



Performance of Pulses Demonstrations in India

Experiences of KVKs under NFSM (2016-17)

**Division of Agricultural Extension
Indian Council of Agriculture Research, New Delhi-110012**

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**Singh A.K., Gautam U.S., Chahal V.P.,
Singh N.P., Singh Atar, Dubey S.K.
and Yemul S.N.**



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सचिव एवं महानिदेशक

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FOREWORD

India is the biggest producer, as well as the largest consumer and importer of pulses. India is the largest producer (25% of global production), consumer (27% of world consumption) and importer (14%) of pulses in the world. Pulses account for around 20 per cent of the area under foodgrains and contribute around 7-10 per cent of the total foodgrains production in the country. Gram is the most dominant pulse having a share of around 40 per cent in the total production followed by Pigeonpea at 15 to 20 per cent and Blackgram and Greengram at around 8-10 per cent each. Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh and Karnataka are the top five pulses producing States. Productivity of pulses is 764 kg/ha.

The UN International Year of Pulses provides an unprecedented opportunity to raise awareness and to celebrate the role of beans, chickpeas, lentils and other pulses in feeding the world. Importantly, it is a galvanising moment to draw together key actors to further the contribution pulses make to health, nutrition and sustainability. In order to achieve nutritional security, the Government of India has taken progressive steps in bringing self-sufficiency in pulses, whereby we expect an increase in pulses growing area by 2 m ha by 2017-18. The Council has activated frontline demonstration in this direction, wherein the KVKs are handholding our farmers with quality seeds and agronomic techniques to enhance pulses production in the country.

I am glad that the ICAR-ATARs has spearheaded these activities of the Council in letter and spirit and have documented their experiences in the form of a book. I appreciate the efforts of Agricultural Extension Division in this direction. I am sure, much more will be done in the future to achieve self-sufficiency in pulses in the country.

(T. MOHAPATRA)

Dated the 21th September, 2017
New Delhi



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MESSAGE

The International Year of Pulses 2016 heightened the public awareness of the nutritional benefits of pulses as part of sustainable food system. The Year created an unique opportunity to encourage connections throughout the food chain that could better utilize pulse-based proteins, further global production of pulses, better utilize crop rotations and address the challenges in the trade of pulses. There is a need to further increase the production and productivity through an annual growth rate of 4.2% to meet the requirement of 32 MT by the year 2030. However, in context to the production, a record production of 22.95 million tonnes was registered in the year 2016-17.

The success of 2016-17 in case of pulses production is attributed to favorable crop season and policy support. However, one component which was significant, was the large number of Cluster Front Line Demonstrations i.e. 72500 organized by 534 KVKs across the country. I am sure that the establishment of pulses seed hubs at 97 KVKs and in total 151 in the country, will further support the pulses development programme in the country.

I express my sincere gratitude to Hon'ble Union Minister of Agriculture and Farmers Welfare; Secretary, DARE & DG, ICAR and Secretary, Department of Agriculture & Cooperation for their kind support and guidance for execution of this programme. I appreciate the efforts of Assistant Director General (AE) at head quarter and all the participating Directors of ATARIs and their Scientists; KVKs of the country, and officials of Ministry of Agriculture & Farmers Welfare, GOI for effective implementation and monitoring of CFLDs on Pulses under NFSM programme.

I hope this publication "Performance of Pulses Demonstrations in India: Experiences of KVKs" will be helpful for the scientists, policy makers, extension workers, students and farmers.

Dated the 21st September, 2017
New Delhi

(A.K. Singh)



PREFACE

Pulses are the cheapest source of dietary proteins. The high content of protein in pulses makes the diet more nutritive for vegetarian when taken with other cooked food items. The pulses are also known for increasing productivity of soil through fixation of nitrogen from atmosphere, addition of biomass to soil and secretion of growth promoting substances. Pulses are well suited in rainfed conditions and require less farm resources, hence farmers prefer to grow them from economic point of view throughout the country. The area and production has stagnated last two decades. However, the production stagnated around 12-15 million tones in last few decades with average annual pulses production of about 13.5 million tones. The pulses production touched its peak in the year 2015 which was 17.15 million tones further, by dedicated efforts by the KVKs involvement at grass root level a record production 22.95 MT achieved during 2016-17. However, India is now facing severe shortage in pulses production in spite of talking up various measures. Per capita availability of pulses in India is highest during 1951-1961 (60.7-69.0 gm/day) after that it constantly decreased upto the year 2001 (30.0 gm/day). Per capita availability of pulses has been upward moment during the last two decades as against the recommendations of ICMR of 52g/capita/day. The current per capita availability however is estimated at 43.8g/capita/day which is still low as compared to the recommendation of ICMR. Other than their suitability for human health, pulses are also good for environment.

In this context, we are indebted to hona'ble Union Minister of Agriculture and Farmers Welfare, Secretary (DARE) & Director General (ICAR), Secretary Agril. GOI, New Delhi and DDGs of (Agril. Extn. & Crop Sciences), ICAR New Delhi for their kind support and guidance for execution of this programme. ICAR-ATARI, Kanpur is coordinating centre of this activity for 567 KVKs in Kharif season(pigeonpea, blackgram, greengram, horsegram, rajmash, mothbean), 660 KVKs in Rabi season(chickpea, lentil, fieldpea, greengram, blackgram, pigeonpea, rajmash, lathyrus) and 232 KVKs in Summer season(greengram, blackgram, rajmash) 71910 demonstrations were organized in 28968 ha area in 26 states. KVKs of the country have laid out package of practices based technological interventions in CFLDs. The programme was implemented as per the national standards and requirements. The results have indicated enhanced trend with the publication as the major documented evidence. I do hope that the book will be for all the stakeholders such as scientists, extension workers, Krishi Vigyan Kendras, Policy makers, students and farmers.

(Author)

कार्यकारी सारांश

कृषि एवं किसान कल्याण मंत्रालय, भारत सरकार, नई दिल्ली द्वारा यह कार्यक्रम 2015-16 के दौरान दलहन के अग्रिम पंक्ति प्रदर्शनों को लागू करने के लिए शुरू किया गया था। वर्ष 2014-15 के दौरान, हुद-हुद के कारण आपदा हुई थी, जिससे सामान्य तौर पर खरीफ दलहनी फसलों को काफी क्षति पहुंची थी। इसी प्रकार, रबी मौसम के दौरान 2014-15 मार्च महीने के प्रथम हफ्ते में अप्रत्याशित बारिश हुई। उस समय सभी रबी फसलें परिपक्व अवस्था में थी और इस प्रकार इन फसलों को 50-60% तक नुकसान हुआ था, इसलिए दालों का उत्पादन 16% कम हो गया। दालों की मांगों को पूरा करने की आवश्यकता महसूस की गई क्योंकि यह शाकाहारियों के प्रोटीन के लिए दालें महत्वपूर्ण स्रोत है। भारत दालों का एक सबसे बड़ा उत्पादक और उपभोक्ता देश है। आईसीएमआर की सिफारिश के अनुसार 52 ग्राम / व्यक्ति / दिन की आवश्यकता के मुकाबले दालों की उपलब्धता 37 ग्राम / व्यक्ति / दिन है। इस बात को ध्यान में रखते हुए, दलहन की वर्तमान मांग 28 मिलियन टन होगी, लेकिन 2013-14 के दौरान दलहनी उत्पादन के लिए यह 19.2 लाख टन था और 2014-15 में यह 17.2 मिलियन टन तक घट गया। इसलिए, 2015-16 के दौरान यह अनुमान लगाया गया था कि 18.2 लाख टन दलहनों की जरूरत है। वर्ष 2016-17 के दौरान दलहन का उत्पादन 22.95 लाख टन तक पहुंच गया, क्योंकि भारत सरकार ने दलहनी तकनीकियों के माध्यम से किसानों को मदद की। जैसा कि हम यह भी जानते हैं कि दाल भारतीय कृषि के लिए दीर्घकालिक स्थिरता को बढ़ावा देता है, इसे कम पानी की आवश्यकता होती है, जो विभिन्न प्रकार की भूमि पर वर्षा आधारित फसल है।

कृषि प्रसार विभाग, आई.सी.ए.आर, नई दिल्ली के देश के आठो जोन के कृषि विज्ञान केंद्रों को जिम्मेदारिया दी गई कि महत्वपूर्ण दलहनी फसलों जैसे अरहर, चना, मटर, राजमा, मसूर, उर्द, मूंग, मोथ वीन और लिथाइरस, जैसे महत्वपूर्ण दालों की फसलों पर समूहबद्ध अग्रिम पंक्ति प्रदर्शन को प्रदर्शित किया जाए। राष्ट्रीय कार्यक्रम समूहबद्ध अग्रिम पंक्ति प्रदर्शन, दलहन के लिए आईसीएआर-अटारी, कानपुर, जोन - 4 को जिम्मेदारी दी गई। साथ ही साथ मानव संसाधन विकास के उद्देश्यों के लिए आईसीएआर-भारतीय दलहन अनुसंधान संस्थान, कानपुर की मदद ली जा रही है ताकि विभिन्न जगहों पर संवेदीकरण के लिए के.वी.के के प्रमुख वैज्ञानिक संबंधित उत्पादक तकनीकियों में प्रदर्शन कर सकें। नवीनतम तकनीकों के साथ दलहनी बीज की उपलब्धता के लिए राष्ट्रीय बीज निगम / राज्य कृषि विश्वविद्यालय / आई.सी.ए.आर के संस्थानों और अन्य संगठनों से प्राप्त करने का प्रावधान किया।

समूहबद्ध अग्रिम पंक्ति प्रदर्शन, दलहन 2016-17 में 31,000 हेक्टेयर क्षेत्र का आवंटन किया गया, जिसमें से 29008 हेक्टेयर क्षेत्र को सीएफएलडी के तहत आईसीएआर के सभी क्षेत्रों में प्रदर्शनों से लक्ष्य पूरा कर लिया गया है। कुल मिलाकर अग्रिम पंक्ति प्रदर्शन, दलहन 2016-17 लिए खरीफ, रबी और जायद के मौसम में रु 25.29 करोड़ का उपयोग किया गया जो बहुत संतुष्टीकृत था। आईसीएआर के आठ क्षेत्रों में समूहबद्ध अग्रिम पंक्ति प्रदर्शन, दलहन 2016-17 के लिए 11790 हेक्टेयर क्षेत्रफल खरीफ में, 15010 हेक्टेयर क्षेत्रफल रबी में और जायद में 4200 हे. क्षेत्र आवंटित किया गया, जिसमें से खरीफ में 9939 हेक्टेयर क्षेत्रफल में, रबी में 14411.85 हेक्टर क्षेत्रफल और जायद में प्रदर्शनों में 4656.65 हेक्टेयर क्षेत्रफल पर दलहन का प्रदर्शन किया गया।

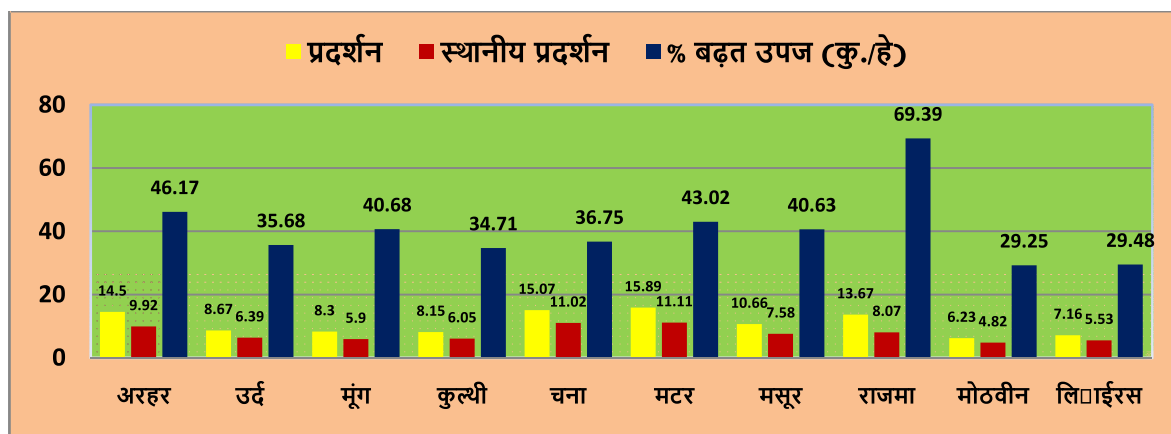
भारतीय कृषि अनुसंधान परिषद, नई दिल्ली ने दलहनों पर राष्ट्रीय स्तर के अग्रिम पंक्ति प्रदर्शन की शुरुआत की, ताकि नई दलहनों की नई किस्मों और संबंधित तकनीकियों की उत्पादन क्षमता को प्रदर्शित किया जा सके। इस परियोजना का मुख्य उद्देश्य वर्ष 2016-17 के दौरान खरीफ, रबी और जायद मौसम में देश के दलहनी फसलों का उत्पादन स्तर को बढ़ाना था। कुल 29008 हेक्टेयर क्षेत्रफल पर प्रदर्शन किया गया जिनमें प्रमुख दलहनी फसलें शामिल हैं :- खरीफ में अरहर (4741.8 हे.), उर्द (2734.6 हे.), मूंग(2103.8 हे.), कुल्थी (228 हे.), राजमा (19.129 हे.), मोथवीन (112 हे.) ; रबी में चना(6054.46 हे.), मसूर (3689.7 हे.), मटर (1819.09 हे.), मूंग (1449.4 हे.), उर्द (1020.2 हे.), अरहर (83 हे.), राजमा (180 हे.), लिथाइरस (116 हे.) ; एवं जायद में मूंग(3938 हे.), उर्द (714.2 हे.), राजमा (4.45 हे.)।

आवंटित और प्रदर्शन में किये गये जोनों में, जोन I में 1436.5/1480 हे. क्षे., जोन II में 6342.3 / 6650 हे.क्षे., जोन III में 2392/2490 हे.क्षे., जोन IV में 3531/4540 हे.क्षे., जोन V में 3893.70/4030 हे.क्षे., जोन VI में 2748.2 / 2940 हे.क्षे. जोन VI, जोन VII में 7164/7310 और जोन VIII में 1500.4 / 1560 हे.क्षे., 2016-17 में अग्रिम पंक्ति प्रदर्शन दलहनों में आयोजित क्षेत्रीय क्षेत्रफल आवंटन के मुकाबले सभी क्षेत्रों में से 92.79%पर प्रदर्शन किया गया।

तालिका 1. समूहबद्ध अग्रिम पंक्ति प्रदर्शन 2016-17 के दौरान जोनवार आवंटित और प्रदर्शित क्षेत्रफल

जोन	आवंटित क्षेत्रफल (हे.)	प्रदर्शित क्षेत्रफल (हे.)
I	1480	1436.55
II	6650	6342.30
III	2490	2392.00
IV	4540	3531.00
V	4030	3893.70
VI	2940	2748.20
VII	7310	7164.00
VIII	1560	1500.40
कुल	31000	29008.15

राष्ट्रीय स्तर पर अरहर में उच्चतम उपज लाभ प्रतिशत (46.17) दर्ज किया गया, इसके बाद क्रमवार मटर(43.02), मूंग (40.68), मसूर (40.63), चना (36.75), उर्द(35.68), कुल्थी (34.71) एवं अन्य दालों जैसे राजमा में सबसे ज्यादा (69.39), मोथबीन (29.25), लिथाइरस (29.48) दर्ज किया गया था। मटर और अरहर की उपज के आधार पर राजमा में अधिक उपज अंतर 5.6 कु. देखा गया ।



चित्र सं. 2 वर्ष 2016-17 के दौरान विभिन्न दलहनी फसलों से उपज लाभ %

अरहर, उर्द, मूंग, कुल्थी, चना, मटर, मसूर, राजमा, मोथबीन, लिथाइरस के लिए औसत प्रदर्शन उपज क्रमशः 14.5, 8.67, 8.3, 8.15, 15.7, 15.89, 10.66, 13.67, 6.23 और 7.16 कुन्तल / हेक्टेयर दर्ज किया गया।

तालिका 2: समूहबद्ध अंग्रिम पंक्ति प्रदर्शन 2016-17 में विभिन्न दलहनी फसलों का कुल प्रदर्शन एवं प्रभाव

क्र. स.	फसल	क्षेत्रफल (हे.)	उपज (कु./हे.)		%बढ़त उपज	उपज अंतर (कु./हे.)
			प्रदर्शन	स्थानीय प्रदर्शन		
1	अरहर	4824.80	14.50	9.92	46.17	4.58
2	उर्द	4469	8.67	6.39	35.68	2.28
3	मूंग	7491.20	8.30	5.90	40.68	2.40
4	कुल्थी	228.00	8.15	6.05	34.71	2.10
5	चना	6054.46	15.07	11.02	36.75	4.05
6	मटर	1819.09	15.89	11.11	43.02	4.78
7	मसूर	3689.70	10.66	7.58	40.63	3.08
8	राजमा	203.65	13.67	8.07	69.39	5.60
9	मोथ बीन	112.00	6.23	4.82	29.25	1.41
10	लेथैरस	116	7.16	5.53	29.48	1.63
	कुल	29008.15				

तालिका 3: समूहबद्ध अंग्रिम पंक्ति प्रदर्शन 2016-17, खरीफ प्रदर्शन के प्रभाव

क्र. स.	फसल	क्षेत्रफल (हे.)	उपज (कु./हे.)		%बढ़त उपज	उपज अंतर (कु./हे.)
			प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)		
1	अरहर	4741.80	12.22	8.51	43.60	3.71
2	उर्द	2734.60	8.39	5.85	43.42	2.54
3	मूंग	2103.80	8.66	6.34	36.59	2.32
4	कुल्थी	228	8.15	6.05	34.71	2.1
5	राजमा	19.20	13.31	6.2	114.68	7.11
6	मोथबीन	112	6.23	4.82	29.25	1.41

सभी जोनों में खरीफ 2016 में स्थान विशिष्ट किस्मों में जैसे कि अरहर में AL-201, मालवीय अरहर -13, आशा, यूपीएस - 120, एनए -2, बीएसएम 3-736, जीआरजी -811; उर्द में मैश 114, यूजी 218 में प्रदर्शन किया, शेखर, पीयू -31, एकेयू - 15; मूंग में एमएच 421, पंत मूंग 5, आईपीएम 2-3, त्रिपुरा मूंग -1, एमजीजी -347, उत्तरा, जीएम -4, केकेएम -3; कुल्थी में बिरासा कुल्थी, पावर- 2, इंद्र कुल्थी; राजमा में वाज़ज राजमा, त्रिपुरा राजम सेल -1; मोठबीन में आरएमओ -257, सीजीएम -2, जैसे कि एकीकृत पोषक प्रबंधन, एकीकृत कीट प्रबंधन, बेहतर किस्मों, बीज + पंक्ति बुवाई, बीज उपचार के साथ बैवीस्टिन 2.5 ग्रा/ कि. बीज, राइज़ोबियम के साथ बीज का टीका, पीएसबी और फसल प्रबंधन प्रथाओं में यह देखा गया है कि 1.41 कु./हे. से 7.11 कु./हे. के उपज अंतर को विभिन्न खरीफ दलहनों जैसे अरहर, उर्द, मूंग, कुल्थी, राजमा और मोथबीन जैसे पारंपरिक तकनीकियों पर बेहतर तकनीक का प्रदर्शन करके कम किया जा सकता है।

जोनवार सबसे ज्यादा औसत प्रदर्शन तालिका (3.1) में दिए गए आंकड़ों के अनुसार अरहर में उपज (कु./हे.) जोन -VI (16.44) में पायी गयी क्रमशः जोन - IV (14.22), जोन -VII (13.3), जोन - II (13.22) , जोन - V (11.7), इसी तरह उर्द की फसल में उच्चतम प्रदर्शन औसत उपज जोन-V (9.48) में दर्ज किया गयी थी, क्रमशः जोन-II (9.09), जोन -VIII (

8.86), जोन-IV (8.50), जोन-III (8.13), जोन -VII (7.80), जोन -I (7.66) और जोन-VI (7.60)। मूंग की फसल में उच्चतम प्रदर्शन के मामले में जोन - VIII (10.04) क्रमशः जोन - II (9.86), जोन - I (9.5), जोन - V (9.00), जोन - VI (8.81), जोन - III (8.04), जोन - IV (7.2) और जोन - VII (6.89) में सबसे कम उपज प्राप्त हुई।

तालिका (3.1) : खरीफ 2016-17 के दौरान जोनवार समूहबद्ध अग्रिम पंक्ति प्रदर्शन

जोन	अरहर			उर्द			मूंग		
	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)
I	20.00	7.50	4.50	106.00	7.66	5.65	40.00	9.50	6.35
II	1256.00	13.22	9.62	440.00	9.09	6.51	170.00	9.86	6.80
III	30.00	11.40	6.90	330.00	8.13	5.15	160.00	8.04	6.24
IV	541.00	14.22	8.93	359.80	8.50	6.01	138.60	7.20	5.27
V	1154.80	11.70	8.80	170.00	9.48	6.73	592.00	9.00	6.61
VI	130.00	16.44	13.25	360.00	7.60	5.70	477.20	8.81	6.90
VII	1330.00	13.30	8.60	928.80	7.80	5.08	326.00	6.89	4.42
VIII	280.00	10.04	7.52	40.00	8.86	6.00	200.00	10.04	8.20
कुल	4741.80	12.22	8.51	2734.60	8.39	5.85	2103.8	8.66	6.34

कुल्थी की फसल में, औसत उच्चतम प्रदर्शन उपज जोन IV (9.98) में पायी गयी क्रमशः जोन II (8.57) और जोन VII (5.91) में सबसे कम उपज प्राप्त हुई। राजमा की फसल में जोन VII (16.6) का औसत प्रदर्शन उपज अधिकतम पाया गया एवं सबसे न्यूनतम उपज जोन II (10.33) में प्राप्त हुई। मोथबीन के मामले में केवल जोन VII में सबसे ज्यादा प्रदर्शन औसत उपज (6.23) पाया गया।

तालिका (3.2) : खरीफ 2016-17 के दौरान जोनवार समूहबद्ध अग्रिम पंक्ति प्रदर्शन

जोन	कुल्थी			जोन	राजमा			जोन	मोथबीन		
	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)		क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)		क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)
II	90.00	8.57	6.65	I	9.20	10.33	8.20	VI	112.00	6.23	4.82
IV	8.00	9.98	7.85	III	10.00	16.60	10.40				
VII	130.00	5.91	3.65								
कुल	228.00	8.15	6.05		19.20	13.31	6.20		112.00	6.23	4.82

तालिका (4) : जोनवार रबी 2016-17 के दौरान समूहबद्ध अग्रिम पंक्ति प्रदर्शन

क्र. स.	फसल	क्षेत्रफल (हे.)	उपज (कु./हे.)		%बढ़त उपज	उपज अंतर (कु./हे.)
			प्रदर्शन	स्थानीय प्रदर्शन		
1	चना	6054.46	15.07	11.02	36.75	4.05
2	मसूर	3689.7	10.66	7.58	40.63	3.08

3	मटर	1819.09	15.89	11.11	43.02	4.78
4	मूंग	1449.4	7.99	5.24	52.48	2.75
5	उर्द	1020.2	9.33	6.88	35.61	2.45
6	अरहर	83	16.82	11.33	48.46	5.49
7	राजमा	180	19.6	11.88	64.98	7.72
8	लेथैरस	116	7.16	5.53	29.48	1.63

सभी जनों में स्थान विशिष्ट किस्मों जैसे मसूर में एचयूएल 57, डीपीएल 62, एल 4594 का प्रदर्शन किया गया। मटर में किस्में प्रकाश, रचना, अनुपम, शालीमार; चना में किस्में जेजी 16, एचसी 1, जीएनजी 1581, एचसी 1, एचसी 5, जाकी 9218, विजय, विशाल, दिग्विजय, एनबीईजी -3, बीडीएनजी -797, जीजी -2, जीजेजी -3 और जीजी -5, जेजीजी -1, जीजी -5; उर्द में , एलबीजी 752, एलबीजी -787, जीबीजी -1, पु -31; मूंग में एलजीजी 460, डब्लूजीजी -42, टीएम 9 2-2, एमजीजी -295, जीजी -2, सीओ -4, आईपीएम-99-125 के साथ-साथ एकीकृत पोषक प्रबंधन, एकीकृत कीट प्रबंधन, संसाधन रिज एंड फरो विधि जैसे व्यापक रूप से संरक्षण प्रौद्योगिकियों, व्यापक विस्तार फरो विधि आदि का प्रदर्शन किया गया। प्रौद्योगिकी प्रदर्शनों के आधार पर सहफसलों में यह देखा गया है कि विभिन्न रबी दलहनी फसलों में पारंपरिक प्रौद्योगिकियों पर बेहतर प्रौद्योगिकियों का प्रदर्शन करके 1.63 कु./हे. से 7.72 कु./हे. के उपज अंतर को कम किया जा सकता है, इसी प्रकार चना, मसूर, मटर, मूंग, उर्द, राजमा और लिथाइरस में भी पाया गया।

तालिका 4.1 के अनुसार चने की फसल में उच्चतम औसत उपज प्रदर्शन जोन IV (18.9 9 कु./हे.); मसूर की फसल में उच्चतम औसत उपज प्रदर्शन में जोन VI (12.72 कु./हे.) एवं मटर की फसल में उच्चतम औसत उपज प्रदर्शन जोन IV (19 कु./हे.) में प्राप्त किया गया।

तालिका 4.1 : रबी मौसम 2016-17 के दौरान समूहबद्ध अंग्रिम पंक्ति प्रदर्शन

जोन	चना			मसूर			मटर		
	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)
I	449.80	11.78	9.15	40.00	10.61	8.11			
II	1056.00	13.86	9.82	1520.00	11.98	8.83	470.25	14.05	10.28
III				775.00	7.44	3.73	607.00	15.12	9.40
IV	266.00	18.99	13.78	914.70	10.93	7.78	451.84	19.00	13.85
V	1287.90	17.90	12.38						
VI	1123.00	17.62	13.85	20.00	12.72	10.36			
VII	1644.56	13.84	9.14	420.00	10.32	6.69	290.00	15.40	10.93
VIII	227.20	11.56	9.05						
कुल	6054.46	15.07	11.02	3689.70	10.66	7.58	1819.09	15.89	11.11

मूंग का उच्चतम प्रदर्शन औसत उपज जोन V (11.53 कु./हे.) ; उर्द की फसल में उच्चतम प्रदर्शन औसत उपज में जोन V (14.1 कु./हे.) एवं अरहर की फसल में उच्चतम प्रदर्शन औसत उपज जोन V (17.25 कु./हे.) में तालिका 4.2 के अनुसार दर्ज की गयी।

तालिका 4.2 : रबी 2016-17 के दौरान समूहबद्ध अग्रिम पंक्ति प्रदर्शन

जोन	मूंग			उर्द			अरहर		
	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)
III	-	-	-	70.00	8.50	6.50	-	-	-
V	180.80	11.53	4.84	430.20	14.10	11.05	28.00	17.25	14.17
VI	28.00	8.78	6.92	-	-	-	-	-	-
VII	946.60	6.08	5.18	200.00	7.55	4.81	55.00	10.40	8.50
VIII	294.00	5.58	4.05	320.00	7.17	5.19	-	-	-
कुल	1449.4	7.99	5.24	1020.20	9.33	6.88	83.00	16.82	11.33

तालिका 4.3 के अनुसार राजमा की फसल में जोन III ने प्रदर्शन औसत उपज (कु./हे) 19.6 प्राप्त कि और इसी प्रकार एक अन्य फसल लैथिरस केवल दो जोन प्रदर्शित की गयी जिसमें उच्चतम प्रदर्शन औसत उपज में जोन III (8.12) और जोन सातवें में सबसे कम उपज (6.21) प्राप्त हुई।

तालिका 4.3: रबी सीजन 2016-17 के दौरान समूहबद्ध अग्रिम पंक्ति प्रदर्शन

जोन	राजमा			जोन	लिथाइरस		
	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)		क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)
III	180	19.60	11.88	III	40	8.12	6.41
				VII	76	6.21	4.66
कुल	180	19.60	11.88		116	7.16	5.53

तालिका 5 : जायद 2016-17 के दौरान समूहबद्ध अग्रिम पंक्ति प्रदर्शन

क्र. स.	फसल	उपज (हे)	उपज (कु./हे.)		% बढ़त उपज	उपज अन्तर (कु./हे.)
			प्रदर्शन	स्थानीय प्रदर्शन		
1	मूंग	3938	8.25	6.14	34.36	2.11
2	उर्द	714.2	8.31	6.44	29.04	1.87
3	राजमा	4.45	8.10	6.15	31.71	1.95

सभी जोन में मूंग की किस्म-एसएमएल -668, एसएमएल -832, आईपीएम-2-3, एचएम -16, सम्राट, त्रिपुरा मूंग, उर्द-पीयू -31, आईपीयू -94-1, शेखर, पीयू -19 स्थान विशिष्ट किस्मों के साथ जायद के मौसम 2017 के दौरान प्रदर्शन किया गया। राजमा कि किस्म -त्रिलोकी (के 198), बसपा (केसीआर -8) जैसे संसाधन संरक्षण प्रौद्योगिकियों जैसे रिज एंड फरो विधि, ब्रॉड बेड फरो विधि, प्रौद्योगिकी प्रदर्शनों के आधार पर सहफसलों जैसे संबधित उत्पादक तकनीक के साथ प्रदर्शन किया गया। आईसीएम, खरपतवार नियंत्रण और पौधे संरक्षण तालिका 5 के अनुसार विभिन्न जायद दलहनी फसलों में 1.87 - 2.11 के उपज अंतर को नई प्रौद्योगिकियों का प्रदर्शन करके कम किया जा सकता है, इसी प्रकार उर्द, मूंग और राजमा की फसलों में भी।

तालिका 5.1 के अनुसार उपज(कु./हे.) मूंग की फसल में जोन V (10.01); उर्द में जोन I (10.4) एवं राजमा की फसल में जोन I (8.1) का उच्चतम प्रदर्शन औसत उपज प्राप्त की गयी।

तालिका 5.1 : जायद 2016-17 दौरान समूहबद्ध अग्रिम पंक्ति प्रदर्शन

जोन	मूंग			उर्द				राजमा			
	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)	जोन	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)	जोन	क्षेत्रफल (हे.)	प्रदर्शन (कु./हे.)	स्थानीय प्रदर्शन (कु./हे.)
I	729.50	8.04	6.53	I	37.60	10.40	8.83	I	4.45	8.1	6.15
II	1170	9.30	6.78	II	170	9.41	7.46				
III	110	8.30	5.60	III	80	7.73	6.47				
IV	588	9.36	7.09	IV	263	8.29	6.99				
V	50	10.01	8.16								
VI	498	9.46	7.14								
VII	733.30	8.20	5.15								
VIII	59.20	3.36	2.72	VIII	80	5.99	4.49				
कुल	3938	8.23	6.14		714.2	8.31	6.44		4.45	8.1	6.15

EXECUTIVE SUMMARY

This programme is initiated by Ministry of Agriculture and Farmers Welfares, GOI, New Delhi to implement the cluster frontline demonstrations of pulses during 2015-16. During 2014-15, there was disaster due to Hud-Hud which damaged the *Kharif* crops and pulses in general. Similarly, during *Rabi* Season there was unseasonal rainfall in the month of February and 1st week of March 2014-15. All the *Rabi* crops were at the maturity stage especially pulses were at ripening stage and these crops were damaged to a great extent up to 50-60%; therefore the production of pulses reduced by 16%. There was felt need to meet the demands of pulses because it is an important source of protein for vegetarian who depends most on pulses. India is a large producer and consumer of the pulses. The availability of pulses is 37 g/capita/day as per the recommendation of ICMR against the requirement of 52g/capita/day. Keeping this in view, the present demand will be 28 million tones but to seeing the production during 2013-14 it was 19.2 million tones and further it declined to 17.2 million tones in 2014-15. Hence, during the year 2015-16 it was estimated that 18.2 millions tones pulses are needed. During year 2016-17 the pulses production reached 22.95 MT, because of Technological push the farmers end through the GOI. As we also know that pulses promote long term sustainability to the Indian Agriculture, it needs less water, grown on degraded and rainfed lands.

