.70	24.00	1.70	20.00	5.00	13.50	7.30	5.80
37	IC 35757	43.00	108.00	129.30	97.60	26.00	1.90	23.00	4.20	14.20	7.50	6.40
38	IC 35759	53.00	113.00	104.20	80.60	14.00	0.90	16.00	4.00	10.50	5.43	7.20
39	IC 35761	46.00	103.00	107.30	73.70	19.00	1.00	21.00	4.00	13.60	19.50	6.20
40	IC 35766	48.00	107.00	133.20	74.90	24.00	1.30	18.00	5.00	9.80	6.67	7.00
41	IC 35770	50.00	116.00	135.40	66.40	11.00	1.70	20.00	4.30	10.80	10.03	6.80
42	IC 35771	51.00	112.00	143.20	73.20	19.00	1.90	18.00	5.00	10.40	10.90	7.60
43	IC 35775	45.00	108.00	123.40	65.00	15.00	1.40	23.00	6.00	16.50	8.67	7.60
44	IC 35776	52.00	101.00	128.70	70.00	25.00	1.30	15.00	3.40	8.40	25.60	7.20
45	IC 81711	45.00	100.00	132.30	77.60	23.00	1.90	17.10	3.00	10.20	6.70	6.90
46	IC 93941	44.00	101.00	124.90	80.40	19.00	1.30	17.00	4.30	11.20	5.63	6.60
47	IC 93942	55.00	121.00	129.70	77.00	20.00	1.30	18.00	5.00	12.50	12.37	7.90
48	IC 93945	40.00	105.00	106.20	62.00	17.10	1.40	11.30	3.10	6.90	9.23	6.70
49	IC 95283	48.00	97.00	92.40	60.50	15.00	1.30	17.20	4.00	7.60	8.43	6.40
50	IC 95290	45.00	98.00	106.60	75.40	20.10	1.30	18.00	3.00	7.80	22.60	6.00
51	SKGPA- 144	43.00	110.00	128.20	81.20	17.00	1.40	16.00	3.00	8.20	6.03	5.70
52	SKGPA- 145	51.00	121.00	133.70	72.80	22.10	1.30	19.10	5.00	9.50	8.37	6.80
53	SKGPA- 146	57.00	125.00	140.20	77.60	24.00	2.00	16.00	4.30	10.20	7.37	6.60

S. No.	Genotypes	Days to 50 % Flowering	Days to 80% maturity	Plant height (cm)	Inflorescence length (cm)	Lateral spikelet length (cm)	Stem thickness (cm)	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Seed yield (g/plant)	Seed vol. wt. (g/10 ml)
54	SKGPA- 147	55.00	134.00	137.80	73.60	20.30	1.70	24.00	6.10	15.60	28.67	7.00
55	SKGPA- 148	54.00	131.00	159.60	76.40	24.00	1.60	22.00	4.00	12.50	5.57	6.90
56	SKGPA- 149	52.00	133.00	151.20	69.40	20.00	1.20	19.00	3.10	13.70	14.97	6.60
57	SKGPA- 150	56.00	112.00	148.20	73.40	28.00	1.70	20.00	4.80	12.50	10.23	6.60
58	SKGPA- 151	57.00	123.00	151.20	77.60	21.00	2.00	19.00	4.00	8.30	9.56	7.20
59	SKGPA- 152	51.00	120.00	150.40	74.60	20.00	1.90	21.70	4.00	12.60	11.93	6.20
60	SKGPA- 153	50.00	101.00	121.60	59.40	13.00	1.30	18.00	3.40	9.70	19.23	7.60
61	SKGPA- 154	48.00	98.00	140.30	63.80	19.20	1.20	15.30	3.70	8.50	12.17	7.20
62	SKGPA- 155	50.00	105.00	161.20	90.60	25.20	1.60	16.40	3.00	8.60	8.30	7.80
63	SKGPA- 156	51.00	106.00	126.10	66.80	17.00	1.30	13.00	2.20	8.20	6.97	6.20
64	SKGPA- 157	45.00	108.00	131.40	76.70	15.40	1.50	21.80	4.80	13.80	5.43	7.00
65	SKGPA- 158	60.00	116.00	154.80	75.60	20.20	1.30	17.30	3.80	10.40	7.70	7.60
66	SKGPA- 159	47.00	100.00	120.70	66.40	23.10	1.20	13.70	3.20	9.30	8.23	7.20
67	SKGPA- 160	51.00	134.00	141.60	72.60	16.20	1.30	17.20	3.40	8.90	7.00	6.20
68	SKGPA- 161	42.00	95.00	151.90	76.40	25.10	1.10	14.20	4.00	7.80	11.97	6.60
69	SKGPA- 162	52.00	113.00	132.70	58.60	15.20	1.30	13.10	3.00	7.20	11.60	6.80
70	SKGPA- 163	52.00	127.00	127.60	63.50	19.30	4.40	18.10	3.80	8.00	7.87	7.50

S. No.	Genotypes	Days to 50 % Flowering	Days to 80% maturity	Plant height (cm)	Inflorescence length (cm)	Lateral spikelet length (cm)	Stem thickness (cm)	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Seed yield (g/plant)	Seed vol. wt. (g/10 ml)
	BGA-2	57.20	119.20	150.70	65.58	17.84	2.00	21.42	5.98	13.42	18.62	5.62
	GA-2	52.20	111.40	148.64	81.32	21.00	1.98	21.20	4.98	13.46	26.22	6.36
	RMA-7	59.40	116.20	132.16	94.32	18.82	1.32	14.68	2.68	8.76	14.52	5.56
	Suvarna	56.40	118.80	160.08	70.48	16.24	2.00	24.44	6.76	14.46	19.78	6.12
	Minimum	40.00	93.00	60.70	40.30	11.00	0.70	10.00	1.70	5.60	5.43	4.90
	Maximum	61.00	134.00	163.40	97.60	28.00	4.40	25.20	6.76	19.50	28.67	7.90
	Mean	50.83	112.82	124.21	71.75	19.03	1.51	18.01	4.07	10.92	10.86	6.75
	CD (0.05)	2.22	1.93	26.18	19.05	4.09	1.45	13.63	3.39	10.06	3.22	1.13
	CV (%) Error	1.48	0.62	6.63	9.16	8.28	29.85	24.99	24.87	30.07	6.09	7.15
	CV (%) Phen.	10.11	9.05	19.23	18.86	21.64	37.20	21.76	27.62	27.15	50.45	9.36

Table 11: Evaluation of germplasm in Grain amaranth at Ranchi Rabi 2016-17 (Plains)

S. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant stand at harvest	Plant height (cm)	Number of branches/plant	Inflorescence length (cm)	Lateral inflorescence length (cm)	Number of lateral inflorescence	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Stem thickness (cm)	Seed vol. wt (g/10 ml)	Grain yield/ plant (g)
1	IC-21922	76.0	147.0	3.0	41.8	5.3	17.0	13.0	8.9	6.2	3.2	4.5	4.1	7.7	9.6
2	IC-21923	81.0	127.0	2.0	45.0	6.2	17.1	12.3	13.0	6.3	3.9	4.1	3.5	9.5	7.5
3	IC-21925	75.0	133.0	5.0	60.3	7.0	22.8	11.0	15.0	5.6	2.3	3.2	4.2	9.5	7.4
4	IC-21927	72.0	131.0	18.0	51.4	6.4	15.6	8.7	12.8	5.8	3.2	3.5	2.8	10.0	6.8
5	IC-21930	78.0	137.0	4.0	59.0	5.0	13.2	8.2	8.5	5.3	3.2	3.5	2.6	11.6	6.9
6	IC-21935	80.0	137.0	5.0	25.0	10.0	14.0	5.0	3.0	4.0	3.0	1.0	1.0	9.6	8.5
7	IC-35534	79.0	135.0	9.0	12.5	5.5	6.5	6.7	3.0	3.7	3.0	5.0	2.0	8.9	7.3
8	IC-35539	78.0	132.0	9.0	16.0	8.0	11.0	7.0	4.0	5.0	4.0	6.0	1.0	7.5	7.6
9	IC-35541	76.0	133.0	8.0	20.0	8.0	9.0	7.0	3.5	4.0	2.5	4.0	1.0	9.4	8.5
10	IC-35542	75.0	132.0	8.0	17.3	8.8	12.6	4.6	2.6	2.3	3.3	5.0	3.0	8.2	7.5
11	IC-35543	76.0	136.0	8.0	17.0	10.2	4.5	6.0	2.7	2.5	3.2	10.0	2.0	8.4	7.9
12	IC-35545	78.0	134.0	8.5	16.0	11.0	7.5	5.0	3.0	2.7	3.0	7.0	2.0	6.6	8.2
18	IC-35546	76.0	133.0	10.0	56.2	5.6	18.6	11.7	10.5	6.9	3.3	3.5	3.2	10.1	9.4
19	IC-35547	77.0	136.0	2.0	43.5	5.0	15.2	8.5	10.0	4.7	2.5	3.0	3.5	9.8	8.9
20	IC-35548	78.0	137.0	3.0	42.6	5.3	18.0	13.0	9.0	6.0	3.1	4.6	4.0	9.4	9.8
21	IC-35549	80.0	129.0	2.0	48.0	6.0	17.0	12.5	13.0	6.2	3.7	4.0	3.2	9.0	9.2

S. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant stand at harvest	Plant height (cm)	Number of branches/plant	Inflorescence length (cm)	Lateral inflorescence length (cm)	Number of lateral inflorescence	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Stem thickness (cm)	Seed vol. wt (g/10 ml)	Grain yield/ plant (g)
22	IC-35550	78.0	135.0	5.0	61.8	7.0	21.8	13.0	14.0	5.5	2.2	3.1	4.1	9.5	7.8
23	IC-35551	75.0	132.0	3.0	58.0	7.0	22.3	13.8	12.6	8.3	4.0	5.8	3.6	8.2	7.6
24	IC-35552	77.0	133.0	8.0	12.0	5.5	18.5	8.3	4.2	4.3	3.8	6.0	4.0	10.0	6.9
25	IC-35553	77.0	135.0	4.0	51.3	6.6	9.3	8.3	13.3	5.5	3.0	3.0	3.3	9.2	6.8
26	IC-35554	80.0	134.0	8.0	69.8	10.0	17.2	10.0	19.6	6.5	3.4	3.3	4.1	9.3	6.8
27	IC-35610	78.0	129.0	5.0	63.4	7.0	23.4	15.8	13.4	5.4	3.0	3.7	4.1	7.1	8.4
28	IC-35611	79.0	137.0	7.0	15.7	9.7	9.2	7.3	3.5	4.7	3.2	6.0	4.0	8.2	8.4
29	IC-35612	78.0	133.0	5.0	64.4	7.0	24.0	15.2	11.8	6.8	4.1	3.8	3.8	8.4	8.4
35	IC-35614	81.0	137.0	6.0	64.0	6.4	22.2	15.0	10.2	6.4	4.1	3.9	3.9	6.6	7.9
36	IC-35617	76.0	134.0	6.0	59.0	6.8	19.5	11.0	8.0	6.3	3.4	4.2	4.2	10.1	7.7
37	IC-35618	80.0	134.0	5.0	73.4	8.0	24.0	19.0	15.2	7.3	4.0	4.8	4.5	9.8	6.4
38	IC-35621	75.0	135.0	10.0	64.2	9.0	25.6	18.0	17.4	6.2	3.6	4.0	4.1	9.4	8.2
39	IC-35622	79.0	126.0	5.0	59.6	7.4	22.2	14.0	16.2	5.7	3.5	3.6	3.9	9.0	8.3
40	IC-35623	73.0	135.0	4.0	58.5	7.2	24.2	13.5	12.7	4.8	2.3	2.7	3.5	8.8	9.6
41	IC-35624	78.0	135.0	5.0	61.8	7.0	21.8	13.0	14.0	5.5	2.2	3.1	4.1	8.7	10.0
42	IC-35625	75.0	132.0	3.0	58.0	7.0	22.3	13.8	12.6	8.3	4.0	5.8	3.6	9.2	11.0
43	IC-35668	76.0	132.0	8.0	17.5	5.7	7.5	4.2	2.5	3.5	2.0	5.0	2.0	9.9	9.8
44	IC-35692	77.0	133.0	8.0	12.0	5.5	18.5	8.3	4.2	4.3	3.8	6.0	4.0	9.7	8.9
45	IC-35696	79.0	137.0	9.0	15.7	9.7	9.2	7.3	3.5	4.7	3.2	6.0	4.0	8.8	7.1

S. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant stand at harvest	Plant height (cm)	Number of branches/plant	Inflorescence length (cm)	Lateral inflorescence length (cm)	Number of lateral inflorescence	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Stem thickness (cm)	Seed vol. wt (g/10 ml)	Grain yield/ plant (g)
46	IC-35755	81.0	136.0	9.0	16.5	9.8	15.5	8.3	4.7	5.8	3.7	9.0	4.00	9.5	9.5
52	IC-35757	77.0	137.0	8.0	23.4	12.8	6.6	6.7	3.1	4.0	4.2	15.0	8.0	8.7	7.7
53	IC-35759	78.0	138.0	8.0	11.0	6.3	11.3	9.3	5.3	6.5	6.6	6.0	3.0	7.4	7.5
54	IC-35761	80.0	137.0	8.0	25.0	10.0	14.0	5.0	3.0	4.0	3.0	1.0	1.0	9.2	9.2
55	IC-35766	79.0	135.0	9.0	12.5	5.5	6.5	6.7	3.0	3.7	3.0	5.0	2.0	9.9	9.1
56	IC-35770	78.0	132.0	9.0	16.0	8.0	11.0	7.0	4.0	5.0	4.0	6.0	1.0	9.6	9.2
57	IC-35771	76.0	133.0	8.0	20.0	8.0	9.0	7.0	3.5	4.0	2.5	4.0	1.0	9.7	7.3
58	IC-35775	75.0	132.0	8.0	17.3	8.8	12.6	4.6	2.6	2.3	3.3	5.0	3.0	8.5	8.3
59	IC-35776	76.0	136.0	10.0	17.0	10.2	4.5	6.0	2.7	2.5	3.2	10.0	2.0	8.6	7.6
60	IC-81711	78.0	134.0	8.0	16.0	11.0	7.5	5.0	3.0	2.7	3.0	7.0	2.0	8.0	8.7
61	IC-93941	76.0	132.0	9.0	17.5	5.7	7.5	4.2	2.5	3.5	2.0	5.0	2.0	9.7	10.0
62	IC-93942	79.0	148.0	5.0	48.7	7.1	11.2	8.9	8.8	5.2	3.2	2.4	3.3	7.7	10.0
63	IC-93945	76.0	133.0	11.0	20.0	8.0	9.0	7.0	3.5	4.0	2.5	4.0	1.0	7.4	8.8
69	IC-95283	76.0	133.0	8.0	20.0	8.0	9.0	7.0	3.5	4.0	2.5	4.0	1.0	7.7	7.5
70	IC-95290	81.0	136.0	9.0	16.5	9.8	15.5	8.3	4.7	5.8	3.7	9.0	4.00	8.6	7.6
71	IC-95292	80.0	145.0	9.0	64.8	8.0	23.4	14.8	11.0	7.1	3.3	3.5	5.2	7.3	8.7
72	IC-95293	81.0	145.0	4.0	38.7	6.7	10.2	8.5	8.2	4.0	2.2	2.0	3.5	7.2	11.0
73	IC-95295	81.0	129.0	7.0	55.8	6.0	13.6	9.8	14.2	6.2	3.6	4.7	3.3	9.6	11.0

S. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant stand at harvest	Plant height (cm)	Number of branches/plant	Inflorescence length (cm)	Lateral inflorescence length (cm)	Number of lateral inflorescence	Leaf length (cm)	Leaf width (cm)	Petiole length (cm)	Stem thickness (cm)	Seed vol. wt (g/10 ml)	Grain yield/ plant (g)
74	IC-95297	76.0	130.0	8.0	57.2	7.0	19.6	14.0	15.0	5.4	2.9	3.6	3.2	9.7	8.8
75	IC-95299	77.0	132.0	2.0	61.5	6.0	22.5	16.5	12.5	6.5	4.0	3.5	3.5	8.6	7.5
76	IC-95588	78.0	142.0	10.0	69.4	7.8	19.8	12.4	11.4	8.2	4.6	4.9	4.3	9.8	8.2
77	IC-95595	80.0	137.0	7.0	55.8	7.8	21.6	9.0	5.4	5.9	3.2	4.0	4.7	9.4	7.5
78	IC-95596	76.0	143.0	10.0	64.4	9.0	19.0	18.0	12.8	7.2	4.0	5.5	3.9	10.2	9.2
79	IC-95597	75.0	136.0	9.0	58.2	8.2	22.2	11.8	14.4	7.1	4.0	4.0	3.7	7.7	9.1
80	IC-95598	73.0	133.0	8.0	50.4	6.4	15.6	8.7	10.8	5.7	3.1	3.4	2.7	9.5	9.2
	BGA-2	92.0	153.2	6.8	38.6	8.2	12.7	6.8	6.9	4.6	3.0	2.3	2.0	8.6	8.8
	GA-1	86.0	144.0	4.0	70.6	13.9	14.1	6.7	12.7	7.0	3.2	4.0	4.3	9.1	9.0
	GA-2	81.4	144.6	7.9	53.5	9.1	18.6	8.3	7.7	5.7	3.2	6.3	3.9	9.5	9.1
	RMA-7	87.0	156.2	5.8	40.2	6.8	11.1	7.9	7.3	6.1	3.4	2.4	1.7	7.6	7.8
	Suvarna	88.4	149.2	6.6	181.6	9.1	20.2	8.5	16.3	9.6	4.8	6.2	4.4	7.4	9.4
	Minimum	72.0	126.0	2.0	11.0	5.0	4.5	4.2	2.5	2.3	2.0	1.0	1.0	6.6	6.4
	Maximum	92.0	156.2	18.0	181.6	13.9	25.6	19.0	19.6	9.6	6.6	15.0	8.0	11.6	11.0
	Mean	78.2	136.0	6.9	42.6	7.7	15.3	9.7	8.6	5.3	3.3	4.7	3.2	8.9	8.5
	CD (0.05)	8.60	22.04	3.49	273.66	8.01	18.22	5.09	14.31	5.14	2.63	5.62	3.24	1.41	3.12
	CV (%) Error	3.89	5.80	22.10	139.86	33.46	46.73	26.20	55.16	30.66	29.52	52.18	38.83	6.55	13.90
	CV (%) Phen.	4.39	4.30	39.89	63.54	24.39	38.40	38.74	57.16	29.33	22.48	47.06	39.76	11.36	12.83

Table 12: Evaluation of germplasm in Grain amaranth at S.K. Nagar Rabi 2016-17 (Plains)

S.N.	Genotypes	Days to 50% flowering	Day to 80% maturity	Plant height (cm)	No. of branches / plant	Petiole length (cm)	Stem thickness (cm)	Lateral spikelet length(cm)	Inflorescence length (cm)	Seed yield / 5 plant(g)	Straw weight/ 5 plant(g)	Seed vol. wt. (g/10ml)
1	SKGPA-144	50.0	97.0	100.4	0.0	4.6	3.1	14.4	51.8	97.7	160.0	6.6
2	SKGPA-145	49.0	95.0	102.2	0.0	3.3	3.4	12.9	39.0	83.3	180.0	7.1
3	SKGPA-146	49.0	96.0	128.6	0.0	3.7	3.1	20.0	50.0	127.4	250.0	6.4
4	SKGPA-147	48.0	110.0	143.2	0.0	6.3	3.4	17.1	52.0	89.8	166.0	6.3
5	SKGPA-148	58.0	108.0	158.8	0.0	8.0	3.7	21.3	60.4	92.4	318.0	6.6
6	SKGPA-149	59.0	109.0	154.4	0.0	7.2	3.3	22.8	60.8	64.7	185.0	6.4
7	SKGPA-150	58.0	116.0	151.0	0.0	7.3	3.4	20.5	59.2	139.5	218.0	6.1
8	SKGPA-151	60.0	107.0	158.8	0.0	6.3	3.5	21.6	69.0	94.8	390.0	6.1
9	SKGPA-152	61.0	108.0	156.6	0.0	8.4	3.2	13.9	58.2	77.8	182.0	6.2
10	SKGPA-153	61.0	118.0	138.2	0.0	5.9	3.2	14.6	57.0	45.9	150.0	6.4
11	SKGPA-154	52.0	117.0	121.2	0.0	7.2	3.6	17.0	58.4	122.6	320.0	6.3
12	SKGPA-155	62.0	116.0	131.0	0.0	5.3	3.1	15.1	47.4	57.9	180.0	6.1
13	SKGPA-156	59.0	115.0	146.4	0.0	6.1	3.2	18.3	48.0	51.8	215.0	6.1
14	SKGPA-157	53.0	114.0	136.4	0.0	7.7	3.3	17.9	52.6	48.4	280.0	6.0
15	SKGPA-158	54.0	114.0	120.6	0.0	6.4	3.2	13.1	39.0	49.4	138.0	6.6
16	SKGPA-159	53.0	116.0	133.4	0.0	7.9	3.4	14.4	43.8	114.3	300.0	6.2
17	SKGPA-160	58.0	117.0	144.2	0.0	9.2	3.5	14.4	44.2	127.2	366.0	5.2
18	SKGPA-161	54.0	116.0	127.2	0.0	4.3	3.4	21.4	50.0	89.3	270.0	6.4

S.N.	Genotypes	Days to 50% flowering	Day to 80% maturity	Plant height (cm)	No. of branches / plant	Petiole length (cm)	Stem thickness (cm)	Lateral spikelet length(cm)	Inflorescence length (cm)	Seed yield / 5 plant(g)	Straw weight/ 5Plant(g)	Seed vol. wt. (g/10ml)
19	SKGPA-162	53.0	114.0	104.0	0.0	4.8	2.9	12.2	33.4	120.6	175.0	6.3
20	SKGPA-163	54.0	115.0	103.8	0.0	4.6	3.0	16.2	57.8	64.7	140.0	6.4
21	IC 21922	64.0	116.0	129.8	0.0	6.7	3.1	15.1	52.8	17.8	158.0	5.2
22	IC 21923	54.0	110.0	134.0	0.0	4.4	3.3	17.0	69.2	80.9	187.0	6.1
23	IC 21925	52.0	109.0	129.6	0.0	4.6	3.7	22.7	54.0	100.8	270.0	6.0
24	IC 21927	53.0	120.0	142.8	0.0	7.4	3.7	19.4	68.0	53.4	358.0	5.8
25	IC 21930	51.0	115.0	135.6	2.0	6.2	3.3	17.6	54.2	73.9	195.0	6.0
26	IC 21935	52.0	117.0	122.8	3.0	6.5	3.5	14.7	67.4	88.4	265.0	6.2
27	IC 35534	61.0	108.0	88.2	0.0	4.4	3.3	9.9	40.3	58.7	130.0	6.6
28	IC 35539	64.0	107.0	121.2	2.0	4.3	3.2	16.6	51.5	12.6	90.0	5.8
29	IC 35541	48.0	107.0	79.6	3.0	5.6	3.3	13.7	40.2	115.9	215.0	6.2
30	IC 35542	53.0	116.0	117.8	7.0	5.4	3.2	12.5	51.4	52.4	218.0	5.8
31	IC 35543	57.0	114.0	122.4	2.0	5.7	3.2	8.9	48.6	46.2	195.0	5.9
32	IC 35545	54.0	110.0	121.4	0.0	7.3	3.7	12.0	61.2	70.3	173.0	6.5
33	IC 35546	51.0	117.0	146.6	0.0	4.2	3.6	21.9	61.6	118.1	305.0	6.5
34	IC 35547	52.0	115.0	121.6	0.0	4.8	3.6	18.3	52.8	85.4	215.0	6.5
36	IC 35549	56.0	108.0	94.0	3.0	11.4	3.9	14.2	44.0	16.7	230.0	6.0
37	IC 35550	54.0	107.0	110.0	0.0	2.6	3.6	18.4	49.4	88.3	280.0	6.6
38	IC 35551	52.0	108.0	95.4	3.0	3.6	3.9	16.3	51.2	134.8	302.0	7.0

S.N.	Genotypes	Days to 50% flowering	Day to 80% maturity	Plant height (cm)	No. of branches / plant	Petiole length (cm)	Stem thickness (cm)	Lateral spikelet length(cm)	Inflorescence length (cm)	Seed yield / 5 plant(g)	Straw weight/ 5Plant(g)	Seed vol. wt. (g/10ml)
39	IC 35552	53.0	110.0	122.4	0.0	7.2	3.7	17.9	58.2	125.7	340.0	6.5
40	IC 35553	51.0	106.0	107.8	4.0	6.7	3.7	14.0	53.8	90.9	246.0	6.2
41	IC 35554	59.0	110.0	128.6	3.0	5.6	4.0	17.3	57.0	39.0	250.0	6.3
42	IC 35610	55.0	107.0	121.2	4.0	3.3	4.1	19.6	55.6	151.5	318.0	7.1
43	IC 35611	53.0	109.0	123.8	2.0	5.6	3.8	18.9	60.0	91.4	320.0	6.5
44	IC 35612	52.0	111.0	126.0	3.0	5.4	3.9	15.0	55.4	111.4	360.0	6.4
45	IC 35614	55.0	113.0	140.4	4.0	5.3	3.9	23.5	59.4	48.9	240.0	5.9
46	IC 35617	55.0	112.0	131.6	3.0	6.9	3.9	23.8	55.8	48.3	278.0	6.6
47	IC 35618	54.0	111.0	129.6	3.0	5.7	3.8	15.4	62.4	82.8	320.0	6.2
48	IC 35621	54.0	110.0	112.6	4.0	6.2	4.0	16.7	55.8	74.9	340.0	6.7
49	IC 35622	59.0	114.0	121.8	4.0	4.7	3.7	19.9	56.8	37.0	154.0	6.0
50	IC 35623	55.0	108.0	101.0	3.0	2.4	3.8	15.7	47.8	51.7	225.0	6.7
51	IC 35624	61.0	115.0	99.2	3.0	3.0	3.5	12.8	47.5	32.3	105.0	6.0
52	IC 35625	61.0	110.0	116.0	4.0	6.2	3.8	19.6	42.0	52.0	180.0	6.2
53	IC 35668	64.0	107.0	88.0	4.0	3.6	3.7	16.7	50.2	23.6	168.0	6.1
54	IC 35692	62.0	108.0	92.4	4.0	5.4	3.7	14.3	53.8	34.4	132.0	7.2
55	IC 35696	64.0	110.0	93.8	4.0	3.6	3.8	14.1	44.8	37.6	172.0	6.6
56	IC 35755	64.0	108.0	99.0	3.0	3.9	3.8	18.9	51.8	63.6	121.0	7.2
57	IC 35757	64.0	113.0	102.8	4.0	5.4	4.0	13.5	56.2	41.2	225.0	6.0

S.N.	Genotypes	Days to 50% flowering	Day to 80% maturity	Plant height (cm)	No. of branches / plant	Petiole length (cm)	Stem thickness (cm)	Lateral spikelet length(cm)	Inflorescence length (cm)	Seed yield / 5 plant(g)	Straw weight/ 5Plant(g)	Seed vol. wt. (g/10ml)
58	IC 35759	62.0	110.0	109.0	4.0	5.5	3.7	17.6	50.0	33.6	158.0	6.4
59	IC 35761	54.0	107.0	99.4	3.0	3.9	3.8	13.4	45.4	49.1	125.0	6.3
60	IC 35766	54.0	106.0	101.8	3.0	2.8	3.7	11.3	53.0	74.4	186.0	6.8
61	IC 35770	64.0	108.0	139.4	0.0	4.4	4.2	23.7	52.8	81.3	280.0	7.0
62	IC 35771	59.0	107.0	117.4	0.0	4.4	3.9	16.9	48.6	85.8	190.0	7.7
63	IC 35775	68.0	109.0	120.6	2.0	7.7	3.8	17.3	56.6	99.9	205.0	6.3
64	IC 35776	55.0	107.0	98.4	0.0	2.7	3.6	18.8	50.2	204.4	343.0	6.7
65	IC 81711	51.0	106.0	114.8	0.0	2.5	4.0	17.6	58.6	69.6	216.0	6.3
66	IC 93941	52.0	108.0	99.6	2.0	6.2	4.1	20.2	46.6	130.5	325.0	6.9
67	IC 93942	52.0	107.0	114.6	3.0	6.1	3.9	15.2	58.2	138.6	327.0	7.4
68	IC 93945	51.0	106.0	124.2	0.0	7.7	4.3	23.1	56.6	132.0	300.0	7.3
69	IC 95283	50.0	110.0	131.2	0.0	6.0	4.1	15.2	61.2	67.3	205.0	6.9
70	IC 95290	49.0	108.0	126.0	0.0	5.0	4.2	12.9	55.6	121.4	224.0	7.8
71	IC 95292	52.0	122.0	126.8	0.0	8.3	4.0	14.5	53.8	93.9	242.0	6.9
72	IC 95293	50.0	115.0	105.6	0.0	6.2	3.8	17.7	50.4	73.8	188.0	6.8
73	IC 95295	50.0	113.0	129.8	0.0	10.0	3.9	13.2	50.2	88.9	172.0	7.0
74	IC 95297	50.0	112.0	113.2	0.0	10.1	4.0	12.8	50.0	143.4	271.0	7.2
75	IC 95299	50.0	117.0	117.4	0.0	8.4	4.2	13.4	48.6	116.1	325.0	7.2
76	IC 95588	51.0	121.0	135.4	0.0	5.7	3.8	11.4	51.8	48.8	252.0	6.6

S.N.	Genotypes	Days to 50% flowering	Day to 80% maturity	Plant height (cm)	No. of branches / plant	Petiole length (cm)	Stem thickness (cm)	Lateral spikelet length(cm)	Inflorescence length (cm)	Seed yield / 5 plant(g)	Straw weight/ 5Plant(g)	Seed vol. wt. (g/10ml)
77	IC 95595	51.0	121.0	148.2	0.0	6.0	4.0	15.6	55.8	110.8	342.0	5.5
78	IC 95596	57.0	115.0	126.2	0.0	7.6	4.2	16.4	52.4	103.7	218.0	6.4
79	IC 95597	59.0	114.0	117.6	0.0	6.1	4.0	13.0	44.2	52.8	139.0	6.2
80	IC 95598	59.0	113.0	105.0	0.0	3.9	3.9	17.4	44.4	67.1	198.0	7.0
	BGA-2	67.9	117.9	133.0	0.0	6.7	3.9	12.2	42.3	59.9	233.9	5.0
	GA-2	63.1	116.0	151.0	0.0	6.8	3.9	18.7	54.7	105.7	329.4	6.3
	RMA-7	65.6	117.5	157.1	0.0	7.0	3.8	17.0	56.7	96.7	314.6	5.9
	Suvarna	67.3	119.5	134.9	0.0	6.7	3.9	13.0	39.1	67.7	258.5	4.9
	Minimum	48.0	95.0	79.6	0.0	2.4	2.9	8.9	33.4	12.6	90.0	4.9
	Maximum	68.0	122.0	158.8	7.0	11.4	4.3	23.8	69.2	204.4	390.0	7.8
	Mean	55.9	111.4	122.0	1.3	5.8	3.7	16.5	52.6	81.1	234.1	6.4
	CD (0.05)	3.9	8.3	17.2		2.1	0.5	4.0	12.2	15.3	193.7	0.8
	CV (%) Error	2.37	2.86	4.86		12.41	5.54	10.68	10.24	7.50	27.65	5.80
	CV (%) Phen.	9.36	4.65	15.12	135.84	31.44	8.81	20.51	13.52	44.59	30.75	8.45

Table 13: Promising lines in Grain amaranth germplasm for various characters at different locations Rabi 2016-17 (Plains)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
I	IGKV Ambikapur (83 accessions)				
1	Days to 50% flowering	60.0	85.0	SKGPA-145 (60.0), SKGPA-144 (61.0) IC 35552 (62.0), IC 35771 (62.0) SKGPA-162 (62.0)	GA-2 (72.0)
2	Plant height (cm) dwarf	53.00	117.20	SKGPA-146 (53.00), SKGPA-151 (53.80), SKGPA-149 (54.20), SKGPA-155 (55.40)	RMA-7 (58.80)
	Plant height (cm) tall	53.00	117.20	IC 35618 (117.20), IC 95588 (117.20) IC 35761 (114.00). IC 35542 (114.00)	BGA-2 (97.60)
3	Lateral Spikelet length (cm)	12.80	32.80	IC 21930 (32.8), IC 35757 (32.8), IC 35625 (32.2), IC 21923 (32.2)	Suvarna (21.60)
4	Inflorescence length (cm)	39.40	62.20	SKGPA-156 (62.2), IC 35625 (60.2) IC 95597 (60.2), IC 21930 (58.4) SKGPA-159 (58.2)	GA-2 (53.30)
5	Seed yield/plant (g)	16.40	19.60	N.A.	RMA-7 (19.60)
6	10 ml seed weight (g)	4.90	8.80	N.A.	RMA-7 (8.80)
	NBPGR New Delhi (20 accessions)				
1	Days to 50% flowering	58.67	82.33	SKGPA-146 (58.67), SKGPA-144 (59.00), SKGPA-145 (59.00), SKGPA-147 (61.00)	GA-2 (71.33)
2	Days to 80% maturity	123.67	140.33	SKGPA-145 (123.67) SKGPA-148 (123.67)	BGA-2 (127.33)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
3	leaf length (cm)	10.66	14.90	SKGPA-150 (14.90) SKGPA-147 (14.58) SKGPA-149 (14.40) SKGPA-153 (14.05)	GA-2 (12.97)
4	Petiole length (cm)	6.50	11.10	SKGPA-157 (11.10), SKGPA-149 (10.19), SKGPA-148 (9.81)	RMA-7 (9.68)
5	Stem thickness (mm)	9.87	16.17	-	Suvarna (16.17)
6	Plant height (cm) dwarf	57.30	120.27	SKGPA-160 (57.30), SKGPA-159 (72.770, SKGPA-163 (74.33), SKGPA-162 (75.20)	RMA-7 (76.60)
7	Plant height (cm) tall	57.30	120.27	SKGPA-153 (120.27)	BGA-2 (109.80)
8	No. of Branches/ plant	1.80	5.10	SKGPA-152 (5.10),	RMA-7 (4.77)
9	Lateral spikelet length (cm)	10.40	19.46	GA-2 (19.46)	
10	Inflorescence length (cm)	30.85	52.05	SKGPA-153 (52.05), SKGPA-155 (48.86), SKGPA-149 (48.44), SKGPA-147 (48.16)	GA-2 (44.73)
12	Seed yield/plant (g)	23.36	59.36	SKGPA-155 (59.36), SKGPA-148 (55.00), SKGPA-149 (53.33)	RMA-7 (48.00)
II	OUAT, Bhubaneswar (80 accessions)				
1	Days to 50% flowering	39.00	53.00	SKGPA 144 (39), SKGPA 145 (390), SKGPA 146 (39), IC 95297 (41), IC 95295 (41)	GA 2 (49.40)
2	Days to 80% maturity	86.00	94.80	IC 35618 (86), IC 35625 (86) SKGPA 144 (86), SKGPA 145 (86)	GA 2 (92.60)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
3	Plant height (cm) dwarf	73.80	135.00	SKGPA 162 (73.80), SKGPA 163 (77.60), SKGPA 145 (78.20), IC 35696 (82.40)	Suvarna (107.28)
	Plant height (Cm) tall	73.80	135.00	IC 35554 (135.00), IC 35617 (131.20)	GA 2 (123.84)
4	Inflorescence length (cm)	31.00	51.60	IC 95596 (51.6), IC 35554 (51.2) IC 21930 (50.0)	GA 2 (40.48)
5	Grain yield/plant (g)	9.93	68.81	IC 35618 (68.81), IC 35625 (67.03) IC 21923 (66.56), IC 35761 (64.08) IC 35771 (63.00)	RMA 7 (40.42)
6	Seed Vol. Weight (g/10ml)	7.03	7.91	SKGPA 145 (7.91), SKGPA 144 (7.83) SKGPA 147 (7.82)	BGA 2 (7.41)
III	NDUA&T Faizabad (20 accessions)				
1	Days to 50% flowering	35.0	48.0	SKGPA 149 (35.0), SKGPA 151 (37.0) SKGPA 163 (37.0), SKGPA 150 (38.0)	GA-2 (42.0)
2	Days to 80% maturity	114.0	140.0	SKGPA 149 (114.0), SKGPA 156 (115.0) SKGPA 157 (116.0), SKGPA 158 (117.0)	GA-2 (120.5)
3	Plant height (cm) dwarf	70.0	110.0	SKGPA 149 (70.00), SKGPA 150 (75.00) SKGPA 144 (75.50), SKGPA 155 (75.50)	Suvarna (83.90)
3	Plant height (cm) tall	70.0	110.0	SKGPA 158 (110.0), SKGPA 162 (110.0) SKGPA 163 (108.0), SKGPA 157 (100.0)	GA-2 (87.88)
4	Inflorescence length (cm)	33.60	42.00	SKGPA 147 (42.0), SKGPA 160 (41.5) SKGPA 163 (40.6), SKGPA 161 (40.5)	Suvarna (39.65)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
5	Seed yield / plant (g)	10.50	17.00	SKGPA 156 (17.00), SKGPA 151 (16.60) SKGPA 157 (16.40), SKGPA 148 (16.30)	GA-2 (13.85)
IV	ARS, Mandor (78 accessions)				
1	Days to 80% maturity	121.0	126.0	IC 33542 (121.0), IC 33541(121.0) IC 35696 (121.0), IC 35761(121.0)	BGA-2 (124.6)
2	Plant height (cm) dwarf	54.0	127.4	IC 33539 (54.0), IC 21930 (55.0), IC 95295 (58.0), IC 33541 (60.0)	RMA-7 (110.6)
	Plant height (cm) tall	54.0	127.4	IC 35623 (127.4), IC 21922 (116.0)	GA-2 (115.3)
3	Inflorescence length (cm)	29.2	65.4	IC 35623 (65.4), IC 21922 (61.8) IC 21925 (60.0)	GA-2 (59.4)
4	Seed yield/plant (g)	0.98	7.14	IC 95292 (7.1), IC 33548 (6.9) SKGPA-158 (6.6), IC 33542 (6.5)	RMA-7 (3.6)
5	Seed vol. wt. (g/10 ml)	4.01	6.11	IC 95290 (6.11), IC 95283 (6.11)	RMA-7 (5.05)
V	MPKV Rahuri (70 accessions)				
1	Days to 50 % Flowering	40.00	61.00	IC 93945 (40.00), IC 35755 (40.00) IC 35610 (42.00), SKGPA- 161 (42.00)	GA-2 (52.20)
2	Days to 80 %maturity	93.00	134.00	IC 35621 (93.00), SKGPA- 161 (95.00) IC 35614 (95.00), IC 95283 (97.00)	GA-2 (111.40)
3	Plant height (cm) dwarf	60.70	163.40	IC 35547 (60.70), IC 35550 (66.20), IC 35543 (66.70), IC 35552 (77.40)	RMA-7 (132.16)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
	Plant height (cm) tall	60.70	163.40	IC 35539 (163.40), SKGPA- 155 (161.20) IC 21922 (160.20)	Suvarna (160.08)
4	Inflorescence length (cm)	40.30	97.60	IC 35757 (97.60), IC 35542 (96.70) IC 35622 (96.30)	RMA-7 (94.32)
5	Lateral spikelet length (cm)	11.00	28.00	SKGPA- 150 (28.00), IC 35757 (26.00) IC 35554 (26.00), IC 35617 (26.00)	GA-2 (21.00)
6	Petiole length (cm)	5.60	19.50	IC 35554 (19.50), IC 35542 (18.20) IC 35551 (16.80), IC 35625 (16.50)	Suvarna (14.46)
7	Seed yield (g/plant)	5.43	28.67	SKGPA- 147 (28.67)	GA-2 (26.22)
8	Seed vol. wt. (g/10 ml)	4.90	7.90	IC 93942 (7.90), IC 35543 (7.80) IC 35614 (7.80), SKGPA- 155 (7.80)	GA-2 (6.36)
VI	BAU, Ranchi (80 accessions)				
1	Days to 50% flowering	72.0	92.0	IC-21927 (72.0), IC-35623 (73.0) IC-95598 (73.00, IC-21925 (75.0)	GA-2 (81.4)
2	Days to 80% maturity	126.0	156.2	IC-35622 (126.0), IC-21923 (127.0) IC-35610 (129.0), IC-35549 (129.0)	GA-1 (144.0)
3	Plant stand at harvest	2.0	18.0	IC-21927 (18.0), IC-93945 (11.0) IC-35546 (10.0), IC-35621 (10.0)	GA-2 (7.9)
4	Plant height (cm) dwarf	11.0	181.6	IC-35759 (11.0), IC-35552 (12.0), IC-35692 (12.0), IC-35534 (12.5)	BGA-2 (38.6)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
	Plant height (cm) tall	11.0	181.6	-	Suvarna (181.6)
5	Number of branches/plant	5.0	13.9	-	GA-1 (13.9)
6	Inflorescence length (cm)	4.5	25.6	IC-35621 (25.6), IC-35623 (24.20) IC-35618 (24.0), IC-35612 (24.0)	Suvarna (20.2)
7	Seed vol. wt. (g/10 ml)	6.6	11.6	IC-21930 (11.6), IC-95596 (10.2) IC-35617 (10.1), IC-35546 (10.1)	GA-2 (9.5)
8	Grain yield/plant (g)	6.4	11.0	IC-95295 (11.0), IC-35625 (11.00) IC-95293 (11.00), IC-93941 (10.0)	Suvarna (9.4)
VII	SDAU, S. K. Nagar (107 accessions)				
1	Days to 50% flowering	48.00	68.00	SKGPA-147 (48), IC 35541 (48) IC 95290 (49), SKGPA-146 (49)	GA-2 (63.13)
2	Day to 80% maturity	95.00	122.00	SKGPA-145 (95), SKGPA-146 (96) SKGPA-144 (97), IC 81711 (106)	GA-2 (116.00)
3	Plant height (cm) dwarf	79.60	158.80	IC 35541 (79.6), IC 35668 (88.0), IC 35534 (88.2), IC 35692 (92.4)	BGA-2 (133.0)
	Plant height (cm) tall	79.60	158.80	SKGPA-148 (158.8), SKGPA-151 (158.8)	RMA-7 (157.06)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
4	Petiole length (cm)	2.44	11.40	IC 35549 (11.40), IC 95297 (10.10) IC 95295 (10.40), SKGPA-160 (9.16)	RMA-7 (6.98)
5	Lateral spikelet length(cm)	8.90	23.84	IC 35617 (23.8), IC 35770 (23.7) IC 35614 (23.5) IC 93945 (23.1)	GA-2 (8.68)
6	Inflorescence length (cm)	33.40	69.20	IC 21923 (69.2), SKGPA-151 (69.0) IC 21927 (68.0), IC 21935 (67.4)	RMA-7 (56.65)
7	Seed yield /5 plant(g)	12.60	204.42	IC 35776 (204.42), IC 35610 (151.53) IC 95297 (143.370, SKGPA-150 (139.50)	GA-2 (105.67)
8	Seed vol. wt. (g/10 ml)	4.91	7.80	IC 95290 (7.80), IC 35771 (7.73)	GA-2 (6.34)
Based on all locations (80 accessions)					
1	Days to 50% flowering	48.7	69.5	SKGPA 144 (48.7), SKGPA 145 (50.0), SKGPA 146 (51.9), SKGPA 147 (52.2), SKGPA 161 (52.4), SKGPA 163 (53.4), SKGPA 154 (53.6), SKGPA 162 (53.7), SKGPA 159 (54.5), SKGPA 157 (55.0),	GA-2 (61.6)
2	Days to 80% Maturity	109.0	129.0	IC 35621(109.0), IC 93941 (109.8), IC 95290 (110.0), IC 35541(110.2), IC 35610 (110.4), IC 95283 (110.4), IC 35755 (110.6), SKGPA 144 (110.8), IC 35542 (110.8)	GA-2 (121.6)
3	Seed yield/plant (g)	5.32	19.92	SKGPA 154 (19.92), SKGPA 147 (19.90), SKGPA 148 (19.25), SKGPA 155 (19.19)	RMA-7 (18.81)
4	10 ML seed weight (g)	6.13	7.30	IC 35771 (7.30), IC 95290 (7.18), IC 95297 (7.16), SKGPA 163 (7.15), IC 35617 (7.14)	GA-2 (6.93)

Table 14: Over the locations promising accessions in Grain amaranth Rabi 2016-17 (Plains)

S.N .	Genotypes	Days to 50% flowering							Days to 80% Maturity								
		Ambikapur	Bhubaneswar	Delhi	Faizabad	Rahuri	Ranchi	S. K. Nagar	Mean	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
1	IC 21922	73.0	45.0	-	-	48.0	76.0	64.0	61.2	86	-	-	126	111	147	116	117.2
2	IC 21923	75.0	45.0	-	-	53.0	81.0	54.0	61.6	87	-	-	125	123	127	110	114.4
3	IC 21925	76.0	-	-	-	55.0	75.0	52.0	64.5	-	-	-	125	126	133	109	123.3
4	IC 21927	78.0	47.0	-	-	55.0	72.0	53.0	61.0	88	-	-	126	120	131	120	117.0
5	IC 21930	76.0	43.0	-	-	46.0	78.0	51.0	58.8	86	-	-	123	119	137	115	116.0
6	IC 21935	79.0	43.0	-	-	55.0	80.0	52.0	61.8	87	-	-	126	124	137	117	118.2
7	IC 35534	75.0	-	-	-	43.0	79.0	61.0	64.5	-	-	-	124	106	135	108	118.3
8	IC 35539	76.0	-	-	-	56.0	78.0	64.0	68.5	-	-	-	122	105	132	107	116.5
9	IC 35541	74.0	49.0	-	-	56.0	76.0	48.0	60.6	86	-	-	121	104	133	107	110.2
10	IC 35542	77.0	49.0	-	-	42.0	75.0	53.0	59.2	87	-	-	121	98	132	116	110.8
11	IC 35543	69.0	49.0	-	-	51.0	76.0	57.0	60.4	86	-	-	123	111	136	114	114.0
12	IC 35545	68.0	-	-	-	53.0	78.0	54.0	63.3	-	-	-	126	116	134	110	121.5
13	IC 35546	64.0	42.0	-	-	52.0	76.0	51.0	57.0	86	-	-	126	123	133	117	117.0
14	IC 35547	66.0	-	-	-	57.0	77.0	52.0	63.0	-	-	-	125	122	136	115	124.5
15	IC 35548	67.0	-	-	-	54.0	78.0	-	66.3	-	-	-	122	128	137	-	129.0
16	IC 35549	66.0	-	-	-	55.0	80.0	56.0	64.3	-	-	-	122	122	129	108	120.3

S.N	Genotypes	Days to 50% flowering							Days to 80% Maturity								
		Ambikapur	Bhubaneswar	Delhi	Faizabad	Rahuri	Ranchi	S. K. Nagar	Mean	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
17	IC 35550	66.0	-	-	-	45.0	78.0	54.0	60.8	-	-	-	123	103	135	107	117.0
18	IC 35551	63.0	-	-	-	56.0	75.0	52.0	61.5	-	-	-	123	126	132	108	122.3
19	IC 35552	62.0	-	-	-	46.0	77.0	53.0	59.5	-	-	-	123	107	133	110	118.3
20	IC 35553	64.0	-	-	-	52.0	77.0	51.0	61.0	-	-	-	122	113	135	106	119.0
21	IC 35554	71.0	45.0	-	-	48.0	80.0	59.0	60.6	90	-	-	123	105	134	110	112.4
22	IC 35610	79.0	41.0	-	-	42.0	78.0	55.0	59.0	88	-	-	123	105	129	107	110.4
23	IC 35611	82.0	41.0	-	-	61.0	79.0	53.0	63.2	90	-	-	124	119	137	109	115.8
24	IC 35612	77.0	43.0	-	-	60.0	78.0	52.0	62.0	94	-	-	125	120	133	111	116.6
25	IC 35614	76.0	43.0	-	-	48.0	81.0	55.0	60.6	88	-	-	122	95	137	113	111.0
26	IC 35617	77.0	43.0	-	-	52.0	76.0	55.0	60.6	90	-	-	123	113	134	112	114.4
27	IC 35618	75.0	43.0	-	-	54.0	80.0	54.0	61.2	86	-	-	121	121	134	111	114.6
28	IC 35621	82.0	43.0	-	-	44.0	75.0	54.0	59.6	86	-	-	121	93	135	110	109.0
29	IC 35622	83.0	-	-	-	55.0	79.0	59.0	69.0		-	-	121	120	126	114	120.3
30	IC 35623	84.0	-	-	-	54.0	73.0	55.0	66.5		-	-	124	116	135	108	120.8
31	IC 35624	83.0	-	-	-	48.0	78.0	61.0	67.5		-	-	123	112	135	115	121.3
32	IC 35625	85.0	45.0	-	-	48.0	75.0	61.0	62.8	86	-	-	122	117	132	110	113.4

S.N	Genotypes	Days to 50% flowering							Days to 80% Maturity								
		Ambikapur	Bhubaneswar	Delhi	Faizabad	Rahuri	Ranchi	S. K. Nagar	Mean	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
33	IC 35668	83.0	-	-	-	55.0	76.0	64.0	69.5		-	-	123	115	132	107	119.3
34	IC 35692	76.0	43.0	-	-	54.0	77.0	62.0	62.4	89	-	-	122	106	133	108	111.6
35	IC 35696	82.0	45.0	-	-	54.0	79.0	64.0	64.8	86	-	-	121	119	137	110	114.6
36	IC 35755	77.0	45.0	-	-	40.0	81.0	64.0	61.4	90	-	-	121	98	136	108	110.6
37	IC 35757	75.0	-	-	-	43.0	77.0	64.0	64.8		-	-	122	108	137	113	120.0
38	IC 35759	-	43.0	-	-	53.0	78.0	62.0	59.0	88	-	-	122	113	138	110	114.2
39	IC 35761	66.0	47.0	-	-	46.0	80.0	54.0	58.6	89	-	-	121	103	137	107	111.4
40	IC 35766	66.0	45.0	-	-	48.0	79.0	54.0	58.4	88	-	-	121	107	135	106	111.4
41	IC 35770	63.0	43.0	-	-	50.0	78.0	64.0	59.6	90	-	-	122	116	132	108	113.6
42	IC 35771	62.0	43.0	-	-	51.0	76.0	59.0	58.2	86	-	-	122	112	133	107	112.0
43	IC 35775	64.0	47.0	-	-	45.0	75.0	68.0	59.8	89	-	-	125	108	132	109	112.6
44	IC 35776	71.0	45.0	-	-	52.0	76.0	55.0	59.8	88	-	-	123	101	136	107	111.0
45	IC 81711	79.0	-	-	-	45.0	78.0	51.0	63.3		-	-	123	100	134	106	115.8
46	IC 93941	82.0	47.0	-	-	44.0	76.0	52.0	60.2	86	-	-	122	101	132	108	109.8
47	IC 93942	77.0	47.0	-	-	55.0	79.0	52.0	62.0	88	-	-	122	121	148	107	117.2
48	IC 93945	76.0	-	-	-	40.0	76.0	51.0	60.8		-	-	122	105	133	106	116.5

S.N	Genotypes	Days to 50% flowering							Days to 80% Maturity								
		Ambikapur	Bhubaneswar	Delhi	Faizabad	Rahuri	Ranchi	S. K. Nagar	Mean	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
49	IC 95283	77.0	45.0	-	-	48.0	76.0	50.0	59.2	90	-	-	122	97	133	110	110.4
50	IC 95290	75.0	47.0	-	-	45.0	81.0	49.0	59.4	86	-	-	122	98	136	108	110.0
51	IC 95292	82.0	49.0	-	-	-	80.0	52.0	65.8	90	-	-	122	-	145	122	119.8
52	IC 95293	83.0	47.0	-	-	-	81.0	50.0	65.3	90	-	-	122	-	145	115	118.0
53	IC 95295	84.0	41.0	-	-	-	81.0	50.0	64.0	88	-	-	122	-	129	113	113.0
54	IC 95297	83.0	41.0	-	-	-	76.0	50.0	62.5	86	-	-	122	-	130	112	112.5
55	IC 95299	85.0	47.0	-	-	-	77.0	50.0	64.8	88	-	-	122	-	132	117	114.8
56	IC 95588	83.0	51.0	-	-	-	78.0	51.0	65.8	90	-	-	124	-	142	121	119.3
57	IC 95595	76.0	45.0	-	-	-	80.0	51.0	63.0	90	-	-	125	-	137	121	118.3
58	IC 95596	82.0	43.0	-	-	-	76.0	57.0	64.5	92	-	-	123	-	143	115	118.3
59	IC 95597	77.0	43.0	-	-	-	75.0	59.0	63.5	88	-	-	124	-	136	114	115.5
60	IC 95598	75.0	47.0	-	-	-	73.0	59.0	63.5	88	-	-	124	-	133	113	114.5
61	SKGPA 144	61.0	39.0	59.0	40.0	43.0	-	50.0	46.6	86	125	125	122	110	-	97	108.0
62	SKGPA 145	60.0	39.0	59.0	42.0	51.0	-	49.0	48.2	86	124	120	122	121	-	95	108.8
63	SKGPA 146	63.0	39.0	58.7	45.0	57.0	-	49.0	50.6	89	132	125	124	125	-	96	111.8
64	SKGPA 147	64.0	43.0	61.0	42.0	55.0	-	48.0	50.4	86	131	137	126	134	-	110	118.6
65	SKGPA 148	77.0	49.0	71.3	48.0	54.0	-	58.0	57.2	88	124	125	125	131	-	108	115.4

S.N	Genotypes	Days to 50% flowering							Days to 80% Maturity								
		Ambikapur	Bhubaneswar	Delhi	Faizabad	Rahuri	Ranchi	S. K. Nagar	Mean	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
66	SKGPA 149	69.0	47.0	70.3	35.0	52.0	-	59.0	52.4	90	136	114	126	133	-	109	114.4
67	SKGPA 150	75.0	49.0	68.0	38.0	56.0	-	58.0	55.2	88	136	118	125	112	-	116	111.8
68	SKGPA 151	76.0	47.0	71.0	37.0	57.0	-	60.0	55.4	90	130	120	123	123	-	107	112.6
69	SKGPA 152	74.0	49.0	69.3	40.0	51.0	-	61.0	55.0	88	126	125	123	120	-	108	112.8
70	SKGPA 153	77.0	49.0	70.7	45.0	50.0	-	61.0	56.4	92	129	130	124	101	-	118	113.0
71	SKGPA 154	69.0	47.0	67.3	38.0	48.0	-	52.0	50.8	88	134	125	125	98	-	117	110.6
72	SKGPA 155	68.0	47.0	73.0	40.0	50.0	-	62.0	53.4	90	134	120	124	105	-	116	111.0
73	SKGPA 156	64.0	47.0	66.7	45.0	51.0	-	59.0	53.2	88	128	115	126	106	-	115	110.0
74	SKGPA 157	66.0	47.0	72.0	47.0	45.0	-	53.0	51.6	88	135	116	122	108	-	114	109.6
75	SKGPA 158	67.0	47.0	68.7	38.0	60.0	-	54.0	53.2	90	132	117	123	116	-	114	112.0
76	SKGPA 159	66.0	47.0	67.0	47.0	47.0	-	53.0	52.0	88	131	125	123	100	-	116	110.4
77	SKGPA 160	66.0	49.0	72.0	48.0	51.0	-	58.0	54.4	90	130	140	123	134	-	117	120.8
78	SKGPA 161	63.0	49.0	66.3	40.0	42.0	-	54.0	49.6	88	133	135	124	95	-	116	111.6
79	SKGPA 162	62.0	47.0	66.0	42.0	52.0	-	53.0	51.2	86	128	125	-	113	-	114	109.5
80	SKGPA 163	64.0	47.0	66.3	37.0	52.0	-	54.0	50.8	86	131	130	-	127	-	115	114.5

S.N	Genotypes	Ambikapur	Days to 50% flowering							Days to 80% Maturity							
			Bhubaneswar	Delhi	Faizabad	Rahuri	Ranchi	S. K. Nagar	Mean	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
	BGA 2	77.5	-	82.3	-	57.2	92.0	67.9	73.6		127		125	119	153	118	128.7
	GA 2	72.0	49.4	71.3	42.0	52.2	81.4	63.1	60.0	93	140	121	126	111	145	116	118.5
	RMA 7	77.0	51.8	76.0	-	59.4	87.0	65.6	68.2	93	140		125	116	156	118	121.7
	SUVARNA	78.5	53.0	77.3	43.8	56.4	88.4	67.3	64.6	95	133	125	125	119	149	120	122.1
	Minimum	60.0	39.0	58.7	35.0	40.0	72.0	48.0	46.6	86	124	114	121	93.0	126	95.0	108.0
	Maximum	85.0	51.0	73.0	48.0	61.0	81.0	68.0	69.5	94	136	140	126	134.0	148	122.0	129.0
	Mean	73.2	45.3	67.2	41.7	50.5	77.5	55.4	59.8	88.1	130	124	123	112.6	135	111.1	115.0

S.N.	Genotypes	Seed yield/plant (g)							Mean	Seed vol. wt. (g/10 ml)							
		Ambikapur	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar		Ambikapur	Delhi	Bhubaneswar	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
1	IC 21922	16.5	-	-	5.4	16.20	9.6	3.6	10.25	5.45	-	7.21	5.21	7.20	7.70	5.18	6.33
2	IC 21923	16.7	-	-	2.8	10.2	7.5	16.2	10.67	6.20	-	7.45	4.79	6.80	9.50	6.13	6.81
3	IC 21925	16.9	-	-	5.6	7.8	7.4	20.2	11.58	6.55	-	-	5.11	7.40	9.50	6.01	6.91
4	IC 21927	17.0	-	-	6.1	6.6	6.8	10.7	9.44	6.00	-	7.15	5.12	6.40	10.00	5.81	6.75
5	IC 21930	17.1	-	-	2.2	5.8	6.9	14.8	9.36	5.45	-	7.27	5.12	6.00	11.60	5.96	6.90
6	IC 21935	17.2	-	-	5.4	9.4	8.5	17.7	11.63	6.35	-	7.33	5.13	6.80	9.60	6.21	6.90
7	IC 35534	17.3	-	-	5.0	7.1	7.3	11.7	9.69	6.85	-	-	5.14	6.20	8.90	6.58	6.73
8	IC 35539	16.4	-	-	5.0	6.5	7.6	2.5	7.60	6.20	-	-	4.12	7.50	7.50	5.80	6.22
9	IC 35541	17.0	-	-	5.2	9.4	8.5	23.2	12.66	5.45	-	7.17	4.72	7.00	9.40	6.22	6.66
10	IC 35542	16.8	-	-	6.5	9.5	7.5	10.5	10.16	5.40	-	7.36	4.73	6.40	8.20	5.79	6.31
11	IC 35543	16.9	-	-	4.9	8.2	7.9	9.2	9.43	6.80	-	7.28	5.01	7.80	8.40	5.94	6.87
12	IC 35545	16.8	-	-	2.0	12.0	8.2	14.1	10.62	5.95	-	-	4.76	6.80	6.60	6.52	6.13
13	IC 35546	17.1	-	-	3.5	7.0	9.4	23.6	12.13	6.60	-	7.06	5.14	5.80	10.10	6.47	6.86
14	IC 35547	17.9	-	-	2.5	5.8	8.9	17.1	10.44	6.70	-	-	4.81	7.20	9.80	6.54	7.01
15	IC 35548	17.5	-	-	6.9	8.7	9.8	-	10.73	6.40	-	-	5.12	7.20	9.40	-	7.03
16	IC 35549	17.6	-	-	5.9	9.0	9.2	3.3	9.02	5.70	-	-	5.11	6.80	9.00	6.01	6.52
17	IC 35550	16.9	-	-	4.8	8.7	7.8	17.7	11.17	5.55	-	-	4.33	6.20	9.50	6.63	6.44

S.N.	Genotypes	Seed yield/plant (g)							Seed vol. wt. (g/10 ml)								
		Ambikapur	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean	Ambikapur	Delhi	Bhubaneswar	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
18	IC 35551	17.2	-	-	3.4	7.6	7.6	27.0	12.56	5.80	-	-	4.12	7.40	8.20	6.99	6.50
19	IC 35552	17.5	-	-	3.5	7.5	6.9	25.1	12.11	5.85	-	-	4.23	6.40	10.00	6.45	6.59
20	IC 35553	16.9	-	-	1.7	7.6	6.8	18.2	10.23	4.90	-	-	4.24	6.20	9.20	6.16	6.14
21	IC 35554	17.0	-	-	1.3	6.7	6.8	7.8	7.92	6.10	-	7.29	4.61	6.00	9.30	6.33	6.61
22	IC 35610	17.1	-	-	1.5	15.6	8.4	30.3	14.58	5.75	-	7.08	5.11	5.80	7.10	7.12	6.33
23	IC 35611	18.0	-	-	1.4	16.1	8.4	18.3	12.42	6.05	-	7.31	5.11	7.00	8.20	6.54	6.70
24	IC 35612	17.8	-	-	1.0	8.4	8.4	22.3	11.57	6.30	-	7.11	4.28	6.10	8.40	6.40	6.43
25	IC 35614	17.7	-	-	1.1	18.5	7.9	9.8	10.99	6.55	-	7.25	5.11	7.80	6.60	5.90	6.53
26	IC 35617	18.2	-	-	2.3	8.3	7.7	9.7	9.23	7.25	-	7.44	4.23	7.20	10.10	6.60	7.14
27	IC 35618	18.3	-	-	1.4	8.9	6.4	16.6	10.31	7.50	-	7.36	4.79	4.90	9.80	6.18	6.75
28	IC 35621	18.7	-	-	1.7	12.4	8.2	15.0	11.20	7.10	-	7.21	4.72	6.00	9.40	6.70	6.86
29	IC 35622	19.0	-	-	1.3	6.4	8.3	7.4	8.47	6.50	-	-	4.82	7.00	9.00	5.99	6.66
30	IC 35623	18.8	-	-	1.2	6.1	9.6	10.3	9.20	6.50	-	-	4.77	6.80	8.80	6.69	6.71
31	IC 35624	18.4	-	-	1.2	21.7	10.0	6.5	11.54	5.70	-	-	4.12	7.00	8.70	6.02	6.31
32	IC 35625	18.5	-	-	3.8	18.3	11.0	10.4	12.40	6.35	-	7.19	4.78	7.30	9.20	6.21	6.84
33	IC 35668	18.1	-	-	5.3	5.4	9.8	4.7	8.68	6.75	-	-	4.79	7.50	9.90	6.08	7.00
34	IC 35692	18.7	-	-	1.6	7.4	8.9	6.9	8.70	6.30	-	7.24	4.12	7.40	9.70	7.16	6.99

S.N.	Genotypes	Seed yield/plant (g)							Seed vol. wt. (g/10 ml)								
		Ambikapur	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean	Ambikapur	Delhi	Bhubaneswar	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
35	IC 35696	19.0	-	-	4.8	18.0	7.1	7.5	11.29	6.65	-	7.08	4.77	6.60	8.80	6.58	6.75
36	IC 35755	18.4	-	-	1.3	7.3	9.5	12.7	9.84	6.00	-	7.34	5.11	5.80	9.50	7.20	6.83
37	IC 35757	18.6	-	-	1.9	7.5	7.7	8.2	8.79	5.95	-	-	4.87	6.40	8.70	5.97	6.38
38	IC 35759	-	-	-	1.6	5.4	7.5	6.7	5.32	-	-	7.07	4.76	7.20	7.40	6.41	6.57
39	IC 35761	16.9	-	-	3.1	19.5	9.2	9.8	11.70	6.40	-	7.23	5.11	6.20	9.20	6.28	6.74
40	IC 35766	16.8	-	-	2.5	6.7	9.1	14.9	9.99	5.70	-	7.43	4.78	7.00	9.90	6.80	6.94
41	IC 35770	17.1	-	-	4.3	10.0	9.2	16.3	11.39	5.55	-	7.31	5.23	6.80	9.60	7.01	6.92
42	IC 35771	17.9	-	-	1.3	10.9	7.3	17.2	10.91	5.80	-	7.28	5.72	7.60	9.70	7.73	7.30
43	IC 35775	17.5	-	-	6.3	8.7	8.3	20.0	12.14	5.85	-	7.35	5.43	7.60	8.50	6.30	6.84
44	IC 35776	17.6	-	-	3.5	25.6	7.6	40.9	19.03	4.90	-	7.08	6.01	7.20	8.60	6.73	6.75
45	IC 81711	16.9	-	-	4.4	6.7	8.7	13.9	10.13	6.10	-	-	4.76	6.90	8.00	6.25	6.40
46	IC 93941	17.2	-	-	5.4	5.6	10.0	26.1	12.87	5.75	-	7.43	4.63	6.60	9.70	6.90	6.83
47	IC 93942	17.5	-	-	6.0	12.4	10.0	27.7	14.72	6.05	-	7.25	6.11	7.90	7.70	7.40	7.07
48	IC 93945	16.9	-	-	4.2	9.2	8.8	26.4	13.10	6.30	-	-	5.75	6.70	7.40	7.28	6.69
49	IC 95283	17.0	-	-	3.6	8.4	7.5	13.5	10.00	6.55	-	7.22	6.11	6.40	7.70	6.94	6.82
50	IC 95290	17.1	-	-	3.7	22.6	7.6	24.3	15.06	7.25	-	7.29	6.11	6.00	8.60	7.80	7.18

S.N.	Genotypes	Seed yield/plant (g)							Seed vol. wt. (g/10 ml)								
		Ambikapur	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean	Ambikapur	Delhi	Bhubaneswar	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
51	IC 95292	18.0	-	-	7.1	-	8.7	18.8	13.15	7.50	-	7.16	6.11	-	7.30	6.91	7.00
52	IC 95293	17.8	-	-	6.0	-	11.0	14.8	12.39	7.10	-	7.33	5.98	-	7.20	6.82	6.89
53	IC 95295	17.7	-	-	5.0	-	11.0	17.8	12.87	6.50	-	7.15	4.81	-	9.60	6.99	7.01
54	IC 95297	18.2	-	-	3.7	-	8.8	28.7	14.84	6.50	-	7.26	5.11	-	9.70	7.22	7.16
55	IC 95299	18.3	-	-	2.9	-	7.5	23.2	12.99	5.70	-	7.31	4.52	-	8.60	7.23	6.67
56	IC 95588	18.7	-	-	2.4	-	8.2	9.8	9.77	6.35	-	7.12	5.11	-	9.80	6.55	6.99
57	IC 95595	19.0	-	-	3.3	-	7.5	22.2	12.98	6.75	-	7.27	4.01	-	9.40	5.52	6.59
58	IC 95596	18.8	-	-	3.0	-	9.2	20.7	12.94	6.30	-	7.18	5.02	-	10.20	6.35	7.01
59	IC 95597	18.4	-	-	1.9	-	9.1	10.6	9.98	6.65	-	7.03	5.11	-	7.70	6.24	6.55
60	IC 95598	18.5	-	-	4.0	-	9.2	13.4	11.28	6.00	-	7.07	4.51	-	9.50	6.99	6.81
61	SKGPA 144	17.5	37.01	10.7	2.7	6.0	-	19.5	11.29	5.89	6.97	7.83	4.87	5.70	-	6.57	6.17
62	SKGPA 145	17.6	39.75	10.5	2.8	8.4	-	16.7	11.19	6.21	7.33	7.91	4.75	6.80	-	7.12	6.56
63	SKGPA 146	17.4	45.40	12.8	2.9	7.4	-	25.5	13.20	6.56	6.98	7.19	4.16	6.60	-	6.42	6.19
64	SKGPA 147	17.3	38.52	15.5	1.5	28.7	6.75	18.0	12.35	6.89	7.04	7.82	4.71	7.00	-	6.30	6.54
65	SKGPA 148	17.8	55.00	16.3	2.3	5.6	-	18.5	12.09	6.76	7.10	7.7	4.12	6.90	-	6.56	6.41
66	SKGPA 149	17.6	53.33	13.0	2.8	15.0	-	12.9	12.25	5.78	7.23	7.64	4.23	6.60	-	6.36	6.12
67	SKGPA 150	17.7	35.75	15.6	2.7	10.2	-	27.9	14.83	5.45	6.71	7.71	4.63	6.60	-	6.07	6.09

S.N.	Genotypes	Seed yield/plant (g)							Seed vol. wt. (g/10 ml)						
		Ambikapur	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean	Ambikapur	Delhi	Bhubaneswar	Mandor	Rahuri	Ranchi
68	SKGPA 151	17.2 35.45	16.6 35.45	2.4	9.6	-	19.0	12.95	5.89 7.25	7.15	4.16	7.20	-	6.11	6.10
69	SKGPA 152	17.4 45.92	14.6 45.92	1.9	11.9	-	15.6	12.27	5.89 7.22	7.65	5.23	6.20	-	6.24	6.24
70	SKGPA 153	17.5 28.12	13.2 28.12	3.7	19.2	-	9.2	12.55	6.23 6.97	7.72	4.98	7.60	-	6.44	6.59
71	SKGPA 154	17.6 48.30	12.6 48.30	4.3	12.2	-	24.5	14.24	6.32 7.25	7.58	5.31	7.20	-	6.34	6.55
72	SKGPA 155	17.7 59.36	15.5 59.36	2.7	8.3	-	11.6	11.16	5.46 6.86	7.48	4.78	7.80	-	6.12	6.33
73	SKGPA 156	17.3 41.11	17.0 41.11	5.6	7.0	-	10.4	11.44	6.24 7.27	7.25	4.81	6.20	-	6.14	6.13
74	SKGPA 157	17.5 35.10	16.4 35.10	3.1	5.4	-	9.7	10.43	5.67 7.33	7.31	4.92	7.00	-	6.02	6.18
75	SKGPA 158	17.4 39.57	13.4 39.57	6.6	7.7	-	9.9	11.00	6.45 7.38	7.62	5.11	7.60	-	6.60	6.68
76	SKGPA 159	17.8 40.00	12.7 40.00	3.2	8.2	-	22.9	12.95	7.10 7.73	7.56	6.11	7.20	-	6.19	6.83
77	SKGPA 160	17.6 23.36	15.4 23.36	5.1	7.0	-	25.4	14.11	6.11 7.39	7.25	5.18	6.20	-	5.16	5.98
78	SKGPA 161	17.5 40.67	13.5 40.67	6.1	12.0	-	17.9	13.39	6.30 6.64	7.63	5.79	6.60	-	6.44	6.55
79	SKGPA 162	17.7 28.65	12.8 28.65	-	11.6	-	24.1	16.56	6.20 7.17	7.31	-	6.80	-	6.30	6.65
80	SKGPA 163	17.8 34.58	12.6 34.58	-	7.9	-	12.9	12.81	7.23 7.51	7.16	-	7.50	-	6.36	7.06

S.N.	Genotypes	Seed yield/plant (g)							Seed vol. wt. (g/10 ml)								
		Ambikapur	Delhi	Faizabad	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean	Ambikapur	Delhi	Bhubaneswar	Mandor	Rahuri	Ranchi	S. K. Nagar	Mean
	BGA 2	18.2	24.32		2.0	18.6	8.8	12.0	11.91	6.88	7.09		4.91	5.62	8.56	5.02	6.20
	GA 2	18.1	37.35	13.9	2.8	26.2	9.1	21.1	15.21	6.48	7.58	7.39	4.81	6.36	9.54	6.34	6.82
	RMA 7	19.6	48.00		3.6	14.5	7.8	19.3	12.97	8.80	7.24	7.26	5.05	5.56	7.64	5.93	6.71
	SUVARNA	18.7	37.68	11.2	1.7	19.8	9.4	13.5	12.39	7.39	7.20	7.33	4.90	6.12	7.44	4.91	6.35
	Minimum	16.4	23.4	10.5	1.0	5.4	-6.8	2.5	5.32	4.90	6.6	7.03	4.01	4.90	6.60	5.16	5.98
	Maximum	19.0	59.4	17.0	7.1	28.7	11.0	40.9	19.03	7.50	7.7	7.91	6.11	7.90	11.60	7.80	7.30
	Mean	17.6	40.2	14.0	3.5	10.4	8.2	16.2	11.52	6.22	7.2	7.33	4.93	6.79	8.91	6.45	6.65

Table 15: Experimental details of germplasm evaluation in Fababean Rabi 2016-17 (Plains)

S. No	Items	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Ranchi
1	No. of accessions	51	51	50	51	50	50
2	No. of Checks	1	2	2	2	2	4
3	Design	ABD	ABD	ABD	ABD	RBD	ABD
4	No. of Block	-	12	5	12	5	5
5	Number of Rows	-	3	2	3	-	1
6	Row Length (m)	-	3.0	4.0	3.0	-	-
7	Row spacing (cm)	30 cm	30 cm	30 cm	30 cm	-	30 cm
8	Plant spacing (cm)	10 cm	10 cm	10 cm	10 cm	-	10 cm
9	NPKS (kg/ha)		20:40:0	-	20:40:0	-	40:40:20:20
10	Plot size (m ²)	4.0X 0.60	3.0x0.90	4.0×0.60	3.0x0.90	3.0x0.30	4.0X 0.30
11	Sowing Date	8/12/2016	27/11/2016	23/11/ 2016	7/11/2016	24/11/16	3/12/2016
12	Harvesting /iod	-	1/4/2017 – 10/4/2017	11/5/2017	7/4/2017 – 10/4/2017	-	1/4/2017 – 20/4/2017

Table 16: Evaluation of germplasm in Fababean at Ambikapur Rabi 2016-17 (Plains)

S. No.	Genotype	Days to 50% flowering	No of branches/plant	Plant height (cm)	Pod length (cm)	No of pod/plant	No of seeds/pod	100 seed weight (g)	Grain yield (g/plot)
1	HB-1	54	2.20	50.00	3.80	7.00	2.80	24.35	346
2	HB-2	54	1.80	60.80	3.60	7.40	3.20	24.00	265
3	HB-3	52	2.20	56.20	3.40	7.80	2.60	22.20	299
4	HB-5	53	2.40	64.40	4.20	10.00	2.60	29.35	222
5	HB-8	51	3.00	54.80	3.60	8.00	2.20	22.75	266
6	HB-15	53	2.60	73.60	4.20	9.80	3.00	24.40	330
7	HB-19	54	2.60	69.00	4.00	11.00	3.00	24.10	306
8	HB-21	51	2.00	68.60	3.80	7.60	2.60	22.15	270
9	HB-24	55	2.20	72.20	3.60	9.40	3.00	27.40	310
10	HB-28	52	1.80	61.40	3.40	7.60	2.20	22.65	312
11	HB-30	53	2.20	65.20	3.60	7.20	2.40	25.20	220
12	HB-33	51	1.80	54.20	3.00	9.00	2.00	23.55	320
13	HB-37	53	1.80	59.20	3.80	6.00	2.40	21.45	294
14	HB-58	54	2.20	59.60	2.80	3.80	2.00	24.50	241
15	HB-61	51	2.00	58.20	2.80	6.40	2.40	23.70	286
16	HB-63	53	1.80	66.20	3.80	8.80	2.60	23.90	295
17	HB-65	52	2.20	61.80	4.00	9.40	2.80	22.05	289
18	HB-66	55	1.80	59.80	3.40	6.40	2.80	24.40	288
19	HB-68	56	1.60	63.00	3.00	8.86	2.60	23.50	303
20	HB-71	54	1.80	59.40	4.00	9.00	3.00	25.25	264
21	HB-73	54	1.80	66.40	3.60	9.20	2.60	23.10	260

S. No.	Genotype	Days to 50% flowering	No of branches/ plant	Plant height (cm)	Pod length (cm)	No of pod/ plant	No of seeds/ pod	100 seed weight (g)	Grain yield (g/plot)
22	HB-78	55	2.00	68.40	3.40	8.60	2.80	22.05	261
23	HB-79	53	2.20	66.40	3.20	7.80	2.60	21.90	272
24	HB-82	56	2.00	69.00	4.00	6.80	2.20	19.85	304
25	HB-90	55	2.20	70.00	3.60	5.80	3.00	23.05	266
26	NDF-12	54	1.80	66.40	3.80	6.20	2.80	24.60	268
27	NDF-14	57	2.00	62.00	3.60	8.20	2.40	24.00	248
28	HFB-1	54	2.40	64.20	3.20	9.40	3.40	20.15	221
29	EC 331564	57	2.40	60.00	3.60	6.40	2.60	23.60	373
30	EC 32905	55	1.80	59.00	3.80	7.00	2.00	26.75	222
31	EC 243596	54	1.60	60.20	3.60	7.40	2.20	21.35	215
32	EC 628942	56	2.20	50.00	3.80	7.80	2.80	24.35	256
33	EC 25085	54	1.80	60.80	3.60	10.00	3.20	24.00	204
34	EC 329681	54	2.20	56.20	3.40	8.00	2.60	22.20	258
35	EC 363781	52	2.40	64.40	4.20	9.80	2.60	29.35	219
36	EC 117744	53	3.00	54.80	3.60	11.00	2.20	22.75	181
37	EC 628925	51	2.60	73.60	4.20	7.60	3.00	24.40	203
38	EC 628940	53	2.60	69.00	4.00	9.40	3.00	24.10	214
39	EC 32976	54	2.00	68.60	3.80	7.60	2.60	22.15	195
40	EC 343691	51	2.20	72.20	3.60	7.20	3.00	27.40	196
41	EC 287710	55	1.80	61.40	3.40	9.00	2.20	22.65	237
42	EC 243036	52	2.20	65.20	3.60	6.00	2.40	25.20	225
43	EC 25192	53	1.80	54.20	3.00	3.80	2.00	23.55	209

S. No.	Genotype	Days to 50% flowering	No of branches/ plant	Plant height (cm)	Pod length (cm)	No of pod/ plant	No of seeds/pod	100 seed weight (g)	Grain yield (g/plot)
44	EC 32923	51	1.80	59.20	3.80	6.40	2.40	21.45	204
45	EC 591784	53	2.20	59.60	2.80	8.80	2.00	24.50	236
46	EC 366272	54	2.00	58.20	2.80	9.40	2.40	23.70	202
47	EC 351287	51	1.80	66.20	3.80	6.40	2.60	23.90	235
48	EC 293820	53	2.20	61.80	4.00	7.60	2.80	22.05	178
49	EC 361485	52	1.80	59.80	3.40	9.00	2.80	24.40	194
50	EC 3279	55	1.60	63.00	3.00	8.20	2.60	23.50	191
51	EC 243793	56	1.80	59.40	4.00	6.80	3.00	25.25	202
	VIKRANT	56	2.40	62.00	3.40	6.80	2.60	21.75	213
	Minimum	51.00	1.60	50.00	2.80	3.80	2.00	19.85	178
	Maximum	57.00	3.00	73.60	4.20	11.00	3.40	29.35	373
	Mean	53.54	2.09	62.48	3.58	7.88	2.61	23.73	251.69
	CV (%) Phen.	3.10	15.80	9.01	10.76	19.69	13.32	8.09	18.96

Table 17: Evaluation of germplasm in Fababean at New Delhi Rabi 2016-17 (Plains)

S. No	Accession	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	No of Braches /plant	Pod length (mm)	Pod width (mm)	Number of Seed / pod	Number of pods / plant	Number of leaflets / leaf	Seed yield/ plant (g)	100 seed wt.(g)
1	HB-30	76.0	126.0	58.4	6.6	48.65	9.82	3.40	28.00	6.00	105	19.33
2	EC 628942	78.0	129.0	56.2	5.4	43.38	8.70	3.00	23.20	5.80	95	23.09
3	EC 117744	75.0	130.0	58.0	5.4	49.77	9.85	4.00	33.00	6.00	120	17.82
4	HB-61	74.0	130.0	53.8	4.2	51.29	10.54	3.40	20.00	5.80	80	19.38
5	HB-79	75.0	133.0	69.6	5.2	52.93	10.64	3.20	17.00	5.80	80	24.23
6	EC 343691	75.0	127.0	58.8	5.6	47.85	10.67	3.40	25.40	5.80	130	25.90
7	EC 329681	78.0	134.0	65.4	5.4	46.31	9.90	2.40	22.40	6.00	80	23.04
8	HB-03	77.0	131.0	69.8	5.6	46.06	9.81	3.20	22.40	6.00	10	22.31
9	EC 243793	79.0	130.0	72.0	5.2	52.85	11.17	3.20	18.80	5.80	70	22.21
10	HB-5	73.0	133.0	78.0	5.8	64.57	12.28	3.80	24.80	6.00	80	29.46
11	HB-02	74.0	132.0	77.0	5.8	42.64	9.73	3.00	24.00	5.80	80	23.71
12	EC 351587	71.0	133.0	70.0	5.2	53.63	10.77	3.80	16.00	5.80	90	24.81
13	HB-71	73.0	133.0	65.4	5.6	52.31	10.51	3.80	33.80	5.60	230	28.21
14	NDF-8	69.0	131.0	74.4	6.2	55.13	10.73	4.00	34.80	5.80	150	29.51
15	EC 32905	71.0	134.0	76.6	6.0	44.64	10.14	2.60	27.20	5.60	130	29.28
16	EC 331564	73.0	130.0	63.8	6.8	43.80	11.57	2.60	16.20	6.20	70	26.06
17	NDF-14	74.0	128.0	67.8	6.0	52.76	11.03	3.20	19.40	5.80	60	26.02
18	HB-65	73.0	125.0	61.2	5.6	40.51	10.35	3.20	20.40	5.60	60	24.77
19	EC 25085	68.0	123.0	59.2	6.2	50.45	11.36	3.60	19.60	5.60	80	21.24
20	EC 3279	75.0	128.0	57.6	7.8	50.87	10.96	3.20	25.60	6.00	90	29.65
21	EC 628925	71.0	125.0	59.6	4.0	52.13	11.73	3.20	12.40	6.20	45	26.27

S. No	Accession	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	No of Braches /plant	Pod length (mm)	Pod width (mm)	Number of Seed / pod	Number of pods / plant	Number of leaflets / leaf	Seed yield/ plant (g)	100 seed wt.(g)
22	HB-63	69.0	127.0	63.8	5.2	40.45	10.51	3.20	22.80	6.00	110	24.87
23	HB-33	70.0	129.0	67.6	5.8	56.98	10.71	3.20	18.00	6.00	70	26.14
24	HB-24	71.0	131.0	68.2	5.4	46.02	10.37	3.20	18.00	5.60	56	26.89
25	EC 25192	73.0	127.0	60.8	5.0	44.42	10.25	3.60	18.40	5.60	70	27.42
26	HB-191	73.0	131.0	54.0	5.2	62.57	11.84	3.20	19.40	5.80	80	24.24
27	HB-28	69.0	130.0	58.2	6.6	43.01	9.50	3.20	21.60	5.40	90	23.48
28	EC 363781	75.0	131.0	56.8	5.6	42.28	10.37	2.80	19.60	5.40	65	27.64
29	HB-66	73.0	129.0	53.2	4.6	45.04	9.52	3.80	23.00	5.40	80	25.39
30	HB-58	74.0	131.0	52.8	5.0	59.14	10.46	3.60	22.20	5.80	56	25.70
31	HB-68	71.0	128.0	52.8	6.0	46.63	10.89	3.20	26.60	5.60	80	26.32
32	HB-82	75.0	131.0	54.8	5.4	49.00	9.28	3.60	19.80	6.00	70	20.904
33	HB-73	73.0	132.0	54.8	5.6	54.20	10.58	3.20	15.20	5.80	60	26.996
34	EC 243036	75.0	133.0	51.0	5.2	46.32	9.82	3.40	12.80	5.80	60	24.441
35	EC 293820	70.0	132.0	52.2	5.2	53.11	8.36	3.60	15.40	5.60	60	17.766
36	EC 361485	74.0	134.0	49.0	4.8	45.09	10.29	2.80	14.20	5.40	60	26.923
37	NDF-12	71.0	132.0	55.2	6.0	35.94	9.53	3.00	20.40	5.60	60	23.46
38	EC 287710	70.0	134.0	60.0	4.4	38.85	8.84	3.00	17.20	5.60	60	24.974
39	HB-15	74.0	135.0	55.4	4.8	46.93	10.55	2.80	20.20	5.20	70	26.311
40	HB-21	69.0	134.0	61.8	4.8	47.01	10.72	3.40	18.60	5.60	80	27.39
41	EC 591784	73.0	135.0	77.6	6.4	52.41	8.96	2.80	9.60	5.60	120	24.134
42	EC 32923	75.0	136.0	79.0	7.2	57.09	11.12	3.60	19.20	5.80	70	24.332

S. No	Accession	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	No of Braches /plant	Pod length (mm)	Pod width (mm)	Number of Seed / pod	Number of pods / plant	Number of leaflets / leaf	Seed yield/ plant (g)	100 seed wt.(g)
43	HB-1	76.0	134.0	75.0	5.4	48.18	10.16	2.60	15.60	6.20	60	24.636
44	EC 32976	73.0	133.0	80.6	8.0	49.14	9.69	3.40	24.00	6.00	70	27.254
45	EC 366272	71.0	132.0	71.4	5.0	55.17	11.15	3.00	12.40	5.60	40	26.443
46	EC 628940	70.0	134.0	72.2	6.6	50.98	9.38	3.00	21.00	6.00	90	20.62
47	HB-37	71.0	134.0	67.8	7.0	54.63	9.39	4.00	15.40	5.80	40	21.736
48	HB-60	73.0	132.0	64.2	8.2	51.85	9.73	3.40	17.80	5.40	80	19.318
49	EC 243596	74.0	133.0	70.4	6.4	55.39	10.66	2.80	25.20	6.00	105	21.796
50	HB-78	72.0	132.0	69.2	5.6	48.81	11.28	3.00	22.80	6.00	70	22.502
	HFB-1	72.33	127.8	64.0	6.2	50.56	10.02	3.2	16.93	5.86	74.16	21.708
	PRT-12	69.66	131.6	63.66	5.13	51.32	10.68	3.53	17.06	5.73	83.33	22.983
	VIKARANT	72.00	131.2	69.32	6.04	47.77	10.10	3.28	24.64	5.76	91	25.153
	Minimum	68.00	123.0	49.00	4.00	35.94	8.36	2.40	9.60	5.20	10.00	17.77
	Maximum	79.00	136.0	80.60	8.20	64.57	12.28	4.00	34.80	6.20	230.00	29.65
	Mean	72.89	130.9	63.76	5.72	49.41	10.32	3.26	20.56	5.77	80.48	24.46
	CD (0.05)	-	-	-	-	-	-	-	-	-	-	-
	CV (%) Error	-	-	-	-	-	-	-	-	-	-	-
	CV (%) Phen.	3.45	2.19	13.18	15.39	11.54	7.85	11.54	25.43	3.91	39.94	11.97

Table 18: Evaluation of germplasm in Fababean at Faizabad Rabi 2016-17 (Plains)

S. No	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Branches/ Plant	Seeds/ pod	100 seed weight (g)	Seed yield / plant (g)
1	HB 1	66.0	148.0	98.0	4.4	3.4	25.4	22.1
2	HB 2	63.0	151.0	86.0	4.2	3.4	22.8	24.5
3	HB 3	61.0	138.0	84.4	3.4	3.6	25.0	24.1
4	HB 5	59.0	140.0	80.5	3.8	3.0	25.2	23.0
5	HB 15	68.0	138.0	77.9	3.4	3.4	27.0	24.5
6	HB 19	69.0	142.0	95.0	4.6	3.0	24.8	22.8
7	HB 21	62.0	147.0	97.0	4.2	2.8	25.8	24.5
8	HB 24	66.0	149.0	104.8	3.6	3.4	22.6	27.6
9	HB 28	67.0	151.0	80.0	3.8	2.8	23.6	28.5
10	HB 30	59.0	149.0	87.5	3.8	2.6	23.0	25.0
11	HB 33	58.0	146.0	88.0	4.4	3.0	23.9	24.0
12	HB 37	69.0	148.0	92.0	3.4	2.8	23.8	25.0
13	HB 58	71.0	145.0	99.5	3.4	3.0	24.7	23.0
14	HB 61	68.0	146.0	95.0	4.6	2.8	23.0	24.6
15	HB 63	61.0	144.0	100.0	4.4	3.2	20.4	25.0
16	HB 65	66.0	147.0	85.6	3.4	3.0	25.6	30.0
17	HB 66	60.0	146.0	82.2	4.0	3.0	27.3	28.0
18	HB 68	61.0	150.0	91.2	4.6	2.8	24.4	29.6
19	HB 71	60.0	151.0	78.4	4.8	3.8	32.8	30.0

S. No	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Branches/ Plant	Seeds/ pod	100 seed weight (g)	Seed yield / plant (g)
20	HB 73	59.0	149.0	77.0	4.8	2.8	27.6	27.5
21	HB 78	62.0	151.0	87.2	4.2	3.2	28.0	25.6
22	HB 79	58.0	145.0	77.3	5.8	3.4	26.0	28.0
23	HB 82	57.0	149.0	85.0	3.0	3.2	25.0	27.6
24	NDF 8	60.0	150.0	100.0	3.0	3.8	25.5	26.0
25	NDF 12	65.0	148.0	98.0	3.0	3.0	26.0	25.5
26	NDF 14	65.0	160.0	105.0	3.0	3.2	24.0	26.0
27	EC 243793	66.0	157.0	95.0	3.0	3.2	25.5	28.0
28	EC 117744	62.0	148.0	105.0	3.6	3.2	22.4	22.2
29	EC 243036	66.0	149.0	105.0	4.0	3.8	23.1	25.6
30	EC 243596	61.0	138.0	90.0	3.5	3.0	28.1	24.6
31	EC 25085	60.0	145.0	95.0	4.4	3.8	23.8	22.8
32	EC 25192	58.0	148.0	97.0	3.4	3.2	26.5	31.5
33	EC 287710	64.0	151.0	85.0	3.4	3.0	26.7	25.5
34	EC 293820	63.0	147.0	42.6	4.4	2.8	21.3	26.5
35	EC 3279	58.0	146.0	77.5	4.0	3.6	27.2	27.0
36	EC 32905	60.0	151.0	78.4	3.8	3.4	24.9	28.5
37	EC 32923	59.0	146.0	82.0	3.8	3.3	24.2	24.6
38	EC 329681	60.0	148.0	79.0	3.6	3.0	23.5	25.6
39	EC 32976	57.0	144.0	74.6	4.6	2.8	24.0	26.0

S. No	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Branches/ Plant	Seeds/ pod	100 seed weight (g)	Seed yield / plant (g)
40	EC 331564	59.0	146.0	82.5	4.4	3.0	27.7	26.6
41	EC 343691	65.0	149.0	76.0	3.8	4.0	25.0	27.0
42	EC 351587	68.0	151.0	84.0	4.0	4.2	24.5	28.0
43	EC 361485	67.0	150.0	74.4	3.8	4.0	23.8	29.0
44	EC 363781	60.0	158.0	85.2	4.4	3.8	24.8	31.0
45	EC 366272	58.0	150.0	82.7	3.6	3.6	27.5	30.0
46	EC 591784	61.0	151.0	85.1	4.0	3.4	25.5	27.5
47	EC 628925	62.0	145.0	75.5	4.5	3.5	26.0	26.0
48	EC 628940	63.0	141.0	85.4	5.0	3.2	26.0	25.0
49	EC 628942	67.0	146.0	88.4	4.0	3.6	25.8	26.0
	HFB-1	63.4	145.4	90.3	4.4	3.0	25.8	24.3
	Vikrant	62.0	146.8	92.6	4.2	3.3	23.7	27.0
	Minimum	57.0	138.0	42.6	3.0	2.6	20.4	22.1
	Maximum	71.0	160.0	105.0	5.8	4.2	32.8	31.5
	Mean	62.5	147.6	87.1	4.0	3.3	25.1	26.2
	CD (0.05)	-	-	-	-	-	-	-
	CV (%) Error	-	-	-	-	-	-	-
	CV (%) Phen.	5.9	3.0	12.5	14.8	11.6	8.1	8.7

Table 19: Evaluation of germplasm in Fababean at Hisar Rabi 2016-17 (Plains)

Sr. No.	Genotypes	Days to 50% flowering	Days to 80 % maturity	Plant height (cm)	Branches/ plant	Clusters/ plant	Pods / plant	Pod length (cm)	Seeds / pod	100 Seeds weight (g)	Seed yield/ plant (g)	Plant Population at harvest (%)
1	HB-1	47	151	115.5	5	16	45	5.7	3.0	26.20	31.50	95
2	HB-2	41	145	88.7	2	8	21	5.1	3.0	24.50	11.30	92
3	HB-3	37	135	85.1	4	13	35	5.5	3.0	29.10	25.20	90
4	HB-5	45	149	111.9	3	9	26	5.5	3.0	30.30	19.80	93
5	HB-15	61	164	90.5	7	29	80	4.8	3.0	26.10	62.50	94
6	HB-19	39	141	112.5	5	17	53	5.3	3.0	26.70	34.80	95
7	HB-21	65	168	140.3	4	11	30	6.5	3.0	26.30	24.90	92
8	HB-24	35	138	70.4	4	9	26	5.6	3.0	27.90	20.40	87
9	HB-28	34	135	85.8	2	5	18	5.5	3.0	26.50	10.20	85
10	HB-30	50	157	104.5	6	25	69	5.2	3.0	26.10	49.50	94
11	HB-33	32	139	96.5	5	20	58	5.1	3.0	28.10	46.70	92
12	HB-37	60	166	111.2	6	27	79	5.3	3.0	25.50	62.10	90
13	HB-58	41	144	80.6	4	15	44	6.2	3.0	25.30	29.40	95
14	HB-61	40	139	114.4	3	10	28	5.4	3.0	25.50	20.60	91
15	HB-63	63	166	99.2	6	26	77	5.5	3.0	27.80	57.30	96
16	HB-65	64	168	90.3	3	10	34	5.2	3.0	24.50	19.50	87
17	HB-66	65	169	100.5	5	19	55	5.5	3.0	25.50	32.90	95