Division of Agricultural Extension, ICAR, New Delhi have given the responsibility to laid out the cluster frontline demonstrations on important pulses crops such as Pigeonpea, chickpea, field pea, lentil, Rajmash, Moth bean, Lathyrus, Green gram and Black gram. Entire country was given to organize cluster frontline demonstrations of pulses through Krishi Vigyan Kendra's of all eight zones of ICAR.

The National program has coordinated by ICAR-ATARI, Kanpur, Zone IV, for the purpose the human resource development created with the help of ICAR-IIPR, Kanpur at different places for sensitization the Head/Scientist of the KVKs to conduct the demonstrations in packages of practices mode with latest technologies. First of all availability of the seed find out from the NSC/SAUs/ICAR institutes and other organizations.

There was 31000 ha area allotted out of which 29008 ha area were covered with the demonstrations across all the zones of ICAR under CFLDs on pulses 2016-17. In total there was a budget allocation for cluster frontline demonstration to the extent Rs. 25.29 crore. Some of the places, different team visited to demonstrations in *Kharif*, *Rabi* and *Summer* season, the performance was highly satisfied. In *Kharif* season 11790 ha area, in *Rabi* season 15010 ha area and *Summer* season 4200ha areas were allotted for CFLDs of pulses in eight zones of ICAR. In actual 9939 ha area in *Kharif* season, 14411.85 ha area in *Rabi* season and 4656.65 ha area in *Summer* season demonstrations were conducted in eight zones of ICAR on Pulses during 2016-17.

Indian Council of Agriculture Research, New Delhi initiated National Level Cluster Frontline Demonstration on Pulses with main Objective to demonstrate the production potential of new pulses varieties and the related technologies. The project also aimed for enhancing the Pulses production level of the country during 2016-17 in *Kharif*, *Rabi* and *Summer* season. Total demonstrations were conducted on 29008 ha area in the country involving the major pulses i.e. *Kharif* pulses Pigeon pea (4741.8 ha), Blackgram (2734.6 ha), Green gram(2103.8 ha), Horsegram (228 ha), Rajamsh (19.20ha), Mothbean (112 ha), *Rabi* Pulses i.e. Chickpea (6054.46ha), Lentil (3689.7ha), Fieldpea (1819.09ha), Greengram (1449.4 ha), Blackgram (1020.2ha), Pigeonpea (83ha), rajmash(180ha), Lathyrus(116 ha) and *Summer* pulses Greengram (3938 ha), Blackgram (714.2 ha), Rajmash(4.45ha).

The area allotted and conducted is indicated as 1436.5/1480 ha in Zone I, 6342.3/6650 ha in Zone II, 2392/2490 ha in Zone III, 3531/4540 ha in zone IV, 3893.70/4030 ha in Zone V, 2748.2/2940 ha in zone VI, 7164/7310ha in Zone VII, and 1500.4/1560 ha in Zone VIII, Zone wise area conducted in CFLD pulses 2016-17. Over all area coverage was 92.79% against the allotment.

Zonewise conducted area in CFLD Pulses 2016-17

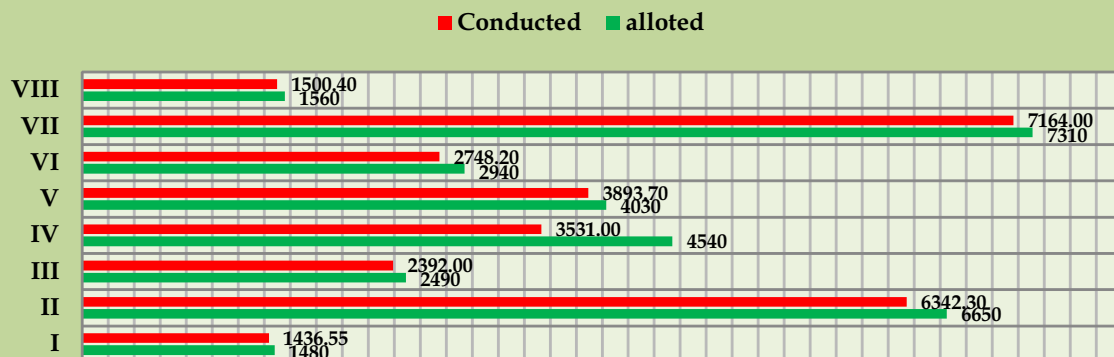


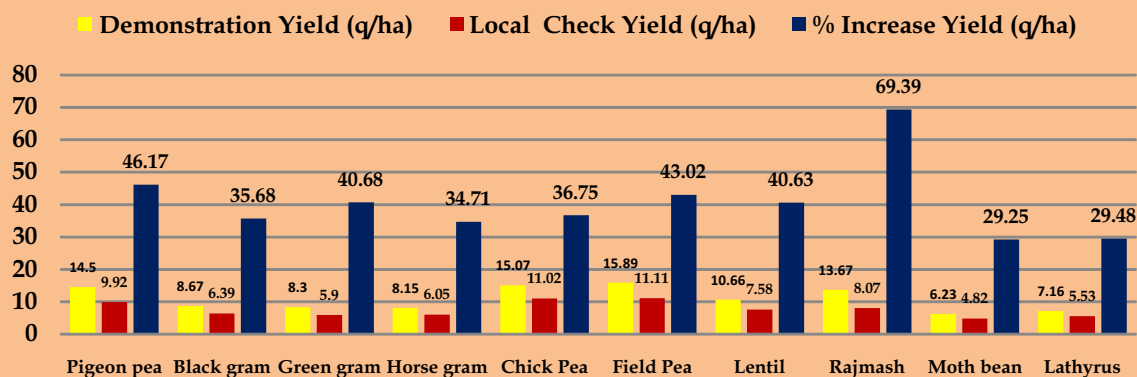
Table i. Zonewise allotted & Conducted area on Pulses 2016-17 in India

Zone wise allotted & conducted Area in CFLD Pulses 2016-17

Zone	Allotted area (ha)	Conducted (ha)
I	1480	1436.55
II	6650	6342.30
III	2490	2392.00
IV	4540	3531.00
V	4030	3893.70
VI	2940	2748.20
VII	7310	7164.00
VIII	1560	1500.40
Total	31000	29008.15

On National Basis the yield advantage in Pigeonpea was recorded highest (46.17%) followed by fieldpea(43.02%), greengram(40.68%), lentil(40.63%), blackgram(35.68%), Horse gram(34.71%). Other Pulses like rajmash was recorded highest (69.39%), Mothbean(29.25%), Lathyrus(29.48). There was huge yield gap was noticed 5.6 qt. in Rajmash followed by field pea and pigeon pea.

Yield advantage of pulses 2016-17 in India



The average demonstration yield for pigeonpea, blackgram, greengram, horsegram, chickpea, fieldpea, lentil, rajmash, mothbean, lathyrus were recorded 14.5, 8.67, 8.3, 8.15, 15.7, 15.89, 10.66, 13.67, 6.23 and 7.16q/ha respectively.

Table ii. Performance of CFLD Pulses 2016-17 in India

Sl. No.	Crop	Area (ha)	Yield (q/ha)		% Increase Yield (q/ha)	Yield gap (q/ha)
			Demonstration	Local Check		
1	Pigeon pea	4824.80	14.50	9.92	46.17	4.58
2	Black gram	4469	8.67	6.39	35.68	2.28
3	Green gram	7491.20	8.30	5.90	40.68	2.40
4	Horse gram	228.00	8.15	6.05	34.71	2.10
5	Chick Pea	6054.46	15.07	11.02	36.75	4.05
6	Field Pea	1819.09	15.89	11.11	43.02	4.78
7	Lentil	3689.70	10.66	7.58	40.63	3.08
8	Rajmash	203.65	13.67	8.07	69.39	5.60
9	Moth bean	112.00	6.23	4.82	29.25	1.41
10	Lathyrus	116.00	7.16	5.53	29.48	1.63
	Total	29008.00				

Table iii: CFLDs on Pulses during Kharif season 2016 in India.

Sl. No.	Crop	Area (ha)	Yield (q/ha)		% Increased	Yield gap (q/ha)
			Demonstration	Local Check		
1	Pigeon pea	4741.8	12.22	8.51	43.60	3.71
2	Black gram	2734.6	8.39	5.85	43.42	2.54
3	Green gram	2103.8	8.66	6.34	36.59	2.32
4	Horse gram	228	8.15	6.05	34.71	2.1
5	Rajmash	19.2	13.31	6.2	114.68	7.11
6	Moth bean	112	6.23	4.82	29.25	1.41

All the zones conducted demonstration in *Kharif* season 2016 with location specific varieties i.e. in Pigeonpea AL-201, Malviya Arhar-13, Asha, UPAS-120, NA-2, BSM3-736, GRG-811, Blackgram, Mash 114, UG 218, Shekhar, PU-31, AKU-15, Greengram-MH421, Pant Moong 5, IPM 2-3, Tripura Moong-1, MGG-347, Uttarsha, GM-4, KKM-3, Horsegram- Birsakulthi, Pavur-2, Indra kulthi. Rajmash- Wazej Rajmash, Tripura Rajmash Sel-1. Mothbean- RMO-257, CZM-2 with package of practices such as integrated nutrient management, integrated pest management, Improved varieties, seed+INM, Line sowing, seed treatment with Bavistin@2.5g/kg seed, inoculation of seed with rhizobium, PSB and crop management practices. It has been observed that the yield gap of 1.41 q/ha to 7.11 q/ha can be bridged by demonstrating the improved technologies over the traditional technologies across the different *Kharif* pulses such as pigeonpea, blackgram, green gram, horsegram, rajmash and moth bean.

The Zone wise highest average demonstration yield of Pigeonpea was found in zone-VI (16.44q/ha) followed by zone- IV (14.22q/ha), zone VII (13.3q/ha), zone II (13.22q/ha), zone V-(11.7q/ha), as given in table, similarly in Blackgram crop highest demonstration average yield was recorded in zone-V (9.48q/ha) followed by zone II (9.09q/ha), Zone VIII (8.86q/ha), zone III (8.13q/ha), zone IV (8.50q/ha), Zone VII (7.80q/ha), zone I (7.66q/ha) & Zone VI(7.60 q/ha). In case of Greengram highest demonstration average yield was recorded in zone VIII (10.04/ha), zone II (9.86 q/ha), zone I (9.5 q/ha), zone V (9.00 q/ha), zone VI (8.81 q/ha), zone III (8.04 q/ha), zone IV (7.2q/ha) and lowest yield in zone VII (6.89).

Table (I-a). Zone wise CFLDs Pulses during Kharif season 2016-17

Zone	Pigeonpea			Blackgram			Greengram		
	Area (ha)	Demo. (q/ha)	Local Check (q/ha)	Area (ha)	Demo. (q/ha)	Local Check (q/ha)	Area (ha)	Demo. (q/ha)	Local Check (q/ha)
I	20.00	7.50	4.50	106.00	7.66	5.65	40.00	9.50	6.35
II	1256.00	13.22	9.62	440.00	9.09	6.51	170.00	9.86	6.80

III	30.00	11.40	6.90	330.00	8.13	5.15	160.00	8.04	6.24
IV	541.00	14.22	8.93	359.80	8.50	6.01	138.60	7.20	5.27
V	1154.80	11.70	8.80	170.00	9.48	6.73	592.00	9.00	6.61
VI	130.00	16.44	13.25	360.00	7.60	5.70	477.20	8.81	6.90
VII	1330.00	13.30	8.60	928.80	7.80	5.08	326.00	6.89	4.42
VIII	280.00	10.04	7.52	40.00	8.86	6.00	200.00	10.04	8.20
Total	4741.80	12.22	8.51	2734.60	8.39	5.85	2103.8	8.66	6.34

In case of Horse gram, highest demonstration average yield was found in zone IV (9.98q/ha) followed by zone II (8.57q/ha) and lowest yield in zone VII(5.91q/ha).In case of Rajmash crop highest demonstration average yield found in zone VII(16.6q/ha),followed by zone II(10.33q/ha).In case of mothbean only VII zone conducted highest demonstration average yield was found (6.23q/ha).

Table (I-b): Zone wise CFLDs Pulses Kharif season 2016-17

Zone	Horsegram			Zone	Rajmash			Zone	Mothbean		
	Area (ha)	Demo. (q/ha)	Local Check (q/ha)		Area (ha)	Demo. (q/ha)	Local Check (q/ha)		Area (ha)	Demo. (q/ha)	Local Check (q/ha)
II	90.00	8.57	6.65	I	9.20	10.33	8.20	VI	112.00	6.23	4.82
IV	8.00	9.98	7.85	III	10.00	16.60	10.40				
VII	130.00	5.91	3.65								
Total	228.00	8.15	6.05		19.20	13.31	6.20		112.00	6.23	4.82

Table II: CFLDs Pulses during Rabi season 2016-17 in India.

Sl. No.	Crop	Area (ha)	Yield (q/ha)		% Increased	Yield gap (q/ha)
			Demonstration	Local Check		
1	Chick Pea	6054.46	15.07	11.02	36.75	4.05
2	Lentil	3689.7	10.66	7.58	40.63	3.08
3	Field Pea	1819.09	15.89	11.11	43.02	4.78
4	Green gram	1449.4	7.99	5.24	52.48	2.75
5	Black gram	1020.2	9.33	6.88	35.61	2.45
6	Pigeon pea	83	16.82	11.33	48.46	5.49
7	Rajmash	180	19.6	11.88	64.98	7.72
8	Lathyrus	116	7.16	5.53	29.48	1.63

All the zones conducted demonstration with location specific varieties i.e.in lentil HUL 57, DPL 62, L 4594. Field pea-Prakash, Rachna, Anupam, Shalimar pea; Chickpea- JG 16, HC1, GNG 1581, HC 1, HC 5, Jaki 9218, Vijay, Vishal, Digvijay, NBEG-3, BDNG-797,GG-2, GJG-3 & GG-5, JGG-1, GG-5; Black gram,LBG 752, LBG-787, GBG-1, PU-31; Green gram,LGG460, WGG-42, TM96-2, MGG-295,GG- 2, G. Co-4,CO-4, IPM-99-125with package of practices such as integrated nutrient management, integrated pest management, resource conservation technologies such as ridge & furrow method, broad bed furrow method; etc. intercropping on basis of technology demonstrations. It has been observed that the yield gap of 1.63 q/ha to 7.72q/ha can be bridged by demonstrating the improved technologies over the conventional technologies across the different Rabi pulses demonstrated such chickpea, lentil, field pea, green gram, black gram, rajmash and lathyrus.

The highest average demonstration yield of chickpea was found in zone IV (18.99q/ha) followed by Zone V (17.92q/ha), zone VI (17.62q/ha) as given in table and lowest yield in zone VIII (11.56q/ha). In case of Lentil crop highest demonstration average yield was found in zone VI (12.72q/ha) followed by zone II (11.98q/ha), zone IV (10.93q/ha) as given in table and lowest yield in zone III (7.44q/ha). In

case of Fieldpea crop highest demonstration average yield was found on zone IV (19q/ha) followed by zone VII (15.40q/ha), zone III (15.12q/ha) and lowest yield in zone II (14.05q/ha).

Table (II-a): Zone wise CFLDs Pulses during Rabi season 2016-17

Zone	Chickpea			Lentil			Fieldpea		
	Area (ha)	Demonstration	Local Check	Area (ha)	Demonstration	Local Check	Area (ha)	Demonstration	Local Check
I	449.80	11.78	9.15	40.00	10.61	8.11			
II	1056.00	13.86	9.82	1520.00	11.98	8.83	470.25	14.05	10.28
III				775.00	7.44	3.73	607.00	15.12	9.40
IV	266	18.99	13.78	914.70	10.93	7.78	451.84	19.00	13.85
V	1287.90	17.90	12.38						
VI	1123.00	17.62	13.85	20.00	12.72	10.36			
VII	1644.56	13.84	9.14	420.00	10.32	6.69	290.00	15.40	10.93
VIII	227.20	11.56	9.05						
Total	6054.46	15.07	11.02	3689.70	10.66	7.58	1819.09	15.89	11.11

The highest average demonstration yield of Greengram was found in zone V (11.53q/ha) followed by Zone VI (8.78q/ha), zone VII (6.08q/ha) and lowest yield in zone VIII (5.58q/ha). Similarly in case of Blackgram crop highest demonstration average yield was found in zone V (14.1q/ha) followed by zone III (8.5q/ha) and lowest yield in zone VII & VIII (7.55q/ha & 7.17q/ha). In case of Pigeonpea crop highest demonstration average yield was found in zone V (17.25q/ha) and lowest in zone VII (10.4q/ha).

Table II(b): Zone wise CFLDs Pulses (Greengram, Blackgram and Pigeonpea) during Rabi season 2016-17.

Zone	Green gram			Blackgram			Pigeonpea		
	Area (ha)	Demonstration	Local Check	Area (ha)	Demonstration	Local Check	Area (ha)	Demonstration	Local Check
III	-	-	-	70.00	8.50	6.50	-	-	-
V	180.80	11.53	4.84	430.20	14.10	11.05	28.00	17.25	14.17
VI	28.00	8.78	6.92	-	-	-	-	-	-
VII	946.60	6.08	5.18	200.00	7.55	4.81	55.00	10.40	8.50
VIII	294.00	5.58	4.05	320.00	7.17	5.19	-	-	-
Total	1449.4	7.99	5.24	1020.20	9.33	6.88	83.00	16.82	11.33

In case of Rajmash crop only Zone III conducted demonstration average yield (19.6q/ha) and similarly another crop Lathyrus only two zone conducted Highest demonstration average yield was found in zone III (8.12q/ha) and the lowest yields in zone VII (6.21q/ha).

Table II (c): Zone wise CFLDs Pulses During Rabi season 2016-17.

Zone	Rajmash			Lathyrus			
	Area (ha)	Demonstration	Local Check	Zone	Area (ha)	Demonstration	Local Check
III	180	19.60	11.88	III	40	8.12	6.41
				VII	76	6.21	4.66
Total	180	19.60	11.88		116	7.16	5.53

Table III: CFLDs on Pulses during Summer season 2017 in India.

Sl. No.	Crop	Area (ha)	Yield (q/ha)			% Increased	Yield gap (q/ha)
			Demonstration	Local Check			
1	Green gram	3938	8.25	6.14	34.36	2.11	
2	Black gram	714.2	8.31	6.44	29.04	1.87	
3	Rajmash	4.45	8.10	6.15	31.71	1.95	

All the zones conducted demonstration during *Summer* season 2017 with location specific varieties Greengram- SML-668, SML-832, IPM-2-3,HUM-16, Samrat,Tripura Moong.Blackgram-PU-31,IPU-94-1,Shekar,PU-19.Rajmash- Triloki(K198), Baspa(KCR-8) With package of practices such as resource conservation technologies such as ridge& furrow method, broad bed furrow method, intercropping on bases of technology demonstrations. ICM, weed control and plant protection. The Table revealed that the yield gap of 1.87 q/ha to 2.11 q/ha can be bridged by demonstrating the new technologies over the traditional one across the various *Summer* pulses demonstrated such as black gram, green gram and rajmash.

The highest average demonstration yield of Greengram was recorded in zone V (10.01q/ha) followed by zone VI (9.46q/ha),zone IV(9.36q/ha)as given in table and lowest yield in zone VIII (3.36q/ha).In case of Blackgram demonstration average yield Was found in zone I (10.4q/ha) followed by zone II (9.41q/ha),zone IV(8.29q/ha)as give in table and lowest yield in zone VIII (5.99q/ha).In case of Rajmash crop only zone I conducted on average demonstration yield (8.1q/ha).

Table III (a): Zone wise CFLD Pulses during *Summer* season 2017

Zone	Greengram			Zone	Blackgram			Zone	Rajmash		
	Area (ha)	Demonstration	Local Check		Area (ha)	Demonstration	Local Check		Area (ha)	Demonstration	Local Check
I	729.50	8.04	6.53	I	37.60	10.40	8.83	I	4.45	8.1	6.15
II	1170	9.30	6.78	II	170	9.41	7.46				
III	110	8.30	5.60	III	80	7.73	6.47				
IV	588	9.36	7.09	IV	263	8.29	6.99				
V	50	10.01	8.16								
VI	498	9.46	7.14								
VII	733.30	8.20	5.15	VII	83.60	8.06	4.41				
VIII	59.20	3.36	2.72	VIII	80	5.99	4.49				
Total	3938	8.23	6.14		714.2	8.31	6.44		4.45	8.1	6.15



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1

INTRODUCTION

Globally, India is the major pulses producer followed by Canada, China, Myanmar and Brazil. The world's major pulses producing countries, which together account for half of the global production are India, Canada, China, Myanmar and Brazil. India is the largest producer of pulses, accounting for 25 per cent of global pulses production. In a country like India, pulses are the cheapest and concentrated source of dietary amino acids, where protein demand of vegetarian population is fulfilled through pulses, so it is also considered as "A poor man's meat". Pulses occupy a unique position in the world of agriculture by virtue of its high protein content, which is almost double than that of cereals. They have a special role in meeting the protein requirement of predominantly vegetarian population. In addition to protein, pulses also contain good quality lysine, tryptophan, ascorbic acid and riboflavin. Pulses are suitable for people with diabetes, also for coronary heart disease and anemia, as they regulate the cholesterol. The presence of bioactive compounds i.e. phytochemicals and antioxidants, build up an anti-cancer properties in pulses. Other than their suitability for human health, pulses are also good for environment. Pulses crop are considered as the wonderful gift of nature as they have an ability to fix the atmospheric nitrogen (N₂), thereby helps in N cycling within the ecosystem. Besides N₂ fixation, incorporation of crop residue increases the microbial activity, restores soil properties in soil and carbon sequestration, and thus provides sustainability in crop production system.

With the above objective in view the Government of India has initiated Cluster Front Line Demonstrations (CFLD) on Pulses during *Rabi* 2015-16 under National Food Security Mission (NFSM). Accordingly the ICAR-Division of Agricultural Extension planned to organize Cluster FLDs on Pulses during *rabi* 2016-17 through Krishi Vigyan Kendras in the country.

Production trends

Globally, pulse crops are grown in area of more than 76 m ha with a production of about 68 m tonnes. In India, the total pulse area is about 25 mha which produces about 18 m tonnes.

Table 1 : Trends in production and productivity of pulses in India

Year	Production (m. ton)	Yield (kg/ha)
1950-51	8.41	441
1960-61	12.70	539
1970-71	11.82	524
1980-81	10.63	437
1990-91	14.26	578
2000-01	11.08	544
2005-06	13.39	598
2008-09	14.57	659
2009-10	14.66	630
2010-11	18.24	691
2011-12	17.09	699
2012-13	18.34	789
2013-14	19.24	764
2014-15	17.15	735
2015-16	16.47	652

Source: - <http://www.iasri.res.in>, <http://www.dacnet.nic.in/eands>

The average productivity at the global level is about **800 kg/ha** and of India is **750 kg/ha**. In 2015-16 the total area, production and average productivity of all pulse crops was **23.37 m ha**, **16.47 m tonnes** and **652 kg/ha** respectively. The present production of **16.47 million tones** of Pulses in India is not meeting the annual domestic demand of **22.42 million tones**. Hence there is a need to increase the production and productivity through an annual growth rate of **4.2% to reach the target of 32 million tonnes by the year 2030**. The progressive trends in production and productivity of pulses in indicated from the given (Tables 1):

Table 2 : State wise area, production and yield of total pulses during 2014-15 & 2015-16

(Area: million ha, Production : million tones, Yield: kg/ha)

State	2015-16			2014-15		
	Area	Production	Yield	Area	Production	Yield
Madhyapradesh	5.76	5.12	888	5.51	4.83	876
Rajasthan	3.87	1.95	504	3.36	1.95	580
Maharastra	3.36	1.41	420	3.41	2.05	602
Karnatka	2.78	1.39	500	2.32	1.39	599
Andhra Pradesh	1.45	1.23	846	1.04	0.95	911
Uttar Pradesh	1.87	1.22	654	2.35	1.44	612
Tamilnadu	0.93	0.57	619	0.88	0.75	852
Odisha	1.29	0.55	428	0.83	0.44	532
Jharkhand	0.59	0.55	920	0.59	0.60	1004
Gujrat	0.60	0.53	890	0.59	0.57	972
Chattisgarh	0.84	0.51	608	0.90	0.74	821
Bihar	0.51	0.43	847	0.57	0.49	859
West Bengal	0.41	0.33	800	0.25	0.24	941
Telangana	0.48	0.24	509	0.41	0.26	645
Haryana	0.07	0.05	692	0.08	0.06	674
Others	0.45	0.39	@	0.44	0.39	@
All-India	25.26	16.47	652	23.55	17.15	728

Source: - Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, @since area/production is individual in other states. Ministry of Statics and Programme implementation

Availability of Pulses in India

Per capita net availability of pulses in India is highest during 1951-1961 (60.7-69.0 gram/ day) after that constantly decreases upto year 2001 (30.0 gram/day). Per capita availability of pulses has seen upward moment during the last two decades. As per the recommendations of ICMR of 52g/capita/day. The current per capita availability is estimated at 43.8 g/capita/day which is still low as compared to the recommendation of ICMR. The progressive trends in availability of pulses in indicated from the following (Tables 3):

Table 3 : Per capita Net availability of total pulses in India

S. No	Year	Availability	
		Per day (Gram)	Per Annum (Kg)
1.	1951	60.7	22.16
2.	1961	69.0	25.19
3.	1971	51.2	18.69
4.	1981	37.5	13.69
5.	1991	41.6	15.18
6.	2001	30.0	10.95
7.	2005	31.5	11.50
8.	2007	35.5	12.96
9.	2009	37.0	13.51
10.	2010	35.4	12.92
11.	2011	43.0	15.70
12.	2012	41.7	15.22
13.	2013	43.3	15.90
14.	2014	46.3	16.80
15.	2015	43.8	15.94

Source: -<http://www.iasri.res.in>, <http://www.dacnet.nic.in/eands>

Nutritional value of pulses

The nutritional importance of pulses are numerous they can be a valuable source of energy.

Table 4 : Nutritional value of pulses

	Energy (Kcals)	Moisture (g)	Protein (g)	Fat (g)	Mineral (g)	Carbohydrates (g)	Fibre (g)	Calcium (mg)	Phosphorus (mg)	Iron (mg)
Bengal gram, whole	360	10	17	5	3	61	4	202	312	5
Bengal gram, dhal	372	10	21	6	3	60	1	56	331	5
Black gram, Dhal	347	11	24	1	3	60	1	154	385	4
Cow pea	323	13	24	1	3	54	3	77	414	9
Field bean, dry	347	10	25	1	3	60	1	60	433	3
Green gram dhal	348	10	24	1	3	60	1	75	405	4
Horsegram	321	12	22	0	3	57	5	287	311	7
Khesari, dhal	345	10	28	1	2	57	2	90	317	6
Lentil	343	12	25	1	2	59	1	69	293	7
Moth beans	330	11	24	1	3	56	4	202	230	9
Peas green	93	73	7	0	1	16	4	20	139	1
Peas dry	315	16	20	1	2	56	4	75	298	7
Rajmah	346	12	23	1	3	61	5	260	410	5
Redgram, dhal	335	13	22	2	3	58	1	73	304	2
Soyabean	432	8	43	20	5	21	4	240	690	10

Source: - Gopalan, et.al (2004)

The energy content of most pulses has been found to be between 315 and 432 Kcal / 100g. Energy is required for all metabolic processes. The energy of Pulses comes from the nutrient supply of protein, fat and carbohydrate. Pulses have a high protein content, the value is about twice that in cereal and several times that in root tuber (FAO, 1968), so they can help to improve the protein intake of meals in which cereals and root tubers in combination with pulses are eaten (Kushwah et al., 2002). Pulse when eaten with cereals, can also help to increase the protein quality of the meal. In man, protein helps in the repair of body tissue, synthesis of enzymes and hormones and also in the supply of energy. The details nutritional value of pulses are shown in (Table 4).

Mission Objectives

- Increasing production of pulses through area expansion and productivity enhancement in a sustainable manner in the identified districts of the country; Ensure food security-area expansion and productivity enhancement of food crops including dual purpose coarse cereals.
- Restoring soil fertility and productivity at the individual farm level; and
- Enhancing farm level economy (i.e. farm profits) to restore confidence amongst the farmers with increasing the Seed Replacement Rate (SRR) under pulses crop.

Constraints of pulse Production

There are several constraints in pulse production. These include:

- ☛ Growing of lathyrus, lentil, green gram under intercropping which leads to poor plant population.
- ☛ Redgram, green gram and black gram are mostly grown as rainfed crop.
- ☛ Since rice is grown in most of the areas in *kharif* season, the sowing of pulses in these areas delays due to cultivation of long duration varieties.
- ☛ In most of the states pulses are grown in unproductive and up land without adequate fertilizers.
- ☛ Availability of good quality seed is still a problem in the majority of the areas, new varieties are not available in adequate quantity.
- ☛ Compared to pulses, other crops like potato, wheat, vegetable, oilseeds get more attention of the farmers as these crops are more profitable.
- ☛ Irrigation is not available in adequate quantity.
- ☛ Seed treatment and use of bio-fertilizers are still very low which affect the productivity of crops.
- ☛ Use of micronutrients is very much important in pulses in many places which farmers cannot afford leading to low productivity.

2

ICAR-ATARI, LUDHIANA, ZONE – I

(Punjab, Haryana, Delhi, Himachal Pradesh, Jammu & Kashmir)

Cluster Frontline demonstrations on *Kharif* Pulses 2016-17

Under the project “Cluster Frontline Demonstrations of Pulses 2016-17”, total 900 FLDs were allocated for an area of 360 ha during *Kharif* season. These FLDs were planned in 19 KVKs of Punjab, Haryana, Himachal Pradesh (H.P.) and Jammu & Kashmir (J&K) on Black gram, Green gram, Rajmash and Pigeon pea crops. Out of the allotted FLDs some KVKs were unable to complete the target due to unavailability of the seeds, thus they will conduct the deficit FLDs either in *Rabi* or *Summer* season. Detail of the allotted, conducted and deficit FLDs and area has been given in Table 1.

Results of *Kharif* season FLDs in Zone-I

Punjab

Black gram: In Nawanshahar, 50 FLDs of black gram on Mash 114 variety were conducted on an area of 20 ha. The followed technology was different planting system; as a result 18.42 per cent higher yield was recorded over the local check. The recommended package of practices of PAU, Ludhiana was followed to conduct the FLDs as a result increment in net return was 20 per cent.

Pigeon pea: Total 50 FLDs of Pigeon pea variety AL-201 were conducted on an area of 20 ha in Mansa. As compared to the local check, 66.67 per cent higher yield was recorded as of following Pest control technology. Increment in net return was 286.8 per cent.

Haryana

Green gram: Total 100 FLDs were conducted on an area of 40 ha in Bhiwani and Mahendargarh on MH 421 variety of green gram. In Mahendargarh, 19.64 per cent higher yield was recorded over the local check from demonstrated technology "biofertilizer use and insect pest management". From such practices 42.6 per cent better net return was recorded.

In Bhiwani, 73.23 per cent higher yield was recorded over the local check. The demonstrated technology was improved variety and production technology.

Himachal Pradesh

In Himachal Pradesh, total 288 FLDs were conducted on an area of 56.00 ha on Black gram in Bilaspur, Hamirpur, Kullu, Mandi and Shimla. However, rest of the 24.00 ha was converted to chickpea. As compared to local check; 78.6, 20.86, 10.42, 24.31 and 54.83 per cent higher yield was recorded from KVK of Bilaspur, Hamirpur, Kullu, Mandi and Shimla respectively. Detail of the demonstrated variety and technology has been given in Table 1.