Sr. No.	Genotypes	Days to 50% flowering	Days to 80 % maturity	Plant height (cm)	Branches/ plant	Clusters/ plant	Pods / plant	Pod length (cm)	Seeds / pod	100 Seeds weight (g)	Seed yield/ plant (g)	Plant Population at harvest (%)
18	HB-68	42	146	78.5	2	8	22	5.5	3.0	27.60	10.90	88
19	HB-71	65	170	98.7	4	14	38	4.7	3.0	26.30	27.10	95
20	HB-73	62	165	115.1	3	10	27	5.1	3.0	26.90	19.60	85
21	HB-78	37	141	90.5	2	9	24	5.7	3.0	26.50	10.10	93
22	HB-79	35	137	66.5	4	13	35	5.1	3.0	27.40	25.70	92
23	HB-82	51	155	92.5	2	6	20	5.8	3.0	29.70	11.50	93
24	HB-90	64	169	135.4	4	15	41	5.8	3.0	25.50	26.50	93
25	NDF-8	62	160	95.3	3	13	35	5.1	3.0	26.20	29.48	90
26	NDF12	66	171	131.6	6	23	66	5.4	3.0	27.40	50.70	92
27	NDFB-14	61	163	86.7	5	18	55	5.6	3.0	27.60	41.90	95
28	EC 243793	58	159	114.5	4	14	37	6.2	3.0	27.90	32.80	93
29	EC 117744	38	140	90.4	4	12	31	5.3	3.0	28.30	25.20	90
30	EC 243036	50	160	105.1	5	24	71	4.9	3.0	24.50	55.90	94
31	EC 243596	60	166	117.5	6	27	77	5.5	3.0	24.60	41.50	91
32	EC 25085	68	174	123.8	2	8	20	6.1	3.0	24.40	11.20	90
33	EC 25192	38	137	85.5	4	14	37	5.1	3.0	24.70	25.20	88
34	EC 287710	41	142	60.5	3	11	28	5.1	3.0	24.90	19.30	92
35	EC 293820	64	173	120.5	6	24	65	6.3	3.0	24.60	42.50	90

Sr. No.	Genotypes	Days to 50% flowering	Days to 80 % maturity	Plant height (cm)	Branches / plant	Clusters / plant	Pods / plant	Pod length (cm)	Seeds / pod	100 Seeds weight (g)	Seed yield / plant (g)	Plant Population at harvest (%)
36	EC 3279	61	168	123.2	4	15	44	5.1	3.0	27.50	34.90	92
37	EC 32905	51	155	80.5	5	24	68	5.7	3.0	24.70	49.60	90
38	EC 32923	61	172	130.5	5	21	57	5.2	3.0	26.70	39.50	93
39	EC 329681	49	151	80.5	3	12	33	5.7	3.0	25.40	24.60	87
40	EC 32976	66	172	90.5	7	28	81	5.4	3.0	26.20	62.80	92
41	EC 331564	70	175	110.5	2	8	22	6.4	3.0	26.40	12.80	90
42	EC 343691	61	165	85.0	4	14	41	5.3	3.0	26.80	30.10	93
43	EC 351587	45	147	120.4	5	22	66	5.5	3.0	25.90	52.50	90
44	EC 361485	65	170	111.6	3	11	30	4.9	3.0	25.50	22.90	92
45	EC 363781	69	177	125.5	3	9	20	5.5	3.0	23.50	9.10	85
46	EC 366272	70	172	135.2	2	7	18	5.3	3.0	24.70	10.20	94
47	EC 591784	66	168	112.5	7	26	82	5.9	3.0	26.80	56.70	90
48	EC628925	60	171	117.5	3	8	23	6.6	3.0	23.80	11.70	85
49	EC 628940	55	158	92.6	5	17	48	5.8	3.0	27.70	39.60	88
50	EC 628942	37	139	68.5	2	6	21	5.5	3.0	24.50	10.20	89
	Vikrant	51	153	98.5	4	19	50	5.1	3.0	25.10	35.20	88
	HFB-1	48	150	109.6	5	5.7	63	6.4	3.0	26.70	49.50	95
	Minimum	32.00	135.00	60.50	2.00	5.00	18.00	4.70	3.0	23.50	9.10	85.00
	Maximum	70.00	177.00	140.30	7.00	29.00	82.00	6.60	3.0	30.30	62.80	96.00
	Mean	53.19	157.02	101.90	4.08	15.09	43.73	5.51	3.0	26.25	31.11	91.15
	CD (0.05)	-	-	-	-	-	-	-	-	-	-	-
	CV (%) Error	-	-	-	-	-	-	-	-	-	-	-
	CV (%) Phen.	22.15	8.36	18.86	35.64	45.65	45.87	8.12	0.02	5.68	51.66	3.26

Table 20: Evaluation of germplasm in Fababean at Hisar (Vegetable type I) Rabi 2016-17 (Plains)

S. No	Genotype	Days to 50% flowering	Days to 80 % maturity	Plant height (Cm)	Branches / plant	Clusters / plant	Pods / plant	Pod length (Cm)	Seeds / pod	100 seed weight (g)	Seed yield / plant (g)	Plant population at harvest
1	EC 591687	93.7	188.3	147.9	6.3	10.3	46.0	6.2	3.3	55.1	80.7	94.7
2	EC 591692	77.3	175.3	119.0	5.0	8.0	40.7	6.8	3.0	76.9	88.2	89.0
3	EC 591719	66.0	162.7	123.3	2.7	6.0	33.0	9.3	3.0	60.0	61.6	80.0
4	EC 591755	92.0	193.7	97.6	5.0	8.7	41.0	7.4	4.0	76.5	117.2	95.7
5	EC 591775	65.0	165.0	119.3	4.0	6.7	22.7	8.9	5.0	59.0	62.4	76.7
6	EC 591776	95.0	194.7	143.3	6.7	10.7	50.7	6.6	3.7	107.5	179.2	96.3
7	EC 591782	57.0	162.0	147.2	4.7	7.3	29.7	9.1	3.0	126.3	98.5	92.7
8	EC 591784	78.3	173.3	127.3	5.0	6.0	22.3	8.1	3.0	62.1	28.1	78.3
9	EC 591828	95.0	187.3	114.5	5.7	10.7	42.3	8.3	5.3	62.7	129.6	96.7
10	EC 628921	92.7	193.7	125.3	5.0	8.0	37.0	8.6	4.0	75.6	90.8	96.3
11	EC 628922	89.3	176.0	146.5	4.7	8.0	30.0	6.9	3.7	71.0	65.4	87.0
12	EC 628925	61.3	166.3	96.1	3.3	7.0	41.3	7.1	3.0	72.3	75.4	89.7
13	EC 628926	82.0	180.0	114.8	4.0	5.0	25.3	8.2	3.3	64.4	33.4	83.3
14	EC 628927	64.3	161.0	124.6	4.3	4.3	14.7	8.9	4.0	71.2	32.2	82.7
15	EC 628929	62.0	159.0	133.7	4.0	6.7	27.7	6.0	3.0	70.6	51.5	83.3
16	EC 628930	96.0	194.3	93.7	6.0	12.3	50.7	6.8	4.0	92.6	176.6	95.3
17	EC 628934	75.0	170.7	91.7	4.7	8.3	38.0	5.9	3.7	77.5	107.3	91.3
18	EC 628935	71.0	166.0	112.4	4.3	8.3	36.3	6.4	4.0	90.7	106.9	94.7
19	EC 628936	86.3	197.7	124.1	3.0	5.3	32.0	6.6	4.0	82.7	105.3	97.3

S. No	Genotype	Days to 50% flowering	Days to 80 % maturity	Plant height (Cm)	Branches / plant	Clusters / plant	Pods / plant	Pod length (Cm)	Seeds / pod	100 seed weight (g)	Seed yield / plant (g)	Plant population at harvest
20	EC 628937	88.7	185.0	93.0	5.3	8.3	39.0	5.4	4.0	71.6	110.3	87.0
21	EC 628938	65.0	158.7	123.9	3.0	4.0	20.0	8.6	4.0	61.4	39.3	92.0
22	EC 628939	65.3	155.3	129.3	3.7	4.7	18.0	7.1	4.0	52.8	33.4	80.3
23	EC 628940	82.7	188.7	114.6	5.0	11.0	37.7	5.8	3.3	51.4	48.0	76.3
24	EC 628941	60.7	169.0	92.3	3.0	4.3	18.3	5.7	3.3	71.4	31.6	80.7
25	EC 628942	56.7	154.7	116.7	2.7	3.3	12.3	8.9	4.0	92.6	39.7	96.7
26	EC 628943	87.3	194.0	93.9	7.0	14.0	61.3	7.1	4.0	61.6	126.6	94.0
27	EC 628946	62.3	162.3	134.0	4.7	4.3	15.0	8.9	3.3	71.4	28.7	84.3
28	EC 628955	56.0	150.3	146.0	3.0	5.7	27.3	7.4	4.0	97.1	104.2	88.7
29	EC 628957	78.7	185.0	96.4	3.0	5.3	25.3	8.8	4.0	81.7	73.7	90.7
30	EC 628971	96.3	194.0	129.4	2.7	4.0	14.7	6.6	4.0	66.2	30.4	92.3
	Minimum	56.0	150.3	91.7	2.7	3.3	12.3	5.4	3.0	51.4	28.1	76.3
	Maximum	96.3	197.7	147.9	7.0	14.0	61.3	9.3	5.3	126.3	179.2	97.3
	Mean	76.63	175.47	119.06	4.38	7.22	31.68	7.42	3.73	74.47	78.53	88.80
	EMS	10.96	24.88	14.09	0.40	1.75	25.44	0.22	0.12	0.91	42.52	7.78
	SE	2.70	4.07	3.06	0.51	1.08	4.12	0.38	0.28	0.78	5.32	2.28
	CD(0.05)	5.41	8.15	6.13	1.03	2.16	8.24	0.76	0.56	1.56	10.66	4.56
	CV(%) Error	4.32	2.84	3.15	14.40	18.32	15.92	6.28	9.13	1.28	8.30	3.14

Table 21: Evaluation of germplasm in Fababean at Hisar (Vegetable type II) Rabi 2016-17 (Plains)

S. No	Genotypes	Days to 50% flowering	Days to 80 % maturity	Plant height (Cm)	Branches / plant	Clusters / plant	Pods / plant	Pod length (Cm)	Seeds / pod	100 seed weight (g)	Seed yield / plant (g)	(%)Plant population at harvest
1	EC-628972	63.0	163.3	118.2	4.3	8.7	34.0	5.9	4.3	55.1	53.9	95.7
2	ET-1107	58.7	161.7	136.8	2.3	3.3	11.7	9.7	4.0	79.4	33.7	85.0
3	ET-1119	78.7	177.3	102.4	3.7	8.0	40.0	9.0	4.0	111.2	166.8	92.0
4	ET-2107	64.0	172.7	133.5	3.7	7.0	33.7	7.8	3.3	67.4	62.5	82.3
5	ET-2112	89.7	192.7	107.5	4.7	9.3	39.0	7.8	4.0	103.8	148.7	98.0
6	ET-3101	60.7	166.3	82.5	4.3	7.3	41.7	8.5	4.0	71.3	106.4	96.0
7	ET-3103	53.0	141.7	80.1	4.0	5.7	22.7	12.7	5.3	76.0	89.1	95.3
8	ET-3104	95.3	194.0	87.9	3.7	6.0	27.0	7.7	3.0	91.1	74.0	92.0
9	ET-3106	87.3	184.3	102.1	4.0	4.0	17.3	8.6	4.3	66.3	43.1	89.3
10	ET-3112	72.0	171.3	115.2	3.3	3.3	13.0	5.6	3.3	77.6	28.5	71.0
11	ET-3116	87.0	191.7	123.2	3.0	5.0	17.0	6.5	3.0	85.9	41.1	88.7
12	ET-3117	95.7	196.7	137.8	6.7	16.3	66.3	7.5	4.0	55.1	126.1	95.3
13	ET-3118	64.7	162.0	132.9	3.3	5.7	28.0	7.1	3.3	59.0	41.2	85.0
14	ET-3124	87.7	189.3	120.9	4.0	6.0	20.7	7.7	4.7	57.4	53.2	85.3
15	ET-3125	94.3	194.3	139.2	3.0	2.7	10.0	6.4	3.3	66.3	14.6	68.3
16	ET-3128	96.3	194.7	84.5	5.0	8.0	38.7	7.5	3.0	61.5	61.7	83.0
17	ET-3131	57.3	151.7	141.7	5.0	12.3	49.0	6.4	4.0	68.2	121.1	95.0

S. No	Genotypes	Days to 50% flowering	Days to 80 % maturity	Plant height (Cm)	Branches / plant	Clusters / plant	Pods / plant	Pod length (Cm)	Seeds / pod	100 seed weight (g)	Seed yield / plant (g)	(%)Plant population at harvest
18	ET-3134	70.0	177.7	93.7	3.3	5.7	33.0	5.3	3.0	86.5	81.2	91.0
19	ET-3137	55.7	152.7	124.7	3.7	4.7	20.7	7.5	4.0	57.3	39.5	81.0
20	ET-3160	79.3	176.0	91.5	4.0	5.7	26.7	6.6	4.0	78.5	77.5	92.3
21	ET-4101	56.3	152.7	137.9	2.7	4.0	18.7	8.7	4.0	50.7	35.2	76.3
22	ET-4102	92.3	189.7	83.5	5.0	12.7	44.7	7.6	3.3	49.1	57.0	86.7
23	ET-4103	80.3	185.0	113.6	6.0	13.0	53.3	5.6	3.0	77.9	104.4	91.7
24	ET-4105	88.3	192.0	95.4	3.7	8.3	30.3	7.9	4.0	29.7	32.9	71.7
25	ET-4107	92.0	199.0	113.8	4.0	3.3	11.7	6.4	3.0	85.6	23.4	87.3
26	ET-4108	78.3	184.3	91.1	3.0	5.3	20.3	6.9	4.0	66.4	49.7	94.0
27	ET-5104	86.0	195.3	114.3	2.7	4.3	14.0	6.4	3.3	67.6	19.3	86.3
28	ET-5106	61.0	160.0	138.0	3.7	5.0	26.3	7.0	4.0	62.7	58.6	92.0
29	ET-5108	80.7	178.3	126.4	3.0	3.0	11.3	5.1	3.0	62.5	23.9	90.0
30	ET-5121	92.0	192.3	133.7	3.0	3.0	9.3	6.6	3.0	91.1	24.1	85.0
31	Pusa Sumit	60.7	155.0	123.8	3.3	5.0	20.7	6.0	3.0	60.2	36.2	90.7
	Mean	76.7	177.3	113.8	3.8	6.5	27.4	7.3	3.7	70.3	62.2	87.5
	EMS	12.50	24.53	13.07	0.35	2.32	17.31	0.11	0.10	0.69	46.15	9.75
	SE	2.89	4.04	2.95	0.48	1.24	3.40	0.26	0.26	0.68	5.55	2.55
	CD(0.05)	5.78	8.09	5.91	0.97	2.49	6.80	0.53	0.53	1.35	11.10	5.10
	CV(%) Error	4.61	2.79	3.18	15.46	23.43	15.16	4.44	8.81	1.18	10.92	3.57

Table 22: Evaluation of germplasm in Fababean at Ludhiana Rabi 2016-17 (Plains)

Sr. No.	Genotypes	Days to 50 % flowering	Days to 80% maturity	Plant height (cm)	No. of branches/plant	Pods/plant	Seeds/pod	Pod length (cm)	100-seed wt(g)	Grain yield/plot(g)
1	DFB 10-1	62.0	141.0	63.5	4.0	33.7	3.0	6.3	29.3	460
2	DFB 10-2	60.0	140.0	58.7	3.3	26.0	2.8	4.3	26.7	250
3	DFB 10-3	63.0	140.0	72.3	5.0	50.3	2.4	5.0	27.8	550
4	DFB 9-1	61.0	145.0	66.5	5.0	64.7	2.8	5.7	30.5	700
5	DFB 9-2	64.0	140.0	72.5	4.3	48.3	3.2	6.3	28.4	550
6	EC 10719	62.0	143.0	64.3	4.7	55.3	3.4	4.8	27.5	550
7	EC 10845	63.0	146.0	67.0	5.3	50.7	2.8	5.0	25.9	550
8	EC 243624	65.0	142.0	72.5	5.3	60.0	3.0	6.3	27.2	600
9	EC 243626	64.0	145.0	66.5	5.0	69.3	2.4	5.3	27.7	750
10	EC 243782	65.0	146.0	71.0	6.0	71.3	2.8	4.3	28.3	800
11	EC 25085	63.0	136.0	68.2	5.3	49.7	3.6	4.7	32.1	570
12	EC 354951	65.0	145.0	71.4	3.7	36.3	2.8	4.3	22.7	450
13	EC 628938	61.0	145.0	74.5	4.3	47.3	3.4	6.3	24.2	550
14	EC 628955	62.0	141.0	85.0	5.7	78.3	2.8	5.7	27.9	750
15	EC 628957	60.0	143.0	85.5	6.0	75.0	2.6	4.7	29.3	800
16	HB 18	62.0	139.0	62.5	3.0	21.0	2.8	5.7	27.9	250
17	HB 19	60.0	141.0	52.0	4.0	39.7	2.4	5.0	28.4	500

Sr. No.	Entry	Days to 50 % flowering	Days to 80% maturity	Plant height (cm)	No. of branches/ plant	Pods/ plant	Seeds/ pod	Pod length (cm)	100-seed wt.(g)	Grain yield/plot(g)
18	HB 20	65.0	145.0	65.5	3.7	44.3	3.0	5.7	27.6	600
19	HB 24	63.0	143.0	63.0	4.0	28.0	2.8	4.3	26.5	350
20	HB 26	64.0	145.0	67.5	5.0	49.0	3.0	4.7	28.1	540
21	HB 3	61.0	140.0	59.5	4.3	38.3	2.8	5.0	28.4	450
22	HB 33	63.0	142.0	68.5	3.0	36.3	2.8	5.3	29.3	400
23	HB 38	65.0	140.0	74.0	4.3	44.0	2.8	4.8	27.2	450
24	HB 39	62.0	143.0	64.5	4.7	32.3	3.0	4.3	27.7	400
25	HB 40	63.0	145.0	52.7	5.0	26.0	2.6	5.1	32.0	250
26	HB 48	63.0	142.0	71.0	6.0	59.7	3.2	6.3	29.0	750
27	HB 50	62.0	145.0	72.4	5.0	48.3	2.8	5.0	27.9	550
28	HB 53	62.0	143.0	68.5	6.3	61.3	3.2	4.7	27.6	700
29	HB 613	60.0	146.0	69.0	4.7	59.7	3.2	6.3	28.1	600
30	HB 64	63.0	140.0	68.0	5.0	52.0	2.8	5.7	27.2	500
31	HB 80	63.0	140.0	73.5	5.3	57.7	3.4	6.3	27.7	600
32	IC 243770	65.0	146.0	77.0	6.0	75.3	2.6	5.7	25.8	850
33	IC 263610	64.0	145.0	68.5	6.0	68.0	2.6	4.7	28.7	800
34	IC 329612	64.0	144.0	69.5	4.3	45.3	3.0	4.0	28.4	500
35	IC 331449	65.0	143.0	72.5	5.3	59.7	2.8	4.0	24.3	650
36	IC 598958	66.0	146.0	64.5	4.0	48.0	3.6	5.3	23.1	500
37	NDF 11	65.0	142.0	70.3	5.0	49.3	2.6	5.0	29.4	500

Sr. No.	Entry	Days to 50 % flowering	Days to 80% maturity	Plant height (cm)	No. of branches/ plant	Pods/ plant	Seeds/ pod	Pod length (cm)	100-seed wt (g)	Grain yield/plot(g)
38	NDF 12-1	69.0	146.0	69.0	4.7	36.6	2.8	4.7	24.3	450
39	NDF 13-2	61.0	142.0	68.2	6.3	75.0	2.8	4.0	28.9	850
40	NDF 4	62.0	141.0	72.0	5.3	62.0	3.4	5.3	25.5	650
41	NDF 9	61.0	140.0	68.5	4.3	53.0	2.8	5.2	28.3	600
42	NDFB 13	59.0	139.0	74.0	6.7	80.0	3.2	4.7	30.2	900
43	NDFB 14	63.0	141.0	80.5	5.0	62.7	3.6	5.0	29.8	600
44	RFB 10	64.0	141.0	74.5	4.0	51.0	3.2	6.3	27.0	450
45	RFB 13-2	62.0	139.0	67.4	3.0	35.0	3.0	6.7	22.0	300
46	RFB 3	59.0	142.0	75.0	6.0	80.0	3.0	5.0	26.3	900
47	RFB 7	60.0	140.0	70.5	5.7	78.0	3.4	6.3	27.3	700
48	RFB 8	63.0	144.0	78.0	4.3	46.7	3.0	4.5	29.2	450
49	RFB 9	63.0	145.0	80.5	4.0	56.3	2.8	5.7	25.9	500
50	RMDFB-1	63.0	139.0	60.5	2.3	29.7	2.8	5.7	23.9	150
	PRT 12	68.0	142.0	59.7	3.0	38.3	2.6	4.1	25.9	300
	Vikrant	63.7	142.7	69.1	4.5	49.8	2.8	5.2	26.8	522.22
	Minimum	59.0	136.0	52.0	2.3	21.0	2.4	4.0	22.0	150.00
	Maximum	69.0	146.0	85.5	6.7	80.0	3.6	6.7	32.1	900.00
	Mean	62.9	142.4	69.3	4.7	51.8	2.9	5.2	27.4	555.62
	CD (0.05)	-	-	-	-	-	-	-	-	-
	CV (%) Error	-	-	-	-	-	-	-	-	-
	CV (%) Phen.	3.26	1.72	9.7	20.85	29.83	10.39	14.17	7.68	31.45

Table 23: Evaluation of germplasm in Fababean at Ranchi Rabi 2016-17 (Plains)

S.No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Number of branches/plant	Number of pods/plant	Number of seeds/pod	Pod length (cm)	Pod width (cm)	100 seed weight (g)	Seed yield/ plant (g)
1	HB-1	57.00	127.00	83.6	2.6	17.8	3.0	4.5	0.9	28.90	8.00
2	HB-2	57.00	113.00	47.8	2.6	13.8	3.2	4.7	0.9	31.90	7.20
3	HB-3	57.00	119.00	90.8	2.8	18.0	3.4	5.4	1.0	30.70	18.30
4	HB-5	51.00	121.00	72.0	3.0	14.0	3.2	5.2	1.0	36.90	12.50
5	HB-15	55.00	123.00	68.2	3.0	16.0	3.0	5.0	0.9	30.40	16.90
6	HB-19	60.00	118.00	80.0	2.8	18.6	3.6	5.1	0.9	34.10	4.60
7	HB-21	53.00	113.00	79.6	2.6	14.6	3.2	6.0	1.1	33.00	8.80
8	HB-24	56.00	121.00	93.6	2.8	27.0	3.4	5.6	1.0	35.00	20.60
9	HB-28	58.00	124.00	85.8	3.0	18.6	3.4	5.1	1.0	32.40	10.60
10	HB-30	51.00	120.00	66.8	3.4	19.0	3.0	5.5	1.0	33.80	10.30
15	HB-33	53.00	116.00	52.2	4.6	34.0	3.0	5.2	1.0	34.70	11.80
16	HB-37	55.00	114.00	72.0	3.8	16.4	3.4	5.5	1.2	32.50	7.60
17	HB-58	52.00	117.00	79.0	3.2	24.4	3.6	5.3	1.4	34.00	18.30
18	HB-61	50.00	115.00	66.4	4.0	19.6	3.0	5.1	0.9	30.60	8.00
19	HB-63	56.00	119.00	66.0	3.4	19.0	2.8	4.8	1.0	30.40	6.70
20	HB-65	63.00	121.00	81.2	2.4	21.2	3.4	4.8	0.9	30.20	8.10

S. No.	Genotypes	Days to 50% flowering	Days to maturity	Plant height (cm)	Number of branches/plant	Number of pods/plant	Number of seeds/pod	Pod length (cm)	Pod width (cm)	100 seed weight (g)	Seed yield/ plant (g)
21	HB-66	53.00	122.00	69.4	4.2	22.2	3.2	4.8	0.9	32.40	10.90
22	HB-68	56.00	126.00	80.4	2.8	21.6	3.4	5.2	1.2	33.00	5.90
23	HB-71	55.00	115.00	66.2	3.6	20.6	2.8	5.7	1.4	34.60	17.00
24	HB-73	50.00	119.00	73.2	2.8	19.9	3.4	5.0	1.0	31.50	6.70
29	HB-78	58.00	120.00	78.4	2.4	18.6	3.0	5.1	1.0	37.20	4.70
30	HB-79	51.00	112.00	63.4	2.0	13.4	3.2	5.5	1.0	29.00	6.80
31	HB-82	60.00	122.00	73.4	3.4	22.8	3.2	5.2	1.0	29.80	10.10
32	HB-90	52.00	117.00	65.4	3.8	18.0	3.2	4.5	0.9	29.20	8.10
33	NDF-8	54.00	118.00	64.4	2.8	15.2	2.8	4.9	1.0	27.10	4.80
34	NDF-12	57.00	116.00	65.8	3.4	15.2	3.4	5.2	0.9	25.80	3.30
35	NDF-14	64.00	120.00	82.6	3.0	16.0	3.2	5.2	0.9	30.60	6.40
36	EC-3279	57.00	121.00	67.8	4.4	20.2	3.2	5.2	1.0	34.70	18.70
37	EC-25085	50.00	122.00	84.0	3.4	20.2	3.0	5.1	0.9	35.00	16.50
38	EC-25192	57.00	123.00	74.6	3.0	14.4	3.0	5.2	1.0	33.00	11.10
43	EC-32776	62.00	120.00	87.4	2.4	16.8	3.2	5.6	0.9	31.50	4.50
44	EC-32905	56.00	114.00	49.8	2.6	15.4	3.0	4.6	1.0	33.70	7.80
45	EC-32923	51.00	119.00	78.8	2.6	14.4	3.4	5.2	0.9	33.70	12.70

S. No.	Genotypes	Days to 50% flowering	Days to maturity	Plant height (cm)	Number of branches/plant	Number of pods/plant	Number of seeds/pod	Pod length (cm)	Pod width (cm)	100 seed weight (g)	Seed yield/ plant (g)
46	EC-117744	61.00	119.00	81.2	1.8	19.6	3.6	5.4	1.0	34.40	6.70
47	EC-243036	59.00	121.00	70.0	2.8	13.6	3.0	5.1	0.9	30.90	6.20
48	EC-243596	55.00	122.00	78.6	2.0	15.8	3.2	4.8	1.0	30.80	6.60
49	EC-243793	53.00	119.00	69.2	3.2	23.8	3.0	5.8	1.4	38.40	18.60
50	EC-287710	53.00	119.00	83.4	2.2	18.2	3.4	5.4	0.9	35.00	9.50
51	EC-293820	63.00	123.00	76.8	3.4	19.0	3.2	5.2	1.0	28.70	3.90
52	EC-329681	56.00	116.00	73.8	2.0	18.2	3.2	4.8	1.0	36.60	7.00
57	EC-331564	54.00	116.00	82.6	3.0	16.0	3.2	5.2	1.0	36.00	6.70
58	EC343691	51.00	118.00	88.2	3.4	28.6	3.8	5.3	1.0	32.80	12.60
59	EC-357587	55.00	114.00	55.4	3.2	17.0	3.6	5.3	0.9	33.00	7.70
60	EC-361485	53.00	121.00	85.2	2.4	17.2	3.4	5.7	1.0	31.50	4.40
61	EC-363781	65.00	123.00	80.0	3.2	18.0	3.2	5.5	0.9	27.00	7.10
62	EC-366272	51.00	120.00	89.6	4.2	21.4	3.6	5.6	1.0	32.80	11.90
63	EC-591784	57.00	120.00	81.4	2.8	16.4	2.8	5.5	0.9	36.00	16.30
64	EC-628925	65.00	125.00	80.2	3.0	15.8	2.8	5.1	1.2	31.40	4.30
65	EC-628940	57.00	116.00	83.2	3.4	23.2	3.2	5.8	0.9	32.90	3.90
66	EC-628942	49.00	122.00	74.0	3.0	19.8	3.4	5.3	1.0	34.80	7.60

S. No.	Genotypes	Days to 50% flowering	Days to maturity	Plant height (cm)	Number of branches/plant	Number of pods/plant	Number of seeds/pod	Pod length (cm)	Pod width (cm)	100 seed weight (g)	Seed yield/ plant (g)
	HFB-1	54.40	121.20	75.8	3.2	20.0	3.4	5.4	1.1	33.16	11.20
	PRT-12	58.00	148.00	42.2	3.1	10.3	3.2	4.1	0.9	34.48	8.70
	Pusa sumit	56.20	115.00	71.8	3.1	14.4	3.0	5.9	1.2	35.98	9.28
	Vikrant	56.20	119.60	79.4	3.3	22.8	3.4	5.4	1.0	29.84	12.62
	Minimum	49.00	112.00	42.2	1.8	10.3	2.8	4.1	0.9	25.80	3.30
	Maximum	65.00	148.00	93.6	4.6	34.0	3.8	6.0	1.4	38.40	20.60
	Mean	55.72	119.72	74.3	3.0	18.6	3.2	5.2	1.0	32.55	9.58
	CD	7.23	6.46	21.1	1.3	9.0	0.8	0.8	0.3	5.03	7.70
	CV(%) Error	4.82	1.92	11.8	15.9	19.9	9.3	5.7	10.9	5.65	27.58
	CV (%) Phen.	7.19	4.34	14.8	19.8	22.1	7.4	7.2	12.7	8.34	47.14

Table 24: Promising lines in Fababean germplasm for various characters at different locations Rabi 2016-17 (Plains)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
I	IGKV Ambikapur (51 accessions)				
1	Days to 50% flowering	51.00	57.00	HB-8 (51), HB-21 (51), HB-33 (51) HB-61 (51)	Vikrant (56)
2	No of branches/ plant	1.60	3.00	HB-8 (3.00), EC 117744 (3.00), HB-15 (2.60), HB-19 (2.60)	Vikrant (2.4)
3	Plant height (cm)	50.00	73.60	EC 628925 (73.60), HB-15 (73.60) EC 343691 (72.20), HB-24 (72.20)	Vikrant (62.0)
4	Pod length (cm)	2.80	4.20	EC 628925 (4.20), HB-15 (4.20) EC 363781 (4.20), HB-5 (4.20)	Vikrant (3.4)
5	No of pod/plant	3.80	11.00	HB-19 (11.0), EC 117744 (11.0) HB-5 (10.0), EC 25085 (10.0)	Vikrant (6.8)
6	No of seeds/pod	2.00	3.40	HFB-1 (3.40), HB-2 (3.20) EC 25085 (3.20)	Vikrant (2.60)
7	100 seed weight (g)	19.85	29.35	HB-5 (29.35), EC 363781 (29.35) HB-24 (27.40), EC 343691 (27.40)	Vikrant (21.75)
8	Grain yield (g/plot)	174	370	EC 331564 (370), HB-1 (342) HB-15 (334), HB-33 (324)	Vikrant (210)
II	NBPGR, New Delhi (50 accessions)				
1	Days to 50% flowering	68.00	79.00	EC-25085 (68), NDF-8 (69), HB-63 (69) HB-28 (69)	PRT-12 (69.7)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
2	Days to 80% maturity	123.0	136.0	EC-25085 (123), EC-628925 (125) HB-65 (125), HB-30 (126), HB-63 (127)	HFB-1 (127.83)
3	Plant height (cm)	49.0	80.6	EC-32976 (80.6), EC-32923 (79.0) HB-5 (78.0), EC-591784 (77.6)	VIKARANT (69.3)
4	No of Braches/plant	4.00	8.20	HB-60 (8.2), EC-32976 (8.0) EC-3279 (7.8), EC-32923 (7.2)	HFB-1 (6.2)
5	Pod length (mm)	35.94	64.57	HB-5 (64.57), HB-191 (62.57) HB-58 (59.14), EC-32923 (57.09)	PRT-12 (51.32)
6	Pod width (mm)	8.36	12.28	HB-5 (12.28), HB-191 (11.84) EC-628925 (11.73), EC-331564 (11.57)	PRT-12 (10.69)
7	Number of Seed / pod	2.40	4.00	NDF-8 (4.00), EC-117744 (4.00), HB-37 (4.00), HB-5 (3.80)	PRT-12 (3.53)
8	Number of pods / plant	9.60	34.80	NDF-8 (34.8), HB-71 (33.8) EC-117744 (33.0)	VIKARANT (24.64)
9	Seed yield/plant	10.00	230.00	HB-71 (230.0), NDF-8 (150.0) EC-343691 (130.0), EC-32905 (130.0)	VIKARANT (91.0)
10	100 seed weight (g)	17.77	29.65	EC-3279 (29.65), NDF-8 (29.52) HB-5 (29.46), EC-32905 (29.28)	VIKARANT (25.15)
III	NDUA&T Faizabad (49 accessions)				
1	Days to 50% flowering	57.0	71.0	HB 82 (57.0), EC 32976 (57.0) HB 33 (58.0), HB 79 (58.0)	Vikrant (62.0)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
2	Days to 80% maturity	138.0	160.0	HB 3 (138.0), EC 243596 (138.0) HB 15 (138.0), HB 5 (140.0)	HFB-1 (145.4)
3	Plant height (cm)	42.6	105.0	EC 117744 (105.0), EC 243036 (105.0), NDF 14 (105.0), HB 24 (104.8)	Vikrant (92.6)
4	No. of branches/ Plant	3.0	5.8	HB 79 (5.8), EC 628940 (5.0), HB 71 (4.8), HB 73 (4.8)	HFB-1 (4.4)
5	No. of seed/ pod	2.6	4.2	EC 351587 (4.2), EC 343691 (4.0), EC 361485 (4.0), HB 71 (3.8)	Vikrant (3.3)
6	100 seed weight (g)	20.4	32.8	HB 71 (32.8), EC 243596 (28.10, HB 78 (28.0), EC 331564 (27.7)	HFB-1 (25.8)
7	Seed yield / plant (g)	22.1	31.5	EC 25192 (31.5), EC 363781 (31.0), HB 71 (30.0), EC 366272 (30.0)	Vikrant (27.0)
IV	CCS HAU, Hisar (50 accessions Germplasm Screening Lines)				
1	Days to 50% flowering	32.0	70.0	HB-33 (32), HB-28 (34) HB-24 (35), HB-79 (35)	HFB-1 (48)
2	Days to 80% maturity	135.0	177.0	HB-28 (135), HB-3 (135), HB-79 (137) EC-25192 (137)	HFB-1 (150)
3	Plant height (cm)	60.5	140.3	HB-21 (140.3), HB-90 (135.4) EC-366272 (135.2), NDF12 (131.6)	HFB-1 (109.6)
4	Branches/ plant	2.0	7.0	EC-591784 (7), HB-15 (7) EC-32976 (7), NDF12 (6)	HFB-1 (5)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
5	Clusters/ plant	5.0	29.0	HB-15 (29), EC-32976 (28) EC-243596 (27)	Vikrant (19)
6	Pods / plant	18.0	82.0	EC-591784 (82), EC-32976 (81), HB-15 (80), HB-37 (79)	HFB-1 (63)
7	Pod length (cm)	4.7	6.6	EC628925 (6.6), HB-21 (6.5)	HFB-1 (6.4)
8	Seeds / pod	3.0	3.0	--	HFB-1 (3.0)
9	100 Seeds weight (g)	23.5	30.3	HB-5 (30.30), HB-82 (29.70), HB-3 (29.10), EC-117744 (28.30)	HFB-1 (26.70)
10	Seed yield/plant (g)	9.1	62.8	EC-32976 (62.80), HB-15 (62.50), HB-37 (62.10) HB-63 (57.30)	HFB-1 (49.50)
11	Plant Population at harvest (%)	85.0	96.0	HB-63 (96)	HFB-1 (95)
IV (a) CCS HAU, Hisar (30 accessions Vegetable types-I)					
1	Days to 50% flowering	56.0	96.3	EC-628955 (56.0), EC-628942 56.7), EC-591782 (57.0), EC-628941 (60.7)	-
2	Days to 80% maturity	150.3	197.7	EC-628955 (150.3), EC-628942 (154.7), EC-628939 (155.3), EC-628938 (158.7)	-
3	Plant height (Cm)	91.7	147.9	EC-591687 (147.9), EC-591782 (147.2), EC-628922 (146.5), EC-628955 (146.0)	-
4	Branches / plant	2.7	7.0	EC-628943 (7.0), EC-591776 (6.7),	-

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
5	Clusters / plant	3.3	14.0	EC-628943 (14.0), EC-628930 12.3), EC-628940 (11.0), EC-591776 (10.7)	-
6	Pods / plant	12.3	61.3	EC-628943 (61.3), EC-628930(50.7), EC-591776 (50.7), EC-591687 (46.0)	-
7	Pod length (Cm)	5.4	9.3	EC-591719 (9.3), EC-591782 (9.1), EC-628946 (8.9), EC-628942 (8.9), EC-591775 (8.9)	-
8	Seeds / pod	3.0	5.3	EC-591828 (5.3), EC-591775 (5.0), EC-628942 (4.0), EC-628927 (4.0)	-
9	100 seed weight (g)	51.4	126.3	EC-591782 (126.3), EC-591776 (107.5) EC-628955 (97.1)	-
10	Seed yield / plant (g)	28.1	179.2	EC-591776 (179.2), EC-628930 (176.6), EC-591828 (129.6), EC-628943 (126.6)	-
11	Plant population at harvest	76.3	97.3	EC-628936 (97.3), EC-591828 (96.7), EC-628942 (96.7), EC-591776 (96.3)	-
IV (b) CCS HAU, Hisar (30 accessions Vegetable types-II)					
1	Days to 50% flowering	53.0	96.3	ET-3103 (53.0), ET-3137 (55.7), ET-4101 (56.3), ET-3131 (57.3)	Pusa Sumit (60.6)
2	Days to 80% maturity	141.7	199.0	ET-3103 (141.7), ET-3131 (151.7), ET-3137 (152.7), ET-4101 (152.7)	Pusa Sumit (155)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
3	Plant height (cm)	80.1	141.7	ET-3131 (141.7), ET-3125 (139.2), ET-5106 (138.0), ET-4101 (137.9)	Pusa Sumit (123.8)
4	Branches / plant	2.3	6.7	ET-3117 (6.7), ET-4103 (6.0), ET-3131 (5.0)	Pusa Sumit (3.3)
5	Clusters / plant	2.7	16.3	ET-3117 (16.3), ET-4103 (13.0), ET-4102 (12.7), ET-3131 (12.3)	Pusa Sumit (5.0)
6	Pods / plant	9.3	66.3	ET-3117 (66.3), ET-4103 (53.3), ET-3131 (49.0)	Pusa Sumit (20.7)
7	Pod length (cm)	5.1	12.7	ET-3103 (12.7), ET-1107 (9.7), ET-1119 (9.0), ET-4101 (8.7)	Pusa Sumit (6.0)
8	Seeds / pod	3.0	5.3	ET-3103 (5.3), ET-3124 (4.7), ET-3106 (4.3), EC-628972 (4.3)	Pusa Sumit (3.0)
9	100 seed weight (g)	29.7	111.2	ET-1119 (111.2), ET-2112 (103.8), ET-5121 (91.1)	Pusa Sumit (60.2)
10	Seed yield / plant (g)	14.6	166.8	ET-1119 (166.8), ET-2112 (148.7), ET-3117 (126.1), ET-3131 (121.1)	Pusa Sumit (36.2)
11	Plant population at harvest	68.3	98.0	ET-2112 (98.0), ET-3101 (96.0), EC-628972 (95.7), ET-3117 (95.3)	Pusa Sumit (90.7)
V	PAU, Ludhiana (50 accessions)				
1	Days to 50 % flowering	59.0	69.0	NDFB 13 (59.0), RFB 3 (59.0), DFB 10-2 (60.0), EC 628957 (60.0)	Vikrant (63.7)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
2	Days to 80% maturity	136.0	146.0	EC 25085 (136.0), NDFB 13 (139.0), HB 18 (139.0)	PRT 12 (142.0)
3	Plant height (cm)	52.0	85.5	EC 628957 (85.5), EC 628955 (85.0), NDFB 14 (80.5), RFB 9 (80.5)	Vikrant (69.1)
4	No. of branches/ plant	2.3	6.7	NDFB 13 (6.7), HB 53 (6.3), NDF 13-2 (6.3)	Vikrant (4.5)
5	Pods/ plant	21.0	80.0	NDFB 13 (80.0), RFB 3 (80.0), EC 628955 (78.3), RFB 7 (78.0)	Vikrant (49.8)
6	Seeds/ pod	2.4	3.6	NDFB 14 (3.6), EC 25085 (3.6), IC 598958 (3.6), RFB 7 (3.4)	Vikrant (2.8)
7	Pod length (cm)	4.0	6.7	RFB 13-2 (6.7), RFB 7 (6.3), HB 80 (6.3), EC 628938 (6.3)	Vikrant (5.2)
8	100- seed wt.(g)	22.0	32.1	EC 25085 (32.1), HB 40 (32.0), DFB 9-1 (30.5), NDFB 13 (30.2)	Vikrant (26.8)
9	Grain yield/plot(g)	150.0	900.0	NDFB 13 (900), RFB 3 (900), NDF 13-2 (850), IC 243770 (850)	Vikrant (522.22)
VI	BAU, Ranchi (66 accessions)				
1	Days to 50% flowering	49.0	65.0	EC-628942 (49.0), HB-61 (50.0) EC-25085 (50.0), HB-73 (50.0)	HFB-1 (54.4)
2	Days to 80% maturity	112.0	148.0	HB-79 (112.0), HB-21 (113.0) HB-2 (113.0), HB-37 (114.0)	Pusa sumit (115.0)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
3	Plant height (cm)	42.2	93.6	HB-24 (93.6), HB-3 (90.8) EC-366272 (89.6), EC343691 (88.2)	Vikrant (79.4)
4	Number of branches/ plant	1.8	4.6	HB-33 (4.6), EC-3279 (4.4) EC-366272 (4.20, HB-66 (4.2)	Vikrant (3.3)
5	Number of pods/plant	10.3	34.0	HB-33 (34.0), EC343691 (28.6), HB-24 (27.0), HB-58 (24.4)	Vikrant (22.8)
6	Number of seeds/pod	2.8	3.8	EC343691 (3.8), HB-58 (3.60), EC-366272 (3.6), EC-117744 (3.6)	HFB-1 (3.4)
7	Pod length (cm)	4.1	6.0	HB-21 (6.0)	Pusa sumit (5.9)
8	Pod width (cm)	0.9	1.4	EC-243793 (1.4), HB-71 (1.4), HB-58 (1.4)	Pusa sumit (1.2)
9	100 seed weight (g)	25.80	38.40	EC-243793 (38.40), HB-78 (37.20), HB-5 (36.90), EC-329681 (36.60)	Pusa sumit (35.98)
10	Seed yield/plant (g)	3.30	20.60	HB-24 (20.60), EC-3279 (18.70), EC-243793 (18.60), HB-58 (18.30)	Vikrant (12.62)
Based on all locations (51 accessions)					
1	Days to 80% Maturity	131.7	152.0	EC 628925 (131.7), HB 79 (131.8), NDF 12 (132.0), HB 61(132.5), HB 3 (132.6)	HFB-1 (136.1)
2	Pod length (mm)	4.20	5.34	HB 5 (5.34), EC 243793 (5.32), NDFB 14 (5.30), HB 21 (5.25), EC 293820 (5.20)	HFB-1 (5.01)
3	Seed yield/ plant (g)	7.93	51.48	NDFB-14 (41.90)	Vikrant (41.45)
4	100 seed weight (g)	22.87	30.24	HB 5 (30.24), HB 71 (29.43), NDFB 14 (28.70), EC 3279 (28.50),	PRT 12 (27.79)

Table 25: Over the locations promising accessions in Fababean Rabi 2016-17 (Plains)

S. No	Accession	Days to 80% maturity						Pod length (mm)						Number of Seed / pod						
		Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean
1	EC 117744	130	148	140	-	119	134.3	3.6	5.0	5.3	-	5.4	4.8	2.2	4.0	3.2	3.0	-	3.6	3.2
2	EC 243036	133	149	160	-	121	140.8	3.6	4.6	4.9	-	5.1	4.6	2.4	3.4	3.8	3.0	-	3.0	3.1
3	EC 243596	133	138	166	-	122	139.8	3.6	5.5	5.5	-	4.8	4.9	2.2	2.8	3.0	3.0	-	3.2	2.8
4	EC 243793	130	157	159	-		148.7	4.0	5.3	6.2	-	5.8	5.3	3.0	3.2	3.2	3.0	-	3.0	3.1
5	EC 25085	123	145	174	136	122	140.0	3.6	5.0	6.1	4.7	5.1	4.9	3.2	3.6	3.8	3.0	3.6	3.0	3.4
6	EC 25192	127	148	137	-	123	133.8	3.0	4.4	5.1	-	5.2	4.4	2.0	3.6	3.2	3.0	-	3.0	3.0
7	EC 287710	134	151	142	-	119	136.5	3.4	3.9	5.1	-	5.4	4.4	2.2	3.0	3.0	3.0	-	3.4	2.9
8	EC 293820	132	147	173	-	123	143.8	4.0	5.3	6.3	-	5.2	5.2	2.8	3.6	2.8	3.0	-	3.2	3.1
9	EC 3279	128	146	168	-	121	140.8	3.0	5.1	5.1	-	5.2	4.6	2.6	3.2	3.6	3.0	-	3.2	3.1
10	EC 32905	134	151	155	-	114	138.5	3.8	4.5	5.7	-	4.6	4.6	2.0	2.6	3.4	3.0	-	3.0	2.8
11	EC 32923	136	146	172	-	119	143.3	3.8	5.7	5.2	-	5.2	5.0	2.4	3.6	3.3	3.0	-	3.4	3.1
12	EC 329681	134	148	151	-	116	137.3	3.4	4.6	5.7	-	4.8	4.6	2.6	2.4	3.0	3.0	-	3.2	2.8
13	EC 32976	133	144	172	-		149.7	3.8	4.9	5.4	-		4.7	2.6	3.4	2.8	3.0	-		3.0
14	EC 331564	130	146	175	-	116	141.8	3.6	4.4	6.4	-	5.2	4.9	2.6	2.6	3.0	3.0	-	3.2	2.9
15	EC 343691	127	149	165	-		147.0	3.6	4.8	5.3	-		4.6	3.0	3.4	4.0	3.0	-		3.4
16	EC 351287	133	151	147	-		143.7	3.8	5.4	-	-		4.6	2.6	3.8	4.2	3.0	-		3.4