Table 1: Detail of yield and FLDs of *Kharif* pulses 2016-17

KVK	Crop	Variety	Demonstrated technology	FLDs	Area ha.	Local check	Demo. yield	% increase
Punjab (2)								
Nawanshahr	Black gram	Mash 114	Different Planting system	50	20.00	7	8.29	18.42
Mansa	Pigeon pea	AL-201	Pest control	50	20.00	4.5	7.5	66.67
Haryana (2)								
Bhiwani	Green gram	MH 421	Biofertilizer use and insect pest management	50	20.00	7.1	12.3	73.23
Mahendargarh	Green gram	MH 421	Improved variety and production technology	50	20.00	5.6	6.7	19.64

HP (5)								
Bilaspur	Black gram	UG 218	IPM (Lambda cyhalothrin 5 % EC)	50	20.00	6.1	10.9	78.68
Hamirpur	Black gram	HIM Mash-I & UG-218)	Varietal seed + INM	45	6.00	4.84	5.85	20.86
Kullu	Black gram	Him Mash 1 and UG 218	Varieties and seed treatment with Bavistin @ 2.5 g/kg seed	50	5.00	6.43	7.11	10.42
Mandi	Black gram	Palampur-93, PantU-19,UG 218and Himachal Mash-1	ICM	93	20.00	5.1	6.34	24.31
Shimla	Black gram	Him 1	Line sowing; Integrated Crop Management	50	5.00	6.2	9.6	54.83
J&K, Jammu								
Kathua	Black gram	Mash PU-31	Weed management and plant protection measures	114	20.00	5.25	9.75	71.42
Rajouri	Black gram	PU-19	Integrated crop management	67	6	3	3.93	31.00
Reasi	Black gram	PU-31	IWM,INM	51	4	4.4	6.7	52.27
J&K, Srinagar								
Anantnag	Rajmash	Wazej Rajmash	Seed and Biofertilizer (PSB)	45	6.65	7.90	8.66	9.60
Pulwama*	Pea	Shalimar pea-1	Improved variety and line sowing	46	2.55			

Table 2: Detail of Black gram in KVKs of Himachal Pradesh

KVK	Variety	Demonstrated technology	% increase in yield
Bilaspur	UG 218	IPM (Lambda cyhalothrin 5 % EC)	78.6
Hamirpur	HIM Mash-I & UG-218)	varietal seed + INM	16.8
Kullu	Him Mash 1 and UG 218	Varieties and Seed treatment with Bavistin @ 2.5 g/kg seed	10.6
Mandi	Palampur-93, Pant U-19, UG 218 and Himachal Mash-1	Improved seed, Seed inoculation with Rhizobium & PSB, line sowing, Crop management practices	24.4
Shimla	Him 1	Line sowing; Integrated Crop Management	35.4
Total			33.16

PHOTOGRAPHS





Raised bed sowing of Black gram at Nawanshahr in Punjab



FLDs of Pigeon pea at Mansa in Punjab

HARYANA



KVK Bhiwani



FLDs of green gram in Mahendargarh



Black gram in Himachal Pradesh



KVK Mandi

MONITORING PHOTOGRAPHS



Monitoring by Dr. Rajvir Singh at Bhiwani



Monitoring team at Nawanshehr

Cluster Frontline demonstrations on *Rabi* Pulses 2016-17

Government of India (GoI) is taking several measures to control the hiked prices of pulses; to give relief to citizens. For this purpose GoI has planned to increase pulses production by increasing the area under pulse crops. Thus, Division of Agriculture, Cooperation & Farmers Welfare (DAC&FW) approved the project "Cluster Frontline Demonstrations on Pulses 2016-17". For this purpose, during May 2016 National Food Security Mission (NFSM) sponsored 1,23,60,000 rupees to ICAR-ATARI, Zone-I, Ludhiana for conducting frontline demonstrations (FLDs) in Haryana, Punjab, Himachal Pradesh and Jammu and Kashmir. For conducting FLDs, the KVKs were allocated @ Rs. 7500 per ha for pulses viz. chickpea, lentil, field pea and *Summer* moong. During *Rabi* season, total of 1884 FLDs were conducted on an area of 489.8 ha in four states on chickpea and lentil. Detail of the FLDs is given in Table 3.

Table 3: Results of *Rabi* season

Crop/State	FLDs (no.)	Area (ha)	Demo Yield (q/ha)	Local check Yield (q/ha)	Increase in yield (%)
Chickpea					
Punjab	719	204	15.87	12.86	23.40
Haryana	365	160	16.74	13.07	28.07
Himachal Pradesh	359	58.3	7.20	5.50	30.90
Jammu & Kashmir	330	27.5	5.93	4.67	26.98
Total (chickpea)	1773	449.8			

Lentil					
Punjab	69	20	8.37	6.23	34.34
Haryana	42	20	12.86	10.00	28.60
Total (lentil)	111	40			
Total (Rabi)	1884	489.8			

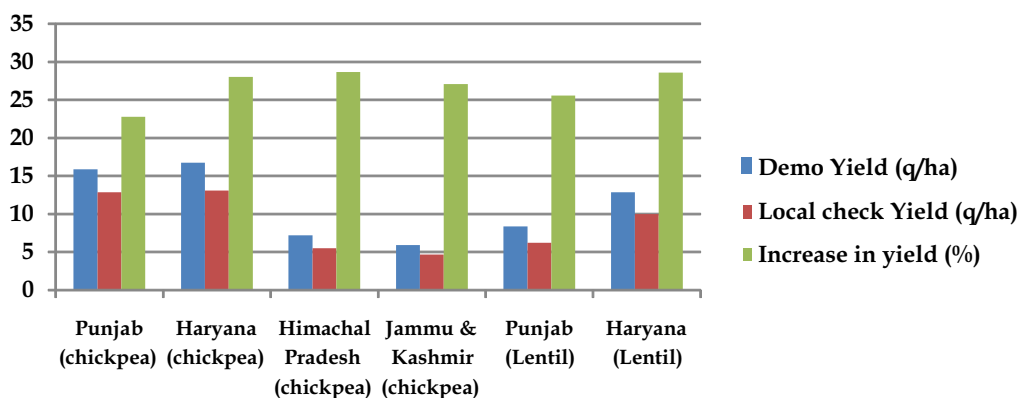


Fig 1: Yield result of FLDs on chickpea and lentil 2016-17

Results of FLDs

Punjab

In Punjab, chickpea varieties viz. PBG 2, PBG 5, PBG 7 and GPF 2 were demonstrated in Amritsar, Bathinda, Faridkot, Fatehgarh Sahib, Ferozepur, Gurdaspur, Hoshiarpur, Nawanshahar, Patiala and Sangrur. Total 719 FLDs were demonstrated on an area of 204 ha. From FLDs of chickpea, 23.40 per cent higher yield was recorded over the local check (Table 4). In Hoshiarpur, 34.34 per cent higher yield of lentil variety LL 699 was recorded over the local check where 69 FLDs of lentil were conducted on an area of 20 ha. Major technologies like improved variety, seed treatment with Rhizobium culture, chloropyrifos, Bavistin, weed control, integrated crop management and plant protection were followed under demonstration at the farmer's field.

Table 4: Results of Rabi season in Punjab

Crop/ Name of KVK	Variety	Conducted		Yield (qt/ha)		Increase in yield %
		FLDs (no.)	Area (ha)	Demo field	Local check	
Chickpea						
Amritsar	PBG 7	114	30	17.30	13.5	28.14
Bathinda	PBG 7, GPF 2	48	20	17.20	16.5	4.20
Faridkot	PBG 7	88	20	12.50	10.20	22.54
Fatehgarh Sahib	PBG 7	71	20	17.85	14.71	21.34
Ferozepur	GPF 2	100	20	17.80	15.40	15.80
Gurdaspur	PBG 7	50	20	14.89	13.30	11.95
Hoshiarpur	PBG 5	67	14	9.64	7.40	30.27
Nawanshahar	PBG 5	40	20	17.50	11.25	55.55
Patiala	GPF 2	52	20	15.85	11.50	37.82
Sangrur	PBG 7	89	20	18.16	12.50	45.28
Total		719	204	15.87	12.86	23.40
Lentil						
Hoshiarpur	LL 931	69	20	8.37	6.23	34.34
Total		69	20	8.37	6.23	34.34



Fig 2: Input distribution in Ferozepur (left) and field preparation in Nawashehr (right)



Fig 3: Crop stand of lentil in Hoshiarpur (left) and chickpea in Nawashehr (right)

Haryana

Total 365 FLDs of chickpea were conducted on an area of 160 ha in selected blocks of Ambala, Karnal, Bhiwani, Hisar, Mahendergarh and Rewari districts of Haryana. As compared to the local check, 28.01 per cent higher yield was recorded from FLDs of chickpea varieties i.e. HC-1, KC 1, CJS 515, GNG 1928 and GNG 15 81 (Table 5). In Yamunanagar, 42 FLDs were conducted on lentil variety LL 931 on an area of 20 ha which resulted in 28.6 per cent higher yield over the local check. Complete package of practices was the demonstrated technologies at farmer's field which includes improved variety, seed treatment with chloropyrifos and Rhizobium culture, weed and pest management.

Table 5: Results of FLDs in Haryana

Name of KVK	Variety	Conducted		Yield(ql/ha)		Increase in yield %
		FLDs (no.)	Area (ha)	Demo field	Local check	
Chickpea						
Ambala	GNG 1581	75	30	18.27	13	40.53
Karnal	HC 1	53	20	18	14.82	21.45
Bhiwani	CJS 515	44	30	19	12	58.30
Hisar	CJS 515	75	30	15.21	13.20	15.22
Mahendergarh	GNG 1581, GNG 1928	99	40	15.84	13.15	20.45
Rewari	KC 1, CJS 515	19	10	14.12	12.27	15.07
Total		365	160	16.74	13.07	28.07
Lentil						
Yamunanagar	LL 931	42	20	12.86	10	28.60
Total		42	20	12.86	10	28.60



Fig 4: Chickpea weeding in Bhiwani (left) and Scientist visit at farmer's field in Hisar

Himachal Pradesh

In Himachal Pradesh, total 359 FLDs of chickpea were conducted on an area of 58.3 ha by following the major technologies i.e. improved variety, seed treatment with fungicide, phosphorus solubilizing bacteria (PSB) & Rhizobium and integrated crop management. Bilaspur, Hamirpur, Mandi, Shimla and Una were selected to conduct the FLDs on chickpea varieties HC 1, HC 2, GPF 2, GNG 1581 and HC 5 which resulted in increase the yield by 29.82 per cent over the local check.

Table 6: Results of FLDs in Himachal Pradesh

Name of KVK	Variety	Conducted		Yield (qt/ha)		Increase in yield %
		FLDs (no.)	Area (ha)	Demo field	Local check	
Chickpea						
Bilaspur	HC 1, HC 2, GPF 2	50	20	8.60	6.10	40.98
Mandi	GNG 1581, HC 2	61	20	5.80	4.50	28.88
Hamirpur	GNG 1581	29	3.3	6.57	5.80	13.20
Una	HC 5	150	10	7.84	5.45	43.85
Shimla	HC 1	69	5	6.05	4.95	22.22
Total		359	58.3	6.97	5.36	30.03



Fig 5: Demonstration on seed treatment in Mandi (left); hand weeding of chickpea in Una (right)

Jammu & Kashmir

In Jammu & Kashmir, 330 demonstrations were conducted on an area of 27.5 ha in Jammu, Reasi and Rajouri on chickpea variety GNG 1581. Full package of practices recommended by SKUAST Jammu and Srinagar was followed to raise the crop (Table 7). As a result 26.98 per cent higher yield was recorded over the local check.

Table 7: Results of FLDs of chickpea in Jammu & Kashmir

Name of KVK	Variety	Conducted		Yield(qt/ha)		Increase in yield %
		FLDs (no.)	Area (ha)	Demo field	Local check	
Jammu	GNG 1581	204	16.5	5.7	5.1	11.76
Rajouri	GNG 1581	45	5	3.9	3.6	8.33
Reasi	GNG 1581	81	6	8.2	5.3	54.71
Total		330	27.5	5.93	4.67	26.98



Fig 6: Line sown chickpea in Reasi (left) and in Jammu (right)

Extension activities conducted to demonstrate improved technologies of pulses cultivation

During *Rabi* 2016-17, different extension activities comprised farmers-scientists interaction, trainings, awareness camp, method demonstrations on scientific practices, kisan goshtis, trainings, field day, monitoring on FLDs etc were conducted (Fig 7). A total of 7805 farmers, including 6814 men and 991 women participated in different extension activities under 706 extension personals (Table 8).

Table 8: Extension activities conducted during FLDs

Name of extension activity	Participant farmers			Participant extension personnel		
	Men	Women	Total	Men	Women	Total
Farmer scientist interaction	1298	325	623	79	151	230
Trainings	599	57	656	23	0	23
Awareness camp	854	200	1054	122	17	139
Kisan Goshti	422	12	434	23	0	23
Field day	1809	273	2082	52	22	74
Field visit	807	35	842	52	32	84
Monitoring on FLDs	821	30	851	64	53	117
Exhibitions	120	0	120	3	3	6
Method Demonstrations	84	59	143	8	2	10
Total	6814	991	7805	426	280	706



Fig 7: Field day in Hoshiarpur (left) and sangrur (right)

Different technologies followed for raising FLDs on chickpea and lentil



Fig 8: Raised bed sown chickpea in Patiala (left) and lentil in popular in Hoshiarpur (right)



Fig 9: Ridge sown chickpea in Ambala (left) and irrigation by sprinkler in Rewari (right)



Fig 10: Use of pheromone trap in Jammu (left) and seed treatment in Bhiwani (right)

Cluster Frontline demonstrations on *Summer Pulses* 2017

During *Summer* season total 1575 FLDs were allocated for an area of 630 ha under the project “Cluster Frontline Demonstrations of Pulses 2016-17”. While 169.5 ha area was reallocated from *Rabi* season to compensate the *Kharif* season deficit area. Thus, out of 799.5 ha allotted area total 771.6 ha area was covered under FLDs. During *Summer* season *Summer moong*, *Summer mash* and *Rajmash* crops were selected to conduct the FLDs in KVKs of Punjab, Haryana, Himachal Pradesh (H.P.) and Jammu & Kashmir (J&K). As of unavailability of the seeds, some KVKs were unable to complete the target of FLDs. Detail of the allotted and conducted area under demonstrations has been given in Table 9.

Table 9: State wise detail of area of *Summer Pulses* 2016-17

States	<i>Summer moong</i>		<i>Summer mash</i>		<i>Rajmash</i>		Total	
	Allotted+Reallocation	C	A	C	A	C	A	C
Haryana	330	310	0	0	0	0	330	310
H.P.	10	10	0	0	10	4.45	20	14.45
J&K	3.5	3.5	0	0	0	0	3.5	3.5
Punjab	240+166=406	406	40	37.6	0	10	446	453.6
Total	749.5	729.5	40	37.6	10	14.45	799.5	771.6

Results of FLDs

Punjab

In Punjab, *Summer moong* varieties namely SML 668 and SML 832 were demonstrated by 16 KVKs while *Summer mash* was demonstrated in 2 KVKs. Thus, total 443.6 ha area was covered through 1022 demonstration in 18 KVKs of Punjab (Table 10). Major technologies demonstrated at the farmer's field were improved variety, seed treatment with *Rhizobium* culture, Captan or Thiram, integrated crop management, weed control and plant protection were demonstrated.

Table 10: Yield results of FLDs of *Summer moong* and *mash* in Punjab

Name of KVK/Crop	Target of FLD approved		Achievements of FLD		Yield (qtl/ha)		Increase %
	No. of Demo	Area (ha)	No. of Demo	Area (ha)	Demo field	Local /Chcek	
<i>Summer moong</i>							
Amritsar	50	20	51	20	10.50	8.70	20.7
Bathinda	75	30	48	30	10.30	9.80	5.30
Faridkot	50	20	53	20	8.40	7.20	16.7
Fatehgarh Sahib	50	20	60	20	8.50	7.20	18.1
Ferozepur	125	50	125	50	4.10	3.50	17.10
Hoshiarpur	15	6	15	6	8.80	7.20	21.90
Kapurthala	50	20	26	20	4.80	4	20
Jalandhar	25	10	25	10	11.10	10.14	9.30
Ludhiana	75	30	36	30	14.40	11.3	27.40
Mansa	50	20	50	20	8.40	7.6	10.50
Moga	100	40	100	40	13.66	8.62	58.40
Muktsar	50	20	50	20	7.80	6.63	17.60
Patiala	50	20	50	20	12	11.03	8.80
Sangrur	50	20	36	20	10.43	7.56	38
Barnala	50	20	50	20	11.84	6.99	69.40
Tarantaran	150	60	150	60	11.70	8.80	33
<i>Summer mash</i>							
Gurdaspur	50	20	50	17.6	11.30	9.96	13.40
Ropar	50	20	47	20	9.50	7.70	23.40
Total	1115	446	1022	443.6			

Glimpses of FLDs of *Summer pulses*



Fig 1: Input distribution in Barnala (left) and moong crop stand in Bathinda (right)



Fig 2: Hand picking of pods in Fatehgarh Sahib (left) and sowing with happy seeder in Kapurthala (right)



Fig 3: Camp on *Summer moong* in Moga (left) and Field day on *Summer moong* in Tarn Taran (right)

Glimpses of monitoring of FLDs



Fig 4: Input distribution in Barnala (left) and moong crop stand in Bathinda (right)



Fig 5: Hand picking of pods in Fatehgarh Sahib (left) and sowing with happy seeder in Kapurthala (right)



3

ICAR-ATARI, Kolkata, ZONE II

(Bihar, Jharkhand and West Bengal)

Cluster Frontline demonstrations on *Kharif* Pulses 2016-17

In the Eastern states of India, like Bihar, Jharkhand, and West Bengal pulses are grown in *kharif*, *rabi* and *rabi-summer* season. Major *kharif* pulses grown in Bihar are Pigeon pea 21874 ha followed by Black gram 15503ha. In the state of Jharkhand, Pigeon pea 196806 ha occupies major portion of *kharif* pulses followed by Black gram 94206ha, Green gram 16137ha, and 16941ha Horse gram. In West Bengal, Black gram 60427ha occupies largest area, followed by Pigeon pea 1483 ha and Green gram 976 ha. The average productivity of the major pulses in these states is indicated in below.

Bihar

Crops	Area (ha)	Production (Mt)	Productivity (kg/ha)
Pigeon Pea	21874	36459	1667
Black gram	15503	14142	879

Jharkhand

Crops	Area (ha)	Production (Mt)	Productivity (kg/ha)
Pigeon Pea	196806	205153	1042
Black gram	94206	88251	937
Green gram	16137	10283	637
Horse gram	16941	11033	651

West Bengal

Crops	Area (ha)	Production (Mt)	Productivity (kg/ha)
Pigeon Pea	1483	2124	1432
Black gram	60427	40267	666
Green gram	976	823	843

Source: Fertilizer and Agriculture Statistics Eastern Region, Edition-39, 2014-15

The total area under *kharif* pulses in Bihar is 37377 ha with average productivity of 1286.5kg/ha and production of 50601Mt. In Jharkhand area under pulses is about 324090 ha with productivity of 816.75 kg/ha with production of 314720 Mt. West Bengal is having 77478 ha under *kharif* pulse with average productivity of 923kg/ha and production of 59209 Mt.

Pigeon Pea: Pigeon pea is one of the most preferred pulses consumed in Bihar. The productivity of pigeon pea has always been more than the national average with highest yield in 2013-14 of 1667 kg/ha. In Bihar traditionally long duration varieties (>200 days) of pigeon pea are grown which are highly photoperiod-sensitive taking about 40 weeks to mature exposing the crop to terminal drought stress and frosts. In Bihar, Pigeon pea production mainly comes from the districts of Samastipur (1836 ha), Kaimur (1791 ha), E. Champaran (1673 ha), Gaya (1535 ha). Productivity of pigeon pea is also highest in Lakhisarai district (3393 kg/ha). Major varieties which are under cultivation in Bihar are Malaviya -13, NDA-2, LRG-41, BSMR736 etc. In Jharkhand pigeon pea production comes mainly from the districts of Palamu(27256 ha), Latehar(25986 ha), Garhwa (23455 ha),and Ranchi (10764 ha). In Jharkhand productivity is highest in the district of Simdega (1930 kg/ha). In Jharkhand major pigeon pea varieties under cultivation are NDA-2, Malaviya -13, ICPL-87119, 85063, UPAS 120 etc. Pigeon

pea is grown mainly in South 24 pgs (437 ha), Purulia (332ha), and West Midnapore(164 ha) districts of West Bengal. Maximum productivity of 1567 kg/ha comes from West Midnapore district. Major varieties under cultivation are UPAS- 120, Laxmi (ICPL 85063) etc.

Black gram: Urd bean is grown mostly during rainy season, however, being a short duration and nitrogen fixing crop, urd bean fits well in multiple cropping systems and can provide desired sustainability to cereal based cropping systems. Black gram is grown in 15503 ha in *kharif* season in Bihar and production is 14142 Mt with average productivity of 912 kg/ha. The leading districts in Black gram production in Bihar are Katihar (3107 ha), Khagaria (2602 ha), Lakhisarai (2244 ha), and Bhagalpur (1981ha). Productivity is highest in Katihar district (3107 kg/ha). In Jharkhand, crop is grown in 94206 ha with production of 88251 Mt and productivity of 937kg/ha, leading Black gram producing districts are Simdega (20687 ha), Palamau (10232ha), and Ranchi (8600 ha) .Highest productivity (1610 kg/ha) comes from Simdega district. In West Bengal, Black gram is grown in 60427 ha and total production is 40267 Mt. Murshidabad is leading district in Black gram production with 14039 ha coverage which is followed by Nadia (12384ha), and Purulia (12986 ha) . The productivity of Malda district (931 kg/ha) is highest in Black gram.

Horse gram: Horse gram is an underutilized pulse crop grown in wide range of adverse climatic conditions. Horse gram is grown in 16941 ha in Jharkhand and production is 11033Mt with average productivity of 651 kg/ha. The leading districts in Horse gram production in Jharkhand are Simdega (3226 Mt), Dumka (1492 Mt), and Lohardaga (882 Mt). Productivity is highest in Lohardaga, Dumka and Latehar districts (900 kg/ha each). The best yielding varieties are Birsa Kulthi-1 and Payur-1, 2.

Performance of clustered Pulses demonstrations in Kharif 2016-17

Pigeon pea, Black gram, Green gram and Horse gram are the major *kharif* pulses in the states of Bihar, Jharkhand and West Bengal. Among these three states, Bihar produced Pigeon pea in large areas. Clustered demonstration was organized in 2130 ha covering these three states. The details of state-wise breakup are provided in the following table.

Crop/State	Area(ha)	No of Demonstration
Pigeon pea		
Bihar	621	1553
Jharkhand	555	1387
West Bengal	80	200
Total	1256	3140
Black gram		
Bihar	0	0
Jharkhand	210	525
West Bengal	230	575
Total	440	1100
Green gram		
Bihar	10	25
Jharkhand	110	275
West Bengal	50	125
Total	170	425
Horse gram		
Jharkhand	90	225
Total	1956	4890
Allotment	2130	5325

Out of 2130 ha allotted demonstrations, coverage was made in 1956 ha through 4890 demonstrations. The area under Pigeon pea was 621 ha in Bihar and 555 ha in Jharkhand. Whereas West Bengal covered maximum area under Black gram area (230 ha) followed by Jharkhand. (Table1).

Pigeon pea the most important pulse crop of Bihar and CFLD on Pigeon pea encompasses 1256 ha area. The highest average yield is 23.5q/ha from the variety Malviya-13 was obtained. Malviya -13 performed with increase yield percentage over existing local check variety which ranges from 12-40 with different applied demonstrated technologies like use of bio fertilizers as seed treatment and soil application, weed management, line sowing method, application of micronutrients (Boron and Zinc) and plant protection measures both inorganic and organic. The benefit: cost ratio of demonstrated plot of variety Malviya-13 to local variety is 4:1 performed best. NDA-2 variety of Arhar in Jharkhand yielded highest i.e. 19.65 q/ha .Other promising variety is Asha (ICPL- 87119) performed best in Jharkhand, the time to 50% flowering ranges between 110 and 125 days and it takes 160 to 202 days for 75% maturity with highest yield of 16.85 q/ha. Mainly technologies followed are integrated nutrient and pest management, application of bio fertilizers and micronutrients. Farmers belonging to Chatra KVK achieved a benefit cost ratio 4.86:1 in demonstrated plot with adoption of Asha variety in compare to farmers local check plot which is 2.94:1. UPAS -120 variety of Arhar yielded highest 12.2q/ha followed by Laxmi (ICPL 85063) and Asha (87119) which are 11.6q/ha and 9.6 q/ha respectively. Different technologies adopted are application of Sulphur (80WP@6kg/ha) with recommended doses of fertilizer and use of bio fertilizers as seed treatment is primarily followed. Benefit cost ratio of demonstrated plot ranges from 2.05:1 to 2.55:1 with farmers local check plot. The highest net returns of Rs 61000/- was obtained from demonstrated plot of variety UPAS-120.

In Jharkhand, Green gram was demonstrated in 110 ha through 275 demonstrations. Highest yield was recorded as 10.41 q/ha, lowest was 6.57 q/ha and average yield was 8.49 q/ha. Average increase percentage in yield was 37.38 due to demonstrations of various technologies. The average net return was Rs.41358.7/ha and BC ratio was 3.48:1. Several technologies like INM, IPM, micronutrients, line sowing, pheromone traps, and seed treatment were introduced in these demonstrations. In West Bengal, green gram was demonstrated is 50 ha through 125 demonstrations. Average yield in these demonstrations was recorded as 10.1q/ha compared to local check average of 7.31 q/ha hence an increase of 38%. The average net return was Rs.40655 with BC ratio of 2.5:1. The increase in yield is mainly due to adaption of integrated nutrient management.

Black gram is the most important pulse crop in eastern states. The coverage area in Jharkhand was 210ha involving 525 demonstrations. The highest yield was recorded as 11.58 q/ha in Black gram and average yield was 9.66 q/ha. The average net return was Rs.41318/ha with B: C ratio of 3.41:1 due to good MSP of the Black gram crop in last few years. The technologies primarily adopted are seed treatment with Rhizobium culture with application of integrated nutrient management which enhances the yield by 40.2% in compare to farmers local check variety. In West Bengal, Black gram crop was demonstrated in 230 ha and 575 demonstrations were organized. The average yield in these demonstrations was 8.51 q/ha and increase in yield about 38.82%. The average net return was attractive and as high as Rs.29414/ha with BC ratio of 2.21:1. The farmers are benefitted from the technologies like seed treatment with Rhizobium and integrated management of organic and inorganic fertilizer with application of different bio- fertilizers.

Horse gram was demonstrated in the state of Jharkhand. The coverage of area was 90ha. The number of demonstrations was 225. The average yield recorded was 11.5q/ha as compared to 6.65 q/ha in local check. The two dominant varieties was demonstrated namely Birsa Kulthi -1 and Payur -1. The average maximum yield was 10.27q/ha with percentage increase over existing farmers yield was approximately 30. The technologies used were seed treatment and use of bio fertilizers which raised the benefit cost ratio from 1.95:1 to 2.63:1 (farmer's plot: demonstrated plot)

Varietal performance of Pigeon pea

Malviya-13 widely adopted variety of Bihar and in CFLD Pigeon pea programme 210 ha was demonstrated through this variety. With highly resistant to wilt, SMD and tolerant to Phytophthora and pod fly infestation characteristics variety's average demonstrated yield is 17.59 q/ha. The

percentage of yield increase over the existing yield is 36.46% (Table 3). NDA 2 covered 100ha of area in CFLD Pulses in Jharkhand with average yield of 14.63 q/ha. The high-yielding pigeon pea variety, Asha variety of pigeon pea was grown in 230ha under CFLD Pulses. The variety is resistant to fusarium wilt and sterility mosaic diseases which gave an average yield of 12.38q/ha for CFLD Pulses in Jharkhand. In West Bengal among the three varieties UPAS 120 performed best with an average yield of 14.37q/ha.

Table: 3 Performance of major varieties of Pigeon pea

Variety	Area in (ha)	No. of demonstrated	Demonstrated yield (q/ha)	Existing yield (q/ha)	% of yield increase	State yield (q/ha)	Yield gap (%)
Bihar							
Malviya 13	210	525	17.59	12.89	36.46	16.67	5.50
NDA -1	130	325	17.35	12.35	40.48	16.67	4.07
LRG-41	90	225	16.69	13.00	28.38	16.67	0.12
NDA-2	50	125	16.72	11.95	39.91	16.67	0.3
Jharkhand							
Asha	230	575	12.38	8.22	50.60	10.42	18.80
NDA 2	100	250	14.63	10.34	41.48	10.42	40.40
Malaviya 13	60	150	13.26	9.90	33.93	10.42	27.20
West Bengal							
UPAS 120	20	50	14.37	13.4	7.23	14.32	0.35

Varietal performance of Green gram (Kharif)

Number of varieties was introduced in pulse demonstrations which have good potential to excel in the situations. In Jharkhand, most coverage of green gram was through variety Pant Moong and SML 668. Other varieties of green gram (*kharif*) use for demonstration are HUM 16 and IPM 2-3. The total coverage of area was 110 ha. Number of demonstration under these varieties was 275. Demonstrated yield was highest with the variety SML 668 which was 10.23 q/ha. (Table 4).

In West Bengal, green gram variety Samrat was used to cover 50ha area comprising of 125 demonstrations. The average yield of Samrat was 10.1 q/ha with percentage yield increase of 38.17.

Table 4: Yield Performance of major varieties of Green gram (Kharif)

Variety	Area in (ha)	No. of demonstrated	Demonstrated yield (q/ha)	Existing yield (q/ha)	% of yield increase	State yield (q/ha)	Yield gap (%)
Jharkhand							
HUM 16	10	25	9.2	6	53.3	6.37	44.4
Pant Moong 5	40	100	9.88	7	41.15	6.37	55.1
IPM2-3	20	50	6.5	4.5	44.4	6.37	0.02
SML 668	40	100	10.23	7.65	35.72	6.37	60.6
West Bengal							
Samrat	50	125	10.1	7.31	38.16	8.43	19.81

Varietal performance of Black gram (Kharif)

Variety PU 31 was demonstrated in 80 ha which covered maximum area under black gram in Jharkhand. The total number of demonstrations was 200. Uttar variety of Black gram covered 50ha and the maximum yield ranges from 10.45-13.6q/ha. Other varieties under black gram cluster frontline demonstration are Azad Urd -2, Meha, Birsa Urad 1, Shekhar-2. Among these varieties Meha and Birsa Urd 1 yield a maximum yield of 17.2q/ha (Table 5).

In West Bengal, Sharda (WBU 108) & Sulata (WBU 109) was demonstrated in 210ha through 525

demonstrations to harvest demonstrated yield of 8.57 q/ha over the existing average of 6.06 q/ha. The yield was about 41.41% higher over the local check by adapting various technologies like seed treatment, bio fertilizers, micronutrients and integrated crop management.