S. No	Accession	Days to 80% maturity					Pod length (mm)					Number of Seed / pod								
		Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean
17	EC 361485	134	150	170	-	121	143.8	3.4	4.5	4.9	-	5.7	4.6	2.8	2.8	4.0	3.0	-	3.4	3.2
18	EC 363781	131	158	177	-	123	147.3	4.2	4.2	5.5	-	5.5	4.9	2.6	2.8	3.8	3.0	-	3.2	3.1
19	EC 366272	132	150	172	-	120	143.5	2.8	5.5	5.3	-	5.6	4.8	2.4	3.0	3.6	3.0	-	3.6	3.1
20	EC 591784	135	151	168	-	120	143.5	2.8	5.2	5.9	-	5.5	4.9	2.0	2.8	3.4	3.0	-	2.8	2.8
21	EC 628925	125	145	-	-	125	131.7	4.2	5.2	-	-	5.1	4.8	3.0	3.2	3.5	-	-	2.8	3.1
22	EC 628940	134	141	158	-	116	137.3	4.0	5.1	5.8	-	5.8	5.2	3.0	3.0	3.2	3.0	-	3.2	3.1
23	EC 628942	129	146	139	-	122	134.0	3.8	4.3	5.5	-	5.3	4.7	2.8	3.0	3.6	3.0	-	3.4	3.2
24	HB 1	134	148	151	-	127	140.0	3.8	4.8	5.7	-	4.5	4.7	2.8	2.6	3.4	3.0	-	3.0	3.0
25	HB 15	135	138	164	-	123	140.0	4.2	4.7	4.8	-	5.0	4.7	3.0	2.8	3.4	3.0	-	3.0	3.0
26	HB 19	131	142	141	141	118	134.6	4.0	6.3	5.3	5.0	5.1	5.1	3.0	3.2	3.0	3.0	2.4	3.6	3.0
27	HB 2	132	151	145	-	113	135.3	3.6	4.3	5.1	-	4.7	4.4	3.2	3.0	3.4	3.0	-	3.2	3.2
28	HB 21	134	147	168	-	113	140.5	3.8	4.7	6.5	-	6.0	5.3	2.6	3.4	2.8	3.0	-	3.2	3.0
29	HB 24	131	149	138	143	121	136.4	3.6	4.6	5.6	4.3	5.6	4.7	3.0	3.2	3.4	3.0	2.8	3.4	3.1
30	HB 28	130	151	135	-	124	135.0	3.4	4.3	5.5	-	5.1	4.6	2.2	3.2	2.8	3.0	-	3.4	2.9
31	HB 3	131	138	135	140	119	132.6	3.4	4.6	5.5	5.0	5.4	4.8	2.6	3.2	3.6	3.0	2.8	3.4	3.1
32	HB 30	126	149	157	-	120	138.0	3.6	4.9	5.2	-	5.5	4.8	2.4	3.4	2.6	3.0	-	3.0	2.9
33	HB 33	129	146	139	142	116	134.4	3.0	5.7	5.1	5.3	5.2	4.9	2.0	3.2	3.0	3.0	2.8	3.0	2.8

S. No	Accession	Days to 80% maturity						Pod length (mm)						Number of Seed / pod						
		Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean
34	HB 37	134	148	166	-	114	140.5	3.8	5.5	5.3	-	5.5	5.0	2.4	4.0	2.8	3.0	-	3.4	3.1
35	HB 5	133	140	149	-	121	135.8	4.2	6.5	5.5	-	5.2	5.3	2.6	3.8	3.0	3.0	-	3.2	3.1
36	HB 58	131	145	144	-	117	134.3	2.8	5.9	6.2	-	5.3	5.1	2.0	3.6	3.0	3.0	-	3.6	3.0
37	HB 61	130	146	139	-	115	132.5	2.8	5.1	5.4	-	5.1	4.6	2.4	3.4	2.8	3.0	-	3.0	2.9
38	HB 63	127	144	166	-	119	139.0	3.8	4.0	5.5	-	4.8	4.5	2.6	3.2	3.2	3.0	-	2.8	3.0
39	HB 65	125	147	168	-	121	140.3	4.0	4.1	5.2	-	4.8	4.5	2.8	3.2	3.0	3.0	-	3.4	3.1
40	HB 66	129	146	169	-	122	141.5	3.4	4.5	5.5	-	4.8	4.6	2.8	3.8	3.0	3.0	-	3.2	3.2
41	HB 68	128	150	146	-	126	137.5	3.0	4.7	5.5	-	5.2	4.6	2.6	3.2	2.8	3.0	-	3.4	3.0
42	HB 71	133	151	170	-	115	142.3	4.0	5.2	4.7	-	5.7	4.9	3.0	3.8	3.8	3.0	-	2.8	3.3
43	HB 73	132	149	165	-	119	141.3	3.6	5.4	5.1	-	5.0	4.8	2.6	3.2	2.8	3.0	-	3.4	3.0
44	HB 78	132	151	141	-	120	136.0	3.4	4.9	5.7	-	5.1	4.8	2.8	3.0	3.2	3.0	-	3.0	3.0
45	HB 79	133	145	137	-	112	131.8	3.2	5.3	5.1	-	5.5	4.8	2.6	3.2	3.4	3.0	-	3.2	3.1
46	HB 82	131	149	155	-	122	139.3	4.0	4.8	5.8	-	5.2	5.0	2.2	3.6	3.2	3.0	-	3.2	3.0
47	HB 90	-	-	169	-	117	143.0	3.6	-	5.8	-	4.5	4.6	3.0	-	-	3.0	-	3.2	3.1
48	NDF 12	132	148	-	-	116	132.0	3.8	3.6	-	-	5.2	4.2	2.8	3.0	3.0	-	-	3.4	3.1
49	NDF 14	128	160	-	-	120	136.0	3.6	5.3	-	-	5.2	4.7	2.4	3.2	3.2	-	-	3.2	3.0
50	HB 8	131	150	160	-	118	139.8	3.6	5.5	5.1	-	4.9	4.8	2.2	4.0	3.8	3.0	-	2.8	3.2

S. No	Accession	Days to 80% maturity					Pod length (mm)					Number of Seed / pod								
		Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean
51	NDFB 14	-	-	163	141	-	152.0	-	5.6	5.0	-	5.3	-	-	-	3.0	3.6	-	3.3	
	HFB-1	128	145	150	-	121	136.1	3.2	5.1	6.4	-	5.4	5.0	3.4	3.2	3.0	3.0	-	3.4	3.2
	PRT 12	132	-	-	142	148	140.6	-	5.1	-	4.1	-	4.6	-	3.5	-	-	2.6	3.2	3.1
	Vikrant	131	147	153	143	120	138.7	3.4	4.8	5.1	5.2	5.4	4.8	2.6	3.3	3.3	3.0	2.8	3.4	3.1
	Minimum	123	138	135	136	112	131.7	2.8	3.6	4.7	4.1	4.5	4.2	2.0	2.4	2.6	3.0	2.4	2.8	2.8
	Maximum	136	160	177	143	148	152.0	4.2	6.5	6.5	5.3	6.0	5.3	3.4	4.0	4.2	3.0	3.6	3.6	3.4

S. No	Accession	Seed yield/ plant (g)						100 seed weight (g)						
		Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean
1	EC 117744	24.0	22.2	25.2	-	6.7	19.5	22.75	17.82	22.4	28.30	-	34.40	25.13
2	EC 243036	12.0	25.6	55.9	-	6.2	24.9	25.20	24.44	23.1	24.50	-	30.90	25.63
3	EC 243596	21.0	24.6	41.5	-	6.6	23.4	21.35	21.80	28.1	24.60	-	30.80	25.33
4	EC 243793	14.0	28.0	32.8	-	18.6	23.4	25.25	22.22	25.5	27.90	-	38.40	27.85
5	EC 25085	16.0	22.8	11.2	57.0	16.5	24.7	24.00	21.24	23.8	24.40	32.1	35.00	26.75
6	EC 25192	14.0	31.5	25.2	-	11.1	20.5	23.55	27.42	26.5	24.70	-	33.00	27.04
7	EC 287710	12.0	25.5	19.3	-	9.5	16.6	22.65	24.97	26.7	24.90	-	35.00	26.84
8	EC 293820	12.0	26.5	42.5	-	3.9	21.2	22.05	17.77	21.3	24.60	-	28.70	22.87
9	EC 3279	18.0	27.0	34.9	-	18.7	24.7	23.50	29.65	27.2	27.50	-	34.70	28.50
10	EC 32905	26.0	28.5	49.6	-	7.8	28.0	26.75	29.28	24.9	24.70	-	33.70	27.87
11	EC 32923	14.0	24.6	39.5	-	12.7	22.7	21.45	24.33	24.2	26.70	-	33.70	26.08
12	EC 329681	16.0	25.6	24.6	-	7.0	18.3	22.20	23.04	23.5	25.40	-	36.60	26.14
13	EC 32976	14.0	26.0	62.8	-		34.3	22.15	27.25	24.0	26.20	-		24.90
14	EC 331564	14.0	26.6	12.8	-	6.7	15.0	23.60	26.06	27.7	26.40	-	36.00	27.95
15	EC 343691	26.0	27.0	30.1	-		27.7	27.40	25.91	25.0	26.80	-		26.28
16	EC 351287	18.0	28.0	52.5	-		32.8	23.90	24.82	24.5	25.90	-		24.78
17	EC 361485	12.0	29.0	22.9	-	4.4	17.1	24.40	26.92	23.8	25.50	-	31.50	26.41

S. No	Accession	Seed yield/ plant						100 seed weight (g)					
		Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Ranchi
18	EC 363781	13.0	31.0	9.1	-	7.1	15.1	29.35	27.64	24.8	23.50	-	27.00
19	EC 366272	8.0	30.0	10.2	-	11.9	15.0	23.70	26.44	27.5	24.70	-	32.80
20	EC 591784	24.0	27.5	56.7	-	16.3	31.1	24.50	24.13	25.5	26.80	-	36.00
21	EC 628925	9.0	26.0	4.3	-		13.1	24.40	26.27	26.0		-	31.40
22	EC 628940	18.0	25.0	39.6	-	3.9	21.6	24.10	20.62	26.0	27.70	-	32.90
23	EC 628942	19.0	26.0	10.2	-	7.6	15.7	24.35	23.09	25.8	24.50	-	34.80
24	HB 1	12.0	22.1	31.5	-	8.0	18.4	24.35	24.64	25.4	26.20	-	28.90
25	HB 15	14.0	24.5	62.5	-	16.9	29.5	24.40	26.31	27.0	26.10	-	30.40
26	HB 19	16.0	22.8	34.8	50.0	4.6	25.6	24.10	24.24	24.8	26.70	28.4	34.10
27	HB 2	16.0	24.5	11.3	-	7.2	14.8	24.00	23.72	22.8	24.50	-	31.90
28	HB 21	16.0	24.5	24.9	-	8.8	18.6	22.15	27.39	25.8	26.30	-	33.00
29	HB 24	11.2	27.6	20.4	-	20.6	20.0	27.40	26.90	22.6	27.90	26.5	35.00
30	HB 28	18.0	28.5	10.2	-	10.6	16.8	22.65	23.48	23.6	26.50	-	32.40
31	HB 3	2.0	24.1	25.2	45.0	18.3	22.9	22.20	22.31	25.0	29.10	28.4	30.70
32	HB 30	21.0	25.0	49.5	-	10.3	26.5	25.20	19.33	23.0	26.10	-	33.80
33	HB 33	14.0	24.0	46.7	40.0	11.8	27.3	23.55	26.14	23.9	28.10	29.3	34.70
34	HB 37	8.0	25.0	62.1	-	7.6	25.7	21.45	21.74	23.8	25.50	-	32.50
													25.00

S. No	Accession	Seed yield/ plant						100 seed weight (g)					
		Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Ranchi
35	HB 5	16.0	23.0	19.8	-	12.5	17.8	29.35	29.46	25.2	30.30	-	36.90
36	HB 58	11.2	23.0	29.4	-	18.3	20.5	24.50	25.71	24.7	25.30	-	34.00
37	HB 61	16.0	24.6	20.6	-	8.0	17.3	23.70	19.39	23.0	25.50	-	30.60
38	HB 63	22.0	25.0	57.3	-	6.7	27.8	23.90	24.88	20.4	27.80	-	30.40
39	HB 65	12.0	30.0	19.5	-	8.1	17.4	22.05	24.78	25.6	24.50	-	30.20
40	HB 66	16.0	28.0	32.9	-	10.9	22.0	24.40	25.39	27.3	25.50	-	32.40
41	HB 68	16.0	29.6	10.9	-	5.9	15.6	23.50	26.32	24.4	27.60	-	33.00
42	HB 71	46.0	30.0	27.1	-	17.0	30.0	25.25	28.22	32.8	26.30	-	34.60
43	HB 73	12.0	27.5	19.6	-	6.7	16.5	23.10	27.00	27.6	26.90	-	31.50
44	HB 78	14.0	25.6	10.1	-	4.7	13.6	22.05	22.50	28.0	26.50	-	37.20
45	HB 79	16.0	28.0	25.7	-	6.8	19.1	21.90	24.23	26.0	27.40	-	29.00
46	HB 82	14.0	27.6	11.5	-	10.1	15.8	19.85	20.90	25.0	29.70	-	29.80
47	HB 90	-	-	26.5	-	8.1	17.3	23.05	-	-	25.50	-	29.20
48	NDF 12	12.0	25.5	-	-	3.3	13.6	24.60	23.46	26.0	-	-	25.80
49	NDF 14	12.0	26.0	-	-	6.4	14.8	24.00	26.02	24.0	-	-	30.60
50	HB 8	30.0	26.0	29.5	-	4.8	22.6	22.75	29.52	25.5	-	-	27.10
													26.22

S. No	Accession	Seed yield/ plant						100 seed weight (g)						
		Delhi	Faizabad	Hisar	Ludhiana	Ranchi	Mean	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Ranchi	
51	NDFB 14	-	-	41.9	-	-	51.0	-	-	27.60	29.80	-	28.70	
	HFB-1	74.2	24.3	49.5	-	11.2	39.8	20.15	21.71	25.83	26.70	-	33.16	25.51
	PRT 12	83.3	-	-	-	8.7	46.02	-	22.98	-	-	25.90	34.48	27.79
	Vikrant	91.0	27.0	35.2	-	12.6	41.46	21.75	25.15	23.74	25.10	26.83	29.84	25.40
	Minimum	2.0	22.1	4.3	-	3.3	7.93	19.85	17.77	20.40	23.50	25.90	25.80	22.87
	Maximum	91.0	31.5	62.8	-	20.6	51.48	29.35	29.65	32.80	30.30	32.10	38.40	30.24

Table 26: Experimental details of germplasm evaluation in Chenopodium Rabi 2016-17 (Plains)

S. No	Items	Bhubaneswar	Delhi	Hisar	Ludhiana	S.K. Nagar
1	No. of acc.	25	13	25	13	13
	No. of Replication	-	4	2	2	-
2	Design	ABD	RBD	RBD	RBD	RBD
3	No. of Block	-	-	-	-	-
4	Number of Rows	3	1	2	2	1
5	Row Length (m)	-	3	4	4	4
6	Row spacing (cm)	30	30	30	30	30
7	Plant spacing (cm)	15	15	-	-	15
8	NPKS (kg/ha)	60:40:20	60:40:0	-	-	-
9	Plot size (m ²)	2.5 x 0.6	3.0x0.3	2.4x2.4	2.4x2.4	-
10	Sowing Date	5/12/2015	28/11/2016	6/11/2016	4/11/2016	24/11/2016
11	Harvesting /period	-	25/3/2017 – 28/3/2017	28/3/2017	-	20/03/2017

Table 27: Evaluation of germplasm in Chenopodium at Bhubaneswar Rabi 2016-17 (Plains)

S. No	Genotypes	Days to 50% flowering	Days to 80 % maturity	Plant height (cm)	Influence Length (cm)	5 Plant yield (g)	Seed Vol. Weight (g/10ml)
1	IC 7958	34	93	100.00	78.00	9.98	6.66
2	IC 7959	34	91	86.30	61.00	3.18	7.14
3	IC 7960	36	93	89.00	47.00	3.21	6.44
4	IC 7961	36	95	88.60	50.00	4.84	7.16
5	IC 7962	38	97	87.60	60.60	5.36	6.85
6	IC 7213	36	97	121.50	72.00	20.82	7.03
7	EC 349444	40	97	118.00	69.00	24.45	5.89
8	EC 349447	41	95	99.60	52.60	12.58	6.62
9	EC 359444	38	95	158.00	86.00	12.44	5.91
10	EC 359448	34	97	124.50	66.50	1.59	6.38
11	IC 411824	34	97	91.00	45.50	16.25	5.94
12	IC 411825	34	93	64.80	24.40	6.6	6.17
13	EC 507738	36	97	61.30	22.60	2.28	6.34
14	EC 507739	34	93	97.00	47.50	16.12	5.75
15	EC 507742	38	93	134.50	48.20	58.32	6.35
16	EC 507743	34	95	97.50	26.80	17.25	6.16
17	EC 507744	34	93	67.40	32.20	37.66	6.34
18	EC 507746	34	97	65.80	24.80	36.63	6.50
19	EC 507747	34	95	123.40	54.60	94.63	6.11
20	EC 507748	36	95	85.00	26.80	4.33	6.09
21	EC 507749	38	97	159.80	44.40	31.45	6.04
	Minimum	34.00	91.00	61.30	22.60	1.59	5.75
	Maximum	41.00	97.00	159.80	86.00	94.63	7.16
	Mean	35.86	95.00	100.98	49.55	20.00	6.37
	CV (%) Phen.	6.13	2.00	27.95	37.65	112.45	6.47

Table 28: Evaluation of germplasm in Chenopodium at New Delhi Rabi 2016-17 (Plains)

Sr. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	No of Branches/plant	Inflorescences length (cm)	Seed yield /plant (g)	Seed vol. wt. (g/10 ml)
1	EC 507738	58.25	119.25	153.30	5.20	25.83	28.00	5.53
2	EC 507739	57.00	116.75	136.70	3.93	23.66	13.00	5.62
3	EC 507740	57.00	118.25	134.50	4.67	25.40	11.00	5.38
4	EC 507741	60.75	121.50	143.27	6.00	24.90	21.50	5.41
5	EC 507742	58.50	119.75	140.60	4.40	23.45	20.50	5.52
6	EC 507743	60.50	120.50	146.90	5.87	22.43	17.00	5.18
7	EC 507744	59.25	120.00	143.80	4.95	22.11	25.50	5.42
8	EC 507746	59.75	120.00	145.85	4.60	21.69	15.00	5.66
9	EC 507747	58.75	120.50	144.00	3.95	23.91	22.50	5.04
10	EC 507748	59.00	118.75	150.28	6.75	23.42	22.50	5.54
11	EC 507749	58.75	119.00	147.50	6.29	25.45	23.50	4.93
12	IC-411824	58.25	119.50	148.99	4.30	21.43	17.00	5.01
13	IC-411825	56.50	117.25	129.55	3.80	23.65	24.50	5.51
	Mean	58.63	119.31	143.48	4.98	23.64	20.12	5.37
	EMS	2.93	7.51	62.13	2.08	8.40	28.11	0.11
	SE	1.21	1.94	5.57	1.02	2.05	3.75	0.24
	CD(0.05)	2.45	3.93	11.30	2.07	4.16	7.60	0.48
	CV(%) Error	2.92	2.30	5.49	28.95	12.26	26.36	6.25

Table 29: Evaluation of germplasm in Chenopodium at Hisar Rabi 2016-17 (Plains)

S. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Branches/plant	Inflorescence length (cm)	Seed volume (g/10ml)	Seed yield/plant (g)	Plant stand at harvest (%)
1	IC-7213	48.1	157.2	146.9	1.3	17.9	6.7	3.8	91.0
2	IC-7958	55.3	162.1	147.0	1.3	23.5	7.8	5.8	87.2
3	IC-7959	61.1	160.9	166.6	1.3	20.1	6.6	3.8	85.1
4	IC-7960	39.2	142.0	174.3	1.0	26.9	7.9	4.9	93.4
5	IC-7961	71.6	188.4	224.5	1.0	16.5	7.7	3.8	88.9
6	IC-7962	65.6	179.3	148.5	1.0	19.5	7.1	5.7	83.0
7	EC-322024	77.4	185.7	142.5	1.3	9.4	8.2	3.4	91.0
8	EC-349444	90.0	191.0	143.5	1.3	13.4	6.8	4.2	95.1
9	EC-349447	82.7	179.3	137.5	1.0	11.5	6.7	4.6	77.9
10	EC-359448	94.4	194.8	146.0	1.3	16.7	6.7	3.7	96.2
11	EC-359449	78.9	182.0	134.6	1.0	25.6	7.6	6.3	84.9
12	EC-359494	85.1	188.3	221.2	1.0	24.0	6.5	4.8	94.2
13	EC-411824	44.1	147.2	124.4	2.3	30.2	6.9	7.4	93.8
14	EC-411825	35.1	138.3	86.1	1.3	35.9	8.3	12.0	92.6
15	EC-507738	45.1	136.6	89.7	1.0	25.6	7.5	7.4	63.0
16	EC-507739	35.3	134.4	68.2	1.7	16.1	6.8	4.0	86.9
17	EC-507740	70.3	166.6	88.5	1.0	31.2	8.1	10.6	86.8
18	EC-507741	46.0	140.7	112.9	1.0	27.9	7.8	9.2	93.9
19	EC-507742	36.0	136.4	90.2	1.0	24.7	7.6	4.1	92.8

S. No.	Genotypes	Days to 50% flowering	Days to 80% maturity	Plant height (cm)	Branches/ plant	Inflorescence length (cm)	Seed volume (g/10ml)	Seed yield/ plant (g)	Plant stand at harvest (%)
20	EC-507743	47.6	146.0	109.0	1.0	24.7	6.9	5.2	91.0
21	EC-507744	48.0	164.2	138.7	2.3	35.5	8.3	8.4	87.9
22	EC-507746	35.3	137.6	94.1	2.0	23.4	6.6	6.9	86.2
23	EC-507747	70.1	172.7	127.1	1.0	28.9	5.5	5.2	92.9
24	EC-507748	41.7	141.6	86.0	1.0	27.5	6.3	7.0	90.0
25	EC-507749	32.4	134.6	162.4	1.0	24.1	7.4	6.5	92.4
	Mean	57.46	160.32	132.41	1.27	23.23	7.22	5.95	88.72
	EMS	9.36	12.82	23.19	0.12	6.95	0.07	0.22	93.49
	SE	2.50	2.92	3.93	0.28	2.15	0.22	0.39	7.89
	CD(0.05)	5.02	5.88	7.91	0.57	4.33	0.45	0.77	15.87
	CV (%) Error	5.32	2.23	3.64	27.54	11.35	3.78	7.94	10.90

Table 30: Evaluation of germplasm in Chenopodium at Ludhiana Rabi 2016-17 (Plains)

Sr. No.	Entry	Days to 50% flowering	Days to 80 % maturity	Plant Height (cm)	Inflorescence length (cm)	Leaf length (cm)	Leaf width (cm)	Grain yield (g/plot)	Seed vol. wt /10 ml (g)
1	IC 411824	85.00	126.50	67.15	20.00	9.05	5.70	75.00	7.80
2	IC 411825	70.00	128.50	76.45	15.90	8.35	5.40	125.00	7.35
3	EC 507738	73.00	124.50	68.80	15.95	6.70	4.35	300.00	7.60
4	EC 507739	72.00	124.00	75.90	16.00	6.80	3.75	25.00	7.75
5	EC 507740	73.00	129.00	70.10	15.40	7.60	5.00	80.00	8.00
6	EC 507741	75.00	133.50	85.65	15.95	9.50	6.10	600.00	7.80
7	EC 507742	72.00	131.00	87.00	16.50	9.40	6.00	550.00	6.85
8	EC 507743	84.00	136.50	77.35	13.85	8.60	5.55	500.00	8.05
9	EC 507744	75.00	135.00	78.80	15.00	9.30	5.55	150.00	8.35
10	EC 507746	71.00	131.50	85.65	14.85	9.90	5.35	650.00	8.60
11	EC 507747	82.00	139.50	76.30	18.85	7.95	4.20	300.00	8.40
12	EC 507748	70.00	129.00	82.65	15.90	9.55	6.00	350.00	7.95
13	EC 507749	83.00	143.50	60.25	13.50	7.30	3.20	55.00	7.45
	Mean	75.77	131.69	76.31	15.97	8.46	5.09	289.23	7.84
	EMS	0.88	3.85	93.13	4.57	1.37	0.61	4038.46	0.08
	SE	0.94	1.96	9.65	2.14	1.17	0.78	63.55	0.29
	CD(0.05)	2.04	4.27	21.03	4.66	2.55	1.70	138.46	0.62
	CV(%) Error	1.24	1.49	12.65	13.38	13.83	15.35	21.97	3.65

Table 31: Evaluation of germplasm in Chenopodium at S.K. Nagar Rabi 2016-17 (Plains)

S. No	Genotypes	Days 50% Flowering	Days to 80% Maturity	Plant height (cm)	Inflorescence length (cm)	Seed yield / plant (g)	Seed Vol. Wt. (g/10ml)
1	IC 411824	51.00	112.33	102.13	42.60	15.80	6.37
2	IC 411825	46.00	106.67	107.55	37.67	13.00	6.27
3	EC 507738	52.67	112.33	103.93	31.53	10.93	6.36
4	EC 507739	48.00	107.00	101.73	34.60	7.50	6.54
5	EC 507740	46.33	104.67	100.80	34.40	7.23	6.40
6	EC 507741	52.33	114.33	113.20	27.80	10.69	6.44
7	EC 507742	54.33	110.67	105.93	32.33	12.19	6.20
8	EC 507743	54.67	114.00	101.60	28.87	10.19	6.29
9	EC 507744	56.67	113.00	106.93	27.07	8.01	6.53
10	EC 507746	54.00	112.67	104.80	35.33	6.95	6.30
11	EC 507747	57.00	116.33	114.40	37.00	7.39	6.50
12	EC 507748	51.00	110.33	101.67	28.73	8.10	6.19
13	EC 507749	48.00	115.67	113.60	36.00	12.53	5.90
	Mean	51.69	111.54	106.02	33.38	10.04	6.33
	EMS	0.95	1.21	66.04	8.88	3.47	0.02
	SE	0.80	0.90	6.64	2.43	1.52	0.11
	CD(0.05)	1.64	1.86	13.69	5.02	3.14	0.23
	CV (%) Error	1.88	0.99	7.66	8.93	18.56	2.14

Table 32: Promising lines in Chenopodium germplasm for various characters at different locations Rabi 2016-17 (Plains)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
I	OUA&T Bhubaneswar (25 accessions)				
1	Days to 50% flowering	34.00	41.00	EC 507747 (34), EC 507744 (34) EC 507746 (34) EC 507743 (34)	-
2	Days to 80% maturity	91.00	97.00	IC 7959 (91), EC 507744 (93) EC 507739 (93) IC 7958 (93)	-
3	Plant height (cm)	61.30	159.80	EC 507749 (159.80), EC 359444 (158.00), EC 507742 (134.50), EC 359448 (124.50)	-
4	Inflorescence length (cm)	22.60	86.00	EC 359444 (86.0), IC 7958 (78.0), IC 7213 (72.0), EC 349444 (69.0)	-
5	5 Plant yield (g)	1.59	94.63	EC 507747 (94.63), EC 507742 (58.32), EC 507744 (37.66), EC 507746 (36.63)	-
6	Seed Vol. Weight (g/10ml)	5.75	7.16	IC 7961 (7.16), IC 7959 (7.14), IC 7213 (7.03), IC 7962 (6.85)	-
II	NBPG, New Delhi				
1	Days to 50% flowering	56.50	60.75	IC-411825 (56.50), EC-507739 (57.00) EC-507740 (57.00), EC-507738 (58.25)	-
2	Days to 80% maturity	116.75	121.50	EC-507739 (116.75), IC-411825 (117.25) EC-507740 (118.25), EC-507748 (118.75)	-

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
3	Plant height (cm)	129.55	153.30	EC-507738 (153.30), EC-507748 (150.28) IC-411824 (148.99), EC-507749 (147.50)	-
4	No of Branches/plant	3.80	6.75	EC-507748 (6.75), EC-507749 (6.29) EC-507741 (6.00), EC-507743 (5.87)	-
5	Inflorescences length (cm)	21.43	25.83	EC-507738 (25.83), EC-507749 (25.45) EC-507740 (25.40), EC-507741 (24.90)	-
6	Seed yield / plant (g)	11.00	28.00	EC-507738 (28.00), EC-507744 (25.50) IC-411825 (24.50), EC-507749 (23.50)	-
7	Seed vol. weight (g/10 ml)	4.93	5.66	EC-507746 (5.66), EC-507739 (5.62) EC-507748 (5.54), EC-507738 (5.53)	-
III	CCS HAU Hisar (25 accessions)				
1	Days to 50% flowering	32.4	94.4	EC-507749 (32.4), EC-411825 (35.1) EC-507739 (35.30, EC-507746 (35.3)	-
2	Days to 80% maturity	134.4	194.8	EC-507739 (134.4), EC-507749 (134.6) EC-507742 (136.4), EC-507738 (136.6)	-
3	Plant height (cm)	68.2	224.5	IC-7961 (224.5), EC-359494 (221.2) IC-7960 (174.3), IC-7959 (166.6)	-
4	Branches/plant	1.0	2.3	EC-507744 (2.3), EC-411824 (2.3) EC-507746 (2.0)	-
5	Inflorescence length (cm)	9.4	35.9	EC-411825 (35.9), EC-507744 (35.5) EC-507740 (31.2), EC-411824 (30.2)	-

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
6	Seed vol. weight (g/10 ml)	5.5	8.3	EC-507744 (8.3), EC-411825 (8.3) EC-322024 (8.2), EC-507740 (8.1)	-
7	Seed yield/plant (g)	3.4	12.0	EC-411825 (12.0), EC-507740 (10.6) EC-507741 (9.2)	-
8	Plant stand at harvest (%)	63.0	96.2	EC-359448 (96.2), EC-349444 (95.1) EC-359494 (94.2), EC-507741 (93.9)	-
IV	PAU, Ludhiana (13 accessions)				
1	Days to 50% flowering	70.00	85.00	EC 507748 (70.0). IC 411825 (70.0) EC 507746 (71.0), EC 507742 (72.0)	-
2	Days to 80% maturity	124.00	143.50	EC 507739 (124.0), EC 507738 (124.5) IC 411824 (126.5), IC 411825 (128.5)	-
3	Plant Height (cm)	60.25	87.00	EC 507742 (87.00), EC 507746 (85.65) EC 507741 (85.65), EC 507748 (82.65)	-
4	Inflorescence length (cm)	13.50	20.00	IC 411824 (20.00), EC 507747 (18.85) EC 507742 (16.50), EC 507739 (16.00)	-
5	Leaf length (cm)	6.70	9.90	EC 507746 (9.90), EC 507748 (9.55) EC 507741 (9.50), EC 507742 (9.40)	-
6	Leaf width (cm)	3.20	6.10	EC 507741 (6.10), EC 507748 (6.00) EC 507742 (6.00), IC 411824 (5.70)	-
7	Seed vol. weight (g/10 ml)	6.85	8.60	EC 507746 (8.60), EC 507747 (8.40) EC 507744 (8.35)	-

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
8	Grain yield (g/plot)	25.00	650.00	EC 507746 (650.0), EC 507741 (600.0) EC 507742 (550.0), EC 507743 (500.0)	-
V	SDAU S.K. Nagar (13 accessions)				
1	Days to 50% Flowering	46.0	57.0	IC 411825 (46.00), EC 507740 (46.33), EC 507739 (48.00), EC 507749 (48.00)	-
2	Days to 80% Maturity	104.67	116.33	EC 507740 (104.67), IC 411825 (106.67), EC 507739 (107.00), EC 507748 (110.33)	-
3	Inflorescences length (cm)	27.07	42.60	IC 411824 (42.60), IC 411825 (37.67), EC 507747 (37.00), EC 507749 (36.00)	-
4	Plant height (cm)	100.80	114.40	EC 507747 (114.40), EC 507749 (113.60), EC 507741 (113.20), IC 411825 (107.55)	-
5	Seed yield / plant (g)	6.95	15.80	IC 411824 (15.80), IC 411825 (13.00), EC 507749 (12.53), EC 507742 (12.19)	-
6	Seed vol. weight (g/10 ml)	5.90	6.54	EC 507739 (6.54), EC 507744 (6.53), EC 507747 (6.50), EC 507741 (6.44)	-
	Based on all locations (22 accessions)				
1	Days to 50% flowering	37.6	65.0	IC 7960 (37.6), IC 7213 (42.1), IC 7958 (44.70), IC 7959 (47.6), EC 507739 (49.3)	-
2	Days to 80% maturity	111.35	145.89	IC 411825 (111.4), IC 411824 (113.8), EC 507739 (115.0), IC 7960 (117.5), EC 507738 (117.9)	-
3	Seed yield/plant (g)	2.0	13.8	EC 507741 (13.8), EC 507747 (13.5), IC 411825 (12.9), EC 507744 (12.4), EC 507749 (12.2)	-
4	10ml Seed Weight (g)	6.28	7.45	IC 7961 (7.45), IC 7958 (7.23), IC 7960 (7.19)	-

Table 33: Over the locations promising accession in Chenopodium Rabi 2016-17 (Plains)

S. No	Accessions	Days to 50% flowering						Days to 80% maturity					
		Bhubaneswar	Delhi	Hisar	Ludhiana	SK Nagar	Mean	Bhubaneswar	Delhi	Hisar	Ludhiana	SK Nagar	Mean
1	EC 349444	40.0	-	90.0	-	-	65.0	97.0	-	191.0	-	-	144.0
2	EC 349447	41.0	-	82.7	-	-	61.8	95.0	-	179.3	-	-	137.2
3	EC 359448	34.0	-	94.4	-	-	64.2	97.0	-	194.8	-	-	145.9
4	EC 507738	36.0	58.3	45.1	73.0	52.7	53.0	97.0	119.3	136.6	124.5	112.3	117.9
5	EC 507739	34.0	57.0	35.3	72.0	48.0	49.3	93.0	116.8	134.4	124.0	107.0	115.0
6	EC 507740	-	57.0	70.3	73.0	46.3	61.7	-	118.3	166.6	129.0	104.7	129.6
7	EC 507741	-	60.8	46.0	75.0	52.3	58.5	-	121.5	140.7	133.5	114.3	127.5
8	EC 507742	38.0	58.5	36.0	72.0	54.3	51.8	93.0	119.8	136.4	131.0	110.7	118.2
9	EC 507743	34.0	60.5	47.6	84.0	54.7	56.1	95.0	120.5	146.0	136.5	114.0	122.4
10	EC 507744	34.0	59.3	48.0	75.0	56.7	54.6	93.0	120.0	164.2	135.0	113.0	125.0
11	EC 507746	34.0	59.8	35.3	71.0	54.0	50.8	97.0	120.0	137.6	131.5	112.7	119.7
12	EC 507747	34.0	58.8	70.1	82.0	57.0	60.4	95.0	120.5	172.7	139.5	116.3	128.8
13	EC 507748	36.0	59.0	41.7	70.0	51.0	51.5	95.0	118.8	141.6	129.0	110.3	118.9
14	EC 507749	38.0	58.8	32.4	83.0	48.0	52.0	97.0	119.0	134.6	143.5	115.7	121.9
15	IC 411824	34.0	58.3	-	85.0	51.0	57.1	97.0	119.5	-	126.5	112.3	113.8
16	IC 411825	34.0	56.5	-	70.0	46.0	51.6	93.0	117.3	-	128.5	106.7	111.4
17	IC 7213	36.0	-	48.1	-	-	42.1	97.0	-	157.2	-	-	127.1
18	IC 7958	34.0	-	55.3	-	-	44.7	93.0	-	162.1	-	-	127.6

S. No	Accessions	Days to 50% flowering						Days to 80% maturity					
		Bhubaneswar	Delhi	Hisar	Ludhiana	SK Nagar	Mean	Bhubaneswar	Delhi	Hisar	Ludhiana	SK Nagar	Mean
19	IC 7959	34.0	-	61.1	-	-	47.6	91.0	-	160.9	-	-	125.9
20	IC 7960	36.0	-	39.2	-	-	37.6	93.0	-	142.0	-	-	117.5
21	IC 7961	36.0	-	71.6	-	-	53.8	95.0	-	188.4	-	-	141.7
22	IC 7962	38.0	-	65.6	-	-	51.8	97.0	-	179.3	-	-	138.2
	Minimum	34.0	56.5	32.4	70.0	46.0	37.6	91.0	116.8	134.4	124.0	104.7	111.4
	Maximum	41.0	60.8	94.4	85.0	57.0	65.0	97.0	121.5	194.8	143.5	116.3	145.9
	Mean	35.8	58.6	55.8	75.8	51.7	53.5	95.0	119.3	158.3	131.7	111.5	126.2

S. No	Accessions	Seed yield (g)					Seed Vol. Wt. (g/10ml)					
		Bhubaneswar	Delhi	Hisar	SK Nagar	Mean	Bhubaneswar	Delhi	Hisar	Ludhiana	SK Nagar	Mean
1	EC 349444	4.9	-	4.2	-	4.5	5.89	-	6.77	-	-	6.33
2	EC 349447	2.5	-	4.6	-	3.5	6.62	-	6.67	-	-	6.64
3	EC 359448	0.3	-	3.7	-	2.0	6.38	-	6.70	-	-	6.54
4	EC 507738	0.5	28.0	7.4	10.9	11.7	6.34	5.53	7.53	7.60	6.36	6.67
5	EC 507739	3.2	13.0	4.0	7.5	6.9	5.75	5.62	6.83	7.75	6.54	6.50
6	EC 507740	-	11.0	10.6	7.2	9.6	-	5.38	8.10	8.00	6.40	6.97
7	EC 507741	-	21.5	9.2	10.7	13.8	-	5.41	7.77	7.80	6.44	6.85
8	EC 507742	11.7	20.5	4.1	12.2	12.1	6.35	5.52	7.60	6.85	6.20	6.50
9	EC 507743	3.5	17.0	5.2	10.2	9.0	6.16	5.18	6.93	8.05	6.29	6.52
10	EC 507744	7.5	25.5	8.4	8.0	12.4	6.34	5.42	8.33	8.35	6.53	7.00
11	EC 507746	7.3	15.0	6.9	6.9	9.0	6.50	5.66	6.63	8.60	6.30	6.74
12	EC 507747	18.9	22.5	5.2	7.4	13.5	6.11	5.04	5.50	8.40	6.50	6.31
13	EC 507748	0.9	22.5	7.0	8.1	9.6	6.09	5.54	6.30	7.95	6.19	6.41
14	EC 507749	6.3	23.5	6.5	12.5	12.2	6.04	4.93	7.43	7.45	5.90	6.35
15	IC 411824	3.3	17.0	-	15.8	12.0	5.94	5.01	-	7.80	6.37	6.28
16	IC 411825	1.3	24.5	-	13.0	12.9	6.17	5.51	-	7.35	6.27	6.32
17	IC 7213	4.2	-	3.8	-	4.0	7.03	-	6.65	-	-	6.84
18	IC 7958	2.0	-	5.8	-	3.9	6.66	-	7.80	-	-	7.23
19	IC 7959	0.6	-	3.8	-	2.2	7.14	-	6.63	-	-	6.89

S. No	Accessions	Seed yield (g)					Seed Vol. Wt. (g/10ml)				
		Bhubaneswar	Delhi	Hisar	SK Nagar	Mean	Bhubaneswar	Delhi	Hisar	Ludhiana	SK Nagar
20	IC 7960	0.6	-	4.9	-	2.8	6.44	-	7.93	-	-
21	IC 7961	1.0	-	3.8	-	2.4	7.16	-	7.73	-	-
22	IC 7962	1.1	-	5.7	-	3.4	6.85	-	7.10	-	-
	Minimum	0.3	11.0	3.7	6.9	2.0	5.8	4.9	5.5	6.9	5.9
	Maximum	18.9	28.0	10.6	15.8	13.8	7.2	5.7	8.3	8.6	6.5
	Mean	4.1	20.1	5.7	10.0	7.9	6.4	5.4	7.1	7.8	6.3
											6.7

Table 34: Evaluation of germplasm in Kalingada at Bhubaneswar Rabi 2016-17 (Plains)

S No	Genotype	Fruit Dia (cm)	Single Fruit weight (g)	No of fruits /plant	No of fruits (9 plants)	Days to 1st fruiting	Total fruit weight (kg)	Seed weight/plot (kg)	100-seed weight (g)	Single fruit seed weight (g)
1	SKGPK 1	31.20	610.0	2.00	17.00	41	5.50	0.220	7.09	20.0
2	SKGPK 2	28.00	400.0	2.00	21.00	36	4.10	0.240	6.93	20.0
3	SKGPK 3	26.40	312.0	2.00	16.00	34	2.60	0.110	7.11	10.0
4	SKGPK 4	31.20	520.0	4.00	33.00	41	5.70	0.690	7.06	40.0
5	SKGPK 5	38.00	418.0	2.00	19.00	34	3.60	0.220	6.86	20.0
6	SKGPK 6	31.00	522.0	1.00	10.00	32	3.50	0.110	7.04	10.0
7	SKGPK 7	29.40	522.0	2.00	15.00	40	3.00	0.280	7.12	30.0
8	SKGPK 8	29.00	366.0	2.00	22.00	36	4.20	1.030	7.21	120.0
9	SKGPK 9	27.20	282.0	2.00	19.00	40	3.00	0.230	6.94	130.0
10	SKGPK 10	29.80	396.0	1.00	13.00	30	3.10	0.010	6.98	30.0
11	SKGPK 11	26.60	150.0	1.00	4.00	34	0.50	0.270	7.01	10.0
12	SKGPK 12	30.20	428.0	2.00	16.00	30	4.50	0.170	6.95	20.0
13	SKGPK 13	25.60	240.0	1.00	11.00	36	1.50	0.330	6.97	20.0
14	SKGPK 14	30.20	476.0	2.00	16.00	34	4.90	0.330	7.08	30.0
15	SKGPK 15	18.60	86.0	1.00	4.00	30	0.40	0.010	7.15	10.0
	GK-1	25.80	519.00	1.50	14.00	35.00	3.00	0.29	7.15	35.0
	SKNK 1102	24.90	440.50	2.00	18.50	36.00	3.95	0.99	7.46	35.0
	Minimum	18.60	86.00	1.00	4.00	30.00	0.40	0.01	6.86	10.0
	Maximum	38.00	610.00	4.00	33.00	41.00	5.70	1.03	7.46	130.0
	Mean	28.42	393.38	1.79	15.79	35.24	3.36	0.32	7.06	34.71
	CD (0.05)									
	CV (%) Error									
	CV (%) Phen.	14.079	35.936	40.696	42.987	10.356	45.216	91.934	1.9436	101.8

Table 35: Promising lines in Kalingada germplasm at Bhubaneswar Rabi 2016-17 (Plains)

S. No	Characters	Range		Promising lines	Value of best check
		Min	Max		
I	OUA&T Bhubaneswar (15 accessions)				
1	Days to 1st fruiting	30.00	41.00	SKGPK 12 (30), SKGPK 10 (30), SKGPK 15 (30), SKGPK 6 (32)	GK-1 (35)
2	Fruit Diameter (cm)	18.60	38.00	SKGPK 5 (38.0), SKGPK 1 (31.2), SKGPK 4 (31.2), SKGPK 6 (31.0)	GK-1 (25.8)
3	Average Fruit weight (g)	86.00	610.00	SKGPK 1 (610.0), SKGPK 6 (522.0), SKGPK 7 (522.0), SKGPK 4 (520.0)	GK-1 (519.0)
4	No of fruits/plant	1.00	4.00	SKGPK-4 (4)	SKNK 1102 (2.00)
5	100-seed weight (g)	6.86	7.46	N.A	SKNK 1102 (7.46)
6	Single fruit seed weight (g)	10.0	130.0	SKGPK 8 (120.0), SKGPK 9 (130.0)	SKNK 1102 (35.00)

2.3. Germplasm Conservation

A total of 48 accessions including amaranth (7), amaranth-vegetable (4), Job's tear (5), Perilla (8) Lamb's quarter (1) were conserved in National Gene Bank at NBPGR New Delhi.

2.4 Germplasm Supply

The seed/planting material of potential crops was supplied with in the country under Material Transfer Agreement (MTA) and GEX 01 Forms. During the period a total of 462 accessions of potential crops were supplied to the ICAR Institutes/SAUs and other users in India based on specific requests received.

S No.	Crop	No. of accn.	Indentor	Source
1	<i>Amaranth</i>	50	SKUAST-K, Srinagar	ICAR-NBPGR Shimla
2	<i>Chenopodium quinoa</i>	30	COH, Halladkari Farm Road, Bidar; ICAR-CSSRI, Karnal; UAS, Vijaypur, Karnataka	ICAR-NBPGR Shimla
3	<i>Chenopodium</i>	271	ICAR-NBPGR, Shimla	GED, ICAR-NBPGR, New Delhi
4	<i>Moringa oleifera</i>	5	UHS, Arabhawi, Bagalkot	ICAR-NBPGR, Srinagar
5	<i>Vicia faba</i>	50	ICAR-NBAIR, Bangalore	AICRN -Potential Crops, New Delhi
6	<i>Buckwheat</i>	50	ICAR-NBAIR, Bangalore	ICAR-NBPGR Shimla
7	<i>Perilla frutescens</i>	01	ICAR-NRC PB, Pusa, New Delhi	ICAR-NBPGR, New Delhi

III. CROP IMPROVEMENT

The promising lines identified in the economically important indigenous as well as introduced plant species are included in the coordinated testing programme. Results of Initial Varietal Trial (IVT) and Advanced Varietal Trials (AVT-I & II) in two important crops i.e. grain amaranth and faba bean, conducted during *Rabi* 2016-17 in the hills and plains are presented below:

3.1 HILLS

3.1.1 FABA BEAN (*Vicia faba*)

Faba bean is grown in the hills mainly for its protein rich green pods and seeds which are used as vegetable/pulse/feed. An Initial Varietal Trial (IVT) and Advanced Varietal Trials (AVT-I&II) were proposed to be conducted at Palampur and Ranichauri and Pasighat. Results have been received from all the three centres.

3.1.1.1 *Initial Varietal Trial (IVT)*

The Initial Varietal Trial (IVT) comprising thirteen entries along with two checks was conducted at two locations. Experimental details for different centres have been presented in Table 36.

Significant differences were observed among the entries for seed yield at Palampur centre (Table 37). Seed yield levels were quite low at Ranichauri (3.37 q/ha). Faba bean cv. Vikrant at Palampur and cv. HFB-1 at Ranichauri center were the best checks. Though none of the entries could produce significantly higher yield at any of the locations, yet entries HB-19, HB-32 and HB 11-38 yielded higher than the best check at Palampur. The mean seed yield over locations was also higher in these entries compared to the trial mean.

Plant height (Table 38) was more at Palampur with an average height of - 49.09 cm as against 29.69 cm at Ranichauri centre. Vikrant was the best check at both the centers. Entry HB 11-15 was significantly taller than the best check at Palampur center. None of the entries at Ranichauri center was taller than the best check.

Average number of days taken for 50% flowering were less at Palampur (84.69 days) compared to 116.00 days at Ranichauri center (Table 39). Faba

bean cv. Vikrant at Palampur and HFB-1 at Ranichauri were the best checks for this trait. All the entries tested except HB-19, HB 11-30 and HB 11-32 at Palampur flowered significantly earlier than the best check while at Ranichauri none of the entries was early than the best check. On the basis of average over locations, entry HB-50 (97.83 days) was recorded to be earliest in flowering.

Similarly, average number of days required for 80% maturity were less at Palampur (146.52 days) as against 179.52 days at Ranichauri (Table 40). None of the entries evaluated was found to be early maturing than the best checks Vikrant and HFB-1 at Palampur and Ranichauri centers, respectively. However, based on the average over two locations, entry HB-50 was earliest in maturity (160.50 days).

Faba bean cv. Vikrant was best check at both the locations for pod length (Table 41). Two entries i.e. HB 11-12 and HB-20 had significantly longer pods than the best check at Palampur center. Based on average over locations entry HB-11-38 had longest pods (4.23 cm).

Significant variations were observed among the entries with respect to green pod yield at Palampur (Table 42). Entry HB-19 produced significantly higher pod yield (80.10q/ha) than the check Vikrant while entry HB-11-32 produced pod yield at par with the check Vikrant (62.97 q/ha).

Faba bean cv. Vikrant was the best check at both the locations for test weight. The mean test weight was higher at Ranichauri (29.33g) centre as against 27.43 g at Palampur centre (Table 43). Entry HB-69 at Palampur center produced significantly higher test weight than the best check. However, on the basis of average over two locations, entry HB-11-32 had the highest 100 seed weight (31.18g) followed by the entry HB-11-38 (30.41g).

3.1.1.2 Advanced Varietal Trial (AVT-I & II)

The advanced Varietal Trials (AVT-I & II) comprising six entries along with two checks were conducted at three locations. The experimental details are presented in Table 44.

Significant differences were observed among the entries for seed yield at Palampur centre (Table 45). Mean seed yield levels were quite low at both Ranichauri (4.30 q/ha) and Pasighat (4.28 q/ha) centers. Faba bean cv. Vikrant at Palampur center and cv. HFB-1 at Ranichauri and Pasighat centers were the best check. None of the entries tested could yield higher than the respective best

check at any of the locations. However, entries HB-122 and HB-186 yielded at par with the best check at Palampur center.

Plant height (Table 46) was maximum at Palampur with an average height of 42.06 cm, while it was the lowest at Ranichauri (30.13 cm) centre. Vikrant was best check at Ranichauri center while HFB-1 was best at Palampur and Pasighat centers. None of the entries tested was taller than the respective best check at any of the locations.

Flowering time was minimum at Pasighat (51.83 days) and maximum at Ranichauri (115.89 days) showing over 60 days difference between the two centres (Table 47). Check HFB-1 was earliest to flower across the locations. None of the entries tested was found to be better than the best check at any of the locations.

Maturity period was shortest at Palampur (143.29 days) and longest (186.81 days) at Ranichauri (Table 48). There was a difference of more than 40 days in maturity between Ranichauri and Palampur centres. All the entries evaluated were at par with the respective best check at both the locations.

Significant variations were observed among the entries with respect to green pod yield at Palampur (Table 49). Pod yield of the check HFB-1 (83.33 q/ha) was the highest followed by entry NDF-10 (74.08 q/ha).

The mean 100-seed weight was the highest at Ranichauri (28.90 g) centre and lowest at Palampur (26.34 g) centre (Table 50). Check Vikrant at Palampur and Ranichauri centers and HFB-1 at Pasighat center were the best checks. None of the entries tested had significantly higher test weight than the respective best check. On the basis of average over three locations, entry HB-122 had the highest 100 seed weight (29.81 g).

Table 36: Experimental Details for IVT of Faba bean Rabi 2016-17: Hills

S. No	Items/Centre	Palampur	Ranichauri
1.	No. of entries	13	15
2.	No. of Check	1	2
3.	Design	RBD	RBD
4.	No of Replication	4	3
5.	Number of Row	4	4
6.	Row length (m)	3	3
7.	Row spacing (cm)	30.0	30.0
8.	Plant spacing (cm)	-	-
9.	NPKS (Kg/ha)	-	-
10.	Plot size (m ²)	3.0x1.2	3.0X 1.2
11.	Sowing Date	26.04.17	25.11.2016
12	Harvesting Period	-	-

Table 37: Grain yield (q/ha) in Initial Varietal Trial (IVT) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Mean
1	EC 024312	19.14	3.86	11.50
2	HB-11-12	17.49	3.38	10.44
3	HB-11-15	16.47	3.57	10.02
4	HB-11-30	19.51	1.91	10.71
5	HB-11-32	15.29	2.84	9.06
6	HB-11-38	23.11	2.97	13.04
7	HB-19	22.54	2.98	12.76
8	HB-20	17.11	3.96	10.54
9	HB-32	22.64	2.29	12.46
10	HB-50	14.26	3.70	8.98
11	HB-60	16.29	3.24	9.76
12	HB-69	17.95	3.68	10.82
13	IC 011726	13.99	-	13.99
14	Vikrant (C)	20.80	3.96	12.38
15	HFB - 1 (C)	-	4.77	4.77
Mean		18.33	3.37	10.85
CD (0.05)		2.94	0.78	-
CV (%) Error		9.55	13.74	-

Table 38: Plant height (cm) in Initial Varietal Trial (IVT) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Mean
1	EC 024312	49.33	29.10	39.22
2	HB-11-12	51.03	31.70	41.37
3	HB-11-15	60.10	29.70	44.90
4	HB-11-30	53.13	29.10	41.12
5	HB-11-32	44.80	22.10	33.45
6	HB-11-38	46.87	25.30	36.08
7	HB-19	51.97	28.30	40.13
8	HB-20	47.10	27.80	37.45
9	HB-32	49.33	31.90	40.62
10	HB-50	41.60	30.10	35.85
11	HB-60	42.10	26.70	34.40
12	HB-69	48.93	29.80	39.37
13	IC 011726	50.53	-	50.53
14	Vikrant (c)	50.40	39.00	44.70
15	HFB - 1 (C)	-	35.10	35.10
Mean		49.09	29.69	39.39
CD (0.05)		8.52	-	-
CV (%) Error		10.34	-	-

Table 39: Days to 50% flowering in Initial Varietal Trial (IVT) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Mean
1	EC 024312	83.33	119.70	101.52
2	HB-11-12	80.33	118.70	99.52
3	HB-11-15	84.33	114.50	99.42
4	HB-11-30	88.33	117.70	103.02
5	HB-11-32	87.00	119.70	103.35
6	HB-11-38	82.33	117.00	99.67
7	HB-19	86.67	114.00	100.33
8	HB-20	83.00	114.70	98.85
9	HB-32	85.00	115.70	100.35
10	HB-50	82.67	113.00	97.83
11	HB-60	85.00	118.70	101.85
12	HB-69	84.00	116.70	100.35
13	IC 011726	85.33	-	85.33
14	Vikrant (C)	88.33	117.50	102.92
15	HFB - 1 (C)	-	113.00	113.00
Mean		84.69	116.47	100.58
CD (0.05)		2.10	-	-
CV (%) Error		1.48	-	-

Table 40: Days to 80% maturity in Initial Varietal Trial (IVT) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Mean
1	EC 024312	144.67	182.00	163.33
2	HB-11-12	146.33	181.00	163.67
3	HB-11-15	145.33	178.50	161.92
4	HB-11-30	146.00	180.50	163.25
5	HB-11-32	148.67	182.50	165.58
6	HB-11-38	146.67	180.50	163.58
7	HB-19	147.67	178.50	163.08
8	HB-20	149.00	177.50	163.25
9	HB-32	144.67	178.70	161.68
10	HB-50	145.00	176.00	160.50
11	HB-60	145.33	180.50	162.92
12	HB-69	147.00	179.70	163.35
13	IC 011726	149.33	-	149.33
14	Vikrant (C)	145.67	180.70	163.18
15	HFB - 1 (C)	-	176.70	176.70
Mean		146.52	179.52	163.02
CD (0.05)		2.36	-	-
CV (%) Error		0.96	-	-

Table 41: Pod length (cm) in Initial Varietal Trial (IVT) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Mean
1	EC 024312	4.50	3.40	3.95
2	HB-11-12	5.27	3.10	4.18
3	HB-11-15	4.47	3.70	4.08
4	HB-11-30	4.87	3.10	3.98
5	HB-11-32	4.83	2.70	3.77
6	HB-11-38	4.87	3.70	4.28
7	HB-19	4.73	3.30	4.02
8	HB-20	5.07	3.40	4.23
9	HB-32	4.37	3.40	3.88
10	HB-50	4.03	3.90	3.97
11	HB-60	4.13	3.10	3.62
12	HB-69	4.50	3.30	3.90
13	IC 011726	4.20	-	4.20
14	Vikrant (C)	4.27	3.90	4.08
15	HFB - 1 (C)	-	3.40	3.40
Mean		4.58	3.39	3.98
CD (0.05)		0.65	-	-
CV (%) Error		8.48	-	-

Table 42: Green Pod yield (q/ha) in Initial Varietal Trial (IVT) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Mean
1	EC 024312	60.19	-	60.19
2	HB-11-12	44.45	-	44.45
3	HB-11-15	50.00	-	50.00
4	HB-11-30	59.26	-	59.26
5	HB-11-32	62.97	-	62.97
6	HB-11-38	60.19	-	60.19
7	HB-19	80.10	-	80.10
8	HB-20	36.11	-	36.11
9	HB-32	43.99	-	43.99
10	HB-50	55.56	-	55.56
11	HB-60	51.86	-	51.86
12	HB-69	50.47	-	50.47
13	IC 011726	58.34	-	58.34
14	Vikrant (c)	62.97	-	62.97
15	HFB - 1 (C)	-	-	-
Mean		55.46	-	55.46
CD (0.05)		13.97	-	-
CV (%) Error		15.01	-	-

Table 43: 100 seed weight (g) in Initial Varietal Trial (IVT) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Mean
1	EC 024312	26.70	26.70	26.70
2	HB-11-12	23.82	29.60	26.71
3	HB-11-15	26.34	29.50	27.92
4	HB-11-30	28.60	30.40	29.50
5	HB-11-32	30.86	31.50	31.18
6	HB-11-38	28.42	32.40	30.41
7	HB-19	29.80	28.60	29.20
8	HB-20	25.63	30.60	28.11
9	HB-32	25.14	29.40	27.27
10	HB-50	24.94	27.60	26.27
11	HB-60	28.21	29.30	28.75
12	HB-69	33.47	26.70	30.09
13	IC 011726	25.51	-	25.51
14	Vikrant (C)	26.53	30.60	28.57
15	HFB-1 (C)	-	27.70	27.70
Mean		27.43	29.33	28.38
CD (0.05)		5.31	-	-
CV (%) Error		11.53	-	-

Table 44: Experimental Details for AVT-I of Faba bean Rabi 2016-17: Hills

S. No	Items/Centre	Palampur	Ranichauri	Pasighat
1.	No. of entries	3	2	2
2.	No. of Checks	2	2	2
3.	Design	RBD	RBD	RBD
4.	No of Replication	3	3	3
5.	Number of Rows	6	4	4
6.	Row length (m)	3	3	2
7.	Row spacing (cm)	30	30	30
8.	Plant spacing (cm)	10	10	10
9.	NPKS (Kg/ha)	-	-	40:20:20:20 + FYM 8t/ha
10.	Plot size (m)	3.0x1.8	3.0X1.2	1.2 x 2
11.	Sowing Date	18.11.16	03.12.2016	22/11/2016
12	Harvesting Period	-	-	10-20 April, 2017

Table 45: Grain yield (q/ha) in Advanced Varietal Trial (AVT-I & II) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Pasighat	Mean
	AVT-I				
1	HB-195	12.59	3.70	3.47	6.59
2	HB-214	16.05	4.90	3.77	8.24
3	HPFB-2	-	3.30	-	3.30
	AVT-II				
4	HB-122	17.84	3.90	5.08	8.94
5	HB-186	17.90	5.80	3.99	9.23
6	NDF-10	13.45	-	-	13.45
7	Vikrant (C)	17.40	2.50	3.69	7.86
8	HFB - 1 (C)	14.94	6.00	5.70	8.88
	Mean	15.74	4.30	4.28	8.31
	CD (0.05)	2.85	0.36	-	-
	CV (%) Error	10.16	4.66	-	-

Table 46: Plant height (cm) in Advanced Varietal Trial (AVT-I & II) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Pasighat	Mean
	AVT-I				
1	HB-195	44.53	26.30	31.70	34.18
2	HB-214	42.47	24.50	34.20	33.72
3	HPFB-2	-	32.50	-	32.50
	AVT-II				
4	HB-122	36.87	26.30	34.70	32.62
5	HB-186	47.30	24.50	28.80	33.53
6	NDF-10	44.63	-	-	44.63
7	Vikrant (C)	34.90	40.50	34.20	36.53
8	HFB - 1 (C)	43.73	36.30	37.50	39.18
	Mean	42.06	30.13	33.52	35.86
	CD (0.05)	6.80	-	-	-
	CV (%) Error	9.09	-	-	-

Table 47: Days to 50% flowering in Advanced Varietal Trial (AVT-I & II) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Pasighat	Mean
	AVT-I				
1	HB-195	88.67	114.30	51.30	84.76
2	HB-214	87.00	115.00	52.70	84.90
3	HPFB-2	-	117.10	-	117.10
	AVT-II				
4	HB-122	89.33	115.00	52.70	85.68
5	HB-186	88.33	116.50	56.70	87.18
6	NDF-10	87.67	-	-	87.67
7	Vikrant (C)	91.33	117.00	50.30	86.21
8	HFB - 1 (C)	87.33	116.30	47.30	83.64
	Mean	88.52	115.89	51.83	89.64
	CD (0.05)	2.75	-	-	-
	CV (%) Error	1.75	-	-	-

Table 48: Days to maturity in Advanced Varietal Trial (AVT-I & II) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Pasighat	Mean
	AVT-I				
1	HB-195	142.67	187.30	-	164.98
2	HB-214	143.67	188.00	-	165.83
3	HPFB-2	-	190.30	-	190.30
	AVT-II				
4	HB-122	142.67	180.00	-	161.33
5	HB-186	142.00	181.50	-	161.75
6	NDF-10	142.00	-	-	142.00
7	Vikrant (C)	144.33	191.30	-	167.82
8	HFB - 1 (C)	145.67	189.30	-	167.48
	Mean	143.29	186.81	-	165.19
	CD (0.05)	2.90	-	-	-
	CV (%) Error	1.14	-	-	-

Table 49: Pod yield (q/ha) in Advanced Varietal Trial (AVT-I & II) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Pasighat	Mean
	AVT-I				
1	HB-195	68.52	-	-	68.52
2	HB-214	66.05	-	-	66.05
	AVT-II				
3	HB-122	66.91	-	-	66.91
4	HB-186	70.37	-	-	70.37
5	NDF-10	74.08	-	-	74.08
6	Vikrant (C)	58.33	-	-	58.33
7	HFB - 1 (C)	83.33	-	-	83.33
	Mean	69.66	-	-	69.66
	CD (0.05)	13.62	-	-	-
	CV (%) Error	10.99	-	-	-

Table 50: 100 seed weight (g) in Advanced Varietal Trial (AVT-I & II) on Faba bean: Rabi 2016-17 (Hills)

S. No.	Genotypes	Palampur	Ranichauri	Pasighat	Mean
	AVT-I				
1	HB-195	27.16	27.60	27.90	27.55
2	HB-214	29.57	28.50	23.50	27.19
3	HPFB-2	-	29.60	-	29.60
	AVT-II				
4	HB-122	25.54	29.50	34.40	29.81
5	HB-186	22.62	27.80	31.10	27.17
6	NDF-10	24.02	-	-	24.02
7	Vikrant (C)	28.66	30.60	24.80	28.02
8	HFB - 1 (C)	26.79	28.70	27.60	27.70
	Mean	26.34	28.90	28.22	27.63
	CD (0.05)	3.05	-	-	-
	CV (%) Error	6.51	-	-	-

3.2 PLAINS

The varietal evaluation programmes constituted in grain amaranth at eight centres and faba bean at seven locations were conducted during *Rabi* 2016-17 season in the plains region. The details of results obtained in IVT, AVT-I and AVT-II are as follows:

3.2.1 Grain Amaranth (*Amaranthus spp.*)

3.2.1.1 Initial Varietal Trial (IVT): Rabi 2016-17

The Initial Varietal Trial comprising 19 entries and four checks was conducted at eight locations. Results have been received from all the centres. The experimental details have been presented in Table 51.

Significant differences were observed for grain yield at different centres (Table 52). Grain yield levels were highest at S.K. Nagar (20.25 q/ha) followed by Rahuri (18.67 q/ha) and Ambikapur (17.21 q/ha) centres. The grain yield at Faizabad and Mandor centres were very low, so the results have not been included in overall mean. Check GA-2 was the best check at Ambikapur, Bhubaneswar, Rahuri and SK Nagar; Suvarna at Delhi and Ranchi centers. Entries BGA-10, BGA-20, RHGA-13-2, RHGA-13-3, RMA-61 at Ambikapur; BGA-10, BGA-14, RGAG 12-22, RHGA 13-3 at Bhubaneswar; RGAG 12-22 at Delhi; BGA 10, BGA-20, RGAG 12-22, RHGA 13-3, RMA-60, RMA-61, SKNA 12-01, SKNA 13-13 at Ranchi and BGA-9, BGA-20, SKNA 12-01 and SKNA 13-13 at SK Nagar yielded significantly higher than the respective best controls. The overall average performance at six locations showed that the best entry was RGA-15 (18.56 q/ha), followed by SKNA-13-13 (17.63 q/ha) and RGAG 12-22 (17.29 q/ha).

Plant height (Table 53) was the highest at S.K. Nagar (154.25 cm) and lowest at Ranchi (66.91 cm). Check Suvarna was the best check at Ambikapur, Delhi, Bhubaneswar and SK Nagar centers, while RMA-7 at Ranchi and BGA-2 at Faizabad, Mandor and Rahuri centers were best checks for plant height. Entries BGA-10, RHGA 13-2, RHGA 13-3, RHGA 13-4 at Bhubaneswar; BGA-10, BGA-14, RHGA 13-2, RHGA 13-3, RMA-60 at Delhi; BGA-10, BGA-14, RHGA 13-3, RHGA 13-4, RMA-60, RMA-61 at Faizabad; BGA-10, BGA-14, KBGA-6, MGA-502, RGA-13, RGA-15 at Rahuri and BGA-10, RHGA 13-2, RHGA 13-4 were significantly dwarf than the respective best

controls at these locations.

Days to 50% Flowering were minimum at Bhubaneswar (46.28 days) followed by Mandor (47.25 days), while these were maximum at Ranchi (91.38 days) centre (Table 54). Check GA-2 was the best check at all the locations except at Faizabad where RMA-7 was best and Ambikapur and Mandor where Suvarna was best. Entries BGA 9, BGA-10, BGA-14, RGAG 12-22, RHGA 13-2, RHGA 13-3, RHGA 13-4 at Bhubaneswar; BGA-10, RHGA 13-2, RHGA 13-3, RHGA 13-4 at Delhi; BGA-10, BGA-14, BGA-20, RGAG 12-22, RHGA 13-3, RMA 61 at Faizabad; BGA-9, BGA-10, BGA-20, MGA-502, RGA-15, RGAG-12-22, RHGA 13-2, RHGA 13-3, RHGA 13-4, SKNA 12-01, SKNA 13-13 at Rahuri and BGA-9, BGA-10, BGA-14, BGA-20, RGAG 12-22, RHGA 13-2, RHGA 13-3, RHGA 13-4 and RMA-61 at SK Nagar flowered significantly earlier than the respective best controls. On the basis of average over locations BGA-9 flowered earliest in 46.91 days.

Days to 80% maturity (Table 52) were lowest at Bhubaneswar (93.37 days) followed by S.K. Nagar (105.28 days). Check BGA-2 at Ambikapur, Delhi; GA-2 at Mandor, Rahuri; RMA-7 at Faizabad, Ranchi and Suvarna at Bhubaneswar and SK Nagar were best checks. Entries RHGA 13-2, RHGA 13-3, RHGA 13-4 at Bhubaneswar; RMA-61 at Faizabad; RGA-13 and RGA-15 at Mandor; BGA-9, BGA-10, BGA-20, MGA-502, RGA-15, RHGA 13-2, RHGA 13-4 and SKNA 13-13 at Rahuri and BGA-14, RGAG 12-22, RHGA 13-2 and RHGA 13-3 matured significantly earlier than the respective best checks. Entry MGA-507 (105.00 days) was the earliest maturing line followed by MGA-502 (105.91 days) and BGA-9 (107.74 days) based on average over locations.

Inflorescence length (Table 56) of the entries was the longest at Rahuri (60.97 cm). Amaranth cv. GA-2 was the best check for inflorescence length at all the locations tested except at Bhubaneswar and Faizabad where BGA-2 and Suvarna were the best checks, respectively. Entries RGAG 12-22, RHGA 13-2, RHGA 13-4 at Ambikapur and RMA-60 at Faizabad had significantly longer inflorescence length than the respective best checks at these locations. Based on the average over the locations entry BGA-9 (52.79 cm) had the longest inflorescence, followed by RGAG 12-22 (52.65 cm).

Test weight (Table 57) as measured by the weight of 10 ml seed showed

maximum mean value at Ranchi (8.70 g) and minimum at Mandor (5.55 g). None of the entries possesses higher seed weight than the respective best checks at any of the locations evaluated except entries RHGA 13-4 and SKNA 12-01 at Rahuri which had significantly higher test weight than the best check BGA-2. Based on the average over the locations entry MGA-507 had the highest seed volume weight (7.83 g) followed by SKNA 12-01 (7.56 g).

3.2.1.2 Advanced Varietal Trial (AVT-I): Rabi 2016-17

The experimental details of AVT-I conducted during Rabi 2016-17 have been presented in Table 58. In this trial, five entries in AVT-I along with four checks were tested at eight locations. The results have been received from all the centres.

Significant differences were observed among the entries for grain yield (Table 59) at different centres. Grain yield was high at Rahuri (20.46 q/ha) and Ambikapur (20.14 q/ha) and low at Faizabad (3.75 q/ha) and Mandor (5.96 q/ha). Therefore, the results of Faizabad and Mandor centres were not included in overall mean due to poor yield. Amaranth cv. BGA-2 at Bhubaneswar; GA-2 at Rahuri, Ranchi and SK Nagar; RMA-7 at Bhubaneswar and Suvarna at Ambikapur and Delhi were best checks for grain yield. Entries BGA-7, BGA 10-1 at Bhubaneswar; BGA-7, SKGPA-61 at Rahuri; RGA-14, SKGPA-61, SKNA-1207 at Ranchi and SKGPA-61 at SK Nagar yielded significantly higher than the respective best checks. Based on the average performance over six locations entry BGA-7 was the highest yielder (16.38 q/ha) followed by entry RGA-14 (16.17 q/ha).

Average plant height of the entries (Table 60) was the highest at Rahuri (149.20 cm) followed by S.K. Nagar (147.12 cm). It was the lowest at Ranchi (62.89 cm) centre. Amaranth cv. BGA-2 at Rahuri; GA-2 at Bhubaneswar, Delhi and Ranchi; RMA-7 at Ambikapur, Mandor and Suvarna at Faizabad and SK Nagar were the best checks. All the entries tested at Ambikapur except RGA-14; entries BGA-7 at Bhubaneswar; BGA 10-1 at Delhi, Rahuri and SK Nagar; SKGPA-61 at Faizabad, and BGA-7 and BGA 10-1 at Mandor were significantly dwarfer than the respective best checks. Based on average performance over eight locations entry BGA-10-1 had the lowest plant height (92.60 cm).

Flowering time showed considerable variation among the locations as well as

among the entries within a location. The mean flowering time was the shortest (47.30 days) at Bhubaneswar and S.K. Nagar (51.37 days) while it was the longest at Ranchi (95.59 days) centre (Table 61). Amaranth cv. GA-2 flowered earliest at all the locations except at Mandor where BGA-2 was the best check. Entries BGA-7, BGA 10-1 at Bhubaneswar; BGA 10-1, SKGPA-61, SKNA 1207 at Delhi; SKNA 1207 at Faizabad; BGA-7, BGA 10-1, RGA-14 at Rahuri and BGA-7, BGA 10-1 and SKNA-1207 at SK Nagar flowered significantly earlier than the respective best checks. Entry, BGA-10-1 showed consistency for early flowering and ranked first (61.92 days) based on the overall performance across the locations.

The average maturity period was minimum at Bhubaneswar (98.04 days), while it was the longest at Ranchi (157.94 days). The average maturity period of the entries over all the locations was 125.44 days (Table 62). Amaranth cv. BGA-2 at Bhubaneswar and Faizabad; GA-2 at Rahuri and SK Nagar; RMA-7 at Mandor and Ranchi and Suvarna at Ambikapur and Delhi were the best checks. All the entries tested except BGA-7 at Delhi; entries BGA-7, BGA 10-1 at Faizabad; BGA 10-1 at Faizabad and BGA-7, BGA 10-1 and SKGPA-61 at SK Nagar matured significantly earlier than the respective best checks. Entry BGA-10-1 was earliest in maturity (121.95 days) based on overall performance across the locations.

The length of inflorescence (Table 33) of the entries was the highest at Rahuri (67.46 cm) followed by Ambikapur (56.93 cm). None of the entries tested had inflorescence length significantly longer than the respective best check across the locations.

Test weight (Table 64) expressed in terms of weight of 10 ml seed recorded at seven centres showed that it was the highest at Ranchi (8.49 g) and lowest at Mandor (5.52 g). The variation among the entries was relatively low. None of the entries tested had significantly higher test weight except SKGPA-61 at SK Nagar who had significantly higher weight than the best check GA-2.

3.2.1.3 Advanced Varietal Trial (AVT-II): Rabi 2016-17

The experimental details of AVT-II conducted during rabi season have been presented in Table 65. In this trial, three AVT-II entries along with four checks were tested at eight locations. The results have been received from all centres. The result of Faizabad and Mandor centre were not included in overall mean due to poor yield. The performance of the entries as compared to the checks has been given in Table

66. Amaranth cv. GA-2 at Rahuri, Ranchi and SK Nagar; RMA-7 at Ambikapur and Suvarna at Bhubaneswar and Delhi were best checks. Entries BGA-9 at Ambikapur, Bhubaneswar and Rahuri and KBGA-4 at Ambikapur, Rahuri and Ranchi yielded significantly higher than the respective best checks. Based on the overall mean performance in respect of grain yield over six locations, entry BGA-4-9 produced highest grain yield (17.04 q/ha) followed by KBGA-4 (16.92 q/ha).

Average plant height of the entries (Table 67) was the maximum at S.K. Nagar (162.85 cm) followed by Rahuri (160.73 cm). It was the lowest at Ranchi (62.76 cm) centre. None of the entries tested was found dwarf than the respective best check at any of the locations except KBGA-4 at Bhubaneswar and SK Nagar which was significantly dwarf than the respective best checks Suvarna and RMA-7.

Flowering time showed considerable variation among the locations. The mean flowering time was the shortest (43.29 days) at Bhubaneswar and S.K. Nagar (49.76 days) while it was the longest at Ranchi (94.76 days) centre (Table 68). Amaranth cv. GA-2 flowered earliest at all the centres except at Ambikapur and Mandor where Suvarna and RMA-7 flowered earlier respectively. Entries BGA 4-9 at Ambikapur, Bhubaneswar, Faizabad and SK Nagar; KBGA-4 at all centers except Delhi and Mandor and KBGA-5 at Bhubaneswar, Rahuri and SK Nagar flowered significantly earlier than the respective best checks.

The average maturity period of the entries over all the locations was 126.29 days (Table 69). The average maturity period was the minimum at Bhubaneswar (98.76 days), while it was the longest at Ranchi (156.48 days). Entries BGA 4-9 at SK Nagar and KBGA-4 and KBGA-5 at Rahuri matured significantly earlier than the respective best checks.

The length of inflorescence (Table 70) of the entries was the highest at Rahuri (73.17 cm) followed by at S.K. Nagar (57.79 cm). Entry KBGA-5 had significantly longer inflorescence than the best check at Faizabad centre. Based on the average over eight locations, entry KBGA-5 had the longest inflorescence (53.52 cm) also.

Test weight (Table 71) expressed in terms of weight of 10 ml seed recorded at seven centres showed that it was the highest at Ranchi (8.94 g) and lowest at Mandor (5.60 g). The variation among the entries was relatively low. None of the

entries at any of the locations tested possessed significantly higher test weight than the respective best check. However, based on the average over seven locations, entry KBGA-5 (8.00 g) showed the highest test weight.

3.1.2 Faba bean (*Vicia faba*)

The Coordinated Varietal Trials were constituted in faba bean at seven centres. All the trials were conducted at all the centres during *rabi* 2016-17 season.

3.2.2.1 Initial Varietal Trial (IVT): Rabi 2016-17

The Initial Varietal Trial comprising eight entries and two checks was conducted at seven locations. Results have been received from all locations. The experimental details are presented in Table 72.

Significant differences were observed among the entries for seed yield at all the locations. Highest seed yield of faba bean (Table 47) was observed at Hisar (37.50 q/ha), while lowest yield was observed at Delhi (9.34 q/ha). Faba bean cv. Vikrant was the best check at Ambikapur, Delhi, Faizabad and Faridkot centres while HFB-1 was best at Hisar, Ludhiana and Ranchi centres. All the entries evaluated except HB 12-15 and HB 12-37 at Ambikapur; entries NDFB-16, NDFB 16-2 at Faizabad; HB 12-8, HB 12-34, HB 12-37, HB 12-42 at Hisar; HB 12-8, NDFB 16-2 at Ludhiana and HB 12-34, HB 12-42, NDFB 16-1 and NDFB 16-2 at Ranchi yielded significantly higher than the respective best checks. The average over the locations showed that seed yield was the highest in the entry HB-12-37 (24.62 q/ha) followed by HB-12-8 (23.50 q/ha).

Plant height was the highest at Hisar (126.77 cm) followed by Faizabad (85.45 cm) centre (Table 74). Lowest plant height was observed at Delhi (55.33 cm) centre. None of the entries tested across the locations was found to be significantly longer than the best check except NDFB-1 at Faizabad centre.

Flowering time ranged from 58.57 days at Faizabad to 76.80 days at Delhi centre (Table 75). Faba bean cv. Vikrant was the best check at all the centres except at Ambikapur, Hisar and Ranchi where HFB-1 flowered earlier. Entries HB 12-42 at Ambikapur; HB 12-8, HB 12-15, HB 12-34, NDFB-16 at Faizabad; HB 12-8, HB 12-15 at Hisar; HB 12-34, HB 12-37 at Ludhiana flowered significantly earlier than

the respective best checks. Based on the average over the locations HB-12-8 (62.01 days) was the earliest flowering entry.

Maturity period varied among the locations with mean maturity period ranging from 117.45 days at Ranchi to 165.97 days at Hisar centre (Table 76). Faba bean cv. Vikrant was the best check at all the locations tested except at Hisar and Ludhiana where HFB-1 matured earlier. Entries HB 12-34, HB 12-37 at Faridkot; HB 12-8 at Hisar; HB 12-34, HB 12-37 and HB 12-42 at Ludhiana matured significantly earlier than the respective best check. On the basis of overall mean, HB-12-8 (132.70 days) had the earliest maturity.

The test weight was highest at Faridkot (30.60 g) and lowest at Delhi (23.89 g) centre (Table 77). Faba bean cv. Vikrant was the best check for test weight at all the locations tested except at Faizabad and Hisar where HFB-1 was best. Entries HB 12-15, HB 12-37, HB 12-42 at Ambikapur; HB 12-37, HB 12-42 at Delhi; NDFB-16, NDFB 16-1 at Faizabad; HB 12-42 at Faridkot; all the entries tested except HB 12-37, NDFB 16-1 NDFB 16-2 at Hisar and HB 12-8 at Ludhiana had significantly higher test weight than the respective best checks. Based on the average over locations the entry HB-12-42 (29.49 g) had the boldest seed.

3.2.2.2 Advanced Varietal Trials (AVT-I & II): Rabi 2016-17

The advanced Varietal Trials AVT-I & II comprising three entries each and two checks were conducted at seven locations. Results have been received from all locations. The experimental details have been presented in Table 78.

Significant differences were observed among the entries for seed yield at many locations. The highest seed yield was obtained at Hisar (40.65 q/ha) and lowest yield was reported from Delhi (13.26 q/ha, Table 79). Faba bean cv. Vikrant was the best yielder at all the locations tested except at Hisar, Ludhiana and Ranchi where HFB-1 yielded higher. Entries HB 09-16, DFB 14-1 at Ambikapur; all the entries tested except HB 11-15 and DFB 14-1 at Hisar; HB 11-15 at Ludhiana and Ranchi yielded significantly higher than the respective best checks. The average over the locations showed that seed yield was the highest in the entry, HB-11-32 (24.98 q/ha).

Plant height was the highest at Hisar (114.44 cm) followed by Faizabad (93.85 cm) centre (Table 80). Lowest plant height was observed at Delhi (54.85 cm) centre. Faba bean cv. Vikrant was the tallest check at Delhi, Hisar and Ludhiana whereas HFB-1 was best at Ambikapur, Faizabad and Ranchi centres. All the entries tested under AVT-I at Ambikapur and entry HB 11-32 at Ranchi were significantly taller than the respective best checks whereas, entry HB 09-16 of AVT-II at Ambikapur and Faizabad and HB 09-15 at Hisar were significantly taller than the respective best checks. Based on the average over the locations the entry HB-11-32 (81.44 cm) showed the highest plant height.

Flowering time ranged from 58.40 days at Ambikapur to 71.25 days at Delhi centre (Table 81). All the entries tested except DFB 14-1 at Faizabad and HB 11-15 at Hisar flowered significantly earlier than the respective best checks at both these centres. Based on the average over the locations HB-11-12 (61.96 days) of AVT-I and DFB 14-1 (61.13 days) of AVT-II were the earliest flowering entries.

Maturity period varied among the locations with mean maturity period ranging from 116.31 days at Ranchi to 158.25 days at Hisar centre (Table 82). All the entries evaluated except HB 11-12 and HB 11-15 at Ludhiana; HB 09-16 and DFB 14-1 at Hisar; HB 11-12 and HB 09-16 at Faridkot and HB 11-12 at Ambikapur matured significantly earlier than the respective best checks at these locations. On the basis of overall mean, HB-11-12 (133.17 days) of AVT-I and DFB 14-1 (132.04 days) had the earliest maturity.

100 seed weight was the highest at Faridkot (29.43 g) and the lowest at Delhi (24.40 g) centre (Table 83). All the entries tested at Hisar except HB 11-15; all the entries tested at Ambikapur except HB 11-12 and HB 11-32; entry HB 11-15 at Ludhiana and HB 11-12 at Ranchi had significantly higher test weight than the respective best checks at these locations. Based on the average over locations, the entries HB 11-12 and HB 11-32 (27.94 g) in AVT-I and HB 09-15 in AVT-II had the boldest seed.

Table 51: Experimental Details of IVT of grain amaranth Rabi 2016-17 (Plain)

S. No	Items/Centre	Ambikapur	Bhubaneswar	Delhi	Mandor	Rahuri	S.K. Nagar
1.	No. of entry	16	15	11	16	18	16
2.	No. of Check	4	4	3	4	4	4
3.	Design	RBD	RBD	RBD	RBD	RBD	RBD
4.	No of Replication	3	3	3	4	3	3
5.	Number of Row	4	4	4	-	4	4
6.	Row length (m)	-	-	3	-	3.90 m	4.0
7.	Row spacing (cm)	45 cm	45 cm	45 cm	50 cm	45 cm	45 cm
8.	Plant spacing (cm)	15 cm	15 cm	15 cm	15 cm	15 cm	15 cm
9.	NPKS (Kg/ha)	40:40:20:20	60:40:20	60:40:0	60:40:20	40:20:20:20	
10.	Plot size (m ²)	4M X1.8 M	4.0 x 1.8 m	3.0X1.8 m	2.0mx4.0m	1.80 m x 3.90 m	4.0X1.8 m
11.	Sowing Date	9/12/2016	3.12.2016	28/11/2016	8/12/2016	18/11/2016	15/11/2016
12	Harvesting Period	-	-	28-03-2017 – 31-3-2017	-	27/02/2017 - 20/03/2017	

Table 52: Grain yield (q/ha) in Initial Varietal Trial (IVT) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad *	Mandor*	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-9	-	9.03	-	-	3.42	15.48	-	24.72	16.41
2	BGA-10	18.85	10.65	12.69	3.92	2.92	20.04	13.17	17.68	15.51
3	BGA-14	-	11.57	7.53	2.67	4.50	21.97	11.53	24.07	15.34
4	BGA-20	19.52	9.26	8.52	4.00	4.69	19.08	12.97	26.41	15.96
5	KBGA-6	17.66	9.49	-	-	5.29	20.18	-	9.82	14.29
6	KBGA-7	15.31	8.10	-	-	4.00	23.50	-	18.31	16.31
7	MGA-501	15.53	-	-	-	-	15.25	-	-	15.39
8	MGA-502	15.36	8.33	-	-	-	21.46	-	17.54	15.67
9	MGA-507	-	-	-	-	-	-	-	14.93	14.93
10	RGA-13	16.55	-	-	-	5.42	15.05	-	-	15.80
11	RGA-15	16.59	-	-	-	5.10	20.54	-	-	18.56
12	RGAG-12-22	18.59	11.11	18.80	3.92	4.50	19.40	13.50	22.35	17.29
13	RHGA-13-2	19.13	10.19	13.46	3.67	4.71	18.19	9.70	22.21	15.48
14	RHGA-13-3	18.98	10.65	17.19	2.58	5.31	10.13	13.50	23.06	15.58
15	RHGA-13-4	18.64	10.19	14.01	3.03	5.00	15.10	10.67	19.06	14.61
16	RMA-60	15.42	9.49	11.08	3.36	4.58	14.61	11.77	23.26	14.27
17	RMA-61	19.13	8.80	4.85	3.35	3.58	13.49	13.37	20.92	13.42
18	SKNA-12-01	16.51	9.95	10.43	4.33	6.46	22.89	13.23	24.92	16.32
19	SKNA-13-13	16.50	9.49	18.03	4.33	6.38	23.79	11.97	26.00	17.63
20	BGA-2 (C)	15.37	8.80	7.62	4.50	2.23	20.67	10.10	14.41	12.83
21	GA-2 (C)	17.88	8.80	4.54	3.50	4.71	22.19	10.40	21.44	14.21
22	RMA-7 (C)	15.95	8.10	-	4.17	4.46	17.90	8.30	17.55	13.56
23	Suvarna (C)	16.75	8.10	15.59	3.93	3.08	19.85	11.03	16.38	14.62
Mean		17.21	9.44	11.74	3.68	4.52	18.67	11.68	20.25	14.83
CD (0.05)		0.94	1.48	3.05	0.75	1.24	2.55	0.74	3.07	-
CV (%) Error		3.30	9.44	15.49	12.13	17.20	8.28	3.78	9.17	-

*Data of Faizabad and Mandor was not included in overall mean

Table 53: Plant height (cm) in Initial Varietal Trial (IVT) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-9	-	114.53	-	-	103.80	128.83	-	161.73	127.23
2	BGA-10	92.53	100.73	98.80	95.83	76.53	89.23	54.30	130.07	92.25
3	BGA-14	-	120.93	102.73	83.33	92.47	109.67	72.13	154.93	105.17
4	BGA-20	108.67	123.73	114.93	106.67	107.13	138.13	75.40	159.13	116.73
5	KBGA-6	106.27	121.20	-	-	75.60	73.23	-	159.40	107.14
6	KBGA-7	78.47	117.60	-	-	115.40	139.50	-	156.40	121.47
7	MGA-501	88.27	-	-	-	-	151.63	-	-	119.95
8	MGA-502	81.53	124.20	-	-	-	82.20	-	153.80	110.43
9	MGA-507	-	-	-	-	-	-	-	146.53	146.53
10	RGA-13	98.81	-	-	-	85.47	89.47	-	-	91.25
11	RGA-15	86.84	-	-	-	100.27	68.70	-	-	85.27
12	RGAG-12-22	120.20	122.13	116.87	104.00	113.67	157.63	65.87	155.93	119.54
13	RHGA-13-2	91.93	107.93	97.33	108.33	104.80	139.00	62.57	140.80	106.59
14	RHGA-13-3	99.67	100.93	102.80	82.33	96.27	127.37	54.27	152.53	102.02
15	RHGA-13-4	95.93	107.80	104.93	91.00	100.73	158.30	56.33	141.13	107.02
16	RMA-60	81.13	121.53	95.00	92.00	97.93	146.87	71.00	153.47	107.37
17	RMA-61	100.52	116.27	103.13	77.83	101.47	155.20	65.03	156.33	109.47
18	SKNA-12-01	99.48	123.20	113.87	106.00	110.13	153.97	79.27	164.47	118.80
19	SKNA-13-13	106.56	115.13	109.47	100.67	126.73	143.30	62.77	152.47	114.64
20	BGA-2 (C)	90.05	126.60	133.60	102.33	98.00	147.57	80.27	159.07	117.19
21	GA-2 (C)	112.31	123.93	126.40	108.33	107.87	169.10	75.47	168.93	124.04
22	RMA-7 (C)	101.27	125.35	-	118.33	118.60	156.23	60.00	162.20	120.28
23	Suvarna (C)	82.73	123.33	124.07	103.33	105.47	162.53	68.97	155.67	115.76
Mean		96.16	118.29	110.28	98.69	101.92	131.26	66.91	154.25	109.72
CD (0.05)		8.95	11.37	22.00	4.15	29.28	21.95	34.18	11.31	-
CV (%) Error		5.63	5.83	11.89	2.52	17.38	10.15	30.55	4.44	-

Table 54: Days to flowering in Initial Varietal Trial (IVT) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-9	-	43.67	-	-	50.00	50.30	-	43.67	46.91
2	BGA-10	71.00	42.33	66.33	61.00	49.67	41.30	92.67	44.00	58.54
3	BGA-14	-	43.67	71.67	62.67	46.00	56.30	88.67	45.00	59.14
4	BGA-20	73.00	45.00	75.67	64.00	47.67	48.00	91.33	46.67	61.42
5	KBGA-6	77.00	48.67	-	-	48.00	57.70	-	55.00	57.27
6	KBGA-7	82.00	45.67	-	-	46.67	57.30	-	52.33	56.79
7	MGA-501	57.00	-	-	-	-	57.70	-	-	57.35
8	MGA-502	58.00	50.33	-	-	-	48.30	-	55.67	53.08
9	MGA-507	-	-	-	-	-	-	-	55.67	55.67
10	RGA-13	74.00	-	-	-	41.00	56.30	-	-	57.10
11	RGA-15	58.00	-	-	-	46.00	44.30	-	-	49.43
12	RGAG-12-22	72.00	43.00	73.33	65.67	48.67	50.70	88.67	47.00	61.13
13	RHGA-13-2	65.00	41.00	67.00	67.33	46.67	44.70	82.67	44.33	57.34
14	RHGA-13-3	62.00	41.67	66.33	65.67	44.00	51.70	89.67	44.33	58.17
15	RHGA-13-4	64.00	41.67	64.67	67.00	47.00	44.00	86.67	44.67	57.46
16	RMA-60	78.33	47.00	76.67	67.33	49.67	52.70	94.00	50.67	64.55
17	RMA-61	71.00	45.00	75.00	65.33	45.00	55.70	93.00	46.00	62.00
18	SKNA-12-01	78.67	50.33	74.67	67.33	51.00	49.00	94.33	54.67	65.00
19	SKNA-13-13	77.00	48.00	74.00	67.33	52.33	46.70	93.67	49.67	63.59
20	BGA-2 (C)	58.00	50.33	80.33	69.00	47.00	60.00	94.00	56.00	64.33
21	GA-2 (C)	75.33	46.33	74.00	69.67	44.33	54.00	89.00	50.33	62.88
22	RMA-7 (C)	78.67	50.00	-	68.00	51.00	61.00	91.33	55.33	65.05
23	Suvarna (C)	57.00	50.33	77.67	68.67	43.33	60.00	101.00	58.67	64.58
Mean		69.35	46.28	72.67	66.40	47.25	52.20	91.38	49.98	61.94
CD (0.05)		1.93	2.07	4.20	1.94	1.93	2.11	8.21	1.47	-
CV (%)		1.68	2.72	3.44	1.75	2.47	2.54	5.37	1.77	-
Error										

Table 55: Days to maturity in Initial Varietal Trial (IVT) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-9	-	94.33	-	-	128.33	103.30	-	105.00	107.74
2	BGA-10	116.00	92.67	132.00	136.00	127.33	102.00	156.00	104.67	120.83
3	BGA-14	-	93.33	133.33	138.33	126.00	111.00	157.33	103.00	123.19
4	BGA-20	117.33	93.33	134.67	141.00	127.00	103.70	152.33	106.00	121.92
5	KBGA-6	119.00	94.67	-	-	126.00	116.70	-	108.33	112.94
6	KBGA-7	121.00	93.67	-	-	128.00	110.30	-	104.33	111.46
7	MGA-501	118.00	-	-	-	-	118.00	-	-	118.00
8	MGA-502	118.33	93.00	-	-	-	105.30	-	107.00	105.91
9	MGA-507	-	-	-	-	-	-	-	105.00	105.00
10	RGA-13	117.33	-	-	-	125.00	115.70	-	-	119.34
11	RGA-15	116.33	-	-	-	125.33	101.70	-	-	114.46
12	RGAG-12-22	117.67	94.67	134.33	135.67	127.00	114.00	155.67	103.67	122.83
13	RHGA-13-2	118.33	90.67	129.00	133.67	126.67	100.00	151.00	102.00	118.92
14	RHGA-13-3	117.67	91.33	130.67	135.67	126.67	111.30	156.00	102.33	121.45
15	RHGA-13-4	118.00	90.67	132.33	131.67	127.33	102.00	159.00	105.67	120.83
16	RMA-60	118.67	92.67	139.33	140.00	126.67	113.70	157.33	104.00	124.05
17	RMA-61	117.67	93.33	136.67	129.33	126.67	116.30	157.33	104.33	122.70
18	SKNA-12-01	117.33	93.67	135.00	135.67	126.00	113.70	158.00	105.33	123.09
19	SKNA-13-13	120.00	93.00	127.33	134.00	127.33	109.00	159.00	108.33	122.25
20	BGA-2 (C)	117.67	94.00	132.33	135.00	129.00	118.30	158.67	106.33	123.91
21	GA-2 (C)	118.00	94.33	136.67	135.00	127.67	111.00	162.00	106.33	123.88
22	RMA-7 (C)	121.00	94.67	-	133.33	128.33	117.30	155.33	108.67	122.66
23	Suvarna (C)	118.00	93.33	133.33	135.67	128.00	121.00	161.00	105.33	124.46
Mean		118.17	93.37	133.36	135.33	127.02	110.70	157.07	105.28	122.54
CD (0.05)		2.76	1.86	7.52	3.66	2.16	1.97	8.60	1.62	-
CV (%) Error		1.41	1.21	3.36	1.62	1.03	1.13	3.27	0.93	-