Table 5: Yield Performance of major varieties of Black gram (Kharif)

Variety	Area in (ha)	No. of demonstrated	Demonstrated yield (q/ha)	Existing yield (q/ha)	% of yield increase	State yield (q/ha)	Yield gap (%)
Jharkhand							
PU 31	80	200	9.67	6.78	42.62	9.37	3.20
Uttra	50	125	9.88	6.90	43.18	9.37	5.44
Shekhar 2	20	50	11.55	8.6	34.3	9.37	23.26
West Bengal							
WBU 108 (Sharda)	120	300	8.38	5.81	44.23	6.66	25.82
WBU 109(Sulata)	90	225	8.77	6.32	38.78	6.66	31.68
PU 31	20	50	10.5	7.6	34.2	6.66	57.65

Varietal performance of Horse gram

Horse gram variety Birsa Kulthi 1 was demonstrated in 40 ha through 100 demonstrations to get average yield of 8.7 q/ha, 52.45% higher than the local check. Another promising varieties of this region are Payur 2, Indra Kulthi -1 with average demonstrated yield of 7.14 q/ha by adopting technologies like seed treatment, use of bio fertilizers and micronutrients.(Table 6)

Table 6: Yield Performance of major varieties of Horse gram

Variety	Area in (ha)	No. of demonstrated	Demonstrated yield (q/ha)	Existing yield (q/ha)	% of yield increase	State yield (q/ha)	Yield gap (%)
Jharkhand							
Birsa Kulthi 1	40	100	8.69	5.70	52.45	6.51	33.48
Payur 2	20	50	6.70	4.20	59.52	6.51	2.91
Indra Kulthi 1	20	50	7.59	6.17	23.01	6.51	16.58

Technology developed through Cluster demonstrations Bihar

The KVK Supaul has developed improved technology to optimize yield of newly released variety of pigeon pea (Malviya Arhar-13). Organic fertilizers, micronutrients and plant protection measures were adopted which enhance the yield by 37.9% in compare to farmers.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
Malviya Arhar-13	20	49	12.8	7.74	10.27	7.45	37.9	15	8.5

Kishanganj KVK, introduced variety Malviya Arhar (MAL - 13) and seed treatment was adopted with bio fertilizer and chemical. Increase in the yield 36.6 % with 6 seeds/pod and 92 grams per 1000 seeds. With integrated nutrient, weed, pest management practices the demonstrated yield was 17.8q/ha which was 15% higher than the state yield (15.46q/ha)

Variety	Area (ha)	No. of farmers	Yield			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
Malviya Arhar-13	50	20	19.4	16.2	17.8	12.0	48.33	15.46	5.78



West Bengal

Hooghly

Seed treatment is not common among the farmers of Hooghly district. The KVK Hooghly introduced demonstration on use of improved variety of Black gram Sarada (WBU 108) along with seed treatment. Seed treatment with Carbandezim @ 2.5 g / kg of seed helped the growth of the plant. As a result of which there is a yield increase of 28% as compared to district yield. Thus seed treatment is being popularized by the KVKs.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
Sarada	20	118	11	8.2	9.6	7.5	28	5-7.5	6.09



Narendrapur (South 24 Pgs):

Black gram: Variety WBU 108 of Black gram performance were observed with three types of observation. I. seed treatment (Rhizobium)and PSB along with 0.2% spray of Boron. II Seed treatment with Mancozeb 50% + Carbendazim 25% WS @ 2.5g/kg seed, yellow sticky trap @ 16/ha & Need Based Spot application of Insecticides & spraying of wettable sulphur @2g/Las prophylactic measures help to reduce the incidence of powdery mildew and YMV, reduced infestation of pod borer. III. Application of Panchagavya and Sanjibani (3%) at flowering and pod formation stage. The application Panchagavya and Sanjibani (3%) enhance the yield by 57.12% in comparison to farmers.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
WBU 108	10	96	9.1	7.25	8.17	5.2	57.12	7.11	7.35

Uttar Dinajpur

Weed management and plant protection measures were important practices. KVK developed application of Pendimithaline as Pre-emergence herbicide and spraying of 20% Boron @ 1.5gm/L of water at 25, 45 and 60 DAS as a part of management practice to increase yield of WB-109 (Sulata). The increase in yield was 33.78% comparison with farmers practice.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
WB - 109	30	84	10.6	9.2	9.9	7.4	33.78	9.2	8.0



Jharkhand

Ramgarh

Horse gram is very popular in Jharkhand particularly by the tribal farmers. KVK demonstrated the variety of Horse gram- Birsa Kulthi 1. Application of Bavistin with rhizobium culture for seed treatment with two foliar spray of NPK 19:19:19 at 45 and 60 days old crops @ 4.0 kg./ha. An organic spray of neem oil (Neemarin) at the time of pod formation @ 2.5 L/ ha increased the yield by 86.67%.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
Birsa Kulthi 1	20	85	9.5	7.62	8.4	4.5	86.67	6.51	4.3

Cluster Frontline demonstrations on Pulses 2016-17 of Rabi & Summer Season

In the Eastern states of Bihar, Jharkhand, and West Bengal pulse is grown in *kharif*, *rabi* and *rabi-summer* season. Major *rabi* pulses grown in Bihar are *Summer* moong (156699 ha) followed by Lentil (152912 ha) and Chickpea (60002 ha). In the state of Jharkhand, Chick pea (160000 ha) occupies major position in *rabi* pulse followed by Lentil (43000 ha). In West Bengal, Lentil (65972 ha) occupies largest area, followed by *summer* moong (27994ha) and field pea (14114ha). The average productivity of the major pulses in these states is indicated in below.

Bihar

Crops	Area (ha)	Production (mt)	Productivity (q/ha)
Lentil	152912	140063	9.15
Chickpea	60002	57490	9.58
Field pea	17142	17313	10.10
Green gram (<i>rabi</i> summer)	156699	90725	5.78
Black gram	15725	14355	9.12

Jharkhand

Crops	Area (ha)	Production (mt)	Productivity (q/ha)
Lentil	43000	39249	8.96
Chickpea	160000	186374	11.0
Field pea	33000	40364	11.74

West Bengal

Crops	Area (ha)	Production (mt)	Productivity (q/ha)
Lentil	65972	63516	9.63
Chickpea	26177	30844	11.78
Field pea	14114	16778	11.89
Green gram (<i>rabi summer</i>)	27994	19059	6.81
Black gram	9625	8543	8.88

Bihar has significant area under *rabi* pulse which is about 448465 ha and it compete with other crops. The average productivity of pulses is 818 kg/ha and production in Bihar is 366695 mt. In Jharkhand area under *rabi* pulses is also significant compare to other crops. The area coverage is about 79148 ha with productivity of 1061.67 kg/ha and production of 78175 mt. West Bengal is having 170553 ha under *rabi* pulse with average productivity of 1015 kg/ha and production of 173130 mt.

Lentil: Lentil is most important pulse in *rabi* season grown mainly in Uttar Pradesh, Madhya Pradesh, Chattishgarh, Bihar and West Bengal. These states all together account for 80-90% of the total area under Lentil. Lentil is grown in wider range of soil types and soil pH compared to other legumes; however, it is more sensitive to water logging. In Bihar, Lentil production mainly comes from the districts of Patna (27722 ha), Aurangabad (13612 ha), Nalanda (12013ha), West Champaran (10238ha) districts of Bihar. Productivity of lentil is also highest in Patna district (1489 kg/ha). Major varieties which are under cultivation in Bihar are PM-5, Pant L-406, DPL-62, Arun, HUL-57 etc. Among the major pulse crops in West Bengal, lentil has prime importance. Lentil was grown mainly in Nadia (24135 ha), Murshidabad (16922 ha), North 24 Parganas (7844 ha), and Birbhum (5864 ha) districts of West Bengal. The maximum productivity of 1145 kg/ha comes from Murshidabad district. Major varieties under cultivation are WBL-58, B-77 etc.

Chickpea: Chickpea is grown in about 60002 ha in *rabi* season in Bihar with production of 57490 mt and average productivity of 958 kg/ha. The leading districts in chickpea production in Bihar are Aurangabad (7599 ha), Patna (6338 ha), Nalanda (5293 ha), Gaya (5058 ha) and Bhojpur (4149 ha). The productivity of chickpea was highest in Patna district (1582 kg/ha). In Jharkhand, chickpea (2013-14) is grown in 155840 ha with production of 181731 mt and productivity of 1166 kg/ha. Leading chickpea producing districts are Latehar (11960 ha), Garwaha (11554 ha), Palamu (10215 ha) and Saraikela (10046 ha). The highest productivity comes from Saraikela district (1880 kg/ha). In West Bengal, Chickpea is grown in 26177 ha and total production is 30844 mt. Nadia is leading district in chickpea production with 9906 ha coverage. It is followed by Birbhum(6781 ha), Murshidabad (5462 ha). The productivity of chick pea was highest in Birbhum district (1390 kg/ha) of West Bengal.

Greengram: Greengram is grown in 156699 ha in *rabi* season in Bihar and production is 90725 mt with average productivity of 579 kg/ha. It was grown mainly in *summer* season. The leading districts in Greengram production in Bihar are Muzaffarpur (24487 ha), Supual (24108 ha), Sahara(19277 ha), Madhepura (18064 ha). The productivity recorded highest in Darbhanga district (1290 kg/ha). In Jharkhand crop is grown in 16137 ha with production of 10283 mt (2013-14). In West Bengal, Greengram is grown in 27994 ha and total production is 19059 mt in *summer* (2014-15). South 24 Parganas is leading district in greengram production with 19457 ha coverage. It is followed by Nadia, Birbhum and Uttar Dinajpur. The productivity was highest in Birbhum (1678 kg/ha).

Fieldpea: Field pea is grown in 31708 ha in *rabi* season in Jharkhand and production is 37600 mt with average productivity of 1186 kg/ha (2013-14). The leading districts in field pea production in Jharkhand are Gumla (3273 ha), Deoghar (2344 ha), Garwah (2410 ha) and Palamau (2105 ha). The productivity is highest in Lohardaga district (3052 kg/ha).

Black gram: Blackgram is grown in 10038 ha in *rabi* season in West Bengal and production was 9433 mt with average productivity of 940 kg/ha (2014-15). The leading districts in *rabi* blackgram production in West Bengal are Murshidabad (4045 ha), Coochbehar (2438 ha), and North 24 Parganas (780 ha). The productivity was highest in Jalpaiguri district (1356 kg/ha).

Performance of CFLDs in *Rabi* and *Rabi Summer* 2016-17

Chickpea, Lentil, Green gram, Field pea and Black gram are the major *rabi* and *summer* pulses in the states of Bihar, Jharkhand and West Bengal. Among these three states, Bihar produced Lentil in large areas. Clustered demonstration was organized in 4456.25 ha covering these three states. The details of state-wise breakup are provided in the following table.

Table 1: State-wise demonstration conducted in *Rabi* 2016-17

Crop/State	Area (ha)	No. of demonstration
Lentil		
Bihar	1189.75	2974
West Bengal	330	825
Total	1519.75	3799
Chickpea		
Bihar	526.25	1316
Jharkhand	450	1125
West Bengal	80	200
Total	1056.25	2641
Field pea		
Bihar	250.25	626
Jharkhand	80	200
West Bengal	140	350
Total	470.25	1176
Green gram		
Bihar	480	1200
Jharkhand	360	900
West Bengal	330	825
Total	1170	2925
Black gram		
Bihar	40	100
Jharkhand	120	300
West Bengal	10	25
Total	170	425
Total	4386.25	10966
Allotment	4520	11300

Out of 4520 ha area, coverage is made in 4386.25 ha through demonstrations. The total number of demonstration was 10966. The area under Lentil 1519.7 ha, Chickpea 1056.25 ha, Field pea 470.3 ha, Green gram 1170 ha, and Black gram 170 ha. (Table 1).

In Bihar, chickpea was demonstrated in 526.25 ha through 1316 demonstrations. The highest yield was recorded as 17.96 q/ha, lowest was 13.06 q/ha and average yield is 15.51 q/ha. The average increase due to demonstrations of various technologies was 39.6%. The average net return was Rs.91, 490/ha and BC ratio was 4.4. Several technologies like INM, IPM, micronutrients, line sowing, pheromone traps, and seed treatment were introduced in these demonstrations. In Jharkhand, Chickpea is demonstrated in 450 ha through 1125 demonstrations. The average yield in these demonstrations was

recorded as 13.91q/ha compared to local check average of 10.07 q/ha thereby increase was 38.13%. The average net return was Rs.48,826/- with BC ratio of 3.22. In West Bengal, Chickpea was grown in 80ha area in some pockets. The average yield was recorded 12.16 q/ha in these 200 demonstrations. An increase in yield of 47% was observed. The average net return was Rs.35534.5/ha with BC ratio of 2.43.

Lentil is the most important pulse crop in eastern states. The coverage area in Bihar was 1189.7 ha involving 2974 demonstrations. The highest yield was recorded as 16.47 q/ha in lentil and average yield was 14.26 q/ha. The percentage increase in yield was 40.49. The average net return was Rs.45,315.8/ha due to good price of the lentil crop in last few years. The BC ratio was 3.05. In West Bengal, lentil crop was demonstrated in 330 ha and 825 demonstrations were organized. The average yield in these demonstrations was 9.69 q/ha and increase in yield about 29.2%. The average net return is attractive and as high as Rs.30,449/ha with BC ratio of 2.42.

Green gram is grown in all the three states especially in *rabi* & *summer* season. The coverage of the crop in the state of Bihar was 480 ha and 1200 demonstrations were organized. The maximum average yield was 11.49 q/ha and average yield obtained was 9.98 q/ha. The average increase due to demonstrations of various technologies was 43.19%.The average return was Rs 33931/- from the demonstrated plot with benefit cost ratio of 2.63. The increase in yield is due different technologies seed treatment, line sowing, soil amelioration with phosphogypsum, IPM, weedicide application, micronutrients, bio fertilizer etc.

In the state of Jharkhand, Green gram demonstrations were organized in 360 ha and 900 demonstrations were conducted. The average yield was 8.95q /ha against local check 6.55 q/ha and increase by 36.64 %. The net return was Rs36,944/ha with BC ratio of 2.82.

In West Bengal, coverage of area under Green gram was 330 ha and 825 demonstrations were organized. The average yield was 8.98q/ha increases by 31.19%. Net return was Rs34,962/ha with BC ratio of 2.32 compare to farmers practice.

Under Field pea 250.25 ha area was covered under demonstration in Bihar. The number of demonstrations was 626. The average yield recorded was 15.0 q/ha compared to existing yield of 10.96 q/ha. The average increase was 36.86%. The average net return was Rs.33,341/ha with BC ratio of 2.5. In Jharkhand, coverage of area was 80 ha and number of demonstrations was 200. The highest yield was 17.7q/ha compared to local check yield 11.0 q/ha - an increase by 38%. The average net return was Rs.34819/ha with BC ratio of 2.85. In West Bengal, crop was demonstrated in 140 ha through 350 no. of demonstrations. The highest yield was 13.75 q/ha, average yield was 12.0 q/ha i.e., an increase by 35.14%. Net return was Rs.27,258/ha with BC ratio of 2.35.

Black gram was demonstrated in the state of Jharkhand. The coverage of area was 120 ha. The number of demonstrations was 300. The technologies mainly followed are seed treatment with Rhizobium, use of bio fertilizer, micronutrients and integrated pest management. The average yield recorded was 9.86 q/ha as compared to 7.18 q/ha in local check. Increase in yield was 37.33%. Net return was Rs 41,227/ha with B: C ratio of 3.17.

Varietal performance of Chick pea

A number of varieties were introduced in pulse demonstrations which have good potential to excel in the situations. In Bihar, most coverage of chickpea was through variety BGM 547. This variety is found suitable for cultivation in late sown conditions and also yields well under both irrigated and rain fed conditions. The coverage of area was 260 ha. The number of demonstration under this cultivar was 650. The demonstrated yield was highest with this variety which was 15.43 q/ha, which are about 43.5% increases over the existing yield 10.75 q/ha (Table 3). The variety was able to overcome the yield gap and excel over the state average of 9.58 q/ha (61.06% increase over state average). GNG-1581 variety demonstrated a yield of 14 q/ha with 348 number of demonstrations which is recommended for NWPZ and resistant to water logging condition. The yield gap of 46.14% was recorded in compared to state yield of 9.58 q/ha. In Jharkhand, JAKI-9218 was demonstrated in 285 ha and in Bihar

and West Bengal 60 ha each. The JAKI-9218 variety was widely adapted due to resistant of wilt, root rot and collar rot. The demonstration of JAKI-9218 variety yield was 11.8 to 15.36 q/ha in these states. The yield gap with state yield was 60% in Bihar, 27.27% in Jharkhand and 0.16% in West Bengal. Other varieties like JG14, Anuradha, Mahamaya, and CSJ 515 were demonstrated in relatively less areas. All these varieties minimized the yield gap and excelled over the state average. Demonstrated yield was in the range of 12.86 to 13.65 q/ha.

Table 3: Performance of major varieties of chickpea

Variety	Area in (ha)	No. of demonstrated	Demonstrated yield (q/ha)	Existing yield (q/ha)	% of yield increase	State yield (q/ha)	Yield gap (%)
Bihar							
BGM 547	260	650	15.43	10.75	43.5	9.58	61.06
GNG-1581	139	348	14.00	11.66	20.06	9.58	46.14
JAKI-9218	60	150	15.36	11.63	32.07	9.58	60.33
Jharkhand							
JAKI - 9218	285	713	14.00	9.36	49.57	11.00	27.27
JG 14	40	100	13.65	11.81	15.58	11.00	24.09
BGM 547	40	100	15.2	11.8	28.81	11.00	38.18
West Bengal							
JAKI-9218	61	153	11.8	8.52	38.49	11.78	0.1698

Varietal performance of Lentil

The variety HUL-57 was demonstrated in 815.45 ha which covered maximum area under lentil in Bihar. The total number of demonstrations was 2039. It gave an average demonstrated yield of 13.9q/ha. The variety KLS-218 was demonstrated in 134.3 ha through 336 demonstrations. Average yield in the demonstrations was 13.4 q/ha compared to local check average of 8.36 q/ha. It has yield advantage of about 60%. Other varieties like Pant L 406, PM- 5, Arun are demonstrated in an area of 20to 40 ha with average yield of 8.5-11.0 q/ha which has yield advantage of 10-36% over the local check average (Table 4).

In West Bengal, WBL-77(Moitree) variety of Lentil was predominantly demonstrated in 330 ha through 825 demonstrations to harvest demonstrated yield of 9.74 q/ha over the existing average of 7.5q/ha. The increase in yield was about 30% higher over the local check average.

Table 4: Performance of major varieties of Lentil

Variety	Area in (ha)	No. of demonstrated	Demonstrated yield (q/ha)	Existing yield (q/ha)	% of yield increase	State yield (q/ha)	Yield gap (%)
Bihar							
HUL-57	815.45	2039	13.9	10.14	37.08	9.15	51.91
KLS-218	134.3	336	13.4	8.36	60.28	9.15	46.45
West Bengal							
Moitree (WBL 77)	330.00	825	9.74	7.5	29.86	9.63	1.14

Varietal performance of Black gram

Black gram variety PU 31was demonstrated in 80 ha through 200 demonstrations to get average yield of 9.76q/ha, 43.66% higher than the existing yield. The yield of the variety was 9.91% higher than the state average.

Table 5: Performance of major varieties of Black gram

Variety	Area in (ha)	No. of demonstrated	Demonstrated yield (q/ha)	Existing yield (q/ha)	% of yield increase	State yield (q/ha)	Yield gap (%)
PU 31	80	200	9.76	6.79	43.74	8.88	9.91

Varietal performance of Green gram

Green gram crop was demonstrated in *rabi summer*. In Bihar and Jharkhand, maximum area is covered by the variety IPM 02-03. In Bihar, the average demonstrated yield is around 9q/ha where as in Jharkhand it is 8.66 q/ha. The yield gap % with state yield is about 36% for both states. In Jharkhand, variety HUM 16 covered 100 ha area with demonstrated yield of 9.67 q/ha. The percentage of yield increase with local was 55.22.

In West Bengal, variety Samrat covered 100ha area and recorded demonstrated yield of 10.22 q/ha compared to existing yield of 6.97 q/ha while SML 668 gave demonstrated yield of 10.65 q/ha compared to existing yield of 8.6 q/ha. (Table 6).

Table 6: Performance of major varieties of Green gram

Variety	Area in (ha)	No. of demonstrated	Demonstrated yield (q/ha)	Existing yield (q/ha)	% of yield increase	State yield (q/ha)	Yield gap (%)
Bihar							
IPM-02-03	246	615	9.16	6.39	43.34	6.72	36.31
HUM - 16	54	135	10.36	7.57	36.85	6.72	54.17
SML 668	50	125	9.25	6.34	45.9	6.72	37.65
Jharkhand							
IPM-02-03	210	525	8.66	6.31	37.24	6.37	35.95
HUM - 16	100	250	9.67	6.23	55.22	6.37	51.8
West Bengal							
Samrat	100	250	10.22	6.97	46.63	8.02	27.43
SML 668	20	50	10.65	8.6	23.83	8.02	32.8

Varietal performance of field pea

Major area (250.25 ha) of field pea demonstrated in Bihar with variety HUDP 15 (Malviya matar15) through 626 demonstrations (Table 7). The variety is most suitable for East UP, Bihar, West Bengal, as it is resistant to powdery mildew, rust and leaf miner. The average yield was 15.0 q/ha compared to existing yield of 10.96 q/ha. It recorded an increase in yield of 36.86 % over local check. The yield gap % between demonstrated and state yield was 48.51. HUDP 15 (Malviya matar 15) variety of field pea average yield in a range of 14.2-15.3 q/ha in few areas of Jharkhand (40 ha) and West Bengal (20 ha). In West Bengal, Vikash variety demonstrated yield was 12.0 q/ha and increase percentage yield was 21 from 100 demonstration.

Table: 7 Performance of major varieties of field pea

Variety	Area in (ha)	No. of demonstrated	Demonstrated yield (q/ha)	Existing yield (q/ha)	% of yield increase	State yield (q/ha)	Yield gap (%)
Bihar							
HUDP 15 (Malviya matar 15)	250.25	626	15.0	10.96	36.86	10.1	48.51
Jharkhand							
HUDP - 15 (Malviya matar 15)	40	100	15.79	11.27	40.10	11.74	34.49
Prakash	20	50	13.5	8.6	57	11.74	14.99
West Bengal							
Vikash	40	100	12.00	9.94	20.72	11.89	0.92
HUDP-15	20	50	15.3	9.5	61.05	11.89	28.67

Technology developed through Clustered demonstrations in Bihar

Darbhanga

Chick pea: The BGM 547 chickpea variety which was released in the North Western Plains Zone (NWPZ) in late sown conditions when monsoon is delayed. KVK Dharbanga did a varietal trial with BGM 547 variety of chickpea with seed inoculation of Rhizobium culture. Basal application of Sulphur increased the yield by 20%. Use of micronutrient like Boron helps in formation of healthy pods and bold grain. The potential yield of this variety is 1800 kg/ha.

Variety	Area (ha)	No. of farmers	Yield			Local check(q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
BGM 547	10	25	16.7	15	15.85	10.25	54.63	12	10



Lentil: Demonstration of HUL-57 variety in KVK Darbhanga has 75% increases in yield in compared to district yield of lentil. Farmers got a net return of Rs 89950/-. Farmer preferred medium size grain, and wilt resistant attribute of this variety.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
HUL 57	20	50	19.00	16.00	17.50	10.00	75	9.00	11.00

Rohtas

Chickpea: In KVK, Bikramganj, zero tillage practice was adopted by the farmers with improved variety BGM-547 of Chick pea and application of bio fertilizer (Rhizobium culture) yielded 20.5q/ha. As a result of which the seeds were bold and there is less infestation of pod borer. This variety of chick pea is very much suitable for Rohtas region and mostly preferred by the farmer with a gross profit of Rs.98000/ha. The demonstrated yield was 57.7% more than the local check and 64% more than the state yield.

Variety	Area (ha)	No. of farmers	Yield			Local check(q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
BGM-547	40	82	23	18	20.50	13.00	57.70	12.50	13.50



Lentil: Zero tillage method of cultivation was adopted with improved variety of lentil (HUL 57) which increased the yield of Lentil by 51.2% over local check variety. The Lentil cultivating farmers associated to Rohtas KVK did seed treatment with Rhizobium culture. The post emergence herbicide Imazethapyr @ 500 ml/ha was use to control weed. The seed size is bold and the farmer fetch a gross profit of Rs.52500/ha. There is a yield increase of 30.2% in comparison to state yield of Lentil.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check(q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
HUL 57	60	106	20.2	17.3	18.75	11.25	66.67	14.40	13.25

Kaimur

Chick pea: The JAKI-9218 variety of Chick pea is a short duration of 93-125 days was cultivated by farmers of KVK Kaimur. The variety is resistant to fusarium wilt, root rot, and collar rot and yield of demonstrated plot is 14.20 q/ha which is one percentage increase over state yield (14.3 q/ha). The benefit: cost ratio of demonstrated plot is 2.38, where in case of control or local check plot it is 1.92. Farmers are satisfied with the variety as it performs well in both upland and low land condition. They are interested in multiplication of foundation seeds.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check(q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
JAKI-9218	40	100	17.9	11.00	14.45	10.87	32.93	14.30	6.39



Saharsa

Lentil: Varietal trial of HUL 57 was conducted in Saharsa. The variety showed good seed germination in comparison to locally identified varieties and preferred by the farmers. The yield increase was 14.79 compared to local check. The B: C ratio is 3.35 in demonstrated plot comparison 3.08 in local check plot.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
HUL 57	30	96	17.5	14.5	16.3	14.2	14.79	14.05	14.2



Sitamarhi

Lentil: The KVK Sitamarhi, demonstrated Lentil variety KLS 218 with soil test based recommended fertilizer NP @ (20:40 kg/ha). The demonstrated increased the yield by 37.5%. Different attributes of KLS 218 variety like maturity in 115-120 days in *Rabi* season, medium grain size and wilt resistant is preferred by the farmers.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
KLS 218	60	145	18.0	13.00	16.5	12.0	37.5	11	8.00



Supaul

Field pea: HUDP-15 variety of field pea along with organic fertilizers, and plant protection measures increased the yield by 27.5% in comparison to district yield

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
HUDP-15	10	39	14.4	11.1	12.75	8.00	59.37	18.00	10.00

Patna

Lentil: In Patna district of Bihar, use of improved variety of Lentil (IPL 406) with recommended package and practices like application of 20:40:20, N, P2O5, K2O along with seed treatment with carbendazim@ 2gm/kg seed+ Chlorpyrifos(20%)@ 8ml/Kg seed followed by rhizobium culture and timely application of pesticide to keep the pest infestation under control resulted in yield enhancement up to 31.25% as compared to local check variety and observed benefit cost ratio is 2.9 and 2.4 in demonstrated plot and check plot respectively.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
IPL 406	40	100	15.1	10.1	12.6	9.6	31.25	10.31	10.4

Field Pea: Pea (HUDP-15) variety along seed treatment with Fungicide (Carbendazim@2gm/kg seed) was demonstrated in Patna district of Bihar. The technology helped to increase 50.49% yield over the farmers practice.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
HUDP-15	20	50	18.2	12.5	15.35	10.2	50.49	10.01	9.47

West Bengal

Hooghly

Lentil: New variety Moitree (WBL 77) was introduced in Hooghly district which has higher yield potential. Pod setting increases with the increased Boron application @ 0.2 % twice at 30 DAS and at flowering stage and yield increase was 16.67%.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
WBL 77	30	194	11.25	9.0	10.50	9.0	16.67	9.59	9.00

Howrah

Lentil: Lentil is widely grown in Howrah district .Seed treatment with T.Viridae @ 5 g/kg of seed of Moitree variety of Lentil and seed inoculation with Rhizobium helped to reduced seed borne fungal diseases with increased no. of nodule and fixed nitrogen to the soil. Improved management practices increased in yield by 48.3% over farmers yield.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
Moitree	10	60	10.1	7.5	8.9	6.01	48.33	6.9	6.6

Nimpith (South 24 parganas):

Lentil: Bio fertilizers are not used by the farmers in pulses in South 24 parganas. The KVK demonstrated the practice of seed inoculation with Rhizobium and use of bio agents like, Trichoderma viridie, Pseudomonas fluorescens & PSB 1.5kg each. The variety Moitree (WBL-77) showed 5.2% yield increase over farmers practice.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check (q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
Moitree	20	105	6.64	6.15	6.47	6.15	5.2	5.75	6.12



Nadia

Lentil: The Nadia KVK, conducted 20ha cluster frontline demonstration of Lentil in *rabi* 2016-17. Application of micronutrients MOBOMIN @ 1.8 kg / ha as basal and foliar application (2g/L of water) with two sprays one at 21 DAS and 2nd before flowering caused enhancement of yield by 19.68 % over local check. MOBOMIN aids in enzymatic process which in term required for good harvest. It also reduces the flower dropping.

Variety	Area (ha)	No. of farmers	Yield (q/ha)			Local check(q/ha)	% increase	State yield (q/ha)	District yield (q/ha)
			Max	Min	Av				
Moitree	20	87	12.75	9.75	11.25	9.42	19.68	9.59	9.62

The variety Moitree is eighteen days early to local check variety.



4

ICAR-ATARI, MEGHALAYA, ZONE – III

(Assam, Arunachal Pradesh, Manipur, Meghalaya,
Mizoram, Nagaland, Sikkim and Tripura)Cluster Frontline demonstrations on *Kharif* Pulses 2016-17

In the North Eastern Region, the Cluster Frontline Demonstrations on Pulses under NFSM was implemented by 43 Krishi Vigyan Kendras in 2016-17. The total area allocated during 2016-17 was 2490 ha through 6225 demonstrations. Of this, 2392 ha was conducted by the KVKs through 6204 demonstrations. The Cluster FLDs were conducted in 7 crops viz. Blackgram, Greengram, Lentil, Field pea, Rajmash Lathyrus and Pigeon Pea during *Kharif, Rabi & Summer* Season 2016-17.

Table1 : The Detailed Report of Cluster FLDs Kharif 2016 on Pulses during 2016-17

Sl. No.	State	KVK	Crop	Target of FLD approved		Achievements of FLD		Yield (q/ha)		Increase %
				No. of Demo.	Area (ha)	No. of Demo.	Area (ha)	Demo field	Local	
1	Assam	Barpeta	Blackgram	50	20	50	20	7.20	6.30	14.29
2	Assam	Cachar	Blackgram	50	20	121	20	10.80	5.50	96.36
3	Assam	Dhemaji	Blackgram	50	20	50	20	7.68	5.24	46.56
4	Assam	Golaghat	Blackgram	75	30	74	30	8.60	5.50	56.36
5	Assam	Jorhat	Blackgram	50	20	63	20	8.20	6.67	22.94
6	Assam	Kamrup	Blackgram	75	30	52	30	5.75	5.25	9.52
7	Assam	Karbi Anglong	Blackgram	50	20	62	20	1.35	4.87	-72.28
8	Assam	Kokrajhar	Blackgram	50	20	50	20	6.70	5.40	24.07
9	Assam	Morigaon	Blackgram	75	30	75	30	-	-	-
10	Assam	Nagaon	Blackgram	75	30	75	30	-	-	-
11	Assam	Sivasagar	Blackgram	50	20	55	20	10.67	7.20	48.19
Sub Total				650	260	727	260	7.44	5.77	28.92
12	AP	Changlang	Blackgram	50	20	52	20	11.76	5.60	110.00
13	AP	Tawang	Blackgram	50	20	44	20	8	5.25	52.38
Sub Total				100	40	96	40	9.88	5.43	82.12
14	Manipur	Bishnupur	Blackgram	50	20	28	20	5	3	66.67
Sub Total				50	20	28	20	5	3	66.67
15	Sikkim	East Sikkim	Blackgram	25	10	35	10	10.20	6.40	59.38
Sub Total				25	10	35	10	10.20	6.40	59.38
Total				825	330	886	330			
1	Assam	Golaghat	Greengram	50	20	52	20	8.50	5.55	53.15
2	Assam	Jorhat	Greengram	50	20	63	20	9.70	5.89	64.69
3	Assam	Morigaon	Greengram	50	20	50	20	8.20	5.60	46.43
4	Assam	Nagaon	Greengram	50	20	50	20	5.93	3.97	49.37
5	Assam	Sivasagar	Greengram	50	20	45	20	8.54	-	-
6	Assam	Sonitpur	Greengram	75	30	75	30	6.80	4.90	38.78
Sub Total				325	130	335	130	7.95	5.18	53.32
7	Sikkim	West Sikkim	Greengram	50	20	50	20	8.93	8.06	10.79
Sub Total				50	20	50	20	8.93	8.06	10.79
8	Tripura	West Tripura	Greengram	25	10	22	10	7.25	5.50	31.82
Sub Total				25	10	22	10	7.25	5.50	31.82
Total				400	160	407	160			
1	Arunachal Pradesh	Tirap	Pigeon pea	75	30	80	30	11.40	6.90	65.22
Total				75	30	80	30	11.40	6.90	65.22
1	Sikkim	East sikkim	Rajma	25	10	35	10	16.60	10.40	59.62
Total				25	10	35	10	16.60	10.40	59.62
Grand total				1325	530	1408	530			

During *Kharif* 2016-17, KVKs conducted CFLD on 4 crops viz. Blackgram (260ha.), Greengram (160ha.), Pigeon pea (30ha.) and Rajma (10ha.). The varieties of blackgram taken up by the KVKs included PU-31, Pant-U-19, T-9 and SKPD-3. Highest yield was obtained by KVK Changlang (11.76 q/ha.) for blackgram.

In Greengram, the varieties taken up included Pratap, IPM-2-3, PDC-3 and Tripura Mung-1. Highest Yield was obtained by KVK Jorhat (9.7 q/ha.).

CFLDs on Pigeon pea was conducted by KVK Tirap with the variety UPAS-120. The productivity obtained was 11.4 q/ha with a percent increase of 65.22%.

CFLDs on Rajma was conducted by KVK East Sikkim with the variety Tripura Rajma Sel 1. Productivity obtained was 16.6 q/ha with a percent increase of 59.62.