Table 56: Inflorescence length (cm) in Initial Varietal Trial (IVT) on grain amaranth Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-9	-	40.07	-	-	50.33	59.43	-	61.33	52.79
2	BGA-10	51.73	43.13	43.73	35.83	44.00	57.60	23.10	55.33	44.31
3	BGA-14	-	46.47	41.95	38.33	45.33	56.13	20.77	59.13	44.02
4	BGA-20	55.80	43.67	41.06	36.67	57.40	61.00	20.67	58.87	46.89
5	KBGA-6	55.33	42.80	-	-	42.13	32.33	-	63.00	47.12
6	KBGA-7	33.67	38.53	-	-	50.00	42.03	-	45.00	41.85
7	MGA-501	34.33	-	-	-	-	50.03	-	-	42.18
8	MGA-502	32.73	38.07	-	-	-	50.33	-	46.60	41.93
9	MGA-507	-	-	-	-	-	-	-	49.00	49.00
10	RGA-13	63.40	-	-	-	43.60	50.00	-	-	52.33
11	RGA-15	62.73	-	-	-	48.87	42.67	-	-	51.42
12	RGAG-12-22	80.33	46.53	46.97	38.67	53.47	71.10	25.60	58.53	52.65
13	RHGA-13-2	66.55	41.73	38.92	41.00	45.47	63.60	24.23	58.53	47.50
14	RHGA-13-3	63.87	40.67	43.89	42.17	52.20	69.20	32.67	57.00	50.21
15	RHGA-13-4	64.47	40.67	39.17	45.00	51.33	73.33	27.63	58.47	50.01
16	RMA-60	47.33	40.60	33.56	46.00	49.87	68.57	16.17	53.07	44.40
17	RMA-61	55.07	43.07	36.46	45.67	47.60	64.37	26.10	61.00	47.42
18	SKNA-12-01	55.00	42.87	45.63	37.83	50.73	76.70	33.53	62.60	50.61
19	SKNA-13-13	63.33	45.87	45.24	37.00	50.47	76.17	36.77	59.07	51.74
20	BGA-2 (C)	39.07	45.67	45.12	41.17	42.47	63.23	19.33	53.80	43.73
21	GA-2 (C)	59.47	40.93	48.01	42.33	55.67	82.47	34.77	69.00	54.08
22	RMA-7 (C)	55.27	44.53	-	38.33	53.40	73.83	26.40	61.13	50.41
23	Suvarna (C)	35.33	39.27	39.97	44.00	46.20	57.27	23.73	48.87	41.83
	Mean	53.74	42.41	42.12	40.67	49.03	60.97	26.10	56.97	46.50
	CD (0.05)	5.42	4.58	8.95	1.98	9.36	9.65	10.01	8.69	-
	CV (%) Error	6.10	6.53	12.66	2.92	11.55	9.60	22.93	9.23	-

Table 57: Seed weight (g/10ml) in Initial Varietal Trial (IVT) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-9	-	7.58	-	-	5.56	6.20	-	7.91	6.81
2	BGA-10	6.08	7.85	6.66	-	5.56	6.13	9.87	7.80	7.14
3	BGA-14	-	7.90	6.82	-	5.56	5.93	8.37	8.11	7.11
4	BGA-20	6.93	7.93	6.39	-	5.57	6.25	6.87	8.10	6.86
5	KBGA-6	6.22	7.93	-	-	5.57	5.83	-	8.03	6.71
6	KBGA-7	5.52	7.65	-	-	5.58	6.20	-	8.07	6.60
7	MGA-501	5.03	-	-	-	-	5.20	-	-	5.12
8	MGA-502	5.47	7.73	-	-	-	5.23	-	7.98	6.60
9	MGA-507	-	-	-	-	-	-	-	7.83	7.83
10	RGA-13	5.80	-	-	-	5.50	6.27	-	-	5.86
11	RGA-15	4.18	-	-	-	5.52	6.07	-	-	5.26
12	RGAG-12-22	6.02	7.73	6.18	-	5.51	6.07	8.13	8.15	6.83
13	RHGA-13-2	6.70	7.75	6.83	-	5.54	5.27	8.87	7.87	6.97
14	RHGA-13-3	5.45	7.53	6.83	-	5.56	5.53	8.20	8.11	6.74
15	RHGA-13-4	5.42	7.92	6.00	-	5.55	7.40	8.83	8.08	7.03
16	RMA-60	6.12	7.60	7.01	-	5.56	6.27	7.93	8.13	6.95
17	RMA-61	6.75	7.85	6.93	-	5.56	5.60	8.50	8.03	7.03
18	SKNA-12-01	6.72	7.96	6.94	-	5.56	7.27	10.33	8.11	7.56
19	SKNA-13-13	5.32	7.82	5.86	-	5.56	6.50	9.33	8.08	6.92
20	BGA-2 (C)	8.70	7.86	6.88	-	5.54	5.43	7.43	7.78	7.09
21	GA-2 (C)	6.10	7.95	6.67	-	5.57	6.47	7.70	8.13	6.94
22	RMA-7 (C)	6.23	7.94	-	-	5.53	5.27	9.80	8.19	7.16
23	Suvarna (C)	7.23	7.76	6.13	-	5.53	6.33	10.40	7.68	7.29
	Mean	6.10	7.81	6.58	-	5.55	6.03	8.70	8.01	6.97
	CD (0.05)	0.22	0.08	0.91	-	0.05	0.46	0.49	0.12	-
	CV (%)	2.20	0.65	8.24	-	0.59	4.80	3.35	0.88	-
	Error									

Table 58: Experimental Details of AVT-I of Grain amaranth: Rabi 2016-17 (Plains)

S. No	Items/Centre	Ambikapur	Bhubaneswar	Delhi	Mandor	Rahuri	S.K. Nagar
1.	No. of entries	5	5	4	5	5	5
2.	No. of Checks	4	4	2	4	4	4
3.	Design	RBD	RBD	RBD	RBD	RBD	RBD
4.	No of Replication	3	3	3	3	3	3
5.	Number of Row	6	6	6	6	6	6
6.	Row length (m)	-	-	3	-	3.90 m	4.0 m
7.	Row spacing (cm)	45 cm	45 cm	45 cm	50 cm	45 cm	45 cm
8.	Plant spacing (cm)	-	15 cm	15 cm	15 cm	15 cm	15 cm
9.	NPKS (Kg/ha)	40:40:20:20	60:40:20	60:40:0	60:40:20	40:20:20:20	-
10.	Plot size (m ²)	4M X2.7 M	4.0 x 2.7 m	3.0X2.7 m	3.0mX4m	2.70 m x 3.90 m	4.0X 2.7
11.	Sowing Date	24/11/2016	1.12.2016	28-11-2016	8-12-2016	18/11/2016	16/11/2016
12	Harvesting Period	-	-	28-03-2017 – 31-3-2017	-	30/02/2017 - 22/03/2017	-

Table 59: Grain yield (q/ha) in Advanced Varietal Trial (AVT-I) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad*	Mandor*	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-7	22.81	10.49	8.56	3.10	5.17	25.38	11.80	19.21	16.38
2	BGA-10-1	15.82	10.80	8.38	4.67	7.57	21.83	11.20	21.39	14.90
3	RGA-14	24.71	8.49	-	-	5.92	16.86	14.07	16.73	16.17
4	SKGPA-61	18.75	8.02	4.28	4.13	7.33	24.15	15.03	23.18	15.57
5	SKNA-1207	16.61	8.02	6.80	3.62	7.58	19.90	14.30	20.12	14.29
6	BGA-2 (C)	20.49	8.80	-	3.37	2.11	19.60	9.70	17.43	15.20
7	GA-2 (C)	20.90	8.18	2.92	3.80	6.42	20.02	11.27	19.36	13.77
8	RMA-7 (C)	17.31	8.80	-	3.18	7.03	17.71	8.63	15.98	13.69
9	Suvarna (C)	23.86	8.49	8.98	4.13	4.53	18.68	10.87	12.95	13.97
Mean		20.14	8.90	6.65	3.75	5.96	20.46	11.87	18.48	14.88
CD (0.05)		1.25	1.49	1.95	0.52	1.24	3.06	0.93	2.78	-
CV (%) Error		3.60	9.66	16.65	8.29	12.00	8.63	4.61	8.68	-

* Data of Faizabad and Mandor was not included in overall mean

Table 60: Plant height (cm) in Advanced Varietal Trial (AVT-I) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-7	97.47	105.13	101.20	96.67	81.53	137.43	58.33	151.60	103.67
2	BGA-10-1	96.20	106.47	91.20	90.83	75.53	97.70	58.33	124.53	92.60
3	RGA-14	136.33	123.33	-	-	119.00	145.27	61.33	164.53	124.97
4	SKGPA-61	108.87	115.40	106.07	81.67	107.13	167.53	57.93	152.40	112.13
5	SKNA-1207	100.13	109.27	96.73	100.67	102.33	140.03	65.37	140.13	106.83
6	BGA-2 (C)	135.88	122.00	-	100.00	105.87	152.50	79.13	141.07	119.49
7	GA-2 (C)	144.33	120.27	108.33	100.33	127.27	166.50	57.40	164.00	123.55
8	RMA-7 (C)	127.81	122.60	-	96.67	104.40	165.17	69.23	149.07	119.28
9	Suvarna (C)	129.40	120.53	133.27	96.00	122.33	170.67	58.93	137.40	121.07
Mean		119.60	116.11	106.13	95.35	105.04	149.20	62.89	147.19	112.69
CD (0.05)		5.82	14.84	14.90	5.42	20.52	20.91	18.52	6.30	-
CV (%) Error		2.81	7.38	7.82	3.21	11.28	8.10	17.68	2.47	-

Table 61: Days to flowering in Advanced Varietal Trial (AVT-I) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-7	77.00	41.00	74.33	65.00	59.67	48.30	91.67	44.33	62.66
2	BGA-10-1	69.00	41.67	73.33	66.00	57.33	48.70	94.67	44.67	61.92
3	RGA-14	76.33	51.67	-	-	57.00	51.70	99.00	53.67	64.89
4	SKGPA-61	90.00	47.00	72.67	65.00	60.00	61.00	93.33	51.00	67.50
5	SKNA-1207	85.67	44.33	72.67	62.00	58.00	55.30	95.33	48.33	65.20
6	BGA-2 (C)	77.67	51.33	-	66.33	55.00	60.70	96.67	58.33	66.58
7	GA-2 (C)	70.33	45.67	78.00	66.00	57.00	55.00	94.67	49.00	64.46
8	RMA-7 (C)	78.00	51.67	-	69.67	56.00	60.70	99.00	53.67	66.96
9	Suvarna (C)	75.00	51.33	79.67	69.00	56.00	59.70	96.00	59.33	68.25
Mean		77.67	47.30	75.11	66.13	57.33	55.70	95.59	51.37	65.77
CD (0.05)		3.73	2.76	4.17	2.46	1.82	1.92	4.64	1.67	-
CV (%) Error		2.78	3.37	3.17	2.22	1.84	2.00	2.91	1.87	-

Table 62: Days to maturity in Advanced Varietal Trial (AVT-I) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-7	131.00	96.67	134.00	125.67	128.00	111.00	160.33	99.67	123.29
2	BGA-10-1	126.33	97.33	131.67	127.00	126.67	103.30	160.67	102.67	121.95
3	RGA-14	128.67	98.67	-	-	126.00	112.30	158.00	111.67	122.55
4	SKGPA-61	135.33	97.33	132.00	137.67	128.33	120.30	150.00	105.33	125.79
5	SKNA-1207	132.00	97.67	130.00	133.67	126.67	115.00	158.67	106.67	125.04
6	BGA-2 (C)	136.00	98.00	-	130.67	127.67	118.30	161.33	108.67	125.80
7	GA-2 (C)	134.33	98.67	140.67	138.67	127.33	113.30	157.67	107.67	127.29
8	RMA-7 (C)	132.67	99.33	-	132.33	127.00	119.30	154.00	110.33	125.00
9	Suvarna (C)	124.00	98.67	139.33	136.67	129.00	120.30	159.00	110.00	127.12
Mean		131.15	98.04	134.61	132.79	127.41	114.80	157.74	106.96	125.44
CD (0.05)		1.79	2.30	6.00	3.22	2.79	2.45	5.95	1.81	-
CV (%) Error		0.79	1.30	2.54	1.42	1.26	1.23	2.26	0.98	-

**Table 63: Inflorescence length (cm) in Advanced Varietal Trial (AVT-I) on grain amaranth:
Rabi 2016- 17 (Plains)**

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-7	51.20	41.80	36.30	43.00	45.67	70.03	20.80	58.60	45.93
2	BGA-10-1	57.47	43.80	37.51	38.50	49.47	71.33	19.33	55.00	46.55
3	RGA-14	66.67	41.93	-	-	53.93	48.03	21.83	65.00	49.57
4	SKGPA-61	63.07	42.00	41.65	38.50	52.80	72.33	20.60	58.53	48.69
5	SKNA-1207	61.47	41.33	39.06	36.50	56.40	63.30	23.10	53.73	46.86
6	BGA-2 (C)	48.73	41.47	-	40.17	46.20	63.33	26.50	42.20	44.09
7	GA-2 (C)	71.22	40.80	40.98	42.67	61.73	85.73	20.80	67.93	53.98
8	RMA-7 (C)	58.40	41.60	-	35.67	54.33	79.70	23.23	64.60	51.08
9	Suvarna (C)	34.13	39.87	43.18	37.33	43.07	53.33	17.83	43.20	38.99
Mean		56.93	41.62	39.78	39.04	51.51	67.46	21.56	56.53	46.80
CD (0.05)		3.27	3.98	15.05	2.19	8.16	12.54	6.05	5.06	-
CV (%) Error		3.32	5.52	21.60	3.19	9.16	10.74	16.48	5.17	-

**Table 64: Seed weight (g/10ml) in Advanced Varietal Trial (AVT-I) on grain amaranth:
Rabi 2016-17 (Plains)**

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-7	8.62	7.86	6.25	5.35	5.53	8.77	8.04	7.20
2	BGA-10-1	7.28	7.83	6.65	5.58	6.39	7.97	7.86	7.08
3	RGA-14	9.38	7.81	-	5.57	6.41	8.43	7.89	7.58
4	SKGPA-61	7.35	7.67	5.60	5.58	6.55	7.73	8.10	6.94
5	SKNA-1207	7.25	7.75	6.21	5.53	6.25	7.97	8.01	7.00
6	BGA-2 (C)	9.47	7.86	-	5.50	5.92	7.60	7.66	7.34
7	GA-2 (C)	7.52	7.50	6.79	5.58	6.84	7.57	7.88	7.10
8	RMA-7 (C)	8.72	7.94	-	5.43	5.28	10.17	7.61	7.52
9	Suvarna (C)	8.50	7.73	6.00	5.58	6.55	10.23	7.68	7.47
Mean		8.23	7.77	6.25	5.52	6.19	8.49	7.86	7.19
CD (0.05)		0.33	0.04	0.65	0.28	0.53	0.33	0.19	-
CV (%) Error		2.35	0.30	5.86	2.97	4.92	2.27	1.36	-

Table 65: Experimental Details of AVT-II of Grain amaranth Rabi 2016-17 (Plains)

S. No	Items/Centre	Ambikapur	Bhubaneswar	Delhi	Mandor	Rahuri	S.K. Nagar
1.	No. of entries	3	3	2	3	3	3
2.	No. of Checks	4	4	2	4	4	4
3.	Design	RBD	RBD	RBD	RBD	RBD	RBD
4.	No of Replication	3	3	3	3	3	3
5.	Number of Row	6	6	6	6	6	6
6.	Row length (m)	-	-	3	-	3.90 m	4.0 m
7.	Row spacing (cm)	45 cm	45 cm	45 cm	50 cm	45 cm	45 cm
8.	Plant spacing (cm)	-	15 cm	15 cm	15 cm	15 cm	15 cm
9.	NPKS (Kg/ha)	40:40:20:20	60:40:20	60:40:0	60:40:20	40:20:20:20	-
10.	Plot size (m ²)	4m X2.7m	4.0 x 2.7 m	3.0X2.7 m	4.0 m x 3.0 m	2.70 m x 3.90 m	4.0X 2.7
11.	Sowing Date	17/11/2016	1.12.2016	28-11-2016	08/12/2016	18/11/2016	16/11/2016
12	Harvesting Period	-	-	28-03-2017 – 31-3-2017	-	29/02/2017 - 20/03/2017	-

Table 66: Grain yield (q/ha) in Advanced Varietal Trial (AVT-II) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad*	Mandor*	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-4-9	22.19	10.80	5.84	3.70	4.75	26.43	11.60	25.35	17.04
2	KBGA-4	23.21	10.19	7.74	3.13	3.67	24.95	12.23	23.21	16.92
3	KBGA-5	19.61	8.64	-	3.42	3.22	21.65	10.83	19.90	16.13
4	BGA-2 (C)	15.03	9.10	-	3.37	3.21	19.37	9.70	21.65	14.97
5	GA-2 (C)	17.56	9.26	2.92	3.80	4.47	21.17	11.27	23.90	14.35
6	RMA-7 (C)	19.88	8.80	-	3.18	4.42	18.03	8.63	23.41	15.75
7	Suvarna (C)	17.69	9.41	8.98	4.13	3.03	18.81	10.87	19.06	14.14
Mean		19.31	9.46	6.37	3.53	3.82	21.49	10.73	22.35	15.61
CD (0.05)		1.52	1.18	1.95	0.52	1.01	3.02	0.93	3.27	-
CV (%) Error		4.43	6.35	16.65	8.29	14.83	7.89	4.61	8.22	-

* Data of Faizabad and Mandor was not included in overall mean

Table67: Plant height (cm) in Advanced Varietal Trial (AVT-II) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-4-9	139.00	132.73	108.13	108.83	100.33	166.37	47.43	162.93	120.72
2	KBGA-4	125.33	132.20	125.62	111.00	101.27	146.40	69.10	157.40	121.04
3	KBGA-5	122.33	117.67	-	106.33	109.60	153.77	58.10	147.00	116.40
4	BGA-2 (C)	119.33	132.60	-	100.00	125.80	153.67	79.13	164.93	125.07
5	GA-2 (C)	134.00	132.73	108.33	100.33	115.27	169.90	57.40	179.73	124.71
6	RMA-7 (C)	130.33	149.67	-	96.67	114.73	161.80	69.23	161.07	126.21
7	Suvarna (C)	127.33	129.87	133.27	96.00	132.20	173.23	58.93	166.87	127.21
Mean		128.24	132.50	118.84	102.74	114.17	160.73	62.76	162.85	122.85
CD (0.05)		3.15	10.00	14.90	5.42	22.30	18.87	18.52	7.24	-
CV (%) Error		1.38	4.36	7.82	3.21	10.98	6.60	17.68	2.50	-

Table 68: Days to flowering in Advanced Varietal Trial (AVT-II) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-4-9	65.00	41.00	75.00	60.00	48.67	55.00	94.33	45.33	60.54
2	KBGA-4	67.00	39.67	75.67	62.33	59.67	48.00	85.67	42.00	60.00
3	KBGA-5	68.00	41.00	-	63.67	60.00	48.70	97.00	44.33	60.39
4	BGA-2 (C)	77.00	46.33	-	66.33	50.33	60.00	96.67	55.67	64.62
5	GA-2 (C)	71.00	43.67	78.00	66.00	57.33	53.00	94.67	49.33	64.13
6	RMA-7 (C)	73.00	45.00	-	69.67	48.33	61.30	99.00	52.33	64.09
7	Suvarna (C)	70.00	46.33	79.67	69.00	54.33	59.70	96.00	59.33	66.80
Mean		70.14	43.29	77.08	65.29	54.10	55.10	94.76	49.76	63.69
CD (0.05)		2.28	1.96	4.17	2.46	2.85	2.05	4.64	1.12	-
CV (%) Error		1.83	2.61	3.17	2.22	2.96	2.09	2.91	1.27	-

Table 69: Days to maturity in Advanced Varietal Trial (AVT-II) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-4-9	132.67	97.00	136.00	135.00	125.67	118.00	153.00	106.33	125.46
2	KBGA-4	136.33	98.00	137.33	130.67	126.00	104.30	149.00	109.00	123.83
3	KBGA-5	135.33	99.33	-	130.00	126.00	104.70	161.33	108.00	123.53
4	BGA-2 (C)	130.00	98.67	-	130.67	127.00	118.70	161.33	111.00	125.34
5	GA-2 (C)	136.33	98.67	140.67	138.67	126.33	113.70	157.67	109.67	127.71
6	RMA-7 (C)	130.67	101.00	-	132.33	125.67	118.30	154.00	111.67	124.80
7	Suvarna (C)	131.00	98.67	139.33	136.67	127.33	121.30	159.00	112.67	128.25
Mean		133.19	98.76	138.33	133.43	126.29	114.10	156.48	109.76	126.29
CD (0.05)		1.61	2.10	6.00	3.22	1.30	2.41	5.95	1.96	-
CV (%) Error		0.68	1.20	2.54	1.42	0.58	1.19	2.26	1.00	-

Table70: Inflorescence length (cm) in Advanced Varietal Trial (AVT-II) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Faizabad	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-4-9	58.60	51.13	33.85	43.17	49.27	72.40	15.23	64.93	48.57
2	KBGA-4	64.40	42.53	45.67	41.00	49.40	83.53	26.20	64.00	52.09
3	KBGA-5	60.07	47.93	-	46.67	55.47	77.00	26.80	60.73	53.52
4	BGA-2 (C)	51.13	39.20	-	40.17	44.33	61.33	26.50	41.40	43.44
5	GA-2 (C)	62.47	46.47	40.98	42.67	56.73	86.20	20.80	66.33	52.83
6	RMA-7 (C)	55.27	38.87	-	35.67	52.47	79.83	23.23	65.60	50.13
7	Suvarna (C)	47.13	50.67	43.18	37.33	48.73	51.90	17.83	41.53	42.29
Mean		57.01	45.26	40.92	40.95	50.91	73.17	22.37	57.79	48.55
CD (0.05)		3.61	5.31	15.05	2.19	7.13	12.66	6.05	5.02	-
CV (%) Error		3.56	6.78	21.60	3.19	7.87	9.72	16.48	4.89	-

Table71: Seed weight (g/10ml) in Advanced Varietal Trial (AVT-II) on grain amaranth: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Bhubaneswar	Delhi	Mandor	Rahuri	Ranchi	SK Nagar	Mean
1	BGA-4-9	9.21	7.60	6.61	5.58	7.21	7.70	7.79	7.39
2	KBGA-4	9.43	7.49	6.28	5.58	6.47	8.80	7.70	7.39
3	KBGA-5	9.78	7.89	-	5.61	6.41	10.53	7.78	8.00
4	BGA-2 (C)	9.42	7.91	-	5.57	5.73	7.60	7.72	7.32
5	GA-2 (C)	7.30	7.68	6.79	5.68	6.81	7.57	8.17	7.14
6	RMA-7 (C)	8.82	7.92	-	5.57	5.40	10.17	7.94	7.64
7	Suvarna (C)	8.40	7.47	6.00	5.58	6.56	10.23	7.79	7.43
Mean		8.91	7.71	6.42	5.60	6.37	8.94	7.84	7.40
CD (0.05)		0.43	0.06	0.65	0.13	0.43	0.33	0.23	-
CV (%) Error		2.72	0.48	5.86	1.28	3.80	2.27	1.66	-

Table72: Experimental Details for IVT of Faba bean Rabi 2016-17: Plains

S. No	Items/Centre	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Faridkot	Ranchi
1.	No. of entry	15	8	5	8	8	5	8
2.	No. of Check	2	2	2	2	2	2	2
3.	Design	RBD	RBD	RBD	RBD	RBD	RBD	RBD
4.	No of Replication	4	3	3	3	3	3	4
5.	Number of Row	6	4	-	4	6	-	6
6.	Row length (m)	-	3	-	3	4	-	
7.	Row spacing (cm)	30 cm	30 cm	-	30 cm	30 cm	-	30 cm
8.	Plant spacing (cm)	10 cm	10 cm	-	10 cm	-	-	10 cm
9.	NPKS (Kg/ha)	40:40:20:20	20:40:20	-	20:40:20	-	-	
10.	Plot size (m ²)	4M X1.8 M	3.0X1.2 m	8 x 4 m x 0.30 m	3.0X1.2 m	7.2 m ²	:8 x 4 m x 0.30 m	1.8m x 4m
11.	Sowing Date	23/11/2016	27/11/2016 6	24.11.2016	2/11/2016	21.11.20 16	24.11- 2016	12/12/2016
12	Harvesting Period	-	10/4/2017 - 15/4/2017	-	4/4/2017 - 5/4/2017	-	-	1/4/2017 - 15/4/2017

Table73: Seed yield (q/ha) in Initial Varietal Trial (IVT) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean
1	HB 12-8	18.07	9.44	24.67	26.48	45.66	20.93	19.28	23.50
2	HB 12-15	17.26	10.12	17.67	26.91	39.93	16.90	20.58	21.34
3	HB 12-34	19.25	10.49	18.63	29.95	40.63	15.51	22.45	22.42
4	HB 12-37	17.60	9.85	26.17	32.55	45.14	20.37	20.65	24.62
5	HB 12-42	18.84	9.78	19.63	26.48	46.11	16.90	21.90	22.81
6	NDFB 16	19.58	10.71	33.67	-	33.51	18.98	19.80	22.71
7	NDFB 16-1	22.55	7.19	28.33	-	26.91	19.17	22.58	21.12
8	NDFB 16-2	20.47	10.99	34.67	-	24.90	20.83	22.40	22.38
9	HFB-1 (C)	16.04	6.76	26.50	27.13	37.88	19.91	19.58	21.97
10	Vikrant (C)	16.93	8.02	27.50	29.08	34.34	19.44	19.25	22.08
Mean		18.66	9.34	25.74	28.37	37.50	18.89	20.85	22.76
CD (0.05)		0.95	3.11	3.34	7.01	2.32	2.96	1.31	-
CV (%) Error		3.74	19.44	7.55	13.89	4.27	9.13	4.34	-

Table 74: Plant height (cm) in Initial Varietal Trial (IVT) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean
1	HB 12-8	48.80	52.27	83.33	-	99.93	69.67	57.50	68.58
2	HB 12-15	56.05	57.93	78.50	-	109.70	71.27	57.85	71.88
3	HB 12-34	60.05	48.20	82.17	-	145.40	66.60	54.93	76.22
4	HB 12-37	60.15	70.93	81.00	-	74.85	70.57	54.50	68.67
5	HB 12-42	59.95	59.67	76.50	-	151.08	76.80	56.60	80.10
6	NDFB 16	60.65	55.87	85.33	-	133.33	74.70	48.20	76.35
7	NDFB 16-1	65.40	45.80	100.00	-	150.10	69.27	54.10	80.78
8	NDFB 16-2	66.45	57.47	82.00	-	111.40	77.43	50.45	74.20
9	HFB-1 (C)	59.80	43.80	90.17	-	148.50	82.03	57.90	80.37
10	Vikrant (C)	62.80	61.33	95.50	-	143.43	81.40	51.45	82.65
Mean		60.01	55.33	85.45	-	126.77	73.97	54.35	75.98
CD (0.05)		4.01	13.97	4.27	-	6.36	4.55	7.63	-
CV (%) Error		4.97	14.72	2.92	-	3.46	3.59	9.68	-

Table75: Days to 50% flowering in Initial Varietal Trial (IVT) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean
1	HB 12-8	66.00	77.67	56.00	64.00	43.00	65.67	61.75	62.01
2	HB 12-15	65.75	77.00	55.67	63.00	49.75	67.67	60.00	62.69
3	HB 12-34	64.75	76.67	55.00	63.00	66.00	64.67	56.25	63.76
4	HB 12-37	63.75	77.33	57.00	63.00	73.00	64.67	60.50	65.61
5	HB 12-42	58.75	74.33	66.00	63.00	73.50	66.00	58.75	65.76
6	NDFB 16	60.75	77.00	56.67	-	65.00	67.33	59.25	64.33
7	NDFB 16-1	63.75	76.33	61.67	-	73.75	66.33	59.00	66.81
8	NDFB 16-2	62.75	78.33	58.33	-	76.00	67.67	60.00	67.18
9	HFB-1 (C)	61.75	77.00	61.00	64.00	55.25	67.33	56.75	63.30
10	Vikrant (C)	64.00	76.33	58.33	64.00	65.00	66.00	57.25	64.42
Mean		63.20	76.80	58.57	63.43	64.03	66.33	58.95	64.47
CD (0.05)		1.20	3.93	1.63	1.35	4.03	1.06	2.95	-
CV (%) Error		1.33	2.98	1.62	1.20	4.34	0.93	3.45	-

Table76: Days to maturity in Initial Varietal Trial (IVT) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean
1	HB 12-8	131.50	133.00	127.67	144.00	145.00	129.00	118.75	132.70
2	HB 12-15	133.75	131.00	131.00	144.00	150.25	129.00	117.75	133.82
3	HB 12-34	130.75	131.67	125.00	142.00	166.00	125.67	117.25	134.05
4	HB 12-37	132.50	131.33	125.00	142.00	175.50	123.33	117.75	135.35
5	HB 12-42	131.50	130.00	128.00	143.00	178.75	123.00	120.25	136.36
6	NDFB 16	134.75	131.00	125.00	-	166.25	128.67	115.25	133.49
7	NDFB 16-1	133.75	133.00	132.33	-	180.50	129.33	118.00	137.82
8	NDFB 16-2	134.00	132.67	125.00	-	179.00	129.33	115.75	135.96
9	HFB-1 (C)	135.25	133.33	128.00	144.00	154.75	129.67	118.25	134.75
10	Vikrant (C)	132.00	131.33	124.33	144.00	163.25	131.00	115.50	134.49
Mean		132.98	131.83	127.13	143.29	165.93	127.80	117.45	135.20
CD (0.05)		2.52	3.92	3.02	1.07	6.55	1.74	4.27	-
CV (%) Error		1.33	1.73	1.38	0.42	2.72	0.80	2.51	-

Table 77: 100 seed weight (g) in Initial Varietal Trial (IVT) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean
1	HB 12-8	25.93	24.42	25.67	30.60	29.55	33.60	25.48	27.89
2	HB 12-15	26.51	23.43	26.17	29.80	28.60	28.90	28.95	27.48
3	HB 12-34	24.84	23.83	25.17	31.90	28.68	30.20	29.75	27.77
4	HB 12-37	26.73	27.36	25.17	29.20	24.98	28.50	30.40	27.48
5	HB 12-42	27.18	27.59	26.33	33.10	29.85	32.00	30.38	29.49
6	NDFB 16	26.00	21.38	27.00	-	28.73	29.30	28.15	26.76
7	NDFB 16-1	22.68	26.03	26.67	-	25.55	31.60	30.20	27.12
8	NDFB 16-2	22.76	20.96	25.83	-	24.60	31.70	29.53	25.90
9	HFB-1 (C)	25.83	20.67	25.83	27.40	27.90	28.33	28.10	26.29
10	Vikrant (C)	26.05	23.27	25.50	32.20	25.83	30.40	32.43	27.95
Mean		25.45	23.89	25.93	30.60	27.43	30.45	29.34	27.58
CD (0.05)		0.43	3.81	0.58	0.70	0.41	1.83	2.20	-
CV (%) Error		1.18	9.30	1.31	1.28	1.02	3.51	5.18	-

Table 78: Experimental Details for AVT- I &II of Faba bean: Rabi 2016-17 (Plains)

S. No	Items/Centre	Ambikapur	Delhi	Faizabad	Hisar	Ludhiana	Faridkot	Ranchi
1.	No. of entries	3+3	3+3	3+3	3	3+3	3+3	3+3
2.	No. of Checks	2	2	2	2	2	2	2
3.	Design	RBD	RBD	RBD	RBD	RBD	RBD	RBD
4.	No of Replication	4	3	3	3	3	3	4
5.	Number of Row	8	6	-	6	6		8
6.	Row length (m)	-	3	-	3	4		-
7.	Row spacing (cm)	30	30	30	30	30		30
8.	Plant spacing (cm)	10	10	10	10	10		10
9.	NPKS (Kg/ha)	40:40:20:20	20:40:20	-	20:40:20	-		
10 .	Plot size (m ²)	4 m X2.4 m	3.0X1.8 m	4 m x 3.0 m	3.0 mX1.8 m	4 m x 1.8 m	4 m x 1.8 m	4 mx2.4m
11 .	Sowing Date	24/11/2016	27/11/2016	24.11.2016	3/11/2016	21.11.20 16	24.11- 2016	12/12/2017
12	Harvesting Period	2/12/2016	10/4/2017 - 15/4/2017	-	5/4/2017 - 6/4/2017	-		3/4/2017 - 15/4/2017

Table 79: Seed yield (q/ha) in Advanced Varietal Trial (AVT-I & II) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean	
AVT-I										
1	HB-11-12	17.92	-	13.84	27.77	27.85	45.73	20.83	19.35	24.76
2	HB-11-15	17.29	-	15.23	29.75	24.23	37.79	22.22	21.20	23.96
3	HB-11-32	16.82	-	14.64	26.50	31.83	47.08	21.18	16.83	24.98
AVT-II										
4	HB-09-15	-	13.37	11.62	27.17	27.13	44.87	18.75	19.15	23.15
5	HB-09-16	-	14.95	15.60	23.67	29.66	42.57	20.14	19.33	23.70
6	DFB-14-1	-	15.30	11.44	22.07	29.30	34.82	19.03	22.08	22.00
7	HFB-1 (C)	16.03	13.83	11.25	28.28	26.05	36.46	18.40	20.18	21.31
8	Vikrant (C)	17.28	14.30	12.47	28.58	30.02	35.90	18.40	13.90	21.36
Mean		17.07	14.35	13.26	26.72	28.26	40.65	19.87	19.00	22.40
CD (0.05)		1.20	0.54	5.25	4.72	6.95	1.81	2.53	0.94	-
CV (%)		5.09	2.60	22.63	10.09	14.04	3.02	7.28	3.36	-
Error										

Table80: Plant height (cm) in Advanced Varietal Trial (AVT-I & II) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean	
AVT-I										
1	HB-11-12	66.45	-	73.07	86.83	-	115.80	80.17	51.95	79.04
2	HB-11-15	68.20	-	71.20	87.67	-	111.28	87.00	56.80	80.36
3	HB-11-32	66.65	-	72.00	93.33	-	123.33	72.10	61.25	81.44
AVT-II										
4	HB-09-15	-	56.10	72.20	99.67	-	126.18	70.57	52.60	79.55
5	HB-09-16	-	59.10	67.47	101.00	-	104.13	80.77	54.60	77.84
6	DFB-14-1	-	53.70	73.00	97.00	-	98.13	70.33	52.75	74.15
7	HFB-1 (C)	59.60	53.00	67.07	95.00	-	117.60	73.00	52.75	74.00
8	Vikrant (C)	59.05	52.35	74.07	90.33	-	119.10	82.50	51.90	75.61
Mean		63.99	54.85	71.26	93.85	-	114.44	77.05	54.33	75.68
CD (0.05)		6.00	4.40	11.91	4.95	-	6.72	5.54	6.45	-
CV (%) Error		7.68	5.79	9.54	3.01	-	4.00	4.11	8.08	-

Table 81: Days to 50% flowering in Advanced Varietal Trial (AVT-I & II) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean	
AVT-I										
1	HB-11-12	59.50	-	71.00	57.00	64.00	56.25	68.00	58.00	61.96
2	HB-11-15	57.75	-	70.00	58.33	64.33	74.00	65.67	60.00	64.30
3	HB-11-32	59.50	-	71.67	61.33	63.00	55.75	66.00	57.25	62.07
AVT-II										
4	HB-09-15	-	55.50	70.33	62.33	63.67	54.00	67.33	60.25	61.92
5	HB-09-16	-	59.75	74.00	62.00	64.33	54.75	70.33	59.25	63.49
6	DFB-14-1	-	56.50	72.00	66.67	63.67	43.75	67.33	58.00	61.13
7	HFB-1 (C)	58.50	56.75	69.33	67.33	63.67	62.75	66.67	57.25	62.78
8	Vikrant (C)	56.75	60.75	71.67	66.00	64.33	67.50	71.00	59.75	64.72
Mean		58.40	57.85	71.25	62.63	63.88	58.59	67.79	58.72	62.39
CD (0.05)		1.45	1.45	3.49	2.31	1.12	4.43	1.75	3.86	-
CV (%) Error		1.66	1.72	2.80	2.11	1.00	5.14	1.48	4.47	-

Table 82: Days to maturity in Advanced Varietal Trial (AVT-I & II) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean	
AVT-I										
1	HB-11-12	128.50	-	131.33	126.00	142.67	156.00	133.67	114.00	133.17
2	HB-11-15	132.25	-	129.33	128.33	143.00	176.50	137.00	118.00	137.77
3	HB-11-32	132.50	-	130.00	129.67	144.33	154.25	130.33	120.25	134.48
AVT-II										
4	HB-09-15	-	129.75	128.33	127.00	144.00	154.00	132.67	114.75	132.93
5	HB-09-16	-	130.00	132.33	126.00	142.67	152.50	130.67	116.00	132.88
6	DFB-14-1	-	132.00	130.67	126.33	143.67	145.75	130.33	115.50	132.04
7	HFB-1 (C)	131.75	132.25	131.67	128.33	144.00	158.75	135.00	116.50	134.78
8	Vikrant (C)	132.50	130.00	131.67	125.00	144.33	168.25	138.00	115.50	135.66
Mean		131.50	130.80	130.67	127.08	143.58	158.25	133.46	116.31	133.96
CD (0.05)		2.25	1.39	3.49	2.15	1.26	5.94	2.18	4.04	-
CV (%) Error		1.19	0.73	1.52	0.97	0.50	2.55	0.93	2.36	-

Table 83: 100 seed weight (g) in Advanced Varietal Trial (AVT-I & II) on Fababean: Rabi 2016-17 (Plains)

S. No.	Genotypes	Ambikapur	Delhi	Faizabad	Faridkot	Hisar	Ludhiana	Ranchi	Mean
AVT-I									
1	HB-11-12	27.84	-	21.77	25.50	30.87	28.78	30.63	30.19
2	HB-11-15	30.48	-	25.05	25.17	26.27	26.20	32.40	28.99
3	HB-11-32	27.83	-	26.26	24.83	30.47	28.88	28.37	28.94
AVT-II									
4	HB-09-15	-	29.43	26.30	26.17	30.43	28.43	28.73	29.28
5	HB-09-16	-	29.15	22.66	25.50	27.20	26.78	28.17	28.20
6	DFB-14-1	-	29.53	23.06	25.83	30.37	28.68	27.43	28.40
7	HFB-1 (C)	21.86	19.80	23.94	25.83	28.63	26.08	29.03	27.85
8	Vikrant (C)	27.55	27.48	26.19	25.67	31.17	24.85	30.00	26.44
Mean		27.11	27.08	24.40	25.56	29.43	27.33	29.35	28.53
CD (0.05)		0.36	0.31	3.24	0.94	0.53	0.57	1.21	1.78
CV (%)		0.98	0.81	7.59	2.11	1.03	1.42	2.36	4.25
Error									

IV. CROP PRODUCTION AND PROTECTION

4.1 CROP PRODUCTION

A total of six agronomic experiments were formulated to be conducted at eleven locations in 24 trials during 2016-17. These comprised of three studies on amaranth, two experiments of buckwheat and one investigation on faba bean. Out of these, results of six experiments were received from five locations in eight trials. Centre-wise details of experiments are presented in Table 84 and the findings are as follows:

Experiment 1	: Response of grain amaranth genotypes to different fertilizer doses
Objective	: To work out the fertilizer requirement of grain amaranth genotypes in the pipeline
Year of start	: Rabi 2015-16
Locations	: S.K. Nagar, Mandor, Faizabad, Ranchi, Bhubaneswar, Rahuri, Ambikapur
Treatments	: A) Amaranth genotypes –RGA -10, BGA- 4-9, KBGA-5, BGA-8-5, RMA-7, GA- 2, BGA-2, Suvarna B) Fertilizer doses – control, 75% RDF, 100% RDF, 125% RDF
Design	: Split plot
Replications	: 3
Plot Size	: 3X3.6 m ²

Results: At SK Nagar (table 85), application of 125% recommended dose of fertilizers (RDF) resulted in the highest grain yield, net return and B:C ratio with all the genotypes followed by 100% RDF. The highest grain yield (2241 kg/ha), net return (Rs.80083/ha) and B:C ratio (4.86) was recorded from BGA 4-9 with 125% RDF. While at Bhubaneswar(Table 86), among genotypes, BGA 4-9 recorded the

maximum seed yield of 1315 kg/ha which remained at par with genotype BGA 8-5 (1290 kg/ha). Among various fertility levels, application of RDF @60-40-20 Kg NPK/ha recorded the maximum seed yield of 1335 kg/ha followed application of 125% of RFD (1265 kg/ha). Interaction effect among genotypes at various fertility levels revealed BGA 4-9 recorded maximum seed yield (1525 kg/ha) at RFD. Economic studies (Table 87) revealed that variety BGA 4-9 recorded maximum net return (Rs 14870/-/ha) and B:C ratio (2.05) followed by variety BGA 8-5 recording a net return of Rs 14247/-/ha and a B:C ratio of 2.01 (Table 88).

Experiment 2 : Comparative economics of grain amaranth vis-à-vis other crops

Objective	: To find out the profitability or other wise of growing grain amaranth in plains region during rabi season
Year of start	: Rabi 2015-16
Locations	: Hisar, Mandor, S.K. Nagar, Rahuri, Faizabad, Ranchi, Bhubaneswar
Treatments	: Grain amaranth, four other major crops grown in the region during rabi season
Design	: RBD
Replications	: Four
Plot size	: 3X3.6 m ²

Results: At S.K. Nagar (Table 89), maximum gross income was obtained in the treatment I 3 F1 C2, while highest net income was obtained from the treatment I 3 F1 C1. On the other hand, highest value of B:C ratio was observed in the I3 F2 C1.

It was revealed the maximum Grain amaranth equivalent yield (GEY) was recorded by green gram (1454 kg/ha) followed by black gram (1327 kg/ha) with highest net return (Rs 16361/-/ha) and B:C ratio(1.82 followed by black gram recording a net return (Rs 13177/-/ha) and B:C ratio (1.66) respectively at Bhubaneswar (table 90).

Experiment 3 : Performance of Buckwheat varieties at Cooch Behar

Objective	: To identify suitable buckwheat variety for the region
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Year of start	:	Rabi 2015-16
Locations	:	Cooch Behar, Ambikapur
Treatments	:	VL Ugal-7, PRB-1, Himpriya, Sangla B-1, Himgiri
Design	:	RBD
Replications	:	Four
Plot size	:	3X3.6 m ²

Results: Genotype Himgiri (Shimla B-1) produced highest yield (26.60 q/ha) followed by Himpriya (22.17 q/ha) and Sangla B1 (19.40 q/ha). The lowest yield (18.76 q/ha) was recorded with VL UGAL-7 (**Table 91**).

Experiment 4 : **Response of promising genotypes (AVT-II entries) of Buckwheat to different levels of management.**

Objective:	To evaluate promising genotypes (AVT-II entries) of buckwheat at different levels of management	
Year of start	:	2014
Locations	:	Cooch Behar, Ambikapur
Treatments	:	a) Genotypes: IC013533, IC13510, IC412733, Himgiri, Himpriya (Seed from Shimla), VL UGAL 7 (Seed from Almora), PRB 1 (Seed from Ranichauri), Sangla B1 (Seed from Sangla) b) Managements levels : Control 50% RDF + one irrigation 75% RDF + two irrigations 100%RDF + three irrigations

Results: Application of 100% recommended dose of fertilizers (RDF) + three irrigations with genotype PRB-1 recorded highest seed yield (23.55 q/ha) followed by 75% RDF + two irrigations and genotype PRB-1 which was at par with 100% RDF + three irrigations and genotype VL UGAL 7 (**Table 92**).

Experiment 5	: Response of grain amaranth to sulphur
Objective	: To work out the Sulphur (S) requirement of grain amaranth
Location	: Bhubaneshwar and Cooch Behar
Treatments	RFD @ 60-40-20 kg NPK/ha RFD + 20 kg S/ha RFD + 40 kg S/ha RFD + 10 kg S/ha at sowing & 10 kg S/ha at 3WAS RFD + 20 kg S/ha at sowing & 20 kg S/ha at 3WAS
Design	: RBD
Replications	: 4

Results: The highest seed yield of grain amaranth, net return and B:C ratio were obtained (Table 93) when the recommended fertilizer dose was supplemented with 10 Kg S/ha at sowing & 10 kg S/ha at 3WAS (T4).

Experiment 6	: Response of promising genotypes (AVT-II entries) of Faba bean to different levels of management
Objective	: To evaluate promising genotypes (AVT-II entries) of faba bean at different levels of management
Year of start	: 2014
Locations	: Palampur, Ranichauri, Hisar, Faizabad, Ranchi,
Treatments	a) Genotypes: HB-122, HB-186, NDF-10, HB-8-12, Vikrant, HFB-1 b) Managements levels : Control 50% RDF + one irrigation 75% RDF + two irrigations

100%RDF + three irrigations

Results: It is revealed from the data (Table 94) that seed yield was significantly increased with the improvement in the management levels. On the mean basis of two year the seed yield was increased to the tune of 33.1, 55.7 and 71.6 percent with 50% RDF + one irrigation, 75% RDF + two irrigation and RDF + three irrigation treatments, respectively than the control. Among the genotypes, HB-186 with seed yield of 29.98 q/ha was found highest seed yielder and it was followed by HB-82, HB-8-12 and NDF-10, respectively. All the genotypes except NDF-10 produced significantly higher seed yield than the national check Vikrant.

Table 84: Centre - wise details of agronomic experiments allotted/conducted on different potential crops.

S. No	Experiments	Ambikapur	Bhubaneswar	Cooch Behar	Faizabad	Hisar	Mandor	Palampur	Rahuri	Ranchi	Ranichauri	S.K. Nagar	Total
1	Response of grain amaranth genotypes to different fertilizer doses	N	Y	-	N	-	N		-	N		Y	2(6)
2	Comparative economics of grain amaranth vis-à-vis other crops	-	Y	-	N	N	N		N	N		Y	2(7)
3	Performance of Buckwheat varieties at different locations	N	-	Y	-	-	-		-	-		-	1(2)
4	Response of promising genotypes (AVT-II entries) of Buckwheat to different levels of management.	N	-	Y	-	-	-		-	-		-	1(2)
5	Response of grain amaranth to sulphur	-	Y	N	-	-	-		-	-		-	1(2)
6	Response of promising genotypes (AVT-II entries) of Faba bean to different levels of management	-	-	-	N	Y	-	N	-	N	N	-	1(5)
		0(3)	3(3)	2(3)	0(3)	1(2)	0(2)	0(1)	0(1)	0(3)	0(1)	2(2)	8(24)

() allotted: Without () conducted

Table 85: Response of grain amaranth genotypes to different fertilizers doses at S.K. Nagar

Sr. No.	Treatment	Days to 50% flowering	Days to maturity	Plant Height (cm)	Length of inflo	Grain Yield (kg/ ha)	Total income (Rs)	Cost of cultivation (Rs)	Net profit (Rs)	B.C. Ratio
1	G1 F1	52	112	145	58	991	44583	15000	29583	2.97
2	G1 F2	54	112	153	59	1455	65486	19250	46236	3.40
3	G1 F3	56	116	152	58	1531	68889	20000	48889	3.44
4	G1 F4	57	111	161	63	1781	80139	20750	59389	3.86
5	G2 F1	56	114	139	58	1231	55417	15000	40417	3.69
6	G2 F2	55	108	161	60	1491	67083	19250	47833	3.48
7	G2 F3	54	114	159	63	1676	75417	20000	55417	3.77
8	G2 F4	53	110	163	61	2241	100833	20750	80083	4.86
9	G3 F1	55	110	129	55	960	43194	15000	28194	2.88
10	G3 F2	55	111	149	62	1052	47361	19250	28111	2.46
11	G3 F3	59	114	151	57	1167	52500	20000	32500	2.62
12	G3 F4	52	110	141	62	1340	60278	20750	39528	2.90
13	G4 F1	52	112	139	60	873	39306	15000	24306	2.62
14	G4 F2	54	110	153	64	1015	45694	19750	25944	2.31
15	G4 F3	55	111	147	61	1191	53611	20000	33611	2.68
16	G4 F4	54	107	163	63	1454	65417	20750	44667	3.15
17	G5 F1	53	110	147	65	1002	45069	15000	30069	3.00
18	G5 F2	54	112	162	61	1275	57361	19000	38361	3.02
19	G5 F3	55	114	164	63	1364	61389	20000	41389	3.07
20	G5 F4	54	112	161	59	1596	71805	20750	51055	3.46
21	G6 F1	54	109	124	40	583	26250	15000	11250	1.75
22	G6 F2	53	107	142	37	787	35417	19250	16167	1.84
23	G6 F3	54	110	140	36	941	42361	20000	22361	2.12
24	G6 F4	53	112	146	36	1318	59305	20750	38555	2.86
25	G7 F1	52	108	119	40	704	31667	15000	16667	2.11
26	G7 F2	53	109	128	43	926	41667	19250	22417	2.16

Sr. No.	Treatment	Days to 50% flowering	Days to maturity	Plant Height (cm)	Length of inflo	Grain Yield (kg/ ha)	Total income (Rs)	Cost of cultivation (Rs)	Net profit (Rs)	B.C. Ratio
27	G7 F3	55	110	138	46	1074	48333	20000	28333	2.42
28	G7 F4	52	110	142	46	1127	50694	20750	29944	2.44
29	G8 F1	53	112	131	62	688	30972	15000	15972	2.06
30	G8 F2	54	111	135	58	920	41389	19250	22139	2.15
31	G8 F3	56	113	141	57	1025	46111	20000	26111	2.31
32	G8 F4	55	112	145	57	1403	63125	20750	42375	3.04
1	CD (0.05) for Main plot G					145.70				
2	CD (0.05) for Sub plot F					67.80				
3	CD (0.05) for Sub plot F means at the same main plot (GXF)					191.77				
4	CD (0.05) for Main plot means at the same or different sub plot (FXG)					220.82				
5	CV (%) Error For Main plot G					13.95				
6	CV (%) Error For Sub plot F					9.80				

Table 86: Effect of different genotypes and fertility levels on yield (kg/ha) of grain amaranth at Bhubaneswar.

S. No	Genotypes	F1	F2	F3	F4	Mean
1	V1-RGA-10	810	1077	1191	1181	1065
2	V2- BGA-4-9	1001	1314	1525	1420	1315
3	V3-KBGA-5	863	1134	1258	1248	1126
4	V4-BGA-8-5	912	1387	1458	1403	1290
5	V5-RMA-7	846	1090	1295	1132	1091
6	V6-GA-2	908	1138	1271	1227	1136
7	V7-BGA-2	773	1235	1470	1348	1206
8	V8-Suvarna	891	1124	1215	1164	1099
	Mean	875	1187	1335	1265	1166
	CD (0.05) Genotypes (main plot)					94
	CD (0.05) Fertilizer (sub plot)					61
	CD (0.05) Genotypes x fertilizer					189
	CD (0.05) Fertilizer x Genotypes					173

Table 87: Economics (Net return- Rs/ha) as affected by different fertilizer doses on different genotype during Rabi 2016-17 at Bhubaneswar location.

S. No	Genotypes	F1	F2	F3	F4	Mean
1	V1-RGA-10	2242	8929	11784	11527	8620
2	V2- BGA-4-9	7026	14845	20117	17494	14870
3	V3-KBGA-5	3579	10344	13456	13199	10144
4	V4-BGA-8-5	4788	16671	18445	17082	14247
5	V5-RMA-7	3142	9238	14382	10292	9263
6	V6-GA-2	4711	10447	13764	12684	10401
7	V7-BGA-2	1316	12864	18754	15693	12157
8	V8-Subarna	4274	10112	12376	11090	9463
	Mean	3885	11681	15385	13633	11146
	CD (0.05) Genotypes (main plot)					2357
	CD (0.05) Fertilizer (sub plot)					1527
	CD (0.05) Genotypes x fertilizer					4722
	CD (0.05) Fertilizer x Genotypes					4318

Table 88: B:C Ratio as affected by different fertilizer doses on different genotype during Rabi 2016-17 at Bhubaneswar location.

S. No	Genotypes	F1	F2	F3	F4	Mean
1	V1-RGA-10	1.26	1.68	1.85	1.84	1.66
2	V2- BGA-4-9	1.56	2.04	2.37	2.21	2.05
3	V3-KBGA-5	1.34	1.76	1.96	1.94	1.75
4	V4-BGA-8-5	1.42	2.16	2.27	2.18	2.01
5	V5-RMA-7	1.32	1.69	2.01	1.76	1.70
6	V6-GA-2	1.41	1.77	1.98	1.91	1.77
7	V7-BGA-2	1.20	1.92	2.29	2.10	1.88
8	V8-Suvarna	1.39	1.75	1.89	1.81	1.71
	Mean	1.36	1.85	2.08	1.97	1.81
	CD (0.05) Genotypes (main plot)					0.147
	CD (0.05) Fertilizer (sub plot)					0.095
	CD (0.05) Genotypes x fertilizer					0.294
	CD (0.05) Fertilizer x Genotypes					0.269

Table 89: Performance of grain amaranth vis-à-vis other crop at sub-optimal levels of management at S.K. Nagar

S. No	Treatment	Days to 50 flowering	Days to maturity	Grain Yield (kg/ha)	Total income (Rs)	Cost of cultivation (Rs)	Net profit (Rs)	B.C. Ratio
1	I 1 F1 C1	73	127	1059	74105	13400	60705	5.53
2	I 1 F1 C2	52	95	1113	55633	20400	35233	2.73
3	I 1 F1 C3	54	115	1525	60988	16400	44588	3.72
4	I 1 F1 C4	54	110	890	40069	16400	23669	2.44
5	I 1 F2 C1	73	130	926	64815	11400	53415	5.69
6	I 1 F2 C2	52	93	846	42284	19150	23134	2.21
7	I 1 F2 C3	56	116	1247	49876	14900	34976	3.35
8	I 1 F2 C4	53	108	772	34722	14900	19822	2.33
9	I 2 F1 C1	72	128	1106	77454	13200	64254	5.87
10	I 2 F1 C2	51	96	1574	78704	21200	57504	3.71
11	I 2 F1 C3	56	114	1753	70123	17200	52923	4.08
12	I 2 F1 C4	55	108	1281	57639	17200	40439	3.35
13	I 2 F2 C1	73	125	1037	72593	13200	59393	5.50
14	I 2 F2 C2	54	99	1235	61728	19750	41978	3.13
15	I 2 F2 C3	57	110	1552	62099	15700	46399	3.96
16	I 2 F2 C4	56	110	1034	46528	15700	30828	2.96
17	I 3 F1 C1	76	127	1292	90417	15000	75417	6.03
18	I 3 F1 C2	55	96	1756	87809	22000	65809	3.99
19	I 3 F1 C3	55	113	2182	87284	20000	67284	4.36
20	I 3 F1 C4	55	107	1512	68055	20000	48055	3.40
21	I 3 F2 C1	76	130	1215	85015	14000	71015	6.07
22	I 3 F2 C2	54	97	1557	77855	20750	57105	3.75
23	I 3 F2 C3	58	115	1682	67284	18500	48784	3.64
24	I 3 F2 C4	56	111	1343	60417	18500	41917	3.27

S. No	Treatment	Days to 50 flowering	Days to maturity	Grain Yield (kg/ha)	Total income (Rs)	Cost of cultivation (Rs)	Net profit (Rs)	B.C. Ratio
1	CD (0.05) [1] for I			81.61				
2	CD (0.05) [2] for F			82.85				
3	CD (0.05) [3] for F It the same or different levels of I			143.51				
4	CD (0.05) [4] for C			89.26				
5	CD (0.05) [5] for C It the same level of I			154.60				
6	CD (0.05) [6] for C It the same level of F			126.23				
7	CD (0.05) [7] for C It the same level of IF			218.63				
8	CD (0.05) [8] for I It the same or different levels of F			129.98				
9	CD (0.05) [9] for F It the same of different levels of C			136.64				
10	CD (0.05) [10]for F It the same or different levels of IC			236.67				
11	CD (0.05) [11] for I It the same or different levels of C			155.50				
12	CD (0.05) [12] for I It the same level of FC			228.44				
13	CV (%) Error for Main plot			7.76				
14	CV (%) Error for Sub plot			10.95				
15	CV (%) Error for sub-sub plot			10.06				

Table 90: Seed yield (kg/ha), Grain Amaranth Equivalent Yield (GEY), Net Return and B:C Ratio of grain amaranth vis-a-vis other crops at Bhubaneswar

Treatments	Seed yield (kg/ha)	GEY (kg/ha)	Net Return (Rs/ha)	B:C Ratio
T-1. Grain Amaranth	1046	1046	8157	1.45
T2- Black gram	763	1327	13177	1.66
T3- Green gram	790	1454	16361	1.82
T4-Toria	812	1039	7986	1.44
T5-Cow Pea	1593	797	5916	1.42
SE(m)		56		
CD (0.05)		171		
CV (%)		9.81		

Price: - Grain amaranth-Rs.25/kg, Black gram- Rs.43.50/kg, Green gram-Rs. 46/kg, Toria- Rs. 31.95/kg, Cowpea- Rs. 12.50/kg,

Table 91: Performance of buckwheat varieties at Cooch Behar

S. No	Treatment	Plant height (cm) at 30 DAS	Plant height (cm) at maturity	No. of primary branches per plant	No. of secondary branches per plant	Seed yield (q/ha)	Test weight
1	Hinpriya (T1)	43.00	100.5	2.75	5.25	22.17	40.375
2	VL UGAL 7 (T2)	53.75	101.5	3.00	5.9975	18.76	49.45
3	PRB 1 (T3)	49.75	91.75	2.75	5.7525	19.03	39.1
4	Shimla B-1 (T4)	41.25	124.25	2.25	5.4175	26.60	41.05
5	Sangla B1 (T5)	41.75	89.75	2.00	4.6675	19.40	41.575
Mean	45.90	101.55	2.55	5.42	21.19	42.31	
SE	4.23	2.84	0.34	0.59	1.07	1.46	
CD(0.05)	9.21	6.19	0.74	1.29	2.47	3.19	
CV(%) Error	11.28	3.43	16.41	13.40	6.18	4.23	

Table 92: Response of promising genotypes (AVT- II entries) of buckwheat to different levels of management at Cooch Behar

Treatments	Plant height (cm)	No. of Pr. Branches/plant	No. of Sr. Branches/plant	Seed yield (q/ha)
T1M1	72.50	1.25	3.00	7.51
T2M1	71.50	1.50	3.50	8.86
T3M1	66.50	1.75	3.92	9.43
T4M1	76.75	1.00	2.17	6.04
T5M1	58.25	1.25	2.75	6.19
T6M1	58.00	1.00	2.17	5.34
T7M1	68.00	1.25	2.58	5.45
T8M1	78.50	1.50	2.92	6.44
T1M2	93.50	2.25	4.67	15.85
T2M2	91.50	2.50	4.92	15.97
T3M2	85.25	2.50	5.00	16.80
T4M2	105.00	1.75	3.42	14.03
T5M2	83.25	1.50	3.00	14.35
T6M2	78.75	1.75	3.50	14.17
T7M2	78.25	1.75	3.25	14.56
T8M2	78.50	1.75	3.34	13.96
T1M3	96.75	2.50	5.50	18.21
T2M3	98.25	2.75	5.58	20.98
T3M3	91.50	3.00	5.92	22.08
T4M3	112.25	2.25	4.42	17.37
T5M3	90.00	2.50	4.92	19.41
T6M3	90.25	2.00	3.75	17.64
T7M3	90.75	2.25	4.50	16.30
T8M3	98.00	2.50	4.83	18.84
T1M4	102.50	2.75	5.42	20.27
T2M4	96.75	3.00	6.00	22.08
T3M4	96.75	3.00	6.08	23.55

Treatments	Plant height (cm)	No. of Pr. Branches/plant	No. of Sr. Branches/plant	Seed yield (q/ha)
T4M4	114.00	2.50	5.00	17.79
T5M4	91.00	2.75	5.42	20.33
T6M4	89.75	2.25	4.58	18.36
T7M4	90.00	2.50	4.42	17.01
T8M4	100.75	2.25	4.25	19.69
Mean	87.29	2.09	4.21	15.15
CD (0.05) for Main plot T	2.45	0.35	0.60	0.70
CD (0.05) for Sub plot M	1.79	0.26	0.41	0.71
CD (0.05) for Sub plot M means at the same main plot (TXM)	5.05	0.72	1.15	2.00
CD (0.05) for Main plot means at the same or different sub plot (MXT)	5.01	0.72	1.16	1.87
CV (%) Error For Main plot T	3.83	23.06	19.38	6.29
CV (%) Error For Sub plot M	4.11	24.91	19.45	9.35

Table 93: Performance and economics of effect of sulphur on Grain Amaranth at Bhubaneswar.

Treatments	Plant height (cm)	Length of inflorescence (cm)	10 ml volume wt (g)	Seed yield (kg/ha)	Net return (Rs/ha)	B:C ratio	Initial S-status (kg/ha)	Final S-status (kg/ha)
T1	89.7	31.35	7.24	963	6074	1.34	26.0	25.0
T2	109.4	34.20	7.33	1250	12859	1.70	26.0	30.0
T3	100.3	32.15	7.29	994	6054	1.32	26.0	35.0
T4	114.4	35.10	7.35	1284	13699	1.74	26.0	27.0
T5	106.2	33.65	7.29	1072	8009	1.43	26.0	33.0
SE(m)	6.07	1.57	0.010	30	752	0.041		
CD (0.05)	18.69	4.84	0.032	92	2319	0.125		
CV (%)	11.67	9.45	0.280	5.41	16.12	5.38		

Source of Sulphur- Gypsum

Table 94: Performance of faba bean genotypes (AVT-II entries) under different levels of management.

Treatment	Seed yield (q/ha)	Seed yield (q/ha)	
Management levels	RABI 2015	RABI 2016	Mean Seed yield (q/ha)
Control	21.40	18.62	20.01
50% RDF + one irrigation	28.67	24.61	26.64
75% RDF + two irrigation	33.02	29.29	31.15
RDF + three irrigation	35.94	32.72	34.33
CD @ 5%	1.38	2.42	----
Genotypes			
HB-82	30.12	27.16	28.64
HB-186	31.22	21.73	29.98
NDF-10	29.62	25.44	27.68
HB-8-12	30.32	26.38	28.35
Vikrant	27.50	23.54	25.52
CD @ 5%	2.22	1.88	----

4.2 CROP PROTECTION

In crop protection, two experiments, namely, Screening of germplasm against major insect pests and diseases and Integrated Pest Management (IPM) in potential crops were formulated to be conducted at 5 locations during Rabi 2016-17 on two crops, i.e. grain amaranth and faba bean. Out of total ten trials allotted to five locations, the results of five trials from three locations i.e. S.K. Nagar, Hisar and Bhubaneswar were received. The experiment and crop wise details of trials allotted/conducted are given in Table 95 and the results are presented as under:

4.2.1 Screening of germplasm against major insect pests and diseases

This experiment was planned in order to identify the source of resistance in IVT, AVT entries and germplasm against major insect pests and diseases on grain amaranth and faba bean at different locations. The results of IVT, AVT and germplasm screening of grain amaranth and faba bean crops at S.K. Nagar, Hisar and Bhubaneswar has been received and being presented below:

4.2.1.1 Grain amaranth

Insect pests and diseases

At S.K. Nagar, during Rabi 2016-17, all germplasm, IVT and AVT entries of grain amaranth were screened against insect pests and diseases but no incidence of any insect pests and diseases was observed in grain amaranth during the entire crop period.

4.2.1.2 Faba bean

Insect pests

At Hisar (Table 96), minimum population of Aphids, *Aphis craccivora* was observed on the genotypes HB 11-32 (4.50 nymphs/5 plants) and it was statistically at par with HB 11-12 (4.75 nymphs/5 plants). The population of stink bugs was also recorded on the crop in the month of March. Stink bugs includes *Lygus lineolaris*, *L. heskerus* and *Nezora viridula*. Minimum population was recorded on HFB-1 check entry (4.25bugs/ 5 plant) and it was statistically at par with genotypes HB-11-32, HB -11-12 and HB 9-15. Percent pod borers incidence was recorded from 5 plants and total pods were plucked and as well total damaged pods were counted. Minimum per cent pod damage was recorded in the

genotype *i.e.* HFB-1 (3.75 %) and it was statistically at par with HB-11-32, HB -11-12 and HB 9-06.

Diseases

At Hisar, about three hundred germplasm lines of faba bean were screened for resistance to *Alternaria* leaf blight and root rot during Rabi 2016-17 (Table 97). Out of three hundred entries, only fifteen entries *i.e.* HB-50, DFB 9-1, DFB 10-3, RFB 10, HFB 1, HB-80, HB-82, HB-85, EC 243793, EC -5864, EC-1072, EC-24710, NDFB-14, DFB 14-1 and Pusa Sumit showed moderate resistance against *Alternaria* leaf blight and root rot incidence.

In case of IVT, AVT-1 and AVT-II trials, out of 16 genotypes evaluated, three genotypes *i.e.* HB 11-15, HB 12-8 and HFB-1 showed resistant to high resistant reaction against *Alternaria* leaf blight and root rot incidence while the genotypes DFB-1, HB 9-15, HB11-12 and HB11-32 showed moderate resistant reaction against *Alternaria* leaf blight and root rot both. The genotype HB12-37 and Vikrant showed resistant reaction against *Alternaria* leaf blight while the genotypes HB 9-06, HB 12-34, HB 12-37 and Vikrant showed the moderate resistant reaction against root rot.

4.2.2 Integrated pest management (IPM) in potential crops

This experiment was planned to manage the insect pests of grain amaranth and faba bean crops during Rabi 2016-17 at five different locations *i.e.* Ranichauri, Hisar and Ludhiana (faba bean) while Bhubaneshwar, and S.K. Nagar (grain amaranth). The detail of results have been summarized as below:

4.2.2.1 Faba bean

At Hisar, efficacy of various insecticides *i.e.* Indoxacarb 15.8 EC @ 0.5ml/litre of water, Spinosad 45 SC @ 0.5ml/litre of water, Profenophos 50 EC @ 0.5ml/litre of water, Bacillus thuringiensis 5 SG @ 1kg/ha, Emamectin benzoate 5 SG @ 0.5g/litre of water and Abamectin @ 0.5ml/litre of water along with control were evaluated against pod borer complex in faba bean (Table 98). Significantly low per cent pod damage was recorded under all the insecticidal treatments over the control treatment. However, among the insecticidal treatments, significantly low pod damage and higher yield were recorded in Emamectin benzoate 5 SG @ 0.5g/litre of water (16.25 %), Profenophos 50 EC @ 0.5ml/litre of water (16.75%) and Spinosad 45 SC @ 0.5ml/litre of water (17.00%) when

compared with Abamectin @ 0.5ml/litre of water, Bacillus thuringiensis 5 SG @ 1kg/ha and Indoxacarb15.8 EC @ 0.5ml/litre of water.

At Hisar centre, bioefficacy of Imidacloprid 17.8 SL @ 0.08 ml/litre of water, Thiamethoxam 25 WG @0.05g/litre of water, Acephate 75 SP @ 0.35 g/litre of water, Acetamiprid 20 SP @ 0.5 g/litre of water, Neem formulation (Azadirachtin) 1500ppm @ 1 ml/litre of water, Neem seed kernel extract @ 5 ml/litre of water and Neem oil @ 2 ml/litre of water was evaluated against sucking insect pests (Stink bug and green bug) during Rabi 2016-17. It is evident from the results that minimum population of stink bugs and green bugs were recorded in acetamiprid 20 SP @ 0.05 g/litre of water treated plots (2.75 bugs/plant) and it was statistically at par with Imidacloprid 17.8 SL, Thiamethoxam 25 MG, Acephate 75 SP and Neem seed kernel extract (Table 99).

4.2.2.2 Grain amaranth

At Bhubaneshwar centre, bioefficacy of different fungicides i.e. Tebuconazole @ 1 ml/litre of water, Hexaconazole @ 2 ml/litre of water, Propiconazole @ 1 ml/litre of water, Carbendazim @ 2 g/litre of water, *Trichoderma viridae* @ 5 kg/ha, *Trichoderma harzianum* @ 4 kg/ha was evaluated against wilt and leaf spot diseases during Rabi 2016-17. The results revealed that no wilting was observed in plants during the whole cropping season. In case of leaf spot, significant low per cent infected plants were observed in all fungicidal treatments over the control treatment. However, the yield was significantly high under the treatment i.e. Propiconazole @ 1 ml/litre of water (Table 100).

At Bhubaneshwar centre, bioefficacy of different insecticides i.e. Imidacloprid 17.8 SL @ 0.08 ml/litre of water, Thiamethoxam 25 WG @0.05g/litre of water, Acephate 75 SP @0.35 g/litre of water, Acetamiprid 20 SP @ 0.5 g/litre of water, Neem formulation (Azadirachtin) 1500ppm @ 1 ml/litre of water, Neem seed kernel extract @ 5 ml/litre of water, Neem oil @ 2 ml/litre of water was evaluated against sucking insect pests (aphids, jassids and mealy bug) during Rabi 2016-17. It is evident from the results that significantly low population of aphids and jassids was recorded under all the insecticidal treatments after 15 days of spraying over the untreated control. However, negligible incidence of mealy bugs was recorded in grain amaranth during the entire crop period. Again a significantly higher yield was recorded under all the insecticidal treatments except Imidacloprid 17.8 SL @ 0.08 ml/litre of water and Neem seed kernel extract @ 5 ml/litre of water (Table 101).

Table 95: Crop protection trials allotted/ conducted during Rabi 2016-17 at different centres.

S. No.	Crops	Hisar	Ludhiana	Ranichauri	Bhubaneswar	S.K. Nagar	Total
1.	Screening of germplasm against major insect pests and diseases						
	Faba bean	1 (1)	1 (0)	1 (0)			3 (1)
	Grain amaranth				1 (0)	1 (1)	2 (1)
2.	Integrated pest management (IPM) in potential crops						
	Faba bean	1 (1)	1 (0)	1 (0)			3 (1)
	Grain amaranth				1 (1)	1 (1)	2 (2)
	Total	2 (2)	2 (0)	2 (0)	2 (1)	2 (2)	10 (5)

() = Trials conducted; without () = Trials allotted

Table 96:- Screening of Faba Bean in AVT-I and AVT-II against aphid, stink bug and pod borer complex during Rabi 2016-17 at Hisar.

Sr. No.	Genotypes	Aphids/5plants	Stink bugs / 5plants	% pod damage
1	HB9-06	5.375 (2.53)	5.5 (2.55)	4.625 (12.402)
2	DFB-1	7.75 (3.00)	6.75 (2.79)	7.50 (15.849)
3	HB9-15	5.5 (2.55)	4.50 (2.37)	6.05 (14.212)
4	HB11-12	4.75 (2.40)	4.75 (2.40)	4.25 (11.834)
5	HB11-32	4.5 (2.37)	4.50 (2.37)	4.00 (11.488)
6	HB11-15	7.75 (2.98)	7.75 (2.98)	8.75 (17.181)
7	Vikrant	11.00 (3.47)	9.50 (3.24)	9.25 (17.644)
8	HFB-1	5.50 (2.55)	4.25 (2.29)	3.75 (11.097)
	SE(m)	0.454	0.428	0.482
	C.D. at 5%	1.343	1.267	1.427

* Figures in parentheses are $\sqrt{n+1}$ values

** Figures in parentheses are angular transformed values.

Table No. 97: Screening of Faba Bean in IVT, AVT-I and AVT-II for Alternaria leaf blight and root rot during Rabi 2016-17 at Hisar

Sr. No.	Genotype	Alternaria leaf blight % disease severity (Reaction)	Root Rot % disease incidence (Reaction)
1	HB9-06	24.2 MS	8.2 MR
2	DFB-1	14.0 MR	6.8 MR
3	HB9-15	11.4 MR	4.6 R
4	HB11-12	12.5 MR	5.5 MR
5	HB11-32	11.5 MR	10.2 MR
6	HB11-15	7.0 R	5.0 R
7	HB12-8	4.2 HR	4.6 HR
8	HB12-34	29.8 MS	14.3 MR
9	NDFB-16	34.6 S	26.0 HS
10	HB12-42	15.8 MR	12.6 MR
11	HB12-15	12.2 MR	10.4 MR
12	NDFB-16-1	24.0 MS	30.0 HS
13	NDFB16-2	30.5 MS	27.4 HS
14	HB12-37	8.1 R	8.9 MR
15	Vikrant	9.8 R	7.5 MR
16	HFB-1	4.8 HR	4.1 HR

Rating	Alternaria leaf blight % disease severity (Reaction)		Root Rot % disease incidence (Reaction)	
	Reaction	Rating	Reaction	Rating
1	HR	0-5 %	R	0-5 %
2	R	6-10 %	MR	6-15 %
3	MR	11-20 %	S	16-25 %
4	MS	21-30 %	HS	>25 %
5	S	31-50%		
6	HS	>50%		

Table 98: Efficacy of different insecticides against pod borer complex in faba bean during Rabi 2016-17 at Hisar.

Sr. No.	Treatment	Dosage	Per cent pod damage	Yield q/ha
1	Indoxacarb 15.8 EC	0.5 ml/lit	18.75 (4.441)	30.50
2	Spinosad 45SC	0.5 ml/lit	17.00 (4.242)	33.50
3	Profenophos50 EC	0.5 ml/lit	16.75 (4.213)	32.50
4	Bacillus thringiensis	1 kg/ha	19.50 (4.526)	29.50
5	Emamectin benzoate5 SG	0.5 g/lit	16.25 (4.152)	36.30
6	Abamectin	0.5 ml/lit	20.25 (4.605)	28.50
7	Control	---	21.75 (4.766)	26.25
	SE (m)		0.505	
	CD at 5%		1.512	

Table 99: Efficacy of different insecticides against sucking insects (stink and green bugs) in faba bean during Rabi 2016-17 at Hisar.

Sr. No.	Treatment	Dosage	Number of bugs/plant
1	Imidacloprid 17.8 SL	0.08 ml/litre of water	3.00 (2)
2	Thiamethoxam 25 WG	0.05 g/ litre of water	2.33 (1.81)
3	Acephate 75 SP	0.35 g/ litre of water	2.85 (1.96)
4	Acetamiprid 20 SP	0.5 g/ litre of water	2.75 (1.93)
5	Neem formulation (Azadirachtin) 1500 ppm	1 ml/ litre of water	4.75 (2.39)
6	Neem seed kernel extract	5 ml/ litre of water	3.25 (2.05)
7	Neem oil	2 ml/ litre of water	4.60 (2.37)
8	Control		4.85 (2.42)
	SE (m)		0.37
	CD at 5%		1.10

Table 100: Efficacy of different fungicides against wilt and leaf spot diseases in grain amaranth during Rabi 2016-17 at Bhubaneshwar

Trea t. No..	Treatments	Wilt disease				Leaf spot disease				Yield (kg/ha)	
		% infected plants 24 hrs before spray		% infected plants 15 days after spray		% infected plants 24 hrs before spray		% infected plants 15 days after spray			
		Actual value	Transfor med value	Actual value	Transfor med value	Actual value	Transfo rmed value	Actual value	Transfor med value		
1	Tebuconazole @ 1 ml/ litre of water	0.00	0.71	0.00	0.71	0.33	0.73	0.07	0.75	919.6	
2	Hexaconazole @ 2 ml/ litre of water	0.00	0.71	0.00	0.71	0.33	0.73	0.07	0.75	1080.0	
3	Propiconazole @ 1 ml/ litre of water	0.00	0.71	0.00	0.71	0.67	0.75	0.20	0.84	1203.5	
4	Carbendazim @ 2 g/ litre of water	0.00	0.71	0.00	0.71	0.33	0.73	0.07	0.75	1067.7	
5	<i>Trichoderma viridae</i> @ 5 kg/ha	0.00	0.71	0.00	0.71	1.00	0.77	0.13	0.79	931.9	
6	<i>Trichoderma harzianum</i> @ 4 kg/ha	0.00	0.71	0.00	0.71	0.00	0.71	0.07	0.75	956.6	
7	Control	0.00	0.71	0.00	0.71	1.00	0.77	0.27	0.88	956.6	
	CD (5%)		0.000		0.000		0.095		0.094	213.35	
	C.V.(%)Error		0.000		0.000		7.215		0.000	11.80	

Table 101: Efficacy of different insecticides against sucking insects (aphids, jassids and Mealy bugs) in grain amaranth during Rabi 2016-17 at Bhubaneshwar

Tre at No.	Treatments	Aphids				Jassids				Mealy bugs/plant				Yield (kg/h a)	
		24 hrs before spray		15 days after spray		24 hrs before spray		15 days after spray		24 hrs before spray		15 days after spray			
		Actual value	Transformed value												
1	Imidacloprid 17.8 SL @ 0.08 ml/litre of water	0.33	0.73	0.02	0.72	0.13	0.72	0.08	0.76	0.00	0.71	0.00	0.71	864.0	
2	Thiamethoxam @ 0.05 g/litre of water	0.40	0.73	0.06	0.75	0.07	0.71	0.04	0.74	0.07	0.71	0.00	0.71	1110.9	
3	Acephate @ 0.35 ml/litre of water	0.53	0.74	0.06	0.75	0.13	0.72	0.02	0.72	0.00	0.71	0.00	0.71	1049.2	
4	Acetamiprid @ 0.5g/litre of water	0.47	0.74	0.04	0.74	0.33	0.73	0.10	0.78	0.00	0.71	0.00	0.71	1049.2	
5	Azadirachtin 1500 ppm @ 1.0 ml/litre of water	0.40	0.73	0.06	0.75	1.40	0.80	0.08	0.76	0.00	0.71	0.00	0.71	987.5	
6	Neem Seed Kernel Extract @ 5 ml/litre of water	0.07	0.71	0.05	0.74	0.80	0.76	0.03	0.73	0.00	0.71	0.00	0.71	864.0	
7	Neem Oil @ 2.0 ml/litre of water	0.53	0.74	0.04	0.73	0.40	0.73	0.06	0.75	0.00	0.71	0.00	0.71	987.5	
8	Control	0.80	0.76	0.18	0.82	0.40	0.73	0.22	0.85	0.00	0.71	0.01	0.71	802.3	
	C.D (5%)		0.040		0.047		0.079		0.060		0.005		0.008	176.4	
	CV (%)		3.134		0.000		6.124		0.000		0.404		0.000	10.4	

V. QUALITY ANALYSIS

5.1 Fababean Germplasm at Hisar Centre (Rabi -2016-17)

Fifty one genotypes from Hisar centre including two check varieties viz., Vikrant and HFB-1 were analyzed for protein (%), vicine-convicine (%) and phenol (%) content. The statistical data and list of promising accessions for these characters has been presented in Table 102

Protein content varied from 23.17 to 27.13%, vicine-convicine content varied from 0.72 to 0.96% with an average value of 24.96 % and 0.81% respectively. Phenol content varied from 0. 22 to 0.28 % with an average value of 0.25%. The promising genotypes identified for high protein content, low vicine-convicine and low phenol content were are presented in Table 103.

5.2 Grain Amaranth Germplasm at S.K. Nagar Centre (Rabi -2016-17)

Eighty two genotypes from S.K. Nagar Centre including four check varieties viz., Suvarna, GA-2, BGA-2 and RMA-7 were analyzed for protein, oil, Fe, Zn, Cu and Mn content. Protein and Oil content varied from 10.6 to 13.4 and 5.2 to 8.6 per cent with an average value of 12.0 and 6.9% respectively. Iron content ranged from 10.1 to 13.7 (mg/100g) with an average value of 11.1(mg/100g). Zn, Cu and Mn content ranged from 2.6 to 3.5, 0.12 to 0.18 and 0.58 to 0.81 with an average value of 3.0, 0.15 and 0.68 (mg/100g) respectively. The statistical data and list of promising accessions in grain amaranth for these characters has been presented in Table 104. The promising genotypes for protein, oil, Fe, Zn, Cu and Mn content in grain amaranth at S.K. Nagar are presented in Table 105.

Table- 102: Quality analysis of Fababean germplasm at Hisar Centre (Rabi -2016-17)

Sr. No.	Genotypes	Protein (%)	Vicine-convicine (%)	Phenol (%)
1	HB-1	26.17	0.90	0.25
2	HB-2	24.80	0.80	0.25
3	HB-3	23.17	0.73	0.24
4	HB-5	26.67	0.91	0.27
5	HB-15	23.93	0.77	0.24
6	HB-19	25.27	0.81	0.24
7	HB-21	23.70	0.76	0.24
8	HB-24	24.10	0.74	0.23
9	HB-28	25.83	0.87	0.26
10	HB-30	26.40	0.96	0.28
11	HB-33	25.17	0.78	0.25
12	HB-37	24.90	0.86	0.24
13	HB-58	25.20	0.81	0.25
14	HB-63	24.77	0.77	0.25
15	HB-65	23.27	0.72	0.23
16	HB-66	24.70	0.78	0.25
17	HB-68	23.67	0.75	0.24
18	HB-71	24.90	0.77	0.25
19	HB-73	26.10	0.85	0.27
20	HB-78	23.50	0.75	0.23
21	HB-79	24.37	0.76	0.25
22	HB-82	25.97	0.79	0.25
23	HB-90	23.93	0.74	0.24
24	NDF-8	25.67	0.83	0.26
25	NDF12	25.83	0.92	0.24
26	NDFB-14	25.20	0.82	0.24
27	EC-243793	25.97	0.84	0.26
28	EC-117744	24.57	0.76	0.26
29	EC-243036	23.53	0.75	0.23
30	EC-243596	24.73	0.78	0.23

Sr. No.	Genotypes	Protein (%)	Vicine-convicine (%)	Phenol (%)
31	EC-25085	23.70	0.76	0.24
32	EC-25192	25.37	0.84	0.26
33	EC-287710	26.67	0.94	0.28
34	EC-293820	24.53	0.77	0.22
35	EC-3279	27.13	0.95	0.27
36	EC-32905	25.73	0.87	0.26
37	EC-32923	26.07	0.91	0.27
38	EC-329681	24.70	0.76	0.25
39	EC-32976	24.90	0.80	0.26
40	EC-331564	23.63	0.75	0.23
41	EC-343691	24.27	0.76	0.22
42	EC-351587	25.90	0.79	0.27
43	EC-361485	24.40	0.80	0.23
44	EC-363781	24.70	0.79	0.25
45	EC-366272	23.83	0.78	0.24
46	EC-591784	24.43	0.73	0.22
47	EC628925	26.67	0.93	0.27
48	EC 628940	24.87	0.87	0.23
49	EC-628942	24.70	0.79	0.24
50	Vikrant (C)	24.97	0.81	0.25
51	HFB-1 (C)	26.03	0.80	0.25
Mean		24.96	0.81	0.25
Range		23.17 – 27.13	0.72 – 0.96	0.22 – 0.28

Table 103: Promising accessions for protein (%), vicine-convicine (%) and phenol (%) content in Fababean germplasm (Rabi -2016-17)

Genotypes	Protein %	Genotypes	Vicine-Convicine %	Genotypes	Phenol %
EC-3279	27.13	HB-65	0.72	EC-293820	0.22
HB-5	26.67	HB-3	0.73	EC-343691	0.22
EC-287710	26.67	EC-591784	0.73	EC-591784	0.22
EC628925	26.67	HB-24	0.74	HB-24	0.23
HFB-1 (C)	26.03	HFB-1 (C)	0.80	Vikrant(C)	0.25

Table 104: Quality analysis of Grain amaranth germplasm at S.K. Nagar (Rabi -2016-17)

S.No.	Genotypes	Protein (%)	Oil (%)	Fe (mg/100g)	Zn (mg/100g)	Cu (mg/100g)	Mn (mg/100g)
1	SKGPA-144	11.2	8.1	12.4	2.8	0.14	0.76
2	SKGPA-145	12.2	7.3	11.8	3.1	0.12	0.79
3	SKGPA-146	12.1	7.6	11.2	3.5	0.16	0.68
4	SKGPA-147	11.7	7.5	12.4	2.7	0.14	0.76
5	SKGPA-148	11.7	8.2	11.1	3.2	0.16	0.79
6	SKGPA-149	10.8	8.6	11.4	2.8	0.16	0.78
7	SKGPA-150	11.2	7.8	10.7	2.7	0.16	0.68
8	SKGPA-151	12.1	6.7	11.2	3.3	0.16	0.72
9	SKGPA-152	12.2	6.1	10.1	3.2.	0.14	0.68
10	SKGPA-153	11.4	6.2	10.5	2.8	0.15	0.71
11	SKGPA-154	11.2	7.7	11.2	2.9	0.15	0.68
12	SKGPA-155	11.8	7.6	11.4	2.7	0.17	0.73
13	SKGPA-156	12.3	7.3	10.7	3.1	0.14	0.81
14	SKGPA-157	11.8	8.2	11.6	3.2	0.17	0.77
15	SKGPA-158	11.4	8.5	11.1	2.9	0.18	0.71
16	SKGPA-159	11.2	7.6	12.7	2.6	0.18	0.68
17	SKGPA-160	12.3	7.9	11.8	3.4	0.17	0.76
18	SKGPA-161	11.6	7.6	11.3	2.8	0.15	0.76
19	SKGPA-162	11.4	7.6	11.2	2.7	0.17	0.65

S.No.	Genotypes	Protein (%)	Oil (%)	Fe (mg/ 100g)	Zn (mg/ 100g)	Cu (mg/ 100g)	Mn (mg/ 100g)
20	SKGPA-163	12.3	6.8	11.8	2.6	0.16	0.73
21	IC-21922	11.8	6.7	11.7	2.9	0.15	0.76
22	IC-21923	12.2	7.1	10.6	3.1	0.14	0.65
23	IC-21925	12.7	6.7	10.6	3.4	0.16	0.74
24	IC-21927	12.5	7.6	10.4	3.2	0.16	0.68
25	IC-21930	11.3	7.7	10.2	3.2	0.15	0.71
26	IC-21935	12.6	6.1	11.2	3.1	0.16	0.68
27	IC-35534	12.2	5.8	10.8	3.3	0.14	0.72
28	IC-35539	13.2	6.5	10.2	3.1	0.16	0.69
29	IC-35541	12.4	6.7	10.7	3.4	0.15	0.73
30	IC-35542	11.3	6.9	10.1	3.1	0.15	0.62
31	IC-35543	12.2	6.3	10.2	3.2	0.16	0.73
32	IC-35545	12.3	6.9	11.2	3.1	0.17	0.64
33	IC-35546	11.2	7.8	10.7	3.2	0.14	0.69
34	IC-35547	12.4	7.1	11.1	2.8	0.16	0.58
35	IC-35549	12.0	6.2	10.1	2.8	0.15	0.61
36	IC-35550	12.7	6.5	10.7	3.4	0.16	0.58
37	IC-35551	11.8	8.3	10.9	2.8	0.15	0.66
38	IC-35552	11.7	8.5	11.7	2.8	0.16	0.73
39	IC-35553	12.6	7.2	10.1	3.2	0.17	0.61
40	IC-35554	12.6	6.4	10.6	3.3	0.14	0.63
41	IC-35610	12.8	6.4	10.8	3.2	0.16	0.65
42	IC-35611	12.2	7.3	10.2	2.8	0.14	0.63
43	IC-35612	11.6	7.6	11.4	2.8	0.15	0.68
44	IC-35614	12.9	6.3	10.5	3.1	0.16	0.71
45	IC-35617	12.2	6.4	11.1	2.6	0.14	0.69
46	IC-35618	11.2	7.2	12.4	2.9	0.13	0.72
47	IC-35621	13.1	6.2	11.5	3.4	0.15	0.64
48	IC-35622	12.5	6.7	10.6	3.2	0.16	0.68
49	IC-35623	11.3	7.3	10.7	2.8	0.14	0.73
50	IC-35624	11.6	6.8	11.2	2.8	0.14	0.65
51	IC-35625	11.2	7.2	11.8	2.7	0.15	0.62
52	IC-35668	10.8	8.1	11.7	2.9	0.14	0.67

S.No.	Genotypes	Protein (%)	Oil (%)	Fe (mg/ 100g)	Zn (mg/ 100g)	Cu (mg/ 100g)	Mn (mg/ 100g)
53	IC-35692	11.7	7.4	10.9	2.6	0.17	0.72
54	IC-35696	12.4	5.7	10.1	3.3	0.15	0.65
55	IC-35755	12.1	6.3	11.2	2.8	0.14	0.58
56	IC-35757	11.7	6.8	11.6	2.9	0.14	0.64
57	IC-35759	11.2	7.1	12.1	3.3	0.15	0.64
58	IC-35761	11.7	7.2	11.7	2.9	0.16	0.67
59	IC-35766	12.8	6.8	10.2	3.3	0.17	0.68
60	IC-35770	11.8	7.6	11.5	2.9	0.15	0.72
61	IC-35771	12.1	6.7	11.1	2.8	0.16	0.67
62	IC-35775	13.2	5.6	10.7	3.1	0.15	0.63
63	IC-35776	13.4	6.2	11.2	3.2	0.14	0.63
64	IC-93941	12.5	6.3	10.1	3.3	0.15	0.71
65	IC-93942	11.8	7.3	11.7	3.1	0.14	0.63
66	IC-93945	12.2	6.4	10.6	2.8	0.15	0.64
67	IC-95283	10.6	7.6	11.3	3.2	0.16	0.73
68	IC-95290	11.5	7.1	10.6	2.8	0.14	0.64
69	IC-95292	12.6	6.4	11.3	2.6	0.15	0.66
70	IC-95293	12.1	6.8	10.5	3.3	0.16	0.61
71	IC-95295	12.4	5.6	10.8	3.4	0.14	0.63
72	IC-95297	13.1	5.2	10.5	3.2	0.15	0.66
73	IC-95299	12.5	6.4	11.2	3.1	0.16	0.65
74	IC-95588	11.8	6.8	10.5	2.8	0.14	0.62
75	IC-95595	10.6	7.8	10.6	2.7	0.14	0.66
76	IC-95596	11.2	7.4	11.5	3.1	0.16	0.61
77	IC-95597	12.4	5.3	10.6	3.3	0.15	0.71
78	IC-95598	12.2	5.8	11.3	3.2	0.17	0.66
79	GA-2 (C)	11.8	7.9	13.1	2.6	0.16	0.68
80	Suvarna (C)	12.8	6.8	13.7	3.1	0.14	0.72
81	BGA-2 (C)	12.1	8.1	10.3	3.0	0.13	0.68
82	RMA-7 (C)	12.7	7.1	12.2	2.9	0.12	0.71
	Mean	12.0	6.9	11.1	3.0	0.15	0.68
	Range	10.6-13.4	5.2-8.6	10.1-13.7	2.6-3.5	0.12-0.18	0.58-0.81

Table 105: Promising accessions for protein, oil, Fe, Zn, Cu and Mn content in grain amaranth germplasm (Rabi -2016-17)

Genotypes	Protein %	Genotypes	Oil (%)	Genotypes	Fe (mg/100 g)
IC-35776	13.4	SKGPA-149	8.6	Suvarna (C)	13.7
IC-35539	13.2	SKGPA-158	8.5	GA-2 (C)	13.1
IC-35775	13.2	IC-35552	8.5	SKGPA-159	12.7
IC-35621	13.1	IC-35551	8.3	SKGPA-144	12.4
Suvarna (C)	12.8	GA-2 (C)	8.1	SKGPA-147	12.4

Genotypes	Zn (mg/100 g)	Genotypes	Cu (mg/100 g)	Genotypes	Mn (mg/100 g)
SKGPA-146	3.5	SKGPA-158	0.18	SKGPA-156	0.81
SKGPA-160	3.4	SKGPA-159	0.18	SKGPA-145	0.79
IC-21925	3.4	SKGPA-155	0.17	SKGPA-148	0.79
IC-35541	3.4	SKGPA-157	0.17	SKGPA-149	0.78
Suvarna (C)	3.1	GA-2 (C)	0.16	Suvarna (C)	0.72

VI. CENTRE REPORTS

6.1 Hisar

- Fresh crosses attempted during *Rabi* 2016-17 at Hisar Centre: 103
- Seed Multiplication: The following seed multiplications of various genotypes were carried out to meet out the ongoing demands. The detail is as under:-

Sr. No.	Name of crops	Genotype	Seed Quantities (kg)
A	BAKLA	Vikrant (General)	200
		HFB-1	100
		Promising genotypes	100
		Total	400

6.2 Faizabad

- **Hybridization Programme:** Fifty one crosses of bakla were made during *Rabi* 2014-15 and sufficient seeds were collected for further study. The details of crosses are given below.