CFLD on *Kharif* Greengram, KVK Nagaon



CFLD on *Kharif* Blackgram, KVK Jorhat



CFLD on *Kharif* Pigeonpea, KVK Tirap



CFLD on *Kharif* Rajma, KVK East Sikkim

Cluster Frontline demonstrations on *Rabi* Pulses 2016-17

S. N.	State	Name of KVK	Name of crop	Target of FLD approved		Achievements of FLD		Yield(q/ha)		Increase %
				No. of Demo	Area (ha)	No. of Demo	Area (ha)	Demo field	Local	
1	Assam	Baksa	Lentil	100	40	100	40	8.8	5.4	62.96
2	Assam	Barpeta	Lentil	125	50	125	50	8.85	6.8	30.15
3	Assam	Bongaigaon	Lentil	75	30	110	30	8.03	6.8	18.09
4	Assam	Cachar	Lentil	50	20	83	20	6.2	5.2	19.23
5	Assam	Chirang	Lentil	125	50	79	50	12.0	7.5	60.00
6	Assam	Darrang	Lentil	75	30	110	30	7.52	5.54	35.74
7	Assam	Dhemaji	Lentil	50	20	50	20	4.3	3.4	26.47

8	Assam	Dhubri	Lentil	50	20	71	20	9.0	6.0	50.00
9	Assam	Goalpara	Lentil	75	30	20	15	7.5	5.65	32.74
10	Assam	Golaghat	Lentil	75	30	74	30	11.2	9.89	13.25
11	Assam	Jorhat	Lentil	50	20	86	20	6.94	5.12	35.55
12	Assam	Kamrup	Lentil	75	30	36	30	5.25	5.0	5.00
13	Assam	Karbi Anglong	Lentil	50	20	57	20	8.17	6.0	36.17
14	Assam	Kokrajhar	Lentil	50	20	83	20	9.5	7.9	20.25
15	Assam	Nagaon	Lentil	50	20	74	20	7.11	4.23	68.09
16	Assam	Nalbari	Lentil	75	30	75	30	6.8	0	-
17	Assam	Sivasagar	Lentil	50	20	50	20	8.29	0	-
18	Assam	Sonitpur	Lentil	75	30	75	30	8.25	4.9	68.37
Subtotal				1275	510	1358	495	13.06	8.67	50.75
19	Arunachal Pradesh	Tirap	Lentil	50	20	50	20	5.73	0	-
Subtotal				50	20	50	20	5.73	0	-
20	Manipur	Bishnupur	Lentil	75	30	40	30	5.2	3.75	38.67
21	Manipur	Imphal West	Lentil	25	10	13	10	Crop Damaged		
22	Manipur	Senapati	Lentil	75	30	75	30	7.2	0	-
23	Manipur	Ukhrul	Lentil	75	30	75	30	10.3	7.4	39.19
Subtotal				250	100	203	100	7.56	5.57	38.93
24	Mizoram	Serchipp	Lentil	50	20	20	20	4.8	0	-
Subtotal				50	20	20	20	4.8	0	-
25	Nagaland	Wokha	Lentil	50	20	56	20	6.4	5.57	14.90
Subtotal				50	20	56	20	6.4	5.57	14.90
26	Tripura	Dhalai	Lentil	100	40	99	40	12.5	6.7	86.57
27	Tripura	North Tripura	Lentil	50	20	37	20	5.15	0	-
28	Tripura	South Tripura	Lentil	75	30	99	30	8.7	6	45.00
29	Tripura	West Tripura	Lentil	75	30	44	30	7.5	5	50.00
Subtotal				300	120	279	120	8.46	4.43	91.24
Total				1975	790	1966	775			
1	Assam	Baksa	Field pea	50	20	50	20	10.8	8	35.00
2	Assam	Barpeta	Field pea	25	10	37	10	12.5	10.2	22.55
3	Assam	Bongaigaon	Field pea	75	30	88	30	16.8	0	-
4	Assam	Chirang	Field pea	25	10	23	10	15.5	10.5	47.62
5	Assam	Dhemaji	Field pea	50	20	50	20	6.9	6.4	7.81
6	Assam	Goalpara	Field pea	50	20	20	10	7	5.5	27.27
7	Assam	Golaghat	Field pea	50	20	55	20	10.85	9.35	16.04
8	Assam	Hailakandi	Field pea	25	10	25	10	8.15	5.9	38.14
9	Assam	Jorhat	Field pea	50	20	54	20	12.25	8.71	40.64
10	Assam	Karbi Anglong	Field pea	75	30	104	30	9.02	7	28.86
11	Assam	Kokrajhar	Field pea	50	20	94	20	9.8	8	22.50
12	Assam	Nagaon	Field pea	75	30	93	30	6.21	4.48	38.62
13	Assam	Sivasagar	Field pea	75	30	46	17	7.62	0	
14	Assam	Sonitpur	Field pea	50	20	50	20	7.2	4.3	67.44
Subtotal				725	290	789	267	17.58	11.04	59.16
15	Arunachal Pradesh	East siang	Field pea	50	20	50	20	8.75	7.3	19.86
15	Arunachal Pradesh	Lower Subansiri	Field pea	50	20	25	20	12.05	9.43	27.78
15	Arunachal Pradesh	Tawang	Field pea	125	50	127	50	18	13.5	33.33
Subtotal				225	90	202	90	12.93	10.07	26.99

18	Manipur	Bishnupur	Field pea	50	20	27	20	7.65	5.56	37.59
19	Manipur	Imphal West	Field pea	75	30	38	30	Crop Damaged		
20	Manipur	Senapati	Field pea	75	30	75	30	13.98	10.46	33.65
21	Manipur	Ukhrul	Field pea	75	30	75	10	23.4	17.35	34.87
Subtotal				275	110	215	90	15.01	11.12	35.37
22	Mizoram	Mamit	Field pea	50	20	34	20	13.81	11.93	15.76
23	Mizoram	Serchipp	Field pea	50	20	20	20	14	0	-
Subtotal				100	40	54	40	13.91	11.93	15.76
24	Nagaland	Kohima	Field pea	50	20	17	20	16.5	14	17.86
25	Nagaland	Mon	Field pea	50	20	40	20	10.5	7	50.00
Subtotal				100	40	57	40	13.5	10.5	28.57
26	Tripura	Dhalai	Field pea	75	30	89	30	12.8	7.8	64.10
27	Tripura	North Tripura	Field pea	75	30	69	30	12.5	0	-
28	Tripura	West Tripura	Field pea	50	20	32	20	11.5	7.5	53.33
Subtotal				200	80	190	80	12.26	7.65	60.35
Total				1625	650	1507	607			
1	Assam	Cachar	Rajma	50	20	82	20	14.5	12	20.83
2	Assam	Hailakandi	Rajma	75	30	76	30	17.65	13.8	27.90
3	Assam	Karimganj	Rajma	125	50	127	50	15	9	66.67
Subtotal				250	100	285	100	10.71	11.6	35.49
4	Arunachal Pradesh	West Kameng	Rajma	50	20	52	20	23.6	19.4	21.65
Subtotal				50	20	52	20	23.6	19.4	21.65
5	Mizoram	Serchipp	Rajma	50	20	20	20	15	0	-
Subtotal				50	20	20	20	15	0	-
6	Sikkim	North sikkim	Rajma	50	20	50	20	16.6	9	84.44
7	Sikkim	West Sikkim	Rajma	50	20	50	20	16.58	12.45	33.17
Subtotal				100	40	100	40	16.59	10.72	54.69
Total				450	180	457	180			
1	Assam	Baksa	Lathyrus	25	10	25	10	7	6.1	14.75
2	Assam	Kokrajhar	Lathyrus	25	10	25	10	9.2	8	15.00
3	Assam	Nagaon	Lathyrus	50	20	65	20	8.16	5.12	59.38
Subtotal				100	40	115	40	8.12	6.41	29.71
Total				100	40	115	40	8.12	6.41	29.71
1	Assam	Dhubri	Blackgram	50	20	79	20	9	6.5	38.46
Subtotal				50	20	79	20	9	6.5	38.46
2	Tripura	Dhalai	Blackgram	75	30	95	30	10.9	6.5	67.69
3	Tripura	North Tripura	Blackgram	50	20	50	20	5.2	0	-
Subtotal				125	50	145	50	8.05	6.5	23.85
Total				175	70	224	70			
Grand total				4325	1730	4269	1672			

During *Rabi* 2016-17, KVKs conducted CFLDs on 5 crops viz. Lentil (775ha.), Field pea (607ha.), Rajma (180ha.), Lathyrus (40ha.) and Blackgram (70ha.). The varieties of lentil taken up by the KVKs included HUL-57, Moitree, and KLS-218. Highest yield was obtained by KVK Dhalai (12.5 q/ha.) for lentil with a percent increase of 86.57%.

In field pea, varieties taken up included Prakash, Rachna, HUDP-15, VL-42 and V-10. Highest yield was obtained by KVK Ukhrul (23.4 q/ha.) with a percent increase of 34.87%.

The varieties of Rajma taken up in CFLDs programme during Rabi Season included Ambar, PDR-14, Utkarsh and Jwala. Highest yield was obtained by KVK West Kameng (23.6 q/ha.) with a percent increase of 21.65%.

In Lathyrus, variety utilized in CFLDs programme is Ratan. Highest yield obtained was 9.2 q/ha. By KVK Kokrajhar with a percent increase of 15.0%.

In Blackgram, varieties utilized are PU-31 and Tripura Maskolai. Highest yield was obtained by KVK Dhalai (10.9 q/ha) with a percent increase of 67.69%.



CFLD on Rabi Lentil, KVK Dhalai



CFLD on Rabi Field pea, KVK Bongaigaon



CFLD on Rabi Rajma, KVK North Sikkim



CFLD on Blackgram, KVK North Tripura

Cluster Frontline demonstrations on Summer Pulses 2017

S. N.	State	Name of KVK	Name of crop	Target of FLD approved		Achievements of FLD		Yield(q/ha)		Increase %
				No. of Demo	Area (ha)	No. of Demo	Area (ha)	Demo field	Local	
1	Assam	Goalpara	Blackgram	75	30	20	10	8.2	6.5	26.15
2		Morigaon	Blackgram	50	20	50	20	7.5	6	25.00
3		Nagaon	Blackgram	25	10	25	10	7.71	5.67	35.97
4		Sivasagar	Blackgram	50	20	50	20	Crop Damaged		
5		Sonitpur	Blackgram	50	20	50	20	7.5	6.9	8.70
			Sub Total	250	100	195	80	7.73	6.26	23.95
1	Assam	Goalpara	Greengram	50	20	0	0	Not conducted		
2		Morigaon	Greengram	75	30	75	30	12.5	7.5	66.67
3		Nagaon	Greengram	50	20	50	20	8.32	5.81	43.20
4		Sivasagar	Greengram	75	30	75	30	Crop Damaged		
			Sub Total	250	100	200	80	10.41	6.65	54.93
5	Manipur	Bishnupur	Greengram	50	20	28	20	5.26	4.02	30.85
			Sub Total	50	20	28	20	5.26	4.02	30.85
6	Tripura	West Tripura	Greengram	25	10	19	10	7.25	5.5	31.82
			Sub Total	25	10	19	10	7.25	5.5	31.82
Grand total				575	230	442	190			

During *Summer* 2016-17, KVKs conducted CFLDs on 2 crops viz. Blackgram (80ha.), Greengram (110ha.). The varieties of Blackgram taken up by the KVKs included PU-31, IPU-94-1, Shekhar and PU-19. Highest yield was obtained by KVK Goalpara (8.2 q/ha.) with a percent increase of 26.15%.

In Greengram, the varieties utilized for CFLDs included Pratap, IPM-2-3 and Tripura Mung 1. The highest yield was obtained by KVK Morigaon (12.5 q/ha.) with a percent increase of 66.67%.



TRAINING PROGRAMMES ORGANIZED DURING 2016-17 UNDER CFLD PULSES PROGRAMME

Season	Crop	No. of trainings	No. of Participants		
			Male	Female	Total
<i>Kharif</i>	Blackgram	40	937	317	1249
	Greengram	9	226	77	303
	Pigeon pea	3	1163	394	1552
	Rajma	1	21	35	56
	Sub total	53	2347	823	3160
<i>Rabi</i>	Lentil	44	1214	305	1573
	Field pea	53	1332	661	2062
	Rajma	15	371	221	597
	Lathyrus	4	120	66	217
	Blackgram	2	95	34	129
	Sub total	118	3132	1287	4578
<i>Summer</i>	Blackgram	7	213	43	256
	Greengram	7	170	49	219
	Sub total	14	383	92	475
Total	185	5862	2202	8213	

During 2016-17, a total number of 185 training programmes were organized by the KVKs with 53 trainings during *Kharif* Season, 118 trainings during *Rabi* and 14 trainings during the *Summer* season. During the training programmes, a total of 8213 participants were benefitted out of which 5862 participants were male and 2202 participants were female.



Training on Blackgram by KVK Bishnupur



Training on Field pea by KVK Kohima



Training on Rajma by KVK East Sikkim



Training on Lentil by KVK Bongaigaon



5

ICAR-ATARI, KANPUR, ZONE IV

(Uttar Pradesh and Uttarakhand)

The ICAR project entitled Cluster Frontline Demonstrations (FLDs) of *Kharif/Rabi/Summer* Pulses under NFSM 2016-17 was sanctioned by Government of India, Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Co-operation & Farmers Welfare with an aim to enhance the production of pulses in the country and it was implemented by the Division of Agricultural Extension, ICAR, New Delhi through eight ICAR-ATARI were located in different Zones of the country. National Food Security Mission (NFSM) had sponsored 373 lakh rupees to ICAR-ATARI, Zone-IV, Kanpur during 2016-17 in *Kharif/Rabi/Summer* Under this project. Frontline Demonstrations (FLDs) were implemented by Krishi Vigyan Kendras (KVKs) in two states namely Uttar Pradesh & Uttarakhand for conducting each FLD, Rs. 7500/ha. were allotted for pulses i.e. *Kharif* season (Pigeonpea, Blackgram, Greengram, Horsegram, Cowpea); *Rabi* season (Chickpea, Field pea, lentil, Rajmash); Summer (Black gram, Greengram).

Area Production and Productivity of Pulses in Uttar Pradesh:

Chickpea: The average area of chickpea was 0.58 million hectare having the production of 0.56 million tonnes with average yield of 955 kg/ha in Uttar Pradesh. The details are as follows.

Table 1 : Area, Production and Productivity of Chickpea

Year	Area	Production	Yield
2008-09	0.55	0.56	1018
2009-10	0.62	0.51	823
2010-11	0.57	0.53	930
2011-12	0.58	0.68	1185
2012-13	0.60	0.67	1219
2013-14	0.58	0.58	824
2014-15	0.56	0.38	683
Average (2008-15)	0.58	0.56	955

Area –million Hectares, Production – Million Tones, Yield– Kg/Hectare

Source:- National Food Security Mission(NFSM) and Directorate of Pulses Development Bhopal

Lentil: The total area of lentil was 495 thousand hectare with and production of 416 thousand tonnes and average yield of lentil in Uttar Pradesh was 791 kg/ha. The details are as follows:

Table 2 : Area, Production and Productivity of Lentil

Year	Area	Production	Yield
2008-09	321.0	460.0	883
2009-10	592.4	475.8	803
2010-11	586.0	411.0	701
2011-12	573.0	505.0	881
2012-13	495.0	441.0	891
2013-14	449.0	310.0	690
2014-15	449.0	310.0	690
Average (2008-15)	495.0	416.0	791

Area □(thousand ha), Production □ □(thousand tons), Yield□ Kg/Hectare

Source:- IIPR, Kanpur and Directorate of Pulses Development Bhopal

Field pea: The total area of Field pea was 339.0 thousand hectare and production of 395.0 thousand tonnes with average yield of 1190 kg/ha in Uttar Pradesh. The details are as follows:

Table 3 : Area, Production and Productivity of Field pea

Year	Area	Production	Yield
2008-09	351.0	424.0	1208
2009-10	312.0	400.4	1283
2010-11	304.0	353.0	1161
2011-12	323.0	463.0	1433
2012-13	307.0	459.0	1495
2013-14	357.0	354.0	992
2014-15	416.0	314.0	755
Average (2008-15)	339.0	395.0	1190

Area –(thousand ha), Production – –(thousand tons), Yield– Kg/Hectare
Source:- IIPR, Kanpur and Directorate of Pulses Development Bhopal

Summary

The total area under FLDs were 3531.04 ha of Zone IV on pulses included *Kharif* season (Pigeonpea, Blackgram, Greengram, Horsegram, Cowpea, Rajmash); *Rabi* season (Chickpea, Field pea, lentil) and *Summer* (Black gram, Greengram). The FLDs allotted and conducted district wise and crop wise during *Kharif, Rabi and Summer* 2016-17 by the KVKs of Zone-IV were given in Table 4.

The total area, 1340 ha were allotted in Zone IV for Uttar Pradesh (1140 ha) and Uttarakhand (200 ha), but 1047 ha were actually achieved in Uttar Pradesh (973.9 ha) and Uttarakhand (73.5 ha) in *Kharif* season i.e. Blackgram (359.8 ha), Greengram (138.6 ha), Pigeonpea (541 ha), Horsegram (8 ha). In *Rabi* season, 2340 ha area were allotted in U.P. (2210 ha) & U.K. (130 ha), but 1632.54 ha were achieved in Uttar Pradesh (1508 ha) and Uttarakhand (124 ha) i.e. Chickpea (266 ha), Fieldpea (451.84 ha), Lentil (914.7 ha); 860 ha area were allotted in *Summer* season for Uttar Pradesh but 851.1 ha area achieved i.e. Blackgram(263 ha), Greengram (588.1 ha).

Table 4: Summary of Progress Report of CFLDs on Pulses during 2016-17

Sl. No	Crops	State	Target of FLDs approved		Achievements of FLDs		Average yield (q/ha)		yield increase (%)	Difference of yield between demo and local (q/ha)
			No. of Demos	Area (ha)	No. of Demos	Area (ha)	Demo	Local		
Kharif season										
1	Blackgram	U.P.	950	370	805	321.8	9.66	6.92	39.59	2.74
2	Greengram	U.P.	458	160	363	138.6	7.20	5.27	36.62	1.93
3	Pigeonpea	U.P.	1526	610	1276	513.5	16.87	11.91	41.64	4.96
4	Horsegram	U.K.	75	30	20	8	9.98	7.85	27.13	2.13
5	Blackgram	U.K.	225	80	95	38	7.35	5.41	35.85	1.94
6	Pigeonpea	U.K.	100	30	69	27.5	11.57	5.94	94.78	5.63
7	Greengram	U.K.	75	30	0	0				
8	Cowpea	U.K.	25	10	0	0				
9	Rajmash	U.K.	50	20	0	0				
Total (kharif)			3484	1340	2628	1047.4	10.44	7.22	44.59	3.22
Rabi Season										
1	Chickpea	U.P.	1350	610	721	266	18.99	13.78	37.74	5.21
2	Fieldpea	U.P.	1479	620	1146	451.84	19.00	13.85	37.11	5.14
3	lentil	U.P.	2445	980	1807	790.7	13.59	9.63	41.08	3.96
4	lentil	U.K.	325	130	310	124	8.28	5.94	39.49	2.35
Total (Rabi)			5599	2340	3984	1632.54	14.97	10.80	38.61	4.17
Summer Season										
1	Blackgram	U.P.	650	260	520	263	8.29	6.99	18.59	1.30
2	Greengram	U.P.	1662.5	600	1412	588.1	9.36	7.09	32.09	2.27
Total (Summer)			2312.5	860	1932	851.1	8.82	7.04	25.28	1.78
Grand Total (Kharif+Rabi+Summer)			11395.5	4540	8544	3531.04				

Summary Area conducted (ha)

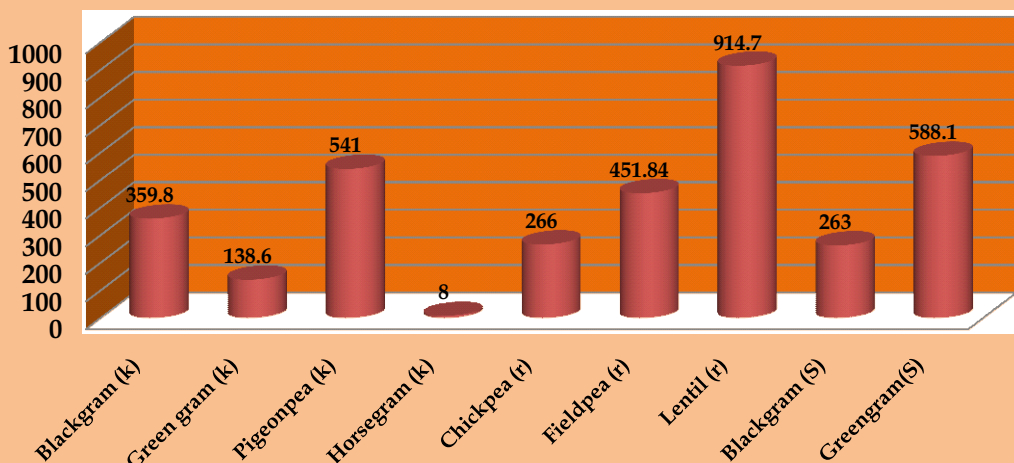


Table 5: Summary of Pulses in Zone IV in U.P. & Uttarakhand

Crop	Area Allotted (ha)	Area conducted (ha)
Blackgram (k)	450	359.8
Green gram (k)	190	138.6
Pigeonpea (k)	640	541.0
Horsegram (k)	30	8.0
Chickpea (r)	610	266.0
Fieldpea (r)	620	451.8
Lentil (r)	1110	914.7
Blackgram (S)	260	263.0
Greengram (S)	600	588.1
Cowpea (K)	10	0
Rajamash (K)	20	0
Total	4540	3531.04

Kharif season 2016

1. Black gram:

Cluster FLDs on Blackgram were conducted in an area of 321.8 ha by 23 KVKs in Uttar Pradesh and 38 ha area by 3 KVKs in Uttarakhand. Results indicated that the average demonstration yield of 8.50 q/ha with yield increase of 41.43 per cent as compared to farmers, yield (6.01 q/ha) followed by 46.55 percent yield increases over district yield (5.8 q/ha) in U.P. i.e. among Black gram, variety PU-31 was demonstrated in an area 216 ha with 500 farmers by 13 KVKs viz., Shahjahnapur, Muzaffarnagar, Rampur, Saharanpur, Moradabad, GB Nagar, Bareilly, Lucknow, Mirzapur, Sitapur, Badaun, Ghaziabad, Baghpat, Shekhar 2, Shekhar 3, Narendra Urd 1 were demonstrated in an area 321 ha. with 750 farmers by 23 KVKs in Uttar Pradesh.

Varietal Performance of Blackgram (PU-31) in Uttar Pradesh:

In Uttar Pradesh, cluster FLDs on Blackgram variety PU-31 was demonstrated in an area of 216 ha

through Krishi Vigyan Kendras in 13 districts of Uttar Pradesh. All the KVKs conducted FLDs with full packages of practices. Results showed that the average demonstration yield of PU-31 was 10.12 q/ha and maximum average demonstration yield was 11.85 q/ha whereas minimum average demonstration yield was 8.54 q/ha. The average farmer yield was 7.02 q/ha. There was an increase about 44.15 percent demonstration yield as compared to farmer yield. (Table 6).

Varietal Performance PU-31 in Black gram of different KVKs of Uttar Pradesh

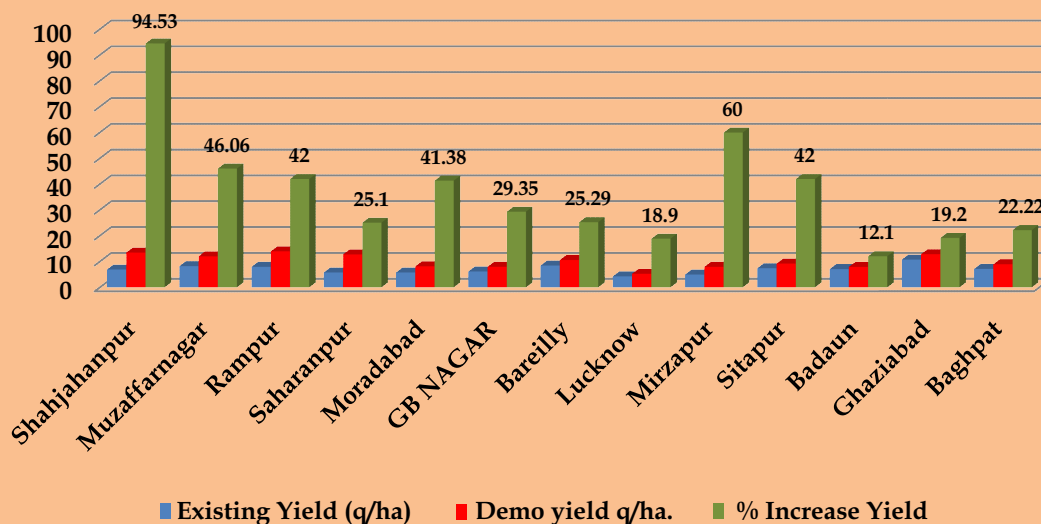


Table 6: Varietal Performance of PU-31 in Black gram

Sl.No	KVK	Existing Farmer yield (q/ha)	Area(ha)	Yield obtained (q/ha)			% increase yield (q/ha)
				Max.	Min.	Av.	
1	Shahjahanpur	6.95	10	15.10	12.20	13.52	94.53
2	Muzaffarnagar	8.25	20	12.75	11.35	12.05	46.06
3	Rampur	8.00	30	16.00	12.00	14.00	75.00
4	Saharanpur	5.80	20	14.60	10.10	12.80	120.60
5	Moradabad	5.80	10	9.50	6.75	8.20	41.30
6	GBNAGAR	6.20	10	10.10	5.80	8.02	29.35
7	Bareilly	8.50	30	15.25	7.70	10.65	25.29
8	Lucknow	4.30	10	6.20	4.40	5.30	23.25
9	Mirzapur	5.00	10	10.00	6.00	8.00	60.00
10	Sitapur	7.45	22	10.60	8.50	9.25	24.16
11	Badaun	7.11	21	8.45	7.56	7.97	12.09
12	Ghaziabad	10.80	10	14.80	11.20	12.90	19.44
13	Baghpat	7.20	13	10.80	7.50	9.00	25.00
Total/mean		7.02	216	11.85	8.54	10.12	44.15

2.Green gram:

Cluster FLDs on Green gram were conducted in an area of 138.6 ha by 10 KVKs in Uttar Pradesh. Results indicated that the average demonstration yield of 7.20 q/ha with yield increase of 36.62 per cent in Uttar Pradesh which was more as compared to farmers Existing Yield (5.27 q/ha). followed by 42.57 percent yield increases over district yield (5.05q/ha). Among Green gram, variety IPM 2-3 was demonstrated in an area of 65.5 ha with 150 farmers by 6 KVKs viz., Hamirpur, Shahjahnapur, Lucknow, SRD nagar, Mirzapur, Mainpuri. Sweta, Meha, Pant Moong, PDM 139, IPM 2-3 in 73.10 ha area with 190 farmers by 10 KVKs in Uttar Pradesh .

Varietal Performance of Greengram (IPM 2-3) in Uttar Pradesh :

In Uttar Pradesh cluster FLDs on Greengram variety IPM 2-3 were conducted in an area of 65.5 ha. through Krishi Vigyan Kendras in 6 districts of Uttar Pradesh. All the KVKs conducted FLDs with full packages of practices. Results showed that the average demonstration yield of Greengram variety IPM 2-3 was 6.64 q/ha whereas, the average farmer yield was 4.81 q/ha. There was 38.04 percent increase in yield higher as compare to farmer yield. (Table 7).

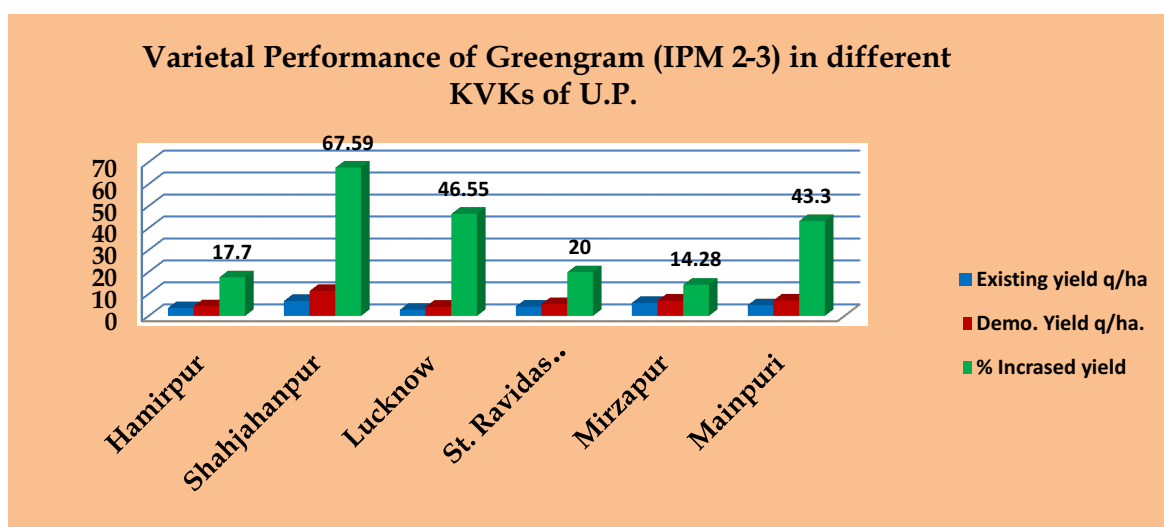


Table 7: Varietal Performance of Green gram (IPM 2-3) at different KVKs of U.P.

Sl. No	KVK	Existing yield (q/ha)	Area (ha)	Yield obtained (q/ha)			% increase yield (q/ha)
				Max.	Min.	Av.	
1	Hamirpur	3.7	10	4.80	2.50	4.50	21.62
2	Shahjahanpur	6.9	10	12.5	11.00	11.48	66.37
3	Lucknow	2.9	10	4.90	3.60	4.25	46.55
4	SRD nagar	4.4	5.5	6.20	4.80	5.50	25.00
5	Mirzapur	6.0	10	9.00	5.00	7.00	16.66
6	Mainpuri	5.0	20	8.92	5.40	7.16	43.20
Total/mean		4.81	65.5	7.72	5.38	6.64	38.04

3. Pigeonpea.

Cluster FLDs on Pigeonpea were conducted in an area of 513.5 ha by 32 KVKs in Uttar Pradesh and 27.5 ha by 2 KVKs in Uttarakhand. Results indicated that the average demonstration yield of 16.87 q/ha with yield increase of 41.64 per cent in Uttar Pradesh was found more as compared to farmers Existing Yield (11.91 q/ha) followed by 23 percent of increase in yield over district yield (13.65 q/ha).

Among Pigeonpea, variety NA 2 variety was demonstrated in an area 416.07 ha with 960 farmers by 23 KVKs viz., Allahabd, Deoria, Mau, Chandauli, Sultanpur, Basti, Balrampur, Lucknow Kushinagar, Mirzapur, Gonda, Etawah, Kanpur dehat etc. other varieties namely IPA 203, NA 1, Pusa 2001 were demonstrated in 513.5 ha. area with 1200 farmers by 32 KVKs in Uttar Pradesh.

Varietal Performance of Pigeon Pea (NA-2) in Uttar Pradesh :

In Uttar Pradesh cluster FLDs on Pigeon Pea variety (NA-2) was conducted in an area of 416.07 ha. through Krishi Vigyan Kendras in 23 districts of Uttar Pradesh. All the KVKs conducted FLDs with full packages of practices. Results showed that the average demonstration yield of NA-2 was 17.45 q/ha, and the average Farmers existing yield was 12.53q/ha. There was increased in yield about 39.22 percent of demonstration yield over the farmer existing yield. (Table 8).