S.N.	Lines			S.N.	Testers
1	EC 5873	13	EC 243845	1	HB 182
2	EC 329706	14	EC 27724	2	HB 184
3	EC 248940	15	EC 187908	3	DFB 10-2
4	EC 243529	16	IC 561414		
5	EC 321605	17	EC 243755		
6	EC 263620		Vikrant©		
7	IC 301470				
8	EC 25085				
9	EC 263820				
10	EC 117705				
11	EC 268914				
12	EC 374731				

F₁ generation: EC 25085 x HB 184, EC 26791 x DFB 10-2, EC 327724 x DFB 10-2, EC 267914 xDFB 10-2, EC 267914 x DFB 10-2, EC 267914 x HB 184 and EC 187905 x HB 184 have been found better than the check variety ..

F₂ generations: EC 25085 x HB 184, EC 26791 x DFB 10-2, EC 327724 x DFB 10-2, EC 267914 xDFB 10-2, EC 267914 x DFB 10-2, EC 267914 x HB 184 and EC 187905 x HB 184 have been found better than the check variety ..

F₃ generations: EC 25085 x HB 184, EC 26791 x DFB 10-2, EC 327724 x DFB 10-2, EC 267914 x DFB 10-2, EC 267914 x DFB 10-2, EC 267914 x HB 184 and EC 187905 x HB 184 have been found better than the check variety.

F₄ generations: Will be sown in *Rabi* 2017-18

- Forty five crosses of bakla were made during *Rabi* 2016-17 and sufficient seeds were collected for further study. The details of crosses are given below.

S. No.	Lines			S. No.	Testers
1.	EC 263620	14.	EC454751	1.	DFB 14-1
2.	EC 5873	15.	HB30	2.	HB 9-15
3.	EC 10719	16	HFB -1 (c)	3.	HB 9-16
4.	EC 329627	17.	Vikrant (c)		
5.	EC 2508				
6.	IC 598958				
7.	IC374731				
8.	IC10845				
9.	EC243626				
10.	EC329706				
11	HB 50				
12	EC 301470				
13	HB 10				

F₁ generation: Will be sown in *Rabi* 2017-18

- *Station trial on Faba bean:*

Table: Performance of faba bean genotypes under Station Trial

S.NO.	Genotype	Yield/plant (g)	Days to 50% flowering	Days to maturity	Plant height (cm)	100 seed weight(g)
1	NDFB 16-3	30.00	65.00	124.0	85.5	26.5
2	NDFB 16-4	29.00	64.00	125.5	82.5	25.8
3	NDFB 16-5	28.00	65.00	126.0	79.5	25.0
4.	Vikrant (c)	26.00	68.00	128.0	80.5	24.0

Four entries including check were evaluated in Randomized Block Design with four replications. The genotype NDFB 16-3 (30.0 g/plant) gave maximum grain yield followed by NDFB 16-4(29.0 g/plant) and check variety Vikrant (26.0 g/plant).

- **New Faba bean (*Vicia Faba*) entry nominated for Initial Varietal trial.**

S.NO.	Genotype	Yield/plant (g)	Days to 50% flowering	Days to maturity	Plant height (cm)	100 seed weight(g)
1	NDFB 16-3	30.00	65.00	124.0	85.5	26.5
2	NDFB 16-4	29.00	64.00	125.5	82.5	25.8
4.	Vikrant (c)	26.00	68.00	128.0	80.5	24.0

6.3 Ludhiana

- Crossing programme: Twenty fresh crosses were attempted at PAU Ludhiana during *rabi* 2016-17 using diverse genotypes from different centers under All Indian Coordinated Research Network (AICRN) on Potential crops.

List of fresh crosses of Fababean attempted at PAU, Ludhiana during *rabi* 2016-17.

Sr. No.	Cross			No of F ₁ seeds
1	Vikrant	x	HB 186	15
2	Vikrant	x	HB 9-16	13
3	Vikrant	x	PRT 12	13
4	Vikrant	x	DFB 103	20
5	Vikrant	x	DFB 14-1	14
6	Vikrant	x	EC 10719	12
7	HB 27	x	HB 186	16
8	HB 27	x	HB 9-16	20
9	HB 27	x	PRT 12	19
10	HB 45	x	DFB 102	18
11	HB 45	x	DFB 14-1	13
12	HFB 1	x	HB 188	21
13	HFB 1	x	HB 9-16	22
14	NDFB 16	x	HFB 1	20
15	NDFB 16	x	HB 12-8	15
16	HB 11-32	x	HFB 1	11
17	NDFB 12	x	RMDFB 2	12
18	NDFB 12	x	DFB 9-2	10
19	NDFB 13	x	DFB 9-2	10
20	NDFB 14	x	EC 10719	11

- **Breeding Material:** The details of breeding material generated during *rabi* 2016-17 is as follows:

List of F₁s evaluated

Sr. No.	Cross			Sr. No.	Cross		
1	Vikrant	x	HB 27	17	DFB 14	x	DFB 102
2	Vikrant	x	HB 45	18	DFB 14	x	NDFB 13
3	Vikrant	x	DFB 102	19	DFB 14	x	NDFB 14
4	Vikrant	x	NDFB 13	20	DFB 14	x	RFB 13
5	Vikrant	x	NDFB 14	21	RMDFB 2	x	HB 27
6	Vikrant	x	RFB 13	22	RMDFB 2	x	HB 45
7	Vikrant	x	ICARDA No. 34103	23	RMDFB 2	x	DFB 102
8	Vikrant	x	ICARDA No. 34105	24	RMDFB 2	x	NDFB 13
9	HB 188	x	HB 27	25	RMDFB 2	x	NDFB 14
10	HB 188	x	HB 45	26	RMDFB 2	x	RFB 13
11	HB 188	x	DFB 102	27	NDFB 12	x	DFB 102
12	HB 188	x	NDFB 13	28	NDFB 12	x	NDFB 13
13	HB 188	x	NDFB 14	29	NDFB 12	x	NDFB 14
14	HB 188	x	RFB 13	30	HB 186	x	ICARDA No. 34103
15	DFB 14-1	x	HB 27	31	HB 186	x	ICARDA No. 34105
16	DFB 14-1	x	HB 45				

6.4 Rahuri

A). Crop and Season (Rabi 2016-17)

The sowing of Grain Amaranthus trials *viz*; IVT, AVT-I, AVT-II and Germplasm Trial was completed in second fortnight of November, 2016 during *Rabi* season. After sowing of trials immediately irrigation was given hence germination was found satisfactory. The initial crop stand and growth was very good. The maximum temperature during this season ranged between 26.5 to 39.9 °C and minimum temperature ranged from 8.6 to 21.0 °C. There was no rainfall received during rabi 2016-17 growing season. In general the season was satisfactory for the *rabi* 2016-17 for Grain Amaranthus crop.

- **Research Highlights (Summary) -*Rabi* 2016-17**
- **Varietal improvement in Grain Amaranth (*Amaranthus hypochondriacus*)**
The *rabi* 2016-17 Grain Amaranthus Coordinated programme comprised of four coordinate trials *viz*; Germplasm evaluation trials, IVT, AVT-I and AVT-II. Also station programme was comprised of two trials i.e .PYT and Station Trial.
- **Station Programme of Grain Amaranthus (*Rabi* 2016-17):**

Station Trial (ST)

The genotype RGAG-14-3 (23.43 q/ha.), RGAG-12-30 (22.98 q/ha.) and RGAG-15-2 (21.92 q/ha.), recorded numerically highest grain yield followed over the best check GA-2 (20.05 q/ha.). The maximum plant height was observed in RGAG-14-3 (181.9 cm) however the inflorescence length was highest in GA-2 (85.4 cm) than the rest of the genotypes under study

Preliminary Yield Trial (PYT)

The genotypes RGAG-12-34 (22.54 q/ha.), RGAG-16-06 (21.96 q/ha.) and RGAG-12-12 (20.18 q/ha.) recorded numerically highest grain yield over the best check GA-2 (20.05 q/ha.). The maximum plant height was observed in check Suvarna (188.6 cm) however the inflorescence length was highest in RGAG-16-02 (87.6 cm) than rest of the genotypes under study.

- **Germplasm Evaluation in Paradise Tree (*Simarouba glauca*): (2016-17)**

During *Rabi/Summer* 2016-17 season, 19 female & 14 male plants has been flowered. On the basis of seed yield data of out 19 female germplasm lines, 4 lines recorded significantly superior yield over mean + 2 SE (9.24 kg/tree). The genotype PS-2003-7 (19.50 kg/tree) recorded significantly highest seed yield per plant followed by PS-2003-26 (13.85 kg/tree), PS-2003-8 (12.67 kg/tree) and PS-2003-29 (10.86 kg/tree).

Mean Weekly Weather situation at MPKV, Rahuri during *Rabi* 2016-17 season

Month	Metro. week	Temperature (°C)		Relative Humidity (%)		SSSH (Hrs.)	Rainfall (mm)	Rainy days (No.)
		Max.	Min.	Morning	Evening			
Nov-16	45	29.6	11.6	52	25	9.5	0	0
	46	29.4	12.6	64	41	7.5	0	0
	47	29.1	10.1	56	27	9.3	0	0
	48	30.9	10.5	62	26	11	0	0
Dec-16	49	28.9	11.2	64	34	8.6	0	0
	52	28.6	11.7	52	37	7.8	0	0
	51	29.2	10.2	54	34	9.3	0	0
	52	29.4	8.6	56	28	9.5	0	0
Jan-17	1	29.2	9.3	57	34	9.5	0	0
	2	26.5	8.9	60	34	9.4	0	0
	3	28.8	13.4	68	39	6.7	0	0
	4	31.0	13.0	62	30	9.4	0	0
	5	31.3	12.8	59	28	9.9	0	0
Feb-17	6	31.7	13.6	59	32	9.5	0	0
	7	32.3	13.9	52	26	9.7	0	0
	8	34.6	13.8	45	20	10.6	0	0
	9	34.0	14.0	41	15	9.8	0	0
Mar-17	10	32.8	13.9	47	22	9.1	0	0
	11	33.0	13.6	33	16	9.2	0	0
	12	36.1	17.2	38	15	9.1	0	0
	13	39.9	21.0	40	14	9.1	0	0
	Mean	31.3	12.6	53	27	9	0	0
	Maximum	39.9	21.0	68	41	11	0	0
	Minimum	26.5	8.6	33	14	6.7	0	0

Duration and morphological characters of Male genotypes of Paradise tree during 2016-17

Sr. No.	Genotype	Flowering initiation	Flowering span	Plant height (cm)	Primary Branches	Trunk girth (cm)
1	PS-2003-2	21-12-16	42	7.2	3	74.6
2	PS-2003-6	18-12-16	38	8.3	3	80.4
3	PS-2003-9	27-12-16	41	6.6	3	56.2
4	PS-2003-10	29-12-16	47	8.4	4	91.5
5	PS-2003-11	23-12-16	44	7.5	3	70.2
6	PS-2003-12	27-12-16	46	7.8	4	85.7
7	PS-2003-18	22-12-16	42	7.4	2	87.6
8	PS-2003-22	24-12-16	37	6.8	4	86.4
9	PS-2003-24	21-12-16	38	7.8	3	91.6
10	PS-2003-32	02-01-17	44	6.2	3	112.3
11	PS-2003-34	27-12-16	44	7.2	2	92.4
12	PS-2003-36	23-12-16	40	6.2	3	94.6
13	PS-2003-37	27-12-16	43	8.2	4	91.6
14	PS-2003-40	25-12-16	38	7.4	2	89.2
		Mean	42	7.4	3	86.0
		Maximum	47	8.4	4	112.3
		Minimum	37	6.2	2	56.2

Fruit yield and morphological characters of female genotypes of Paradise tree during 2016-17

Sr. No.	Genotype	Seed yield (kg/tree)	Flowering initiation	Date of maturity	Plant height (m)	Primary Branches	Trunk girth (cm)	Druplets / tree	Fruits/ drupelets	100 Dry seed wt (g)
1	PS-2003-1	3.65	20-12-16	15-03-17	5.5	4	56.2	78	44	101.6
2	PS-2003-3	8.20	15-01-17	10-03-17	6.2	4	133.2	157	39	131.2
3	PS-2003-4	7.45	24-12-16	18-03-17	9.0	4	125.2	138	44	121.5
4	PS-2003-5	6.78	22-12-16	24-03-17	8.3	3	112.2	124	41	127.6
5	PS-2003-7	19.50*	05-01-17	12-04-17	9.2	3	103.2	177	81	134.3
6	PS-2003-8	12.67*	18-12-16	16-03-17	8.3	3	101.2	148	58	144.8
7	PS-2003-20	3.46	15-12-16	25-03-17	7.2	4	91.2	72	40	123.2
8	PS-2003-21	5.33	18-12-16	16-03-17	7.3	4	91.8	85	46	130.4
9	PS-2003-23	4.48	04-01-17	27-03-17	7.8	2	93.2	77	42	130.8
10	PS-2003-26	13.85*	25-12-16	25-03-17	6.9	3	80.6	142	74	128.6
11	PS-2003-27	7.79	06-01-17	28-03-17	8.3	3	69.8	138	44	122.5
12	PS-2003-28	4.62	03-01-17	20-03-17	6.8	3	62.2	89	40	120.4
13	PS-2003-29	10.86*	06-01-17	18-03-17	7.0	2	103.2	122	55	154.6
15	PS-2003-35	4.36	26-12-16	12-03-17	6.9	5	101.3	84	48	110.2
16	PS-2003-39	3.78	07-01-17	18-03-17	7.3	3	91.6	78	45	108.6
17	PS-2003-41	3.68	24-12-16	16-03-17	7.2	3	97.8	82	38	109.4
18	PS-2003-42	3.87	07-01-17	04-04-17	6.5	4	81.4	86	34	127.6
19	PS-2003-59	5.85	25-12-16	16-03-17	7.7	4	84.3	102	44	121.5
	Mean	7.24			7.4	3.39	93.3	110	48	124.9
	Maximum	19.50			9.2	5.00	133.2	177	81	154.6
	Minimum	3.46			5.5	2.00	56.2	72	34	101.6
	SE±	1.00								
	Mean + 2 SE	9.24								

VII. SUMMARY

A total of 120 experiments were allotted during Rabi 2016-17 which included germplasm evaluation (27), crop improvement (53), crop production (24), crop protection (10) and quality (6). These were allotted at fifteen locations in different agro-climatic zones of the country. Out of these, 92 trials were carried out. A summary of research achievements is given below:

7.1 PLANT GENETIC RESOURCES MANAGEMENT

During the period April 1, 2017 to September 30, 2017, a total of 271 accessions were introduced, 462 accessions were supplied, 200 accessions were evaluated (Hills 50 and Plains -150) and 48 accessions were conserved in National Gene Bank (46 new and 2 regenerated).

7.1.2 Germplasm Introduction

During the period under report 271 accessions were introduced from USA viz., Chenopodium (266) and Lamb's Quarters (5).

7.1.3 Germplasm Evaluation (Hills and Plains)

Germplasm screening nursery consisting of 50 accessions supplied by CCS HAU, Hisar was evaluated at CSKHPKV, Palampur, 80 accessions of grain amaranth supplied by SDAU S.K. Nagar, 25 accessions of chenopodium supplied by NBPGR RS Shimla and 15 accessions of kalingada supplied by SDAU S.K. Nagar were evaluated at 21 locations. The list of promising lines including range and mean for all the descriptors has been presented in Tables 106

Table 106: Promising accessions at different locations

Locations	Promising accessions (Yield)	Promising accessions (Maturity)
Hills (Faba bean 50 accessions)		
CSK HPKV Palampur	-	HB-33 (143), HB-48 (143), EC-243626 (144), EC-25085 (144), Vikrant (147.4)
Plains (Faba bean 50 accessions)		
IGKV Ambikapur	EC 331564 (370), HB-1 (342) HB-15 (334), HB-33 (324), Vikrant (210)	--
NBPGR New Delhi	HB-71 (230.0), NDF-8 (150.0), EC-343691 (130.0), EC-32905 (130.0), Vikrant (91.0)	EC-25085 (123), EC-628925 (125), HB-65 (125), HB-30 (126), HB-63 (127) HFB-1 (127.83)
NDUA&T Faizabad	EC 25192 (31.5), EC 363781 (31.0), HB 71 (30.0), EC 366272 (30.0), Vikrant (27.0)	HB 3 (138.0), EC 243596 (138.0), HB 15 (138.0), HB 5 (140.0), HFB-1 (145.4)
CCS HAU, Hisar	EC-32976 (62.80), HB-15 (62.50), HB-37 (62.10) HB-63 (57.30), HFB-1 (49.50)	HB-28 (135), HB-3 (135), HB-79 (137) EC-25192 (137), HFB-1 (150)
PAU, Ludhiana	NDFB 13 (900), RFB 3 (900), NDF 13-2 (850), IC 243770 (850), Vikrant (522.22)	EC 25085 (136.0), NDFB 13 (139.0), HB 18 (139.0), PRT 12 (142.0)
BAU, Ranchi	HB-24 (20.60), EC-3279 (18.70), EC-243793 (18.60), HB-58 (18.30), Vikrant (12.62)	HB-79 (112.0), HB-21 (113.0) HB-2 (113.0), HB-37 (114.0), Pusa sumit (115.0)
Average over locations	NDFB-14 (41.90), Vikrant (41.45)	EC 628925 (131.7), HB 79 (131.8), NDF 12 (132.0), HB 61(132.5), HB 3 (132.6), HFB-1 (136.1)

Faba bean vegetable type (30 accessions)		
CCS HAU Hisar	ET-1119 (166.8), ET-2112 (148.7), ET-3117 (126.1), ET-3131 (121.1), Pusa Sumit (36.2)	ET-3103 (141.7), ET-3131 (151.7), ET-3137 (152.7), ET-4101 (152.7), Pusa Sumit (155)
Grain amaranth (80 accessions)		
NBPGR New Delhi	SKGPA-155 (59.36), SKGPA-148 (55.00), SKGPA-149 (53.33), RMA-7 (48.00)	SKGPA-145 (123.67) SKGPA-148 (123.67), BGA-2 (127.33)
OUAT, Bhubaneswar	IC 35618 (68.81), IC 35625 (67.03), IC 21923 (66.56), IC 35761 (64.08), IC 35771 (63.00), RMA 7 (40.42)	IC 35618 (86), IC 35625 (86) SKGPA 144 (86), SKGPA 145 (86), GA 2 (92.60)
NDUA&T Faizabad	SKGPA 156 (17.00), SKGPA 151 (16.60) SKGPA 157 (16.40), SKGPA 148 (16.30), GA-2 (13.85)	SKGPA 149 (114.0), SKGPA 156 (115.0) SKGPA 157 (116.0), SKGPA 158 (117.0), GA-2 (120.5)
ARS, Mandor	IC 95292 (7.1), IC 33548 (6.9), SKGPA-158 (6.6), IC 33542 (6.5), RMA-7 (3.6)	IC 33542 (121.0), IC 33541 (121.0), IC 35696 (121.0), IC 35761 (121.0), BGA-2 (124.6)
MPKV Rahuri	SKGPA- 147 (28.67), GA-2 (26.22)	IC 35621 (93.00), SKGPA- 161 (95.00), IC 35614 (95.00), IC 95283 (97.00), GA-2 (111.40)
BAU, Ranchi	IC-95295 (11.0), IC-35625 (11.0), IC-95293 (11.0), IC-93941 (10.0), Suvarna (9.4)	IC-35622 (126.0), IC-21923 (127.0), IC-35610 (129.0), IC-35549 (129.0), GA-1 (144.0)
SDAU, S. K. Nagar	IC 35776 (204.42), IC 35610 (151.53), IC 95297 (143.370, SKGPA-150 (139.50), GA-2 (105.67)	SKGPA-145 (95), SKGPA-146 (96), SKGPA-144 (97), IC 81711 (106), GA-2 (116.00)

Based on average over locations	SKGPA 154 (19.92), SKGPA 147 (19.90), SKGPA 148 (19.25), SKGPA 155 (19.19) (RMA-7 (18.81))	IC 35621(109.0), IC 93941 (109.8), IC 95290 (110.0), GA-2 (121.6)
Chenopodium (25 accessions)		
OUA&T Bhubaneswar	EC 507747 (94.63), EC 507742 (58.32), EC 507744 (37.66), EC 507746 (36.63)	IC 7959 (91), EC 507744 (93) EC 507739 (93), IC 7958 (93)
NBPGR, New Delhi	EC-507738 (28.00), EC-507744 (25.50) IC-411825 (24.50), EC-507749 (23.50)	EC-507739 (116.75), IC-411825 (117.25) EC-507740 (118.25), EC-507748 (118.75)
CCS HAU Hisar	EC-411825 (12.0), EC-507740 (10.6) EC-507741 (9.2)	EC-507739 (134.4), EC-507749 (134.6) EC-507742 (136.4), EC-507738 (136.6)
PAU, Ludhiana	EC 507746 (650.0), EC 507741 (600.0) EC 507742 (550.0), EC 507743 (500.0)	EC 507739 (124.0), EC 507738 (124.5) IC 411824 (126.5), IC 411825 (128.5)
SDAU S.K. Nagar	IC 411824 (15.80), IC 411825 (13.00), EC 507749 (12.53), EC 507742 (12.19)	EC 507740 (104.67), IC 411825 (106.67), EC 507739 (107.00), EC 507748 (110.33)
Based on average over locations	EC 507741 (13.8), EC 507747 (13.5), IC 411825 (12.9), EC 507744 (12.4), EC 507749 (12.2)	IC 411825 (111.4), IC 411824 (113.8), EC 507739 (115.0), IC 7960 (117.5), EC 507738 (117.9)

Kalingada (15 accessions)		
Location	Seed yield per plant (g)	Days to 1st fruiting
OUA&T Bhubaneswar	SKGPK 8 (120.0), SKGPK 9 (130.0), GK-2 (35.0)	SKGPK 12 (30), SKGPK 10 (30), SKGPK 15 (30), SKGPK 6 (32), GK-1 (35)

3.1.3 Crop Improvement

A total of 43 varietal evaluation trials, 8 in hills and 35 in plains were conducted on two potential crops (Grain amaranth and faba bean) in order to identify improved varieties. Details of trials, entries, number of locations and highest yielding entries are given below in Table 107.

Table 107: Best genotypes in different trials conducted at multilocation during 2014-15.

Crop	Trial	Entries	Locations	Top yielder	Yield (q/ha)	Best check yield (q/ha)
Hills						
Faba bean	IVT	13	2	HB-11-38	13.04	Vikrant (12.38)
	AVT-I	3	3	-	-	HFB-1 (8.88)
	AVT-II	3	3	NDF-10	9.23	HFB-1 (8.88)
Plains						
Grain amaranth	IVT	19	8	RGA-15	18.56	GA-2 (14.21)
	AVT-I	5	8	RGA-14	14.46	BGA-2 (11.64)
	AVT-II	3	8	BGA-4-9	13.83	RMA-7 (12.34)
Faba bean	IVT	8	7	HB-12-37	24.62	Vikrant (22.08)
	AVT-I	3	7	HB-11-32	24.98	Vikrant (21.36)
	AVT-II	3	7	HB-09-16	23.70	Vikrant (21.36)

7.3 Crop Production and Protection

7.3.1 Crop Production

A total of seven agronomic experiments were formulated to be conducted at seven locations in 24 trials on grain amaranth, buckwheat and faba bean during Rabi 2016-17. Out of these, results of six experiments were received from five locations in eight trials. Experiment wise details of findings are presented in table 108.

Table 108: Findings of agronomic experiments on potential crops during rabi 2016-17

S. No	Experiment	Findings
1	Response of grain amaranth genotypes to different fertilizer doses	At SK Nagar, application of 125% recommended dose of fertilizers (RDF) resulted in the highest grain yield (2241 kg/ha), net return (Rs. 80083/ha) and B:C ratio (4.86) from BGA 4-9. While at Bhubaneswar, among genotypes, BGA 4-9 recorded the maximum seed yield of 1315 kg/ha. Among various fertility levels, application of RDF @60-40-20 Kg NPK/ha recorded the maximum seed yield of 1335 kg/ha.
2	Comparative economics of grain amaranth vis-à-vis other crops	At S.K. Nagar, maximum gross income, net income and B:C ratio were obtained from grain amaranth. It was revealed that maximum Grain amaranth equivalent yield (GEY) was recorded by green gram (1454 kg/ha) followed by black gram (1327 kg/ha) with highest net return (Rs 16361/-/ha) and B:C ratio(1.82 followed by black gram recording a net return (Rs 13177/-/ha) and B:C ratio (1.66) respectively at Bhubaneswar.
	Performance of Buckwheat varieties at Cooch Behar	Genotype Himgiri (Shimla B-1) produced highest yield (26.60 q/ha) followed by Himpriya (22.17 q/ha) and Sangla B1 (19.40 q/ha). The lowest yield (18.76 q/ha) was recorded with VL UGAL-7.
	Response of promising genotypes (AVT-II entries) of Buckwheat to different levels of management.	Application of 100% recommended dose of fertilizers (RDF) + three irrigations with genotype PRB-1 recorded highest seed yield (23.55 q/ha) followed by 75% RDF + two irrigations and genotype PRB-1 which was at par with 100% RDF + three irrigations and genotype VL UGAL 7
	Response of grain amaranth to sulphur	The highest seed yield of grain amaranth, net return and B:C ratio were obtained when the recommended fertilizer dose was supplemented with 10 Kg S/ha at sowing & 10 kg S/ha at 3WAS
	Response of promising genotypes	Seed yield significantly increased with the improvement in the management levels to the

	(AVT-II entries) of Faba bean to different levels of management	tune of 33.1, 55.7 and 71.6 percent with 50% RDF + one irrigation, 75% RDF + two irrigation and RDF + three irrigation treatments, respectively than the control. Among the genotypes, HB-186 with seed yield of 29.98 q/ha was found highest seed yielder.
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7.3.2 Crop Protection

In crop protection, two experiments, namely, Screening of germplasm against major insect pests and diseases and Integrated Pest Management (IPM) in potential crops were formulated to be conducted at 5 locations during rabi 2016-17 on two crops, i.e. grain amaranth and faba bean. Out of total ten trials allotted to five centres, the results of five trials from three locations i.e. S.K. Nagar, Hisar and Bhubaneshwar were received. The experiment and crop wise details of results are given in table 109.

Table 109: Finding of experiments on crop protection during Rabi 2016-17

S. No.	Experiments	Crops	Results
1.	Screening of germplasm against major insect pests and diseases	Grain amaranth	At S.K. Nagar, during Rabi 2016-17, no incidence of any insect pests and diseases was observed in grain amaranth during the entire crop period.
		Faba bean	At Hisar, AVT entries i.e. HB 11-32, HB 11-12, HFB-1, HB 9-06 and HB 9-15 were found promising against aphid, mealy bug and pod borer complex. In case of IVT, AVT-1 and AVT-II trials, three genotypes i.e. HB 11-15, HB 12-8 and HFB-1 showed resistant to high resistant reaction against Alternaria leaf blight and root rot incidence.
2.	Integrated pest management (IPM) in potential crops	Grain amaranth	At Bhubaneshwar, use of Thiamethoxam 25 WG @0.05g/litre of water, Acephate 75 SP @0.35 g/litre of water, Acetamiprid 20 SP @ 0.5 g/litre of water, Neem formulation (Azadirachtin) 1500ppm @ 1 ml/litre of water and Neem oil @ 2 ml/litre of water gave significant reduction of aphid and jassid population with significantly higher yield over the control.
		Faba bean	At Hisar, significantly low incidence of pod damage and higher yield was recorded in insecticides i.e. Emamectin benzoate5 SG @ 0.5g/litre of water (16.25 %), Profenophos 50 EC @ 0.5ml/litre of water

			(16.75%) and Spinosad 45 SC @ 0.5ml/litre of water (17.00%). Sucking insect pests population was recorded minimum in acetamiprid 20 SP @ 0.05 g/litre of water treated plots (2.75 bugs/plant)
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7.4 QUALITY ANALYSIS

The seed of promising genotypes evaluated in IVT, AVT and germplasm evaluation of the two potential crops, namely, grain amaranth and faba bean were planned for quality analysis at CCSHAU, Hisar, Quality analysis was done and seed was supplied by S.K. Nagar and Hisar centres. The crop-wise details of quality traits are given in table 110.

Table 110 A: Grain Amaranth (seed supply by S.K. Nagar) Rabi 2016-17: Plains

S. No	Parameters	Range	Promising accessions
1	Protein (%)	10.6-13.4	IC-35776 (13.4), IC-35539 (13.2), IC-35775 (13.2), Suvarna (12.8)
2	Oil (%)	5.2-8.6	SKGPA-149 (8.6), SKGPA-158 (8.5), IC-35552 (8.5), GA-2 (8.1)
3	Mn (mg/100g)	0.58-0.81	SKGPA-156 (0.81), SKGPA-145 (0.79), SKGPA-148 (0.79), Suvarna (0.72)
4	Cu (mg/100g)	0.12-0.18	SKGPA-158 (0.18), SKGPA-159 (0.18), SKGPA-155 (0.17), GA-2 (0.16)
5	Fe (mg/100g)	10.1-13.7	Suvarna (13.7)
6	Zn (mg/100g)	2.6-3.5	SKGPA-146 (3.5), SKGPA-160 (3.4), IC-21925 (3.4), Suvarna (3.1)

Table 110 B: Faba bean (seed supply by Hisar) Rabi 2016-17

S. No	Parameters	Range	Promising accessions
1	Protein %	23.17 – 27.13	EC-3279 (27.13), HB-5 (26.67), EC-287710 (26.67), HFB-1 (26.03)
2	Vicine- convicine	0.72 – 0.96	HB-65 (0.72), HB-3 (0.73), EC-591784 (0.73), HFB-1 (0.80)
3	Phenol %	0.22 – 0.28	EC-293820 (0.22) EC-343691 (0.22), EC-591784 (0.22), Vikrant (0.25)

Promising lines in faba bean germplasm for various characters based on multilocation over two year data Rabi 2015-16 and 2016-17 (Hills)

S. No	Characters	Promising lines	value of Best check
1	Days to 50% flowering	HB-24 (86), HB-26 (86), HB-38 (86)	PRT-12 (88.8)
2	Days to 80% maturity	HB-33 (143), HB-48 (143), EC-243626 (144), EC-25085 (144), RMDFB-1 (151.75), RFB-08 (152.25)	PRT-12 (159.33)
3	Grain yield (q/ha)	EC 010845 (13.38), EC 243624 (11.85) EC 243626 (10.80)	Vikrant (8.84)

Promising lines in faba bean germplasm for various characters based on multilocation over two year data Rabi 2015-16 and 2016-17 (Plains)

1	Days to 50% flowering	HB 053 (58.0), DFB-09-01 (58.50), HB 064 (59.0), NDF 09 (59.0)	Vikrant (64.19)
1	Days to 80% Maturity	EC 628925 (131.7), HB 79 (131.8), NDF 12 (132.0), HB 61 (132.5), HB 3 (132.6), HB 039 (139.50), HB 050 (139.50), HB 019 (139.67)	PRT-12 (141.44)
2	Pod length (mm)	RFB 10 (5.57), RFB 07 (5.48), EC 243626 (5.43), HB 5 (5.34), EC 243793 (5.32), NDFB 14 (5.30), HB 21 (5.25), EC 293820 (5.20)	HFB-1 (5.01)
3	Seed yield/ plant (g)	NDFB-14 (41.90), RFB 09 (33.29), NDFB 13 (30.32) NDF 13-2 (28.04)	Vikrant (19.75)
4	100 seed weight (g)	RFB 08 (32.75), RFB 10 (31.43), HB 5 (30.24), NDFB 14 (29.70), HB 71 (29.43), NDFB 14 (28.70), EC 3279 (28.50),	PRT 12 (27.79)

Promising lines in grain amaranth germplasm for various characters based on multilocation over two year data Rabi 2015-16 and 2016-17 (Plains)

1	Days to 50% flowering	SKGPA 144 (48.7), SKGPA 111 (49.50), SKGPA 145 (50.0), SKGPA-122 (51.25), SKGPA 146 (51.9), IC 095385 (52.0), SKGPA 147 (52.2), SKGPA 161 (52.4)	GA-2 (61.6)
2	Days to 80% Maturity	SKGPA 111 (109.0), IC 35621(109.0), IC 93941 (109.8), IC 95290 (110.0),	GA-2 (121.6)
3	Seed yield/plant (g)	EC 095346 (27.55), IC 095563 (22.74), IC 095481 (20.49), SKGPA 154 (19.92), SKGPA 147 (19.90), SKGPA 148 (19.25), SKGPA 155 (19.19)	GA-2 (14.32)
4	10 ML seed weight (g)	IC 095563 (8.15), SKGPA 121 (7.99), IC 094652 (7.98), SKGPA 124 (7.97), IC 35771 (7.30), IC 95290 (7.18), IC 95297 (7.16), SKGPA 163 (7.15), IC 35617 (7.14)	GA-2 (6.93)

Promising lines in Chenopodium germplasm for various characters based on multilocation over two year data Rabi 2015-16 and 2016-17 (Plains)

1	Days to 50% flowering	37.6	65.0	IC 7960 (37.6), IC 7213 (42.1), IC 7958 (44.70), EC 507739 (46.94), IC 7959 (47.6), EC 507749 (48.29) IC 411824 (48.35), IC 411825 (48.44), EC 507739 (49.3),	-
2	Days to 80% maturity	111.35	145.89	EC 507739 (104.98), EC 507749 (105.50), IC 411825 (105.54), IC 411824 (113.8), EC 507739 (115.0), IC 7960 (117.5), EC 507738 (117.9)	-
3	Seed yield/plant (g)	2.0	13.8	EC 507741 (13.8), EC 507747 (13.5), IC 411825 (12.9), EC 507744 (12.4), EC 507749 (12.2), EC507738 (10.44) IC 411824 (10.28)	-
4	10ml Seed Weight (g)	6.28	7.45	IC 7961 (7.45), IC 7958 (7.23), IC 7960 (7.19), EC 507746 (6.85), IC 411824 (6.81), EC 507741 (6.80)	-

**Number of trials/activities allotted and conducted at main centers of AICRN on Potential Crops:
Kharif 2016**

S. No	Name of centres	Allotted						Conducted						Percentage %
		Germplasm evaluation	Crop Improvement	Crop Production	Crop Protection	Quality	Total	Germplasm evaluation	Crop Improvement	Crop Production	Crop Protection	Quality	Total	
1	Ambikapur	3	6	2	-	-	11	2	6	0	-	-	8	66.67
2	Bangalore	1	-	-	-	-	1	-	-	-	-	-	0	0.00
3	Bhubaneswar	2	3	3	2	-	10	2	3	3	1	-	9	75.00
4	Cooch Behar	1	-	3	-	-	4	-	-	2	-	-	2	16.67
5	Faizabad	2	6	3	-	-	11	2	6	0	-	-	8	66.67
6	Ludhiana/ Faridkot	1	6	-	2	-	9	1	6	0	0	-	7	58.33
7	Hisar	3	3	2	2	6	16	3	3	1	2	6	15	93.75
8	Mandor	2	3	2	-	-	7	1	3	0	-	-	4	33.33
9	New Delhi	3	6	-	-	-	9	3	6	-	-	-	9	75.00
10	Palampur	1	3	1	-	-	5	1	3	0	-	-	4	33.33
11	Pasighat	-	2	1	-	-	3	-	2	-	-	-	2	16.67
12	Rahuri	2	3	1	-	-	6	1	3	0	-	-	4	33.33
13	Ranchi	3	6	3	-	-	12	2	6	0	-	-	8	66.67
14	Ranichauri	1	3	1	2	-	7	-	3	0	0	-	3	25.00
15	S.K. Nagar	2	3	2	2	-	9	2	3	2	2	-	9	75.00
		27	53	24	10	6	120	20	53	8	5	6	92	76.03

Annexure-IV

List of Centres and Names of Scientists working on AICRN Potential Crops

S. No	Name	Fax/E-mail	Phone (O)	Phone (R)	
A.	Coordinating Unit				
1.	National Bureau of Plant Genetic Resources, Pusa, New Delhi - 110012				
	Dr. B.S. Phogat, Network Coordinator & Principal Scientist	011-25841835, B.phogat@icar.gov.in bsphogat9@gmail.com	011-25841835	M-09968592706	
	Dr. Hanuman Lal Raiger, PI (Documentation and Database Management)	011-25841835, hanuman.raiger@icar.gov.in , drhanumanlal@yahoo.co.in	011-25841835	M-09968271997	
	Dr. S.K. Yadav, PI (PGR Management)	011-25841835, satish.yadav1@icar.gov.in ; sk_yadav06@yahoo.com ;	011-25841835	M-09868573218	
	Dr. S.K. Kaushik, PI (Crop Improvement), NBPGR, New Delhi	011-25841835, surinder.kaushik1@icar.gov.in	011-25841835	M-08287286113	
	Dr. M.C. Singh, PI (Crop Production)	011-25841835, moolchand.singh@icar.gov.in mcsingh@gmail.com	011-25841835	M-09958196700	
	Dr. S.P. Singh. PI (Crop Protection)	011-25841835 Surendra.Singh7@icar.gov.in	011-25841835	M-07838548439	
	Dr. Sandeep Kumar. PI (Quality Analysis)	011-25841835, Kumarsandeep_boichem@rediffmail.com	011-25841835	M-9873235356	
B.	SAU BASED MAIN CENTRES				
1.	RMD College of Agri. & Research Centre (IGKV), Ambikapur 497 001				
	Dr. Jitendra Kumar Tiwari, Principal Scientist (Plant Breeding)	07774-230986, tiwarijk5@gmail.com	07774-230815, 230986, 230056	M-07828082334	
2	University of Agricultural Sciences, GKVK, Bengaluru 560 024				

S No	Name	Fax / E-mail	Phone (O)	Phone (M)
	Dr. Niranjana Murthy, Professor (Plant Breeding)	080-23414848. 080-23627265, drniranjanamurthy@hotmail.com , aicrnucrops@gmail.com	080-23514353 Ext. 39, 246 080-23627265	M-09448680139
	Dr. Arun Kumar, J. S Jr. Agronomist, AICRN on PC	arungowda63@gmail.com	080-23627265	09886287571
3	Odisha University of Agriculture & Technology, Bhubaneswar 751 003			
	Dr. Dayanidhi Mishra, Associate Prof.(Plant Breeding)	0674-2391692/2391780, bhubaneswar.uucrops@gmail.com	0674-2391692	M-09437208099
	Dr. Mohima Prasad Behera, Associate Prof. Agronomy	0674-2561585, beheramp@gmail.com	0674-2561585	M-09437756821
4	Narendra Dev University of Agriculture & Technology, Faizabad 224 229			
	Dr. C.B. Yadav, Associate Professor (Plant Breeding)	05270-262051, cbyadav57@yahoo.in, kamlesh_2007_2006@india.co m	05270-262051	M-09616833372
5	CCS Haryana Agricultural University, Hisar 125 004			
	Incharge, (MA & PC), Deptt. of Plant Breeding	01662-234952, 234613, mauup@hau.ernet.in ,	01662-289283	
6	Punjab Agricultural University, Ludhiana 141 004			
	Ranjit Kaur Gill Asstt. Breeder Pulses Section	0161-2459065, sskandhola@pau.edu	0161-2401960- 70	M-9876197955
7	Agriculture University Jodhpur, Mandor 342 304			

S No	Name	Fax / E-mail	Phone (O)	Phone (M)
	Dr B S Rajpurohit, Professor (PB &G), Agriculture University Jodhpur, Mandor, Jodhpur, 09414206122	rajpurohitbsingh@gmail.com	--	M-09414206122
8	Forest College & Research Institute (TNAU), Mettupalayam 641 301			
	Dr. P.S. Devanand, Assist. Prof. (Plant Breeding and Genetics)	04254-225064, devps7@yahoo.com	04254-222010	M- 9789441894
9	CSK Himachal Pradesh Krishi Vishwavidyalaya, Palampur 176 062			
	Dr. (Mrs.) Neelam Bhardwaj, Assistant Professor (Plant Breeding) Deptt. of Organic Agriculture	01894-230402, neenabhardwaj@gmail.com	01894-230391	M-09816743729
	Dr. Y.S. Dhaliwal, Prof. & Head, Deptt. of Food Science & Nutrition	ysdhaliwal44@yahoo.co.in	01894-232444	M-09816082444
	Dr. Nageshwar Singh, Asst. Scientist & PI, Deptt. of Chem. & Biochem, COBS, CSKHPKV, Palampur	01894-230311, nageshwars@yahoo.com	01894-230311, 234079/233234	M-09418431713
10	Mahatma Phule Krishi Vidyapeeth, Rahuri 413 722			
	Dr. M.T.Bhingarde, Plant Breeder, AICRN on Potential Crops, Dept. of Botany, MPKV, Rahuri	mtbhingarde@gmail.com ; ptcbot.mpkv@gmail.com ;	----	----
11	Birsa Agricultural University, Ranchi 834 006			
	Dr. Jay Lal Mehto, Assistant Professor, Deptt. of Plant Breeding & Genetics	0651-2451011, jaylalmahto@ymail.com	0651-2450561	M-09334365602
12	College of Horticulture and Forestry (UUHF), Ranichauri 249 199			

S No	Name	Fax / E-mail	Phone (O)	Phone (M)
	Dr. Ajay Kumar PI AICRN on Potential Crops	01376-252606, ajay25912@rediffmail.com ;	01376-252121, 252119	M- 8475004147 M-9415278438
13	Sardar Krushinagar Dantiwada Agri. Univ. (SDAU), Sardar Krushinagar – 385506			
	Dr. Nitesh N. Prajapati, Assoc. Res. Sci. (Pl.Br.)	02748-278471, 02748-278433, Niteshprajapati1978@gmail.com	02748-278471	M-0 9909900962
	Dr. B.M. Patel, Associate Professor Res. Sci. (Agronomy)		02748-278471	02742-251268, M-09879245373
14	Uttar Banga Krishi Vishwavidyalaya, Coochbehar, West Bengal – 736165			
	Tarun Paul, Assistant Prof. (Agronomy) & Incharge, AICRN (PC) Deptt. Of Agronomy	03582-2720246, ubkvdr@gmail.com	03582- 2720246, 03582-2770756	M- 09868096631
C	NBPGR, Regional Station Based Cooperating Centres			
1	Dr. Dinesh Chand, Officer Incharge, NBPGR Regional Station Akola	dinesh.chand@icar.gov.in ; dinesh.chamola@yahoo.co.in	0724-2258067	M-9868133690
2	Dr. I.S. Bisht, Officer Incharge, NBPGR, RS, Bhowali	05942-220027, ishwari.Bisht@icar.gov.in ; bishtis@rediffmail.com ;	05942-220027	-----
3	Dr. Om Vir Singh, Officer Incharge, NBPGR Regional Station Jodhpur	0291-2740490, omvir_singh_ujjlain@yahoo.com	0291-2740385	M-09414030319
4	Dr. A.K. Mishra, Officer Incharge, NBPGR Regional Station Shillong	0364-2570651, nbpgrshl@rediffmail.com	0364-2570193	M 09436703247
5	Dr. Mohar Singh, Sr. Scientist, NBPGR Regional Station Shimla	0177-2235453, singhmohar_2003@yahoo.com	0177-2835459	M-08894009386

S No	Name	Fax / E-mail	Phone (O)	Phone (M)
6	Dr. Joseph John K, Officer Incharge, NBPGR Regional Station, Vellanikkara, KAU, P.O., Thrissur – 680656 (Kerala)	0487-2372589 Joseph.k@icar.gov.in	0487-2370499	M- 91-9447889787
7	Dr. V. Kamala, Pr. Scientist, NBPGR Regional Station, ARI Campus, Rajendranagar, Hyderabad – 500030 (Andhra Pradesh)	040 2401 4072 kamala.venkateshwaran@icar.gov.in	040 2401 5478	M: 0984 92 11356
8	Dr. Santosh Kumar Bishnoi, NBPGR Regional Station, Ranchi	santosh.kumar8@icar.gov.in 0651-2260681	0651-2260681	
D VOLUNTARY CENTRES				
1	Vivekananda Parvatiya Krishi Anusandhan Shala, Almora			
	Dr. Salej Sood, Scientist	05962-231539, salej1plp@gmail.com	05962-241003, 241005 Ext. 105	M-09411706285
2	Central Arid Zone Research Institute (CAZRI), Regional Station, Jaisalmer			
	Dr. H.R. Mahla, Sr. Scientist, CAZRI, RRS, Jaisalmer	hrmahla@cazri.res.in		M-09413568747
3	CSK, Himachal Pradesh Krishi Vishwavidyalaya, Sangla			
	Dr. Surender Sharma, Scientist Incharge, MAREC, CSKHPKV, Sangla - 172106, Kinnaur Distt. (H.P.)	01786-242332,		M-09418043669
4	Agricultural Research Institute P.B. 181 Port Blair- 744101 (Andaman and Nicobar Islands)			
	Dr. A.K. Singh, Central Island	awnindrakumar@gmail.com; drawnindra@yahoo.com	----	----

S No	Name	Fax / E-mail	Phone (O)	Phone (M)
5	ICAR. Res. Complex for NEH Region,			
	Dr. Anup Das, Sr. Scientist, ICAR Res. Complex for NEH Region, Umiam (Meghalaya)	anup_icar@yahoo.com anupicar@gmail.com	+91-3642570306	M- 09436336070
	Dr. L. Thouthend, ICAR Research Complex for NEH Region, Basar – 791101 (Arunachal Pradesh)	----	---	----
	Dr. M.A. Ansari, ICAR Research Complex for NEH Region, Lamphelpat, Imphal – 795004 (Manipur)	merajiasi@gmail.com		M-09089654323
	Dr. A.K. Rattan Kumar Singh, ICAR Research Complex for NEH Region, Kolasib – 796081, (Mizoram)	ratanplantpatho@gmail.com		
	Dr. Rakesh Kumar, ICAR Research Complex for NEH Region, Jharnapani, Medziphema – 797106, (Nagaland)	----	----	---
	Dr. Subhash Babu, ICAR Research Complex for NEH Region, Tadong, Gangtok (Sikkim)	----	----	---
	Dr. S.P. Das, ICAR Research Complex for NEH Region, Lembucherra, (Tripura)	---	---	---
6	CAU, Pasighat			
	Dr. Dinesh Sah, College of Horticulture & Forestry (CAU), Pasighat (Arunachal Pradesh)	dr.d.sah@gmail.com , dineshsah4all@rediffmail.com		M-09862567430, M-9402909014
7	University of Agricultural Science, Dharwad – 580005, Karnataka, India			
	Dr. Shreenivas A. Desai Professor (Genetics & PI. Breeding) Department of Genetics and Plant Breeding		91-836-2744977, 91-836-2214276	M- 9481209623