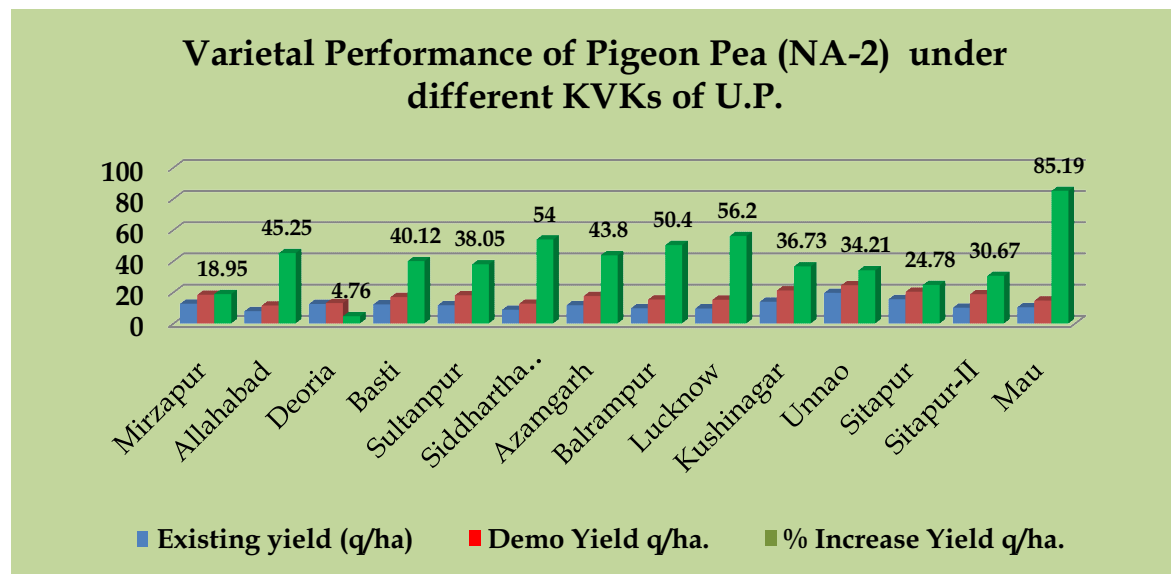


Table 8: Varietal Performance of NA-2 in Pigeon pea under different KVKs of U.P.

Sl. No	KVK	Existing yield (q/ha)	Area (ha)	Yield obtained (q/ha)			% increase yield (q/ha)
				Max.	Min.	Av.	
1	Mirzapur	12.76	10	20.23	16.18	18.52	45.14
2	Allahabad	8.00	10	13.00	10.50	11.62	45.25
3	Deoria	12.6	45	18.50	11.30	13.20	4.76
4	Basti	12.35	20	17.45	16.65	17.05	38.05
5	Sultanpur	11.80	10	18.50	17.90	18.20	54.23
6	Siddhartha nagar	8.90	10	16.90	10.50	12.80	43.80
7	Azamgarh	11.80	16.16	20.40	15.10	17.75	50.42
8	Balrampur	9.85	18	16.57	10.25	15.47	57.05
9	Lucknow	9.70	10	20.00	12.00	15.33	58.04
10	Kushinagar	14.00	17.5	27.00	16.00.	21.28	52.00
11	Unnao	19.73	20	26.82	22.43	24.62	24.78
12	Sitapur	15.65	12.2	23.75	18.90	20.45	30.67
13	Sitapur-II	10.20	10.4	20.20	17.50	18.89	85.19
14	Mau	10.50	15.0	15.60	12.50	14.80	40.95

15	Sonbhadra	12.12	14.4	18.45	13.85	14.85	22.52
16	Chandauli	9.17	20.0	14.32	12.20	13.26	44.60
17	Jaunpur	13.15	10.0	17.64	14.75	16.19	23.11
18	Ambedkarnagar	18.20	16.5	25.70	20.40	23.00	26.37
19	Kanpur dehat	13.00	20.0	22.00	14.00	19.00	46.15
20	Etawah	11.80	16.16	20.40	15.10	17.75	50.42
21	SRD Nagar	14.75	10.1	24.20	15.51	19.20	30.16
22	Gonda	14.75	20.0	22.50	15.60	18.05	22.37
23	Pratapgarh	13.50	64.65	23.80	16.50	20.20	49.62
Total/mean		12.53	416.07	20.17	14.33	17.45	39.22

Rabi 2016-17 (1632.54 ha. area)

1. Chickpea:

Cluster FLDs on Chickpea were conducted in an area of 266 ha by 23 KVKs in Uttar Pradesh. Results indicated that the average demonstration yield of 18.99 q/ha with yield increase of 37.8 per cent in Uttar Pradesh as compared to farmers Existing Yield (13.78q/ha) followed by 86.54 percent increases in yield over district yield (10.18 q/ha). Chickpea variety GNG-1581 was demonstrated in an area of 195 ha with 450 farmers by 12 KVKs viz., Auraiya, Lucknow, Fatehpur, Ghazipur, Deoria, Allahabad, Sitapur-1, Bahraich, Unnao, Sonbhadra, Kanpur Dehat, SRD Nagar followed by Jaki 9218 and BGM 547 in 71 ha. with 175 farmers by 11 KVKs.

Varietal Performance of Chickpea crop in Uttar Pradesh :

In Uttar Pradesh, cluster FLDs on chickpea variety GNG 1581 was conducted in an area of 195 ha. through Krishi Vigyan Kendras in 12 districts of Uttar Pradesh. All the KVKs conducted FLDs with full packages of practices. Results showed that the maximum yield was 21.33 q/ha while lowest yield was 15.89 q/ha . The average yield was found 18.66 q/ha under the demonstration, whereas farmer existing yield was 13.37 q/ha. Overall there was 39.56 percent higher yield was recorded as compared to farmers existing yield. (Table 9).

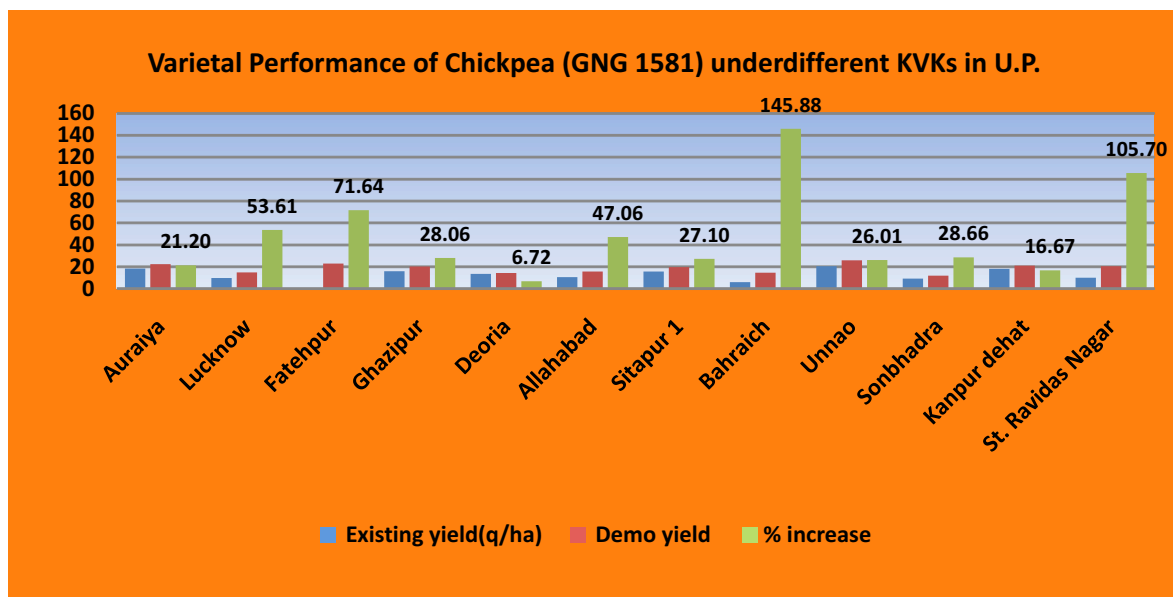


Table 9 : Varietal Performance of Chickpea (GNG 1581) under different KVKs in U.P.

Sl. No	KVK	Existing yield (q/ha)	Area (ha)	Yield obtained (q/ha)			% increase yield (q/ha)
				Max.	Min.	Av.	
1.	Auraiya	18.40	20	24.90	19.70	22.30	21.19
2.	Lucknow	9.70	10	15.70	12.60	14.90	53.60
3.	Fatehpur	13.40	30	22.50	24.00	23.00	71.64
4.	Ghazipur	15.79	15	24.00	16.00	20.22	28.05
5.	Deoria	13.40	20	17.80	10.50	14.30	6.71
6.	Allahabad	10.56	10	20.00	13.30	15.53	47.06
7.	Sitapur 1	15.50	10	22.90	18.10	19.70	27.09
8.	Bahraich	5.95	10	16.15	6.10	14.63	145.88
9.	Unnao	20.57	20	28.48	23.36	25.92	26.00
10.	Sonbhadra	9.21	20	13.80	9.90	11.85	28.66
11.	Kanpur dehat	18.00	20	23.00	20.00	21.00	16.66
12.	SRD nagar	10.00	10	26.80	17.20	20.57	105.70
Total/mean		13.37	195	21.33	15.89	18.66	39.56

In Allahabad district chickpea crop variety (GNG 1581) was demonstrated in an area of 10 ha with full package of practices. The Promising technology demonstrated were variety GNG 1581 with the application of seed treatment with Carbendazime @ 2 gm/kg of seed, along with soil test based recommended dose of fertilizer NPK @(20:60:40 kg/ha). Result showed that the average demonstration yield was 15.53 q/ha. Whereas District average yield was 8.46/ha. Farmers were satisfied with technology and variety.



2. Lentil.

Cluster demonstrations on lentil were conducted in an area of 914.7 ha by 48 KVKs. In Uttar Pradesh. Out of which 40 KVKs conducted demonstration in an area of 790.7 ha with 1900 farmers and 8 KVKs conducted on 124 ha area with 320 farmers in Uttarakhand . In Uttar Pradesh, results showed that the average demonstration yield of 13.59 q/ha with yield increase of 41.12 per cent over local check (9.63 q/ha). Among lentil varieties demonstrated in Uttar Pradesh were PL -8, Pusa masoor, IPL-406, Shekhar-3, KLS-218 HUL-57 etc.

Varietal Performance of Lentil PL-8

In Uttar Pradesh cluster FLDs demonstration on lentil variety PL 8 were conducted in an area of 391 ha through Krishi Vigyan Kendras in 18 districts of Uttar Pradesh. All the KVKs conducted FLDs with full packages of practices. Results showed that the average demonstration yield of PL 8 was 13.64 q/ha, and average farmer yield was 9.69q/ha. Whereas, demonstration yield was 40.76 percent (3.95q/ha) higher than farmer existing yield (Table 10).

Varietal performance of PL-8

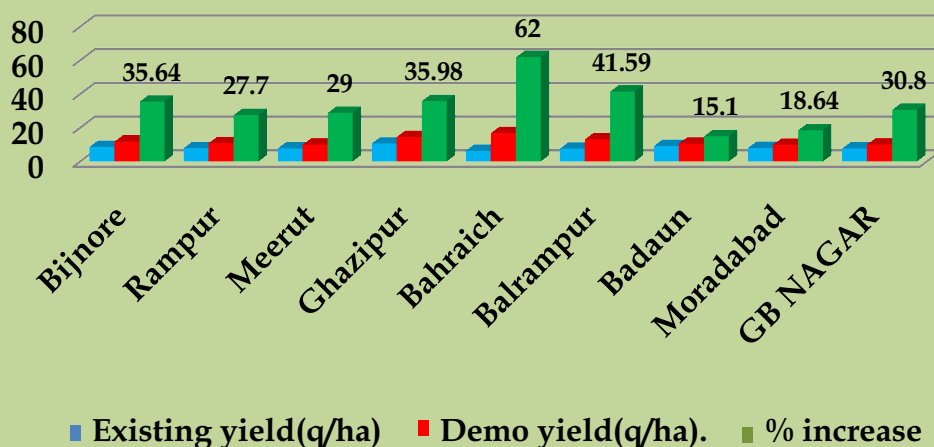


Table 10 : Varietal Performance of Lentil (PL 8) at different KVKs of U.P.

Sl. No	KVK	Existing yield (q/ha)	Area (ha)	Yield obtained (q/ha)			% increase yield(q/ha)
				Max.	Min.	Av.	
1.	Bijnore	8.81	15	13.48	10.18	11.95	35.64
2.	Rampur	8.00	10	12.00	10.00	11.00	37.50
3.	Meerut	7.85	15	12.75	8.00	10.13	29.04
4.	Ghazipur	10.81	30	18.50	10.50	14.70	35.98
5.	Bahraich	6.45	40	18.55	6.75	17.00	163.56
6.	Balrampur	7.75	10	15.00	8.75	13.27	71.22
7.	Badaun	9.34	20	14.00	7.50	10.75	15.09
8.	Moradabad	8.16	16	12.50	8.00	10.03	22.91
9.	GB NAGAR	7.80	2.5	14.60	8.50	10.20	30.76
10.	Muzaffarnagar	12.60	20	15.45	12.60	14.02	11.26
11.	Sitapur 1	13.40	30	19.10	15.60	17.35	29.47
12.	Sitapur-II	9.90	40	20.80	16.40	18.79	89.79
13.	Kushinagar	9.35	16.5	17.50	11.35	14.20	51.87
14.	Maharajganj	8.60	50	12.20	12.00	12.10	40.69
15.	Sonbhadra	10.94	20	14.85	11.71	13.28	21.38
16.	Saharanpur	14.40	20	22.80	17.80	20.30	40.97
17.	Bareilly	12.00	30	18.87	12.62	14.95	24.58
18.	SRD nagar	8.40	6	13.10	8.90	11.50	36.90
Total/mean		9.69	391	15.89	10.95	13.64	40.76

In Saharanpur district lentil (PL 8) were demonstrated in an area of 20 ha. with the active participation of farmers. The Promising technology demonstrated in Lentil was variety IPL-406 with application of Sulphur 90% (Bentonight) @30kg/ha , seed treatment with fungicide sprint (Carbendazim 2 gm+ Mencozeb 1 gm) @ 3 gm/kg of seed, seed inoculation with Rhizobium culture @ 200gm/10kg seed along with soil test based recommended dose of fertilizer NPK @ (25:60:40 kg/ha). Result showed that the average demonstration yield was 20.3 q/ha. The District average yield was 16.1 q/ha. There was yield advantage of 4.2q/ha (26.08%) over district yield. The potential yield of variety was 28.4 q/ha.



Sahjahanpur KVK conducted demonstration in 20 ha area with lentil variety HUL 57. The Promising



technology demonstrated were Lentil variety (HUL 57) with application of Bentonite Sulphur @ 25 kg/ha, seed treatment with Carbendazim @ 3 gm/kg of seed, soil test based recommended dose of fertilizer NPK @ (20:40:40 kg/ha). The result showed that average demonstration yield was 22.28 q/ha with yield advantage of 9.87q/ha (83%) as compared to local check (12.81q/ha). Demonstrated yield was 73.92 percent higher than district yield (9.30q/ha).

3. Field Pea.

Total 451.84 ha area conducted by 22 KVKs of U.P in CFLD Pulses 2016-17 with active participation 400 farmers. In which Field pea were conducted in U.P. Results showed that the average demonstration yield of 19.00/ha with yield increase of 37.11 per cent over local check (13.85 q/ha). Among field Pea varieties demonstrated in Uttar Pradesh were Vikas, Prakash, Aman, KPMR-400, Aparna, KPMR 522 etc.

Varietal performance of Field Pea variety Prakash:-

The pea variety Prakash was demonstrated in an area of 160.39 ha. Through Krishi Vigyan Kendras in 8 districts of Uttar Pradesh. The varietal performance results showed that the average demonstration yield of pea 19.15 q/ha, average maximum demonstration yield was 21.3q/ha and average minimum demonstration yield was 17.15 q/ha. The farmer average existing yield was 14.15 q/ha. whereas demonstration yield was 35.33 percent (5q/ha) higher than farmers' existing yield (Table 11).

Varietal performance of Field Pea Prakash

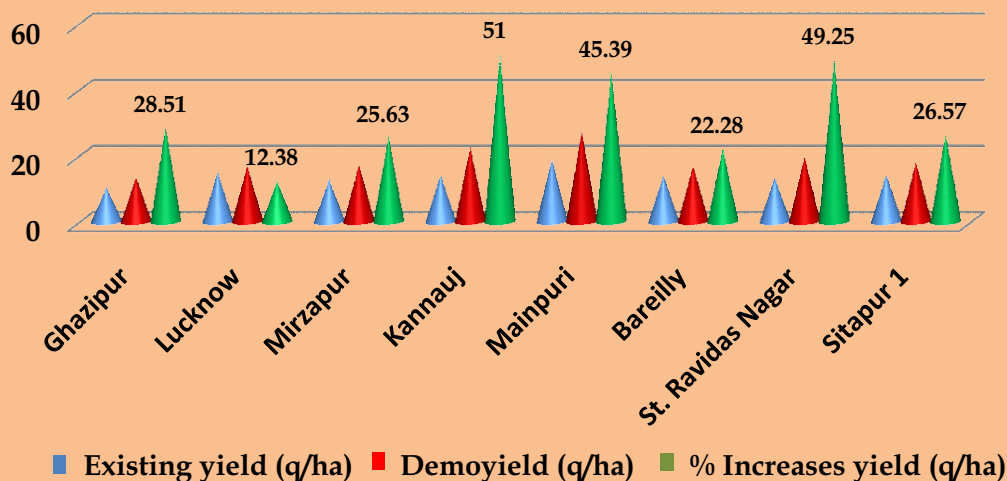


Table 11 : Varietal performance of Field pea prakash

Sl. No	KVK	Exwasting yield (q/ha)	Area (ha.)	Yield obtained (q/ha)			% increase yield (q/ha)
				Max.	Min.	Av.	
1	Ghazipur	10.45	10	14.50	12.50	13.43	28.51
2	Lucknow	15.00	15	18.25	16.00	17.12	14.13
3	Mirzapur	12.88	20	19.47	15.58	17.32	34.47
4	Kannauj	14.00	10.4	24.32	19.40	22.62	61.57
5	Mainpuri	19.20	50	29.84	25.70	27.77	44.63
6	Bareilly	14.00	22.62	21.25	15.37	17.12	22.28
7	St. Ravidas agar	13.40	12.37	22.52	16.10	20.00	49.25
8	Sitapur 1	14.30	20.00	20.80	16.60	18.10	26.57
Total/mean		14.15	160.39	21.3	17.15	19.15	35.33

KVK Mainpuri conducted field pea demonstration in 50 ha area. The Promising technology demonstrated were new cultivar Prakash (80 kg/ha), line sowing (seed drill), weed management (Pendimethalene@3.3litr/ha) with soil test based recommended dose of fertilizer NPK @(20:60:40 kg/ha). Result showed that the average demonstrated yield was 27.77 q/ha which was 45.39 percent higher than district yield (13.02q/ha) and 17.92 percent higher as compared to state yield (12.97 q/ha). The potential yield of the variety was 30 q/ha.



Demonstrations on *summer* pulses in Uttar Pradesh

1. Blackgram:

Total 263 ha area conducted by KVKs of U.P in CFLD Pulses 2016-17. Cluster FLDs on Blackgram PU-31 Variety were conducted in an area of 129.8 by 6 KVKs in Uttar Pradesh. Results indicated that the average demo yield of 9.16 q/ha with yield increase of 37.16 percent as compared to farmers existing yield (6.68 q/ha). The technologies demonstrated at the farmer's field were integrated crop management, seed treatment with Chloropyriphos and Rhizobium with improved cultivation practices.

Varietal Performance of Blackgram (PU-31)

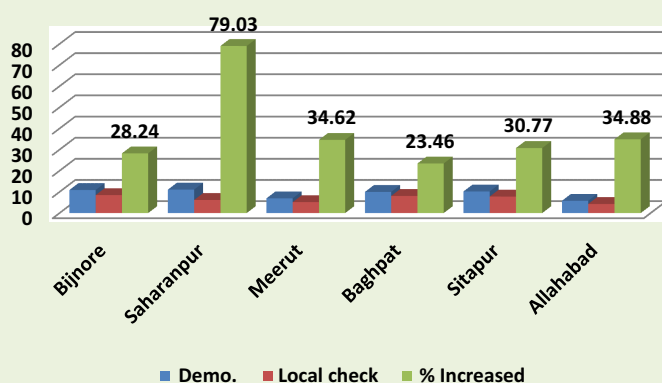


Table 12 : Varietal performance of Blackgram (PU-31)

Sr. No	KVK	Area (ha)	Average Yield (q/ha)		% Increased
			Demo.	Local check	
1.	Bijnore	48	10.90	8.50	28.24
2.	Saharanpur	20	11.10	6.20	79.03
3.	Meerut	20	6.96	5.17	34.62
4.	Baghpat	11.8	10.00	8.10	23.46
5.	Sitapur	20	10.20	7.80	30.77
6.	Allahabad	10	5.80	4.30	34.88
Total/Average		129.8	9.16	6.68	37.16

Black gram, in Kaushambi KVK gave good yield with medium plant height as compared to check variety. Due to more vigorous plant growth and maximum number of pod per plant, use of recommended package of practices like seed treatment with FIR package, timely use of weedicides to reduce crop weed competition, provide required irrigation and timely use of insecticide to control the aphid resulted in higher yield. Line sowing, (25 X 10 Cm), Weed management Use of Pendamethilin @3.3 lit./ha next day of crop sowing. Use of recommended dose of fertilizer(20 :40 : 20 (NPK)/ha), use of insecticide Imedachloprid 7.0 Ltr (@ 1.5 ml/liter of water) for Aphid management.



2. Greengram :

Cluster FLDs on Greengram were conducted in an area of 588 ha. by 28 KVKs in Uttar Pradesh. Results indicated that the average demonstration yield of 9.36 q/ha with yield increase of 32.01 per cent as compared to farmers existing yield (7.09 q/ha). The technologies demonstrated in the demo field were

integrated crop management i.e. seed treatment with Chloropyriphos and Rhizobium, improved cultivation practices, seed variety (IPM 2-3, PDM 139, Sweta) and full package of recommended practices.

Varietal Performance of IPM 2-3 in Uttar Pradesh

In Uttar Pradesh cluster FLDs on Green gram variety, IPM 2-3 was conducted in an area of 408.93 ha through Krishi Vigyan Kendras in 20 districts of Uttar Pradesh. All the KVKs conducted FLDs with full packages of practices. Results showed that the average demonstration yield of IPM 2-3 was 8.85 q/ha and average maximum demonstration yield was 10.16 q/ha and average minimum yield was 7.40 q/ha. The average farmer existing yield was 6.55 q/ha. There was 35.09 percent (2.3 q/ha) higher yield was observed as compare to farmer yield.

Table 13: Varietal Performance of IPM 2-3 in Uttar Pradesh

Sr. No	KVK	Area (ha)	Average Yield (q/ha)				% Increased
			Max. Demo. Yield	Min. Demo. Yield.	Average Demo. Yield	Local check	
1	Fatehpur	30.0	11.40	9.51	10.45	8.10	29.01
2	Aligarh	10.0	10.20	8.50	9.60	7.75	23.87
3	Kannauj	24.0	12.80	7.25	9.62	7.03	36.84
4	Rampur	20.0	6.20	5.00	5.90	4.60	28.26
5	Saharanpur	20.0	13.60	9.20	12.40	7.90	56.99
6	Ghaziabad	17.2	12.25	8.80	9.50	6.80	39.71
7	Shahjahanpur	10.0	10.60	8.70	9.73	6.60	47.47
8	Muzaffarnagar	30.0	7.40	4.10	5.80	4.70	23.40
9	Baghpat	25.2	12.75	8.20	10.8	8.50	27.06
10	GB NAGAR	10.0	8.24	6.41	7.42	5.13	44.64
11	Bulandsahar	16.0	7.40	4.10	5.80	4.70	23.40
12	Bareilly	16.53	8.83	6.31	7.40	6.25	18.40
13	Kushinagar	50.0	11.55	7.55	9.30	7.10	30.99
14	Gonda	10.0	9.80	7.40	8.60	6.20	38.71
15	Pratapgarh	30.0	10.20	7.30	8.75	6.20	41.13
16	Unnao	20.0	11.40	9.51	10.45	8.10	29.01
17	Kaushambi	10.0	11.70	10.90	11.30	8.80	28.41
18	Auraiya	20.0	6.20	5.00	5.90	4.60	28.26
19	Allahabad	10.0	10.20	7.30	8.75	6.20	41.13
20	Mathura	30.0	10.50	7.00	9.58	5.80	65.17
Total/Average		408.93	10.16	7.40	8.85	6.55	35.09

Green gram variety IPM-2-3, in Kaushambi KVK gave good yield with medium plant height as compared to check variety. Due to more vigorous plant growth and maximum number of pod per plant in short span of time, use of new variety IPM-2-3, Seed treatment by FIR package, Line sowing, (25 X 10 Cm), weedicide - Use of Pendamethlin @3.3 lit./ha, next day of crop sowing, Use of recommended dose of fertilizer (20 :40 : 20 (NPK)/ha) and insecticide Imedachloroprid 3.5 Ltr (@ 1.5 ml/liter of water) for Aphid management, providing required irrigation and timely use of insecticide to control the aphid resulted in higher yield.



Photographs



Blackgram in Sitapur



Green gram in Bareilly



Pigeon Pea in Siddharthanagar



Chickpea in Ghazipur



Field Pea in Bareilly



Lentil in G.B. Nagar



6

ICAR-ATARI, HYDERABAD, ZONE – V

(Andhra Pradesh, Telangana and Maharashtra)

Cluster Frontline demonstrations on Pulses 2016-17 of *Kharif* Season

To increase the production and productivity of pulses, the Cluster Frontline Demonstrations on Pulses Programme (CFLD) was initiated by Ministry of Agriculture and Farmers Welfare, Govt. of India during *Rabi* 2015-16 under National Food Security Mission (NFSM). During the year 2016-17 the programme was continued and the Cluster Frontline Demonstrations on Pulses were conducted by KVK's during *Kharif, Rabi and Summer* seasons in Andhra Pradesh, Telangana, Maharashtra States, ZONE-X. A total of 4030ha area was allotted to Zone-X in which 3893.7ha programme was implemented by organizing 9047 No of demonstrations on Pigeonpea, chickpea, blackgram and Greengram crops (Table-1) in the above three states with an achievement of 96.61%. Out of 77 KVK's operating in the zone 74 KVK's participated in the CFLD Programme during the year under report.

Latest improved varieties (not older than 10 years) and crop production and protection technologies were demonstrated. The farmers were given to use the bio-fertilizers, bio-pesticides, micro irrigation and agents and funded under the scheme. Financial assistance of Rs 7500/ha was sanctioned to each crop for inputs, extension activities and monitoring of the programme. The demonstrations were conducted in Cluster approach in interior areas mainly with small and marginal farmers and weaker sections

Results:

Blackgram : Demonstrations on blackgram during *Kharif* season was conducted by one KVK in Kurnool District in Andhra Pradesh State with improved variety LBG-752 and seed treatment with imidacholoprid and application of recommended dose of fertilizers 20:50:0 NPK/ha and plant protection measures by spraying of monocrotophos and installing sticky traps. The average yield recorded in the demonstration was 9.0 q/ha against the check yield of 6.8 q/ha with an increase in yield of 32.35 percent, (Table 2).

In Maharashtra, the demonstrations on blackgram was organized by 10 KVKs. A total of 325 demonstrations were laid out covering 130.0 ha area. In most of the KVKs the AKU-15, a multiple disease resistant blackgram variety along with Rhizobium, PSB, Tricoderma Viridae, 20:50:0 NPK (Urea+SSP) Plant protection with NSKE and other insecticides against whitefly etc., On an average 9.99 q/ha seed yield was obtained against the existing farmers yield of 6.67 q/ha with an increase of 49.77 percent. The highest average yield of 12.25 q/ha was recorded in Aurangabad followed by 12.23 in Washim with Variety AKU-15 and rhizobium, sulphur in medium blacksoils under rainfed situation after cotton and maize crop sequence.

Table 1 : Cluster Front Line Demonstrations on Pulses during 2016-17

Sl.No.	Crops	State	Target of FLDs approved		Achievements of FLDs	
			No. of Demos	Area (ha)	No. of Demos	Area (ha)
<i>Kharif</i> season						
1	Blackgram	Maharashtra	550	220	370	150
2	Greengram	Maharashtra	825	330	820	350
3	Red	Maharashtra	1900	760	1647	635.2
Total		Maharashtra	3275	1310	2837	1135.2

1	Blackgram	Andhra Pradesh	100	40	26	20
2	Greengram	Andhra Pradesh	275	110	286	130
3	Red	Andhra Pradesh	725	290	611	290
Total		Andhra Pradesh	1100	440	923	440
1	Greengram	Telangana	400	160	242	112
2	Red	Telangana	600	240	462	229.6
3	Blackgram	Telangana	50	20	0	0
Total		Telangana	1050	420	704	341.6
Grand Total (Kharif)			5425	2170	4464	1916.8
Rabi season			No. of Demos	Area (ha)	No. of Demos	Area (ha)
1	Bengalgram	Maharashtra	2175	870	2636	1038.7
Total		Maharashtra	2175	870	2636	1038.7
1	Bengalgram	Andhra Pradesh	300	120	190	120.8
2	Blackgram	Andhra Pradesh	825	330	801	385.2
3	Greengram	Andhra Pradesh	375	150	227	106.8
Total		Andhra Pradesh	1500	600	1218	612.8
1	Greengram	Telangana	250	100	188	74
2	Red	Telangana	100	40	70	28
3	Bengalgram	Telangana	350	140	262	128.4
4	Blackgram	Telangana	125	50	85	45
Total		Telangana	825	330	605	275.4
Grand Total (Rabi)			4500	1800	4459	1926.9
Summer Season			No. of Demos	Area (ha)	No. of Demos	Area (ha)
1	Greengram	Telangana	150	60	124	50
Total		Telangana	150	60	124	50
Grand Total (Summer)			150	60	124	50
Grand Total			10075	4030	9047	3893.7

In Washim, the seed was treated with PSB + Rhizobium @ 250 gms/ 10kg seed and Tricoderma @ 5gms /kg seed and nutrients were applied 20:40:0 NPK as the NPK status was medium, low and high status. In Nanded(Sagroli) and Amaravathi(Durgapur) jurisdiction, in CFLD, yield of green gram was registered more than 1.1 tonnes/ha with 50% increase over farmers practice. The demonstrations are vitiated at Nanded (Pokharni area) due to heavy and continuous rains under heavy black soils & in Latur district due to moisture stress. Hence the data was not reported.

Table 2: Performance of Cluster FLDs on Black gram in Andhra Pradesh & Maharashtra (Kharif-Rainfed)2016-17

KVK	District District	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase in yield
				Demo	Check	
Banavasi	Kurnool(A.P) (((A>P)	LBG-752	20 (26)	9	6.80	32.35
Akola	Akola	AKU-15	20 (50)	8.55	5.20	64.42
Durgapur	Amaravati	AKU-15	10 (25)	11.45	7.50	52.66
VNMKV	Aurangabad	AKU-15	20 (50)	12.25	7.00	75
JalgaonJamod	Buldhana	AKU-15	10 (25)	9.25	4.50	105.6
Nandurbar	Nandurbar	AKU-15	10 (25)	6.52	4.25	53.4
Osmanabad	Osmanabad	AKU-15	10 (25)	8.77	7.80	12.4
Karda	Washim	AKU-15	20 (50)	12.23	10.52	16.25
Sagroli	Nanded	Vijay	20(50)	11.16	7.50	48.8
Pal	Jalagaon	TAU 1	10(25)	7.56	2.00	278
TOTAL/Wt.avg			150(351)	9.99	6.67	49.77

Green Gram :The cluster frontline demonstrations on greengram crop during *Kharif* 2016 were conducted in three states i.e. Andhra Pradesh, Telangana and Maharashtra states by 29 KVKs. A total of 1654 demonstrations were conducted covering 412 hectares area. The improved high yielding varieties viz., TM 96-2, LGG-460, IPM 02-03, BM 2003-02, Utkarsha along with recommended package of practices.

The data presented in Table 4 showed that in Prakasham district of A.P., with the use of variety TM 96-2 along with rhizobium, Trichoderma, soil test based nutrient application, plant protection imidachloprid, with trizophos, neem oil gave an average seed yield of 13.75 q/ha against local check of 9.5 q/ha with an increase in yield of 44.73 percent. The variety found tolerant to leaf spot. In Ananthapur (Kalyandurg) is crop failed due to long dry spell.

Table 3: Performance of Cluster FLDs on Green gram in Andhra Pradesh (Kharif-Rainfed)2016-17

KVK	District	Variety	Area(ha) / Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Yagantipally	Kurnool	LGG-460	20(30)	9.05	8.5	6.47
Darsi	Prakasam	TM-96-2	20(50)	13.75	9.5	44.73
RAAS	Chittoor	TM-96-2	20(32)	5.2	4.7	10.63
Pandirimamidi	East Godavari	WGG-42	10(25)	7.3	6.4	14.06
V.Gudem	West Godavari	WGG-42	40(119)	5	4	25
TOTAL/Wt.avg			110(261)	7.57	6.16	22.88

In Telangana, in greengram MGG-347 and WGG-42 varieties were demonstrated along with bio-fertilizers, NP & spraying of multi-k and plant protection measures. An average yield of 10.6 q/ha seed yield was recorded in Nizamabad district in medium black soils under rain fed situation with a highest of 16.0 q/ha. In Warangal (Malyal) area the average yield obtained was 9.1 q/ha under red soils under irrigated situation, (Table 4).

Table 4: Performance of Cluster FLDs on Green gram in Telangana (Kharif-Rain fed) 2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Rudrur	Nizamabad	MGG-347	20(50)	10.6	8.75	21.14
Malyal	Warangal	MGG-347	20(45)	9.10	6.50	40.00
Madanapuram	Mahabubnagar	WGG-42	8 (14)	10.21	6.69	52.61
Gaddipally	Nalgonda	WGG-42	20 (50)	8.90	7.28	22.25
Rangareddy	Ranga Reddy	WGG 42	4 (10)	7.66	6.00	27.66
Mamnoor	Warangal	WGG-42	20 (15)	7.50	6.80	10.29
TOTAL/Wt.avg			92 (184)	9.06	7.21	25.65

The variety WGG-42 a short duration (55-60 days) resistant to YMV was demonstrated in 4 districts in Telangana along with recommended package of practices. The average yields obtained at different locations under rainfed range from 7.5 to 10.21 q/ha giving an increase of 10.29 to 52 percent increase yields. In WGG-42 no incidence of YMV & sucking pest were observed even under dry spells.(Table-6).



In Maharashtra, BM 2003-02 &Utkarsha varieties along with bio-fertilizers, bio-pesticides, and plant protection measures in rainfed medium to deep black soils were demonstrated. The average yields recorded under demonstration ranged from 6.0 to 13.5 q/ha with highest yields of 13.5 q/ha with variety Utkarsha at Aurangabad. The variety utkarsha has synchronized maturity and less shattering. The variety BM 2003-02 also exhibited the potential of 12.45 q/ha average yields in Amravathi district followed by 11.25 q/ha in Osmanabad. The demonstrations in an area of 60 ha at Hingoli, Latur and Aurangabad (MGM) were given low yields due to weather aberrations. Hence the data was not included (Table 5).

Table 5: Performance of Cluster FLDs on Green gram in Maharashtra (Kharif-Rainfed) 2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over
				Demo	Check	
Akola	Akola	BM 2003-02	20(50)	7.19	5.50	30.72
Durgapur	Amaravati	BM 2003-02	20(50)	12.45	9.50	31.05
Ghatkhed	Amaravati	BM 2002-1	20(50)	8.17	2.01	306.5
Ambajogai	Beed	BM 2003-02	12(30)	10.13	6.50	55.84
JalgaonJamod	Buldhana	BM 2003-02	20(47)	8.08	4.25	90.11
Osmanabad	Osmanabad	BM 2003-02	10(25)	11.25	7.80	44.2
Karda	Washim	BM 2003-02	20(50)	9.94	7.75	28.25
VNMKV	Aurangabad	Utkarsha	20(50)	13.5	9.25	45.94
Ambajogai	Beed	Utkarsha	8 (20)	8.65	6.50	33.07
Pal (J)	Jalgaon	Utkarsha	10 (25)	7.62	2.50	204.8
Jalna	Jalna	Utkarsha	20(48)	7.28	6.25	16.48
Sagroli	Nanded	Utkarsha	20(50)	6.09	5.20	17.11
Nandurbar	Nandurbar	Utkarsha	10 (25)	7.11	6.00	18.5

Malegaon	Nasik	Utkarsha	10 (25)	8.94	6.20	44.19
Parbhani	Parbhani	Utkarsha	20(50)	8.91	6.00	48.5
Yavatmal	Yavatmal	Utkarsha	20(25)	9.4	7.15	31.4
Dhule	Dhule	IPM-02-03	20(50)	7.57	6.00	26.16
Pokharni	Nanded	Utkarsha	10(25)	7.2	4.50	60
TOTAL/Wt.avg			290 (695)	8.9	6.12	45.42

Demonstrations on improved varieties for Green gram in Beed district



Name : AmolChore
Variety : Utkasha
Village : Bhatumba



Name : JeevanJogdand
Variety : BM 2003-2
Village : Bhatumba



CFLD on Green gram at KVK, Kurnool

Redgram : The demonstration on redgram crop were conducted under irrigated and rainfed situation in all the three states i.e. Andhra Pradesh, Telangana & Maharashtra. In A.P., the improved varieties LRG-41 & 52, PRG-176 and hybrid ICPH-2740 were demonstrated along with bio-fertilizers rhizobium, PSB and bio-pesticides Trichodermaviridae and recommended fertilizers and plant protection measures. On an average, 16.24 q/ha been yield of redgram was harvested under irrigated situation. The highest yield of 18.37 q/ha was obtained with the use of hybrid ICPH-2740, a long duration variety compared to PRG-176, WRG-53 & 65,(Table 6).

Table 6: Performance of Cluster FLDs on Redgram in Andhra Pradesh (Kharif-Irrigated) 2016-17

KVK	District	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Lam	Guntur	LRG 41	20 (50)	14.65	12.85	14
Yagantipally	Kurnool	PRG-176 (24)	20 (17)	15.49	14.5	6.82
Darsi	Prakasam	LRG-52	20 (50)	16.5	11.25	46.67
Yagantipally	Kurnool	ICPH-2740	20 (24)	18.37	14.5	26.69
TOTAL/Wt.avg			80(141)	16.25	13.27	22.445

In Andhra Pradesh under rainfed situation across the locations the average yields recorded are 10.71 q/ha against the check yield of 8.59 q/ha. In rainfed situation also higher average yields of 18 & 17.5 q/ha was obtained in Vizianagaram and Krishna districts with LRG-41. The demonstrations are failed to an extent of 90 ha area at Anantapur (Kalyandurg & Reddipally), Kadapa, Chittoor (Kalikiri) and Vishakapatnam due to low rainfall & moisture stress at seedling stage (Table 7).

Table 7: Performance of Cluster FLDs on Redgram in Andhra Pradesh (Kharif-Rainfed) 2016-17

KVK	District	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase over
				Demo	Check	
RAAS	Chittoor	LRG-41	20(42)	6.63	3.75	76.8
Pandirimamidi	East godavari	LRG-41	30(75)	9.7	8.4	15.47
Garikapadu	Krishna	LRG 41	20(33)	17.5	16.25	7.69
R.K.Bai	Vizayanagaram	LRG-41	10(30)	18	12	50
Venkatramannagudem	West Godavari	LRG-41	20(50)	10	7.5	3.33
Banavasi	Kurnool	PRG-176	20(26)	7.2	6.25	15.2
Amudalavalasa	Srikakulam	LRG-52	10(18)	9.5	7	35.71
TOTAL/Wt.avg			130 (274)	10.71	8.59	24.67



In Telangana under irrigated situation, the highest average yields of pigeonpea was recorded with PRG-176 i.e.24.0 q/ha at Adilabad under cotton + redgram intercropping system 4:1 followed by Karimnagar 20.15 q/ha in pure crop situation. The varieties WRG-53 & 65 gave an average yield of 15-16 q/ha, (Table 8).

Table 8: Performance of Cluster FLDs on Redgram in Telangana (Kharif-Irrigated)2016-17

KVK	District	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Adilabad	Adilabad	PRG - 176	20(50)	24	22.5	6.67
Rangirikilla	Karimnagar	PRG - 176	20(35)	18.05	16.25	11.08
Jammikunta	Karimnagar	PRG-176	20(42)	20.15	14.7	37.07
Madanapuram	Mahabubnagar	PRG 176	7.6(14)	18.16	10.87	67.06
Gaddipally	Nalgonda	PRG-176	20(44)	15.01	12	25.08
Mamnoor	Warangal	PRG-176	20(39)	18	11.25	60
Malyal	Warangal	WRG-53	16(30)	15	10.3	45.63
Wyra	Khammam	WRG 65	20(30)	16	8.75	82.85
Malyal	Warangal	WRG-65	4(7)	12	10.3	16.5
TOTAL/Wt.avg			147.6 (291)	17.96	13.53	32.67

In Telangana, under rainfed situation, across the locations the average yield reported was 12.06 q/ha against 8.70 q/ha in farmers practice with PRG-176. The highest average yields recorded is at Nalgonda (Kampasagar) i.e. 14.37 q/ha followed by 13.75 q/ha, (Table 9).

Table 9: Performance of Cluster FLDs on Redgram in Telangana (Kharif-Rainfed)2016-17

KVK	District	Variety	Area(ha)/ Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Palem	Mahaboobnagar	PRG 176	20 (50)	13.75	12.5	10
Madanapuram	Mahabubnagar	PRG 176	12 (22)	8.94	4.75	88.21
DDS - KVK	Medak	PRG 176	10 (21)	12.18	9	35.33
Kampasagar	Nalgonda	PRG 176	20 (50)	14.37	10.4	38.17
Rangareddy	Ranga Reddy	PRG 176	20 (28)	9.86	5.4	82.59
TOTAL/Wt.avg			82 (171)	12.06	8.70	38.66

The average gross returns obtained in demonstration plots is Rs. 58893/ha and in farmers practice is Rs.43638/ha with a B.C.Ratio of 2.9 & 2.0.

In Maharashtra, the highest redgram yields under irrigated situation was recorded in Solapur i.e. 29.86 q/ha with variety BDN-711, dibbling, drip irrigation system in medium to heavy black soils followed by Ahmednagar (Dahigaon). In the demonstrations, under irrigated situation over the locations, 18.72 q/ha average seed yields was recorded against the check yield of 12.12 q/ha with an increase of 54.45 percent, (Table 10).

Table 10: Performance of Cluster FLDs on Redgram in Maharashtra (Kharif-Irrigated)2016-17

KVK	District	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Jalna	Jalna	BDN-711	20(50)	18.42	10.5	75.42
Dahigoan	Ahmednagar	BDN-711	20(44)	24.48	18.11	35.17
Ambajogai	Beed	BDN-711	20(50)	17.8	12.14	46.62
Khamgaon	Beed	BDN-711	20(50)	18.25	6	204.2
Solapur	Solapur	BDN-711	20(50)	29.86	12.5	138.9
Ghatkhed	Amaravati	PKV-TARA	20(50)	16.02	13.1	22.29
CICR Nagpur	Nagpur	PKV-TARA	20(50)	13.37	9	48.55
Selsure	Wardha	PKV-TARA	20(50)	16.85	15.65	7.66
Dhule	Dhule	Vipula	20(50)	16.05	14	14.64
Nandurbar	Nandurbar	PhuleRajeshwari	20(50)	16.49	9.85	67.41
Baramati	Pune	ICPH-2740	20(50)	18.38	12.5	47.04
TOTAL/Wt.avg			220 (544)	18.7245	12.123	54.46

In Maharashtra, under rainfed situation, over the locations, yields recorded are 12.8 q/ha against local check yield of 9.16 q/ha. Variety BDN-711 has given higher average yield of 17.5 & 16.35 q/ha in Aurangabad & Nanded districts in medium to heavy black soils (Table 11).

Table 11: Performance of Cluster FLDs on Redgram in Maharashtra (Kharif-Rainfed) 2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Hingoli	Hingoli	BDN-711	20(50)	11.68	9.22	26.68
Latur	Latur	BDN-711	20(36)	7.97	6.9	15.5
VNMKV	Aurangabad	BDN-711	20(50)	17.5	14.63	19.61
MGM	Aurangabad	BDN-711	20(68)	9.88	9.17	7.74
Pokharni	Nanded	BDN-711	20(50)	16.35	11.75	39.14
Sagroli	Nanded	BDN-711	20(50)	7.81	6.6	18.33
Osmanabad	Osmanabad	BDN-711	20(50)	16.01	10	60.1
Parbhani	Parbhani	BDN-711	20(50)	13.26	6	121
Karad	Satara	BDN-711	20(47)	15	6	150
Karda	Washim	BDN 708	20(50)	11.04	9.7	13.81
Akola	Akola	PKV-TARA	40(100)	13.38	7.5	78.4
Durgapur	Amaravati	PKV-TARA	20(47)	14.67	13.12	11.81
ARS	Buldhana	PKV-TARA	20(50)	15.9	9	76.67
JalgaonJamod	Buldhana	PKV-TARA	20(50)	12.5	9	38.88
Gadchiroli	Gadchiroli	PKV-TARA	20(50)	13.275	10.25	29.51
Yavatmal	Yavatmal	PKV-TARA	20(50)	10.65	9.35	13.9
TOTAL/Wt.avg			347.2 (848)	12.89	9.16	40.77

Cluster Frontline demonstrations on Pulses 2016-17 of Rabi Season

Bengalgram :Cluster Front Line Demonstrations on Bengalgram was organized by KVKs in Andhra Pradesh, Telangana and Maharashtra both under irrigated and rainfed situations. In A.P. in demonstrations the average yields obtained under rainfed situation is 9.21 q/ha against farmers practice of 8.72 q/ha. The low yields are due to non-receipt of rains during cropping season (*rabi*) and lack of sufficient moisture,(Table 12). But under irrigated condition the average yields recorded in demonstrations is 17.9 q/ha against check yield of 11.86 q/ha (Table:13). Varieties NBeG-3, 47 & 49 were demonstrated along with bio-fertilizer, bio-pesticides, and need based plant protection. NBeG-3 gave an average yield of 11.0 q/ha under rainfed and 13.5 q/ha under irrigated situation. Variety NBeG-49 has given an highest average yield of 25.0 q/ha under irrigated situation and NBeG-47 which is suitable for mechanical harvest yielded 15.6 q/ha.

Table 12: Performance of Cluster FLDs on Bengalgram in Andhra Pradesh (Rabi-Rainfed) 2016-17

KVK	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase over existing
			Demo	Check	
Utukur	NBeG -47	20(43)	8.68	8.5	2.11
Banavasi	NBeG-3	20(26)	8.42	7.6	10.78
Yagantipally	NBeG-3	15(18)	11	10.5	4.76
TOTAL/Wt.avg		55 (87)	9.21	8.72	5.74

Table 13: Performance of Cluster FLDs on Bengalgram in Andhra Pradesh (Rabi-Irrigated) 2016-17

KVK	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase over existing
			Demo	Check	
Yagantipally	NBeG-3	9(13)	13.5	11.25	20
Darsi	NBeG-49	10(25)	25	11.5	117.39
Yagantipally	NBeG -49	6(7)	17.5	13.2	32.57
Darsi	NBeG -47	10(25)	15.6	11.5	35.65
TOTAL/Wt.avg		35(70)	17.9	11.86	51.40

In Maharashtra, the chickpea yields under demonstrations in rainfed situation registered an average of 9.0 q/ha where as the irrigated demonstrations recorded an average of 18.68 q/ha against check yield of 12.64 q/ha with an increase of 47.81 percent. The highest average yields of 25.27 q/ha was obtained in Solapur district with variety Digvijay, drip, fertigation and improved package. At 17 locations more than 2 tonnes average yield /ha was recorded in the demonstrations. Both varieties Digvijay and Jaki 9218 performed well under demonstrations (Table 14).

Table 14: Performance of Cluster FLDs on Bengalgram in Maharashtra (Rabi-Rainfed)2016-17

KVK	District	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Durgapur	Amaravati	Digvijay	30(67)	7.34	6.23	17.82
Mohal	Solapur	Digvijay	30(55)	6.65	3.12	113.14
Sangli	Sangli	Digvijay	20(25)	10.6	8.86	19.63
MGM	Aurangabad	Digvijay	20(88)	9.85	8	23.12
Gadchiroli	Gadchiroli	JAKI 9218	16(40)	12.35	8.8	40.34
Gondia	Gondia	JAKI 9218	20(50)	8.7	7.4	17.56
Sindewahi	Chandrapur	JAKI 9218	16(40)	10.6	7.2	47.22
TOTAL/Wt.avg			152 (365)	9.01	6.72	34.08

Table 15: Performance of Cluster FLDs on Bengalgram in Maharashtra (Rabi-Irrigated)2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over
				Demo	Check	
Ambajogai	Beed	Akash	30(75)	21	11.6	81.03
Khamgaon	Beed	Akash	20(50)	13.99	6	133.16
Latur	Latur	Akash	40(50)	15.97	11.15	43.22
Osmanabad	Osmanabad	Akash	30(75)	15.78	14.48	8.97
Dahigoan	Ahmednagar	Digvijay	40(98)	18.1	12.97	39.55
Ghatkhed	Amaravati	Digvijay	30(75)	23.62	19.3	22.38
JalgaonJamod	Buldhana	Digvijay	20(50)	20.26	15.7	29.04
Dhule	Dhule	Digvijay	20(50)	19.77	11	79.72
Hingoli	Hingoli	Digvijay	30(75)	24.47	19.26	27.05
Mumrabad	Jalgaon	Digvijay	40(88)	15.58	10.1	54.25
Pal (J)	Jalgaon	Digvijay	30(75)	20.74	16	29.62
Jalna	Jalna	Digvijay	30.6(84)	15.35	10.8	42.12
Kolhapur	Kolhapur	Digvijay	39.3(115)	25.18	13	93.69
Malegaon	Nasik	Digvijay	20(100)	21.27	16.45	29.3
YCMOU	Nasik	Digvijay	20(43)	11.23	5	124.6
Baramati	Pune	Digvijay	30(70)	22.48	15.99	40.58
Narayangaon	Pune	Digvijay	20(56)	25.09	17.4	44.19
Boargaon	Satara	Digvijay	20(51)	19.95	10	99.5
Karad	Satara	Digvijay	30(115)	18	12	50
Solapur	Solapur	Digvijay	20(50)	25.27	13.73	84.04
Karda	Washim	Digvijay	40(100)	14.02	12.11	15.77
Babhaleshwar	Ahmednagar	JAKI 9218	20(50)	20.45	14.9	37.24

Akola	Akola	JAKI 9218	27(68)	22.28	5.2	328.46
Akola	Akola	JAKI 9218	13(32)	20.64	5.2	296.92
VNMKV	Aurangabad	JAKI 9218	20(50)	14.25	12	18.75
Sakoli	Bhandara	JAKI 9218	20(50)	13.2	11.04	19.56
ARS	Buldhana	JAKI 9218	18(45)	21.2	14	51.4
CICR Nagpur	Nagpur	JAKI 9218	20(50)	20.69	15.6	32.62
Pokharni	Nanded	JAKI 9218	20(45)	17.5	12.5	40
Sagroli	Nanded	JAKI 9218	20(50)	14.4	12.4	16.13
Nandurbar	Nandurbar	JAKI 9218	30(75)	14.02	9.79	43.2
Parbhani	Parbhani	JAKI 9218	30(75)	14.13	10.35	36.51
Selsure	Wardha	JAKI 9218	14(35)	19.94	18.4	8.36
Yavatmal	Yavatmal	JAKI 9218	14.8(37)	20.5	14.64	40.02
TOTAL/Wt.avg			866.7 (2207)	18.66	12.63	47.78

In Telangana, the bengalgram demonstrations were organized under irrigated situation with improved varieties NBeG-3 and NBeG-49 and package of practices. The average yields recorded with demonstrations over the locations are 17.94 q/ha against the check yields of 12.73 q/ha. The average yields of NBeG-3 are higher than the NBeG-49.

Table 16: Performance of Cluster FLDs on Bengalgram in Telangana (Rabi-Irrigated) 2016-17

KVK	District	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase over ...
				Demo	Check	
Adilabad	Adilabad	NBeG-3	20(25)	17.5	16.25	7.69
Ramgirikilla	Karimnagar	NBeG-3	21.6(39)	21.6	9.6	18.75
Madanapuram	Mahabubnagar	NBeG-3	14.4(33)	16.8	12.69	32.38
Rudrur	Nizamabad	NBeG-3	20(50)	18.78	13.78	36.28
Rangareddy	Ranga Reddy	NBeG-3	14(35)	17.5	13.5	29.62
Malyal	Warangal	NBeG-3	13.6(28)	18.3	15.4	18.8
Mamnoor	Warangal	NBeG-3	8(20)	16.8	10.8	55.55
DDS - KVK	Medak	NBeG-49	16.8(32)	14.37	9.5	51.26
TOTAL/Wt.avg			128.4 (262)	17.94	12.73	40.89

Blackgram : In Andhra Pradesh, in rabiblackgram demonstrations were laid out with improved varieties viz., LBG-752, TBG-104, MASH-338, LBG-787 along with improved package of practices. The average yields in rabirainfed / residual moisture condition recorded are 10.55 q/ha against local check yield of 8.14 q/h with an increase of 29.58 percent, (Table 17).

Table 17: Performance of Cluster FLDs on Blackgram in Andhra Pradesh (Rabi-Rainfed) 2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Ghantasala	Krishna	LBG-752	40(86)	9.75	8.75	11.42
R.K.Bai	Vizayanagaram	LBG-752	10(43)	12.56	7.7	63.11
Pandirimamidi	East godavari	MASH-338	30(75)	10.9	8.2	32.92
Lam	Guntur	TBG-104	20(50)	12.85	8.7	47.7
Utukur	Kadapa	TBG-104	20(25)	8.32	6.5	28
TOTAL/Wt.avg			120 (279)	10.55	8.14	29.58

In Irrigated situation the demonstrations yields in blackgram, over the location recorded are 16.74 q/ha as compared to existing yield of 13.03 q/ha with seed treatment with manozeb and

imidachloprid, 23kgN, 57kgP & timely plant protection against whitefly, maruca and powdery mildew (Table 18).

Table 18: Performance of Cluster FLDs on Blackgram in Andhra Pradesh (Rabi-Irrigated)2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Yagantipally	Kurnool	LBG-787	18(33)	23	19.5	17.9
Banavasi	Kurnool	LBG-787	20(26)	10.5	7.3	43.8
Yagantipally	Kurnool	MASH-114	4(9)	23	19.5	17.9
RAAS	Chittoor	TBG-104	27.2(52)	14.88	6.25	138.08
Garikapadu	Krishna	TBG-104	20(43)	14.59	11.5	26.86
Yagantipally	Kurnool	TBG-104	18(31)	21.78	21.5	1.3
Darsi	Prakasam	TBG-104	20(40)	16.25	10.7	51.86
Undi	West Godavari	TBG-104	20(39)	9.97	8	24.62
TOTAL/Wt.avg			147.2 (273)	16.74	13.03	40.29

In Telangana the blackgram demonstrations are conducted in Nizambad under rainfed condition and in Khammam under irrigated situation with varieties LBG-787 and PU-31. An average yield of 9.9 and 13.0 q/ha was recorded in the demonstrations, (Table 19).

Table 19: Performance of Cluster FLDs on Blackgram in Telanagana (Rabi-Rainfed& Irrigated) 2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Rudrur (Rainfed)	Nizamabad	LBG-787	20(34)	9.9	4	147.5
Wyra(Irrigated)	Khammam	PU-31	10(14)	13	10	30

Greengram:

In Andhra Pradesh during *rabi* demonstrations the average yields obtained under irrigated situation, in Chittoor district is 16q/ha,(Table-20)with WGG-42 a short duration high yielding variety and other package of practices. In Andhra Pradesh under rainfed situation, an average yield of 6.88 q/h was recorded with a highest of 12.8 q/ha in Vizianagaramdistrict(Table 21).

Table 20: Performance of Cluster FLDs on Greengram in Andhra Pradesh (Rabi-Irrigated)2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Nellore	Nellore	IPM-2-14	20(33)	7.79	4.96	57.05
RAAS	Chittoor	WGG-42	16.8(21)	16	4.7	240.42
TOTAL/Wt.avg			36.8 (54)	11.53	4.84	138.3

Table 21: Performance of Cluster FLDs on Greengram in Andhra Pradesh (Rabi-Rainfed)2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Amudalavalasa	Srikakulam	LGG-460	20(47)	5.51	4.2	31.19
R.K.Bai	Vizayanagaram	LGG-460	10(25)	12.8	7.12	79.77
Kalikiri	Chittoor	WGG-42	20(50)	7.23	6.13	17.9
Vishakapatnam	Vishakapatnam	WGG-42	20(51)	4.96	3.56	39.32
TOTAL/Wt.avg			70 (173)	6.88	4.99	38.11

In Telangana, in *Summer* season, the average yields of demonstrations of greengram obtained under irrigation condition are 10.01 q/ha against the control yield of 8.16 q/ha. The highest average yield of 15.1 q/ha was recorded at Warangal(Malyal) with MGG-347 against the check yield of 12.3q/ha(Table 22).

Table 22: Performance of Cluster FLDs on Greengram in Telangana (Rabi-Summer Irrigated) 2016-17

KVK Rabi	District	Variety	Area(ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Malyal	Warangal	MGG-347	20(43)	15.1	12.3	22.7
Wyra	Khammam	WGG-42	28.4(37)	9.51	8.75	8.68
Mamnoor	Warangal	WGG-42	16(40)	6.3	5.2	21
		TOTAL/Wt.avg	64.4(120)	10.3	8.8	17.04
<i>Summer</i>						
Jammikunta	Karimnagar	WGG-42	40(100)	9.31	6.86	35.71

Redgram :

In Telangana, in rabi redgram demonstration were introduced under irrigated conditions with LRG-41 variety and improved package of practices. An average yield of 17.25 q/ha was recorded against check yield of 14.17 q/ha with an increase of 21.76 percent,(Table 23).

Table 23: Performance of Cluster FLDs on Redgram in Telangana (Rabi-Irrigated) 2016-17

KVK	District	Variety	Area (ha) /Demo No	Av. Yield q/ha		% increase over existing
				Demo	Check	
Gaddipally	Nalgonda	LRG-41	8(20)	19.9	17.98	10.6
Kampasagar	Nalgonda	LRG-41	20(50)	16.2	12.65	28.06
		TOTAL/Wt.avg	28 (70)	17.25	14.17	21.76



7

ICAR-ATARI, JODHPUR, ZONE – VI

(Rajasthan and Gujrat)

India is the largest producer and consumer of pulses. Pulses are rich source of protein and occupy a unique place in the world of agriculture by its high protein content, which is almost double than that of cereals. At the time when, the government is striving to increase the pulse production, ICAR has taken the initiative to augment pulse production and productivity in the country by conducting nationwide cluster frontline demonstrations through 669 Krishi Vigyan Kendra across the country. Under, ICAR-ATARI, 72 KVKs were involved to demonstrate best practices and proven technological packages of pulses for higher productivity and profitability. The initiatives in form of a collaborative project “Cluster Frontline Demonstration on Pulses” since October 2015 under National Food Security Mission with financial assistance of Department of Agriculture, Cooperation & Farmers Welfare, GOI, New Delhi has shown encouraging results. This gives us hope to break yield plateau resulting in production of sufficient quantity of pulses to meet per capita availability of pulses for ensuring nutritional security and agro-ecological sustainability. The results of cluster frontline demonstration have been encouraging compared to existing practices.

Cluster Frontline Demonstrations on Pulses Production Technology were implemented through a network of KVKs since October 2015. Total 57 KVKs including 31 KVKs from Rajasthan & 26 KVKs Gujarat are actively involved in conductance of Cluster FLDs. During 2016-17, a total of 7371 CFLDs were laid out in the 2793.8 ha area under different micro-farming situations of selected districts. In Rajasthan, 31 KVKs were actively involved in CFLDs during *Khharif*, *Rabi* and *summer* season while 26 KVKs of Gujarat demonstrated the production potentiality of pulses. The performance of Moth bean was highest in Bikaner district where the production under CFLDs was 7.60q/ha. CFLDs under green gram, KVK, Sikar obtained 12.54 q/ha followed by Tonk (12.35q/ha) and Patan district (9.20q/ha). The performance of CFLDs on Black gram was highest in Jhalawar district (13.34q/ha) followed by Baran (11.12 q/ha), Bharauch (10.05 q/ha) and Kheda (7.75 q/ha). The results of *Khharif* season pulses especially on pigeon pea indicate that Amreli reported 20.86 q/ha yield. Chickpea productivity was quite satisfactory during 2016-1-17 and it has been reported by KVK Baran (Rajasthan) that farmers obtained 24.30 q/ha and farmers of Porbandar (Gujarat) also got 20.84 q/ha yield during *Rabi* 2016-17.

For promotion of informal seed system to ensure seed availability of farmers preferred varieties at village level, selected farmers were mobilized farmers to keep 20-25% produce as seed for large scale multiplication and farmers to farmers' diffusion. Majority of farmers have followed and kept seeds of green gram, black gram, chick pea and seeds were used during *Rabi* 2016-17 and *summer* 2017 under different pulse crops.

A total of 65 training courses in diverse field were organised by the KVKs of Rajasthan and Gujarat state for skill development of 5716 farmers and farm women. Total 191 extension activities were organized by KVKs of Rajasthan while 130 activities were conducted by KVKs of Gujarat covering 9657 and 6098 farmers/farm women, respectively. To keep updated the nodal officers of KVKs, ICAR-ATARI, Jodhpur has organized two days workshop-cum-training on Pulse Production Technology, one day brainstorming meeting on Increasing *Khharif* Pulses Production, Two days workshop-cum-training on Pulse Production Technology and two days group meeting on pulses under National Food Security Mission.

Table 1: Achievements on pulses under ICAR-ATARI, Jodhpur.

S. No.	State	Season	Sanctioned		Implemented	
			Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
1.	Rajasthan (31 KVKs)	<i>Kharif</i>	1975	800.00	2024	769.20
		<i>Rabi</i>	2050	820.00	1971	800.40
		<i>Summer</i>	175	70.00	175	70.00
		Total	4225	1690.00	4170	1639.60
2.	Gujarat (26 KVKs)	<i>Kharif</i>	825	330.00	876	310.00
		<i>Rabi</i>	1075	430.00	1115	370.60
		<i>Summer</i>	1225	490.00	1160	428.00
		Total	3175	1250.00	3151	1108.60
	Zone Total	7400	2940.00	7321	2748.20	

During *kharif* 2016-17, 2900 CFLDs were organised on 1079.2 ha area (Table 2) on moth bean, green gram, black gram, and pigeon pea. Of the total CFLDs, 2024 were organised in Rajasthan state in 769.2 ha area while 876 CFLDs were conducted in 310 ha area

Table 2 Crop-wise achievements on pulses during *Kharif* 2016-17.

S. No.	State	Crops	Sanctioned		Implemented	
			Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
1.	Rajasthan (28 KVKs)	Moth bean	275	110.00	283	112.00
		Green gram	1050	420.00	1038	417.20
		Black gram	650	260.00	703	240.00
		Total	1975	790.00	2024	769.20
2.	Gujarat (14 KVKs)	Green gram	200	80.00	180	60.00
		Black gram	300	120.00	356	120.00
		Pigeon pea	375	150.00	340	130.00
		Total	875	350.00	876	310.00
Zone Total			2850	1140.00	2900	1079.20

In *Rabi* 2016, 31 KVKs from Rajasthan and 17 KVKs from Gujarat were actively involved in organization of CFLDs on chickpea, lentil and green gram (Table-3.4). A total of 3086 CFLDs were conducted in 1171 ha area in Rajasthan and Gujarat state. Under chick pea and lentil, 1971 CFLDs were laid out in 800.40 ha area by KVKs of Rajasthan. KVKs of Gujarat state conducted CFLDs in 370.60 ha area in chickpea and green gram.

Table 3 Yield Crop-wise achievements of on Pulses during *Rabi* 2016-17

S. No.	State	Crop	Sanctioned		Implemented	
			Demo	Area (ha)	Demo	Area (ha)
1	Rajasthan (31 KVKs)	Chickpea	1900	760.00	1921	780.40
		Lentil	150	60.00	50	20.00
		Total	2050	820.00	1971	800.40
2	Gujarat (17 KVKs)	Chickpea	975	390.00	1025	342.60
		Green gram	100	40.00	90	28.00
		Total	1075	430.00	1115	370.60
	Zone Total	3125	1250.00	3086	1171.00	

In *summer* 2017, 175 demonstrations on green gram were laid out in 70 ha by 3 KVKs in Rajasthan while 18 KVKs of Gujarat state organized 1160 CFLDs in 428.0 ha. Overall in *summer*, 1335 demonstrations covered the 498.0 ha area (Table 4).

Table 4 Achievements on pulses during *summer* 2017.

S. No.	State	Crop	Sanctioned		Implemented	
			Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
1.	Rajasthan (03)	Green gram	175	70.00	175	70.00
2.	Gujarat (18)	Green gram	1225	490.00	1160	428.00
Zone Total			1400	560.00	1335	498.00

3.2.1 Yield performance of Moth bean during *Kharif* 2016-17 in Rajasthan.

Moth bean is the major arid legume and is recognized for its twin tolerance to drought and heat. It is therefore, ultimate choice of marginal and sub-marginal farmers for realization of sustained production under the extreme hostile and harsh agro-climatic situations. Moth bean is an important *kharif* season legume crop of Western Rajasthan and occupies about 54% of the cultivated area under pulses in Rajasthan.

Table 5 Yield performance of Moth bean during *Kharif* 2016-17 in Rajasthan.

Agro-climatic Zone/Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs/ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
I c- Hyper arid and partially irrigated western plain (Arid)	Bikaner- I Churu- I	2.83 2.91	60.00	150	4.99	6.48	32.63	11759.00	17118.00	2.03	2.47
II a - Transitional plain of inland drainage	Nagaur	3.12	22.00	73	5.28	6.45	22.15	10650.00	16700.00	1.80	2.45
II b- Transitional plain of Luni basin (Semi-arid)	Pali	2.92	30.00	60	5.10	6.40	25.49	11000.00	15500.00	1.90	2.60

II a RMO-257, IIb CZM-2, Ic RMO-257 & CZM-2 State Average Yield: 3.84 q/ha. (2015-16).

Moth bean variety – RMO-257 at KVK Churu-I



During 2016-17, CFLDs on RMO-257, CZM-2, RMO-257 & CZM-2 varieties of Moth bean along with packages were demonstrated in 112 ha area by KVK, Nagaur, Pali, Bikaner-I, and Churu-I. A total of 283 demonstrations were laid out during *Kharif* season in Rajasthan (Table-3.6). During this season, 150 demonstrations of RMO-257 & CZM-2 varieties of Moth bean were conducted in Bikaner and Churu districts of hyper Arid Partial Irrigated Zone (I-c) on the area of 60 ha with average productivity of 6.48 q/ha. The yield recorded under these demonstrations was 32.63% higher

over local check. Average net returns from demonstrations was Rs.17118/ha which was found more than local check (Rs.11759/ha). The BC ratio of demonstrations was 2.47 against BC ratio of local check 2.03.

A total of 73 CFLDs on technological packages by involving RMO-257 variety of Moth bean were conducted in Nagaur district of transitional plain of inland drainage zone on area of 22 ha with average productivity of 6.45 q/ha. The yield recorded under these demonstrations was 22.15% higher

over local check. Average net returns from demonstrations was Rs.16700/ha which was found more than local check (Rs.10650 ha). The BC ratio of CFLDs was 2.45 against BC ratio of local check (1.80).

Moth bean variety – RMO-257 at KVK Bikaner-I (Raj.)



A total of 60 demonstrations of CZM-2 variety of Moth bean were laid out in Pali district of transitional plain of Luni basin (Semi-arid) (II b) on area of 30 ha with average productivity of 6.40 q/ha. The yield recorded under these demonstrations was 25.49 % higher over check. Average net returns from demonstrations was Rs.15500/ha which was found more than local check (Rs.11000/ha). The BC ratio of demonstrations was 2.60 against BC ratio of local check 1.90. The yield of CFLDs on moth bean crop

in these regions are much higher than state average production of moth bean (3.84q/ha).

The performance of moth bean varieties has been depicted in fig.1 where it ranged from 5.35 q/ha in Churu-I to 7.60 q/ha in Bikaner-I. Variety RMO-257 showed highest performance in Bikaner district (fig.2).

Fig. 1 Performance of Moth bean in Rajasthan

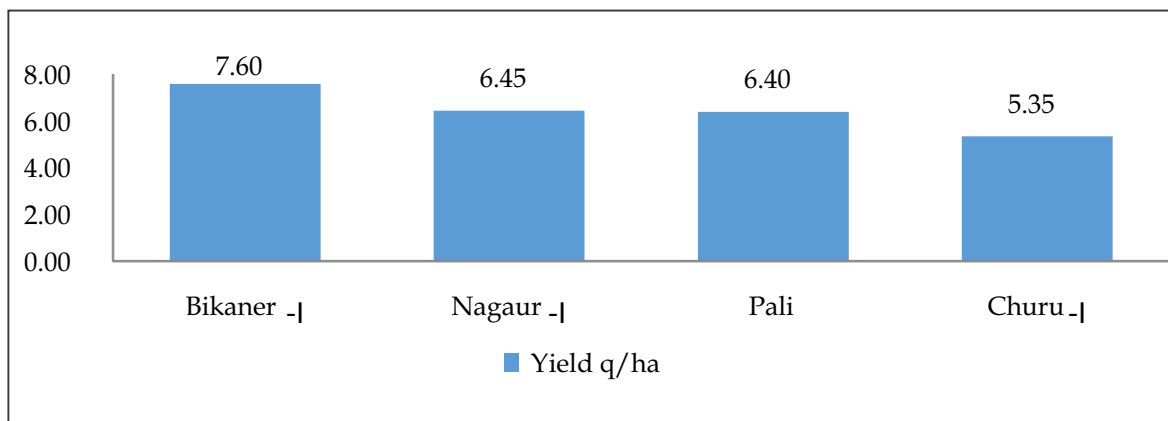
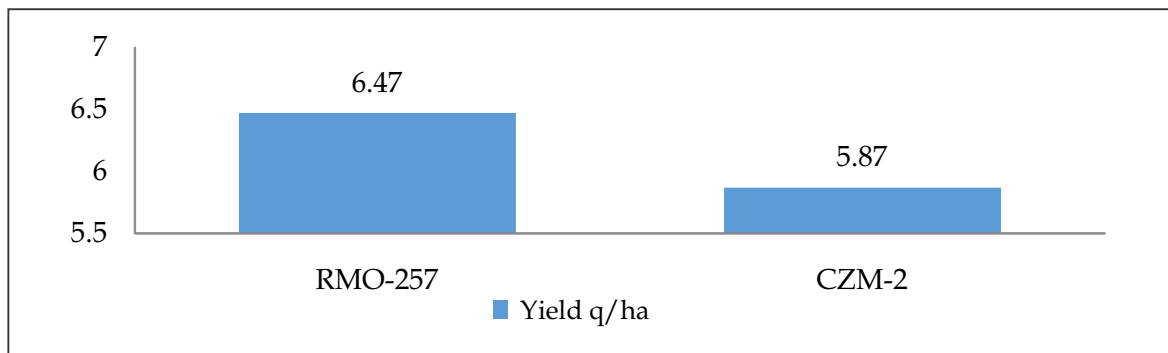


Fig. 2 Varietal performance of moth bean in Rajasthan



3.2.2 Yield performance of Green Gram during *Kharif* 2016-17 in Rajasthan.

Table 6 Performance of Green gram CFLDs during *Kharif* 2016-17 in Rajasthan

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
I a-Arid western plains zone (Arid)	Barmer-I	0.78	20.00	50	2.36	3.45	46.18	1012.00	4990.00	1.09	1.38
I b-Irrigated north western plain zone	Hanumangarh-I Sriganganagar	4.15	50.00	125	7.55	9.55	27.60	25788.00	34191.00	2.80	3.05
		5.31									
I c- Hyper arid & partially Irrigated western plain (Arid)	Bikaner-I	5.09	60.00	150	6.08	8.27	39.59	20320.00	29467.00	2.32	2.81
	Jaisalmer-I	5.02									
	Churu- I	2.20									
II a- Transitional plain of inland drainage (Semi arid)	Jhunjhunu Sikar	4.46	60.00	150	8.55	10.34	20.80	24951.00	31581.00	2.59	2.81
		3.10									

I a GM-4, I b IPM-02-03, MH-421, I c IPM-02-03, II a SML-668, IPM-02-03 State Average Yield: 4.38 q/ ha.

During 2016-17, 50 CFLDs on packages of technologies involving GM-4 variety of Green gram were conducted in Barmer district of Arid western plains zone on 20 ha area with average productivity of 3.45 q/ha (Table 3.7). The yield recorded under these CFLDs was 46.18% higher over local check. Average net returns from demonstrations was Rs. 4990/ha which was found more than local check (Rs.1012/ha). The BC ratio of demonstrations was 1.38 against BC ratio of local check 1.09.

A total of 125 demonstrations of IPM-02-03 and MH-421 varieties of Green gram were conducted in Hanumangarh and Sriganganagar district of Irrigated north western plain zone on area of 50 ha with an average productivity of 9.55 q/ha (Table 6). The yield recorded under these demonstrations was 27.60% higher over local check. Average net returns from CFLDs was Rs.34191/ha which was found more than local check (Rs. 25788/ha). The BC ratio of demonstrations was found 3.05 against BC ratio of local check 2.80.

A total of 150 CFLDs of IPM-02-03 variety of Green gram were conducted in Bikaner and Jaisalmer districts of hyper arid & partially irrigated western plain (Arid) zone on area of 60.00 ha with average productivity of 8.27 q/ha (Table 7). The yield recorded under these demonstrations was 39.59% higher over local check. Average net returns from demonstrations was Rs. 29467/ha which was found more than local check (Rs.20320/ha). The BC ratio of demonstrations was 2.81 against BC ratio of local check 2.32.

A total of 150 CFLDs on technological packages by using SML-668 and IPM-02-03 varieties of Green gram were conducted in Jhunjhunu and Sikar district of hyper arid & partially Irrigated western plain (Arid) zone on area of 60.00 ha with average productivity of 10.34 q/ha (Table 6). The yield recorded under these demonstrations was 20.80 % higher over local check. Average net returns from demonstrations was Rs. 31581.00/ha which was found more than local check (Rs.24951/ha). The BC ratio of demonstrations was 2.81 against BC ratio of local check 2.59.

Table 7 Yield performance of Green gram during *Kharif* 2016-17 in Rajasthan

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% Increase	Net Return		BCR	
					Check	Demo		Check	Demo	Check	Demo
II b - Transitional plain of Luni basin (Semi arid)	Sirohi Pali	4.88	40.00	130	6.13	10.94	87.37	18300.00	28133.00	1.70	2.90
		3.79									
III a - Semi arid eastern plain (Semi arid)	Ajmer Jaipur-I Tonk	5.17	80.00	175	7.45	9.61	28.95	19134.00	27445.00	1.89	2.20
		4.74									
		4.75									
III b - Flood prone eastern plain zone (Semi arid)	Bharatpur Karauli	4.44	40.00	100	6.50	8.55	31.50	18150.00	26850.00	2.35	2.89
		5.71									

II b GM-4, IPM-02-03, II a RMG-492, IPM-02-03 & III b SML-668, IPM-02-03 State Average Yield: 4.38q

Table 8 Yield performance of Green gram during Kharif 2016-17 in Rajasthan

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. Of Demo.	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
IV a - Sub humid southern plain & Aravalli hill zone	Bhilwara	1.23	20.00	50	4.24	5.72	34.90	13840.00	20820.00	1.20	1.50
V - Humid south eastern plain	Bundi Baran Sawai Madhopur	4.38 4.38 4.38	47.2	108	6.89	9.07	31.57	18025.00	29458.00	2.53	3.04

IV a - IPM-02-03, V - SML-668, IPM-02-03, RMG-492 State Average Yield: 4.38 q/ ha.

3.2.3 Yield performance of Green gram during Kharif 2016-17 in Gujarat

Technological practices were decided based on gap analysis between existing and recommended practices. Quality seeds of preferred varieties of green gram along with recommended packages were demonstrated at farmer's fields under different farms situations. Highest yield was reported by KVK Kutch-I (9.2 q/ha) followed by Amereli (8.55 q/ha) and Patan (7.75 q/ha) shown in Table 9. Farmers showed positive attitude and they have kept 30-40 per cent green gram produce as a seed for coming Kharif season (2017) large scale multiplication.

Table 9 Yield performance of Green gram during Kharif 2016-17 in Gujarat

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
North Saurashtra	Amreli	4.57	20.00	50	7.36	8.55	16.16	17884.00	26400.00	2.23	2.82
North Gujarat	Patan	4.49	20.00	50	6.12	7.75	26.63	16300.00	21500.00	2.58	2.98
North west	Kutch- I	3.35	20.00	50	7.6	9.2	21.05	27930.00	31750.00	2.01	2.22

North Saurashtra - GM-4, North Gujarat - GM-4, North west - GM-5 State Average Yield: 4.48 q/ ha.

3.2.4 Yield performance of black gram during Kharif 2016-17 in Rajasthan

Black gram is also important *kharif* pulse crop. Cluster Front Line Demonstrations were carried out at selected farmer's fields by respective KVK's during *kharif* 2016. In almost all districts, yield level was reported double in comparison to State average. Farmers have received maximum net return of Rs 56300/ha with B.C. ratio 4:11 in Humid South Eastern Plain Region of State (Table 10). There is tremendous scope of maximization of productivity of black gram in different parts of Rajasthan during rainy season.

Table 10 Yield performance of Black gram Organized during Kharif 2016-17 in Rajasthan

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
III a - Semi arid eastern plain	Tonk	5.49	20.00	50	7.90	10.95	38.60	34000.00	52300.00	2.61	3.27
IV a-Sub humid southern plain & Aravalli hill zone	Bhilwara Rajsamand Chittorgarh Partapgarh Udaipur	1.87 3.84 2.29 6.70 3.15	110.00	343	5.72	7.38	29.32	21708.00	31334.00	2.09	2.71
IV b - Humid southern plain	Banswara Dungarpur	3.23 5.29	40.00	150	4.5	7.01	63.94	15800.00	25171.00	1.70	2.28
V - Humid south eastern plain	Kota Jhalawar Baran	4.26 3.98 3.21	70.00	160	8.12	11.16	37.47	38000.00	56300.00	2.97	4.11

III a - PU-31, IV a - Azad-2, Azad-3, PU-31, IV b - Azad-3, PU-31, V - PU-31 State Average Yield: 3.84 q/ ha.

3.2.5 Yield performance of Black gram Organized during *Kharif* 2016-17 in Gujarat

Most preferred varieties with relevant and suitable technological packages were demonstrated at farmer's fields during *kharif* 2016 in selected districts of Gujarat. Yield variation was noticed in almost all Agro-Climatic Zone. Highest yield (7.59 q/h) was reported by KVK Mehasana but maximum percentage increase was obtained by farmers of Tapi district of South Gujarat (Table 11). Maximum net profit Rs 30,500/ha has been obtained in Mehasana. Farmers have kept seeds of preferred variety(s) for horizontal expansion during coming *Kharif* 2017.

Table 11 Yield performance of Black gram Organized during *Kharif* 2016-17 in Gujarat

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
South Gujarat heavy rainfall	Tapi	7.69	20.00	50	3.8	5.5	44.73	16800.00	21870.00	2.32	3.05
South Gujarat medium rainfall	Surat Kheda Bharuch	3.75 5.00 10.48	60.00	206	5.52	7.12	25.39	21500.00	28400.00	2.81	3.52
Middle Gujarat	Vadodara	8.41	20.00	50	5.20	7.12	36.92	20900.00	28130.00	2.70	3.42
North Gujarat	Mehsana	9.04	20.00	50	6.22	7.59	22.02	23890.00	30500.00	2.87	3.71

South Gujarat heavy rainfall-GU-1, South Gujarat medium rainfall-GU-1, PU-31, Middle Gujarat-MASH (KUG) -479, North Gujarat-GU-1 State Average Yield: 6.34q/



Black gram variety Mash-479: KVK Vadodara (Guj.) Black gram variety PU-31: KVK Kheda (Guj.)

3.2.6 Yield performance of Pigeon pea Organized during *Kharif* 2016-17 in Gujarat

Pigeon pea is one of the important pulse crops of *Kharif* season. Mostly medium duration varieties which mature 160-170 days are adopted by farmers in Gujarat State. Rainy season 2016-17 was quite favorable for pigeon pea. There was very less infestation of diseases and pod-borer in pigeon pea. Farmers obtained 20.82 q/ha yield in North Saurashtra Zone of Gujarat (Table 12). More over all districts reported better yield advantage in comparison to state and particular district. AGT-2 and Vaishali varieties have been assessed to be promising in the existing farming environment of different agro-ecological zones of Gujarat.

Table 12 Yield performance of Pigeon pea organized during *Kharif* 2016-17 in Gujarat

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Middle Gujarat Zone	Vadodra Panchmahal	12.61 19.14	40.00	100	10.80	14.55	35.31	33950.00	52790.00	2.74	3.59
North Gujarat Zone	Sabarkantha	11.56	20.00	50	10.00	12.70	27.00	21750.00	30500.00	2.05	2.36
South Gujarat medium rainfall	Bharuch Narmada	9.06 9.65	40.00	115	12.50	15.23	21.84	30150.00	56300.00	2.28	3.67
North saurashtra zone	Amreli Jamnagar	9.84 9.84	30.00	75	17.72	20.82	17.54	63883.00	80357.00	3.58	4.29

Middle Gujarat Zone-Vaishali, AGT-2, North Gujarat Zone-AGT-2, South Gujarat medium rainfall-Vaishali, North saurashtra zone-Vaishali State Average Yield: 11.85q/ ha

3.2.7 Yield performance of Chickpea during Rabi 2016-17 in Rajasthan (Zone wise)

Chickpea is most preferred pulse crop of *rabi* season of Rajasthan. Farmers are always eager to cultivate chickpea cultivation in almost districts of Rajasthan. But terminal droughts affect area/coverage of chickpea. Technological packages were finalized in active participation of farmers to conduct Cluster Front Line Demonstrations on chickpea during *rabi* 2016-17. Farmers contributed 25 to 30 percent costs of seeds of different varieties of chickpea. Maximum average yield (19 q/ha) reported in Transitional Plain of inland drainage zone followed by 16.08 q/ha irrigated north western plain zone (Table 13). Farmers have opined that they will continue application of accepted technological packages in coming season.

Table 13 Performance of Chickpea CFLDs during Rabi 2016-17 in Rajasthan

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
I a -Arid western plains zone (Arid)	Barmer- I	08.92	10.40	26	08.21	10.29	25.33	27577.00	37998.00	2.68	3.80
I b-Irrigated north western plain zone	Hanumangarh- I Sriganganagar	10.33 05.51	70.00	150	10.36	16.08	54.85	31866.00	65700.00	3.11	4.74
I c- Hyper arid and partially irrigated western plain (Arid)	Bikaner-I Jaisalmer-I Churu-I	12.50 10.50 03.72	80.00	195	11.79	15.94	35.43	40000.00	57245.00	2.97	3.46
II a - Transitional plain of inland drainage (Semi arid)	Jhunjhunu Sikar Nagaour- I Jaipur-I Tonk	04.83 12.11 10.42 07.76 11.55	110.00	225	15.51	19.03	22.68	56615.00	74345.00	3.22	3.76

I a – GNG-1581, I b - GNG- 1581, I c- GNG- 1581, GNG-663, & II a - GNG-1581 State Average Yield: 8.53 q/ ha

Table 14 Yield performance of Chickpea during Rabi 2016-17 in Rajasthan

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
II b – Transitional plain of Luni basin (Semi arid)	Sirohi Karauli Pali	06.82 17.00 13.50	60.00	150	13.93	17.83	27.82	42417.00	59767.00	3.25	3.73
III a – Semi arid eastern plain (Semi arid)	Dausa Ajmer	11.72 04.65	40.00	90	14.08	17.98	29.83	41500.00	58600.00	2.57	3.22
III b – Flood prone eastern plain zone (Semi arid)	Alwar-I Dholpur Bharatpur	10.48 14.28 12.42	60.00	154	14.66	18.23	24.22	42801.00	62400.00	2.81	3.41

II b - RSG-895 & GNG-1581 III a - GNG-1581 & III b - GNG- 1581 State Average Yield: 8.53 q/ ha



Chickpea variety GNG- 1581: KVK- Alwar-I (Raj.)



Chickpea variety RSG-895: KVK- Pali (Raj.)

It is clear from above table-3.15 that yield of chickpea could be increased by simple use of quality seeds of farmers preferred variety(s) in different agro-ecological zones of Rajasthan. Farmers were perceived that GNG-1581 variety is compatible with existing farming situations. Farmers obtained net profit of Rs. 62,400/- ha with B.C. ratio 3.41 in Flood prone eastern plain zone (Semi-arid). Farmers also briefed that productivity of chickpea is quite satisfactory during *rabi* 2016-17 as there was less attack of pod-borer in chickpea.

Table 15 Yield performance of Chickpea during *Rabi* 2016-17 in Rajasthan

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
IV a - Sub humid southern plain & Aravalli hill zone (Sub-humid)	Rajsamand Chittorgarh Pratapgarh Udaipur	10.00	130.00	317	13.92	18.16	30.52	47240.00	64770.00	3.04	3.44
		11.14									
		08.24									
		09.96									
IV b- Humid southern plain (Humid)	Banswara Bhilwara Dungarpur	11.40	80.00	249	10.74	17.39	67.06	28145.00	55388.00	2.19	2.90
		07.26									
		08.98									
V - Humid south eastern plain (Humid)	Kota Jhalawar S.Madhopur Bundi Baran	13.24	140.00	350	15.70	22.10	22.12	74039.00	92915.00	4.17	4.71
		10.09									
		11.00									
		11.30									
		14.53									

IV a - GNG- 1581, IV b - GNG- 1581, V- GNG-1958, PC-1, GNG- 1581 State Average Yield: 8.53 q/ ha.

Total 714.00 ha area was covered under Cluster Front Line Demonstration of chickpea during *rabi* 2016-17 in three important agro-ecological zones of Rajasthan (Table 15). Maximum yield advantages (22.12 q/ha) was reported by Humid south eastern region comprising Kota, Jhalawar, Swai Madhopur and Bundi districts. Farmers fetched net profit of Rs. 92915/- per ha with B.C. ratio 4.71. Farmers told that they get more than Rs. 1500/- market price in comparison to minimum support price of chickpea (Rs. 4000/quintal).

3.2.8 Yield performance of Lentil during *Rabi* 2016-17 in Rajasthan.

Table 16 Performance of Lentil CFLDs during *Rabi* 2016-17 in Rajasthan

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo.	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
III b - Flood prone eastern plain zone (Semi arid)	Bharatpur	10.54	20.00	50	10.36	12.72	22.78	36341.00	45400.00	2.15	3.45

III b- JL-3 State Average Yield: 8.53 q/ ha.



Lentil demonstrations were laid out by KVK Bharatpur during 2016-17 in 20.00 ha at 50 farmers' field. JL-3 variety along with technological packages was demonstrated at farmers' fields. Demonstration yield was 12.72 q/ha and there was 22.78 percent increase over local practice. Farmers obtained Rs. 45400/ha net profit under demonstrated technologies of lentil (Table 16).

3.2.9 Yield performance of Chickpea during Rabi 2016-17 in Gujarat (Zone wise).

Chickpea is also cultivated in Gujarat during *rabi* season. GJG-3, GC-3 are preferred varieties of farmers of Middle, South Gujarat medium and highest rainfall zones. Technological packages were advocated and demonstrated as per perception and demand of farmers of selected districts. Maximum 16.88 q/ha yield was found in middle Gujarat along with net profit 60244/ha (3.18). Farmers have readily accepted potentiality of technological packages and they will follow in next season.

Table 17 Performance of Chickpea CFLDs during Rabi 2016-17 in Gujarat

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo.	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
South Gujarat Heavy rainfall (Sub humid semi arid)	Valsad Kheda Navsari	11.80	82.00	320	9.99	12.41	25.96	37600.00	43760.00	3.12	3.52
		11.30									
		07.80									
South Gujarat medium rainfall (Sub humid semi arid)	Surat Bharuch Narmada	11.40	60.00	206	13.77	17.17	24.86	45200.00	62480.00	3.33	3.98
North Gujarat (Arid, semi arid)	Patan	05.15	20.00	50	11.20	14.40	28.57	36700.00	51400.00	2.66	3.12
Middle Gujarat	Panchmahal Dahod	06.50 07.67	35.00	85	10.58	16.88	61.07	40800.00	60244.00	2.97	3.82

South Gujarat Heavy rainfall - GJG- 3 (GJG 0207), South Gujarat medium rainfall- GJG-3 & North Gujarat- GC- 3, Middle Gujarat - GG-2 & CJG- 3 (GJG 0207) State Average Yield: 12.51 q/ ha.

Table 18 Yield performance of Chickpea during Rabi 2016-17 in Gujarat

Agro-climatic Zone/Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
North Saurashtra (Semi-arid)	Rajkot-I Jamnagar Amreli Surendranagar	11.00	100.00	250	15.59	18.57	20.23	59664.00	74990.00	3.65	4.25
		08.80									
		08.80									
		07.39									
South Saurasthara (Dry, Sub- humid)	Porbandar	12.41	8.00	20	11.05	20.84	88.60	32090.00	79000.00	2.39	4.13
Bhal and costal (Semi-arid)	Bhavnagar Ahmedabad	11.48	37.60	94	11.39	13.39	17.87	33363.00	43345.00	2.50	2.84
		07.09									

North Saurashtra- GJG-3 & GG-5, South Saurasthara- GJG-3 & Bhal and costal- GG-2 & GJG-3 State Average Yield: 12.51 q/ ha.

North Saurashtra (semi arid) zone is most potential for chickpea cultivation. Black cotton heavy clay soils are found in this zone and this type of soil is suitable for harnessing chickpea productivity. It is clear from above table that maximum yield (20.84 a/ha) was reported by KVK Porbandar followed by 18.57 q/ha by Rajkot, Jamnagar, Amreli and Surendranagar (Table 18). Farmers have accepted importance and utility of application of Resource Conservation Technologies especially in Amreli district of Gujarat. They have sown chickpea in ridges in which water requirement is less in comparison to general (flat) sowing of chickpea. Possibility of disease infestation is quite low. This indicates farmers' interest towards cultivation of chickpea during *rabi* season under available resources and existing micro-farming situations.

3.2.10 Yield performance of Green gram during summer 2017 in Rajasthan (Zone wise)

Table 19 Performance of Green gram CFLDs during summer 2017 in Rajasthan

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
IV a - Sub humid southern plain & Aravalli hill	Partapgarh	4.39	20.00	50	7.50	9.80	30.67	15830.00	25120.00	2.01	2.56
IV b- Humid southern plain (Humid)	Banswara	4.55	30.00	75	7.10	10.03	41.27	8900.00	20220.00	1.46	2.02
V - Humid south eastern plain (Humid)	Baran	4.30	20.00	50	6.18	8.28	33.98	10529.00	17034.000	1.73	2.03

IV a IPM 02-03, IV b- SML-668, V- IPM 02-03 State Average Yield: 4.38 q/ ha.

3.2.11 Yield performance of Green gram during Summer 2017 in Gujarat (Zone wise)

Table 20 Performance of Green gram CFLDs during Summer 2017 in Gujarat

Agro-climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs/ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Middle Gujarat	Panchmahal Anand Dahod Vadodara	4.45 5.50 5.34 5.80	110.00	275	7.32	9.46	30.06	12696.00	22192.00	1.62	1.97
South Gujarat Heavy rainfall	Dangs Valsad Navsari Tapi	4.85 5.32 5.58 5.27	74.00	310	5.64	7.44	32.53	15,144.25	25,655.75	2.08	2.65
South Gujarat medium rainfall	Surat Bharuch Narmada	5.21 5.73 5.00	60.00	143	22	9.69	28.46	16,714.00	26,996.00	2.01	2.50
North Gujarat	Banaskantha-I Sabarkantha Gandhi Nagar	7.00 6.75 5.50	80.00	193	8.66	11.11	35.77	15,940.67	27,738.33	1.75	2.36
North Saurashtra	Amreli	4.50	30.00	75	6.34	7.70	21.45	13,761.86	18,187.98	2.08	2.28
South Saurashtra	Junagadh Porbandar	4.87 4.51	34.00	85	10.19	12.64	26.21	20,750.00	32,992.50	1.95	2.67
Bhal and costal	Kheda Bhavnagar	5.51 5.48	40.00	79	7.40	9.60	30.37	14,757.95	22,718.60	1.74	1.98

Middle Gujarat-GAM-5, South Gujarat Heavy rainfall-GAM-5, IPM-99-125, Co-4 South Gujarat medium rainfall- IPM 99-125, GAM-5 North Gujarat- GAM-5, North Saurashtra- GM -4 South Saurashtra- GAM-5, GM-4 Bhal and costal-GAM-5 state average 5.70 q/ha.

4.1 Scenario and disposal pattern of chick pea production in Rajasthan.

Chickpea is the important pulse crop of *rabi* season of Rajasthan. There is wide fluctuation in area under chickpea mainly due to rainfall variation. In few years area under chickpea was reported 1.8 million ha to 2.00 million ha when rainfall was quite satisfactory during September and area was drastically reduced even below 1.00 million ha due to drought situation in September and onwards. There is potential to enhance productivity of chickpea under different micro-environment of potential districts of Rajasthan by adopting need based proven technological packages. Total 28 KVKs actively demonstrated different technological packages covering 513 ha area during *rabi* 2015-16. GNG-1581 is most preferred variety of chickpea and was used in 376 ha area under CFLDs during *rabi* 2015-16. Seeds of other varieties were also kept by partner farmers. Total 2432 quintals seeds of chickpea were used in 3229 ha area during *rabi* 2016-17 in selected districts of Rajasthan (Table-21).

Table-21 Scenario and disposal pattern of chickpea production (28 KVKs).

Sl. No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Used as seed during <i>rabi</i> 2016-17	Area covered during <i>rabi</i> 2016-17
1.	GNG-1581	376.05	5440.00	3350.00	1887.00	2510.00
2.	GNG-1958	67.00	871.00	525.00	190.00	254.00
3.	RSG-895	46.00	736.00	475.00	240.00	320.00
4.	RSG-896	24.00	360.00	210.00	115.00	155.00
	Total	513.05	7407.00	4560.00	2432.00	3239.00

4.1.1 Scenario and disposal pattern of green gram production in Rajasthan.

There is tremendous scope of cultivation of *summer* mung bean in Pratapgarh, Baran, Kota, and Banaswara districts of Rajasthan. Yellow Mosaic Virus resistant varieties were demonstrated in Pratapgarh and Baran district of Rajasthan during *summer* 2016. Farmers stored 75 quintals seeds of both varieties and they have used in 300.00 ha during *summer* 2017. Farmers have shown positive attitude towards promotion of informal seed system to ensure seed availability at village level.

Table: 22 Scenario and disposal pattern of Green gram production during summer, 2016 (2 KVKs).

Sl. No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Used as seed during summer 2016-17	Area covered during summer 2017
1.	IPM-2-3	10.00	112.00	70.00	30.00	120.00
2.	SML-668	26.00	217.50	153.00	45.00	180.00
Total		36.00	329.50	223.00	75.00	300.00

4.1.2 Scenario and disposal pattern of Green gram production during kharif 2016.

Green gram (Mung bean) is most preferred pulse crops of rainy season of Rajasthan state. More than 30% area of green gram of country is covered only in Rajasthan during *Kharif* season. Being short duration, majority of farmers prefer to cultivate green gram in their fields during rainy season. Total 417.20 ha area was covered under CFLD *Kharif* 2016 and farmers have kept quality seeds of IPM-02-03, IPM-02-14, GM-4 & SML-668 and coming *Kharif* (2017-18) multiplication and Farmers to Farmers diffusion & application.

Table-23 Scenario and disposal pattern of Green gram production during Kharif 2016 (9 KVKs)

S.No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Kept as seed for Kharif 2017-18	Area to be covered during Kharif 2017
1.	IPM-02-03	279.00	2790.00	1850.00	768.00	5120.00
2.	IPM-02-14	10.00	130.00	40.00	52.00	346.00
3.	GM-4	70.00	780.00	525.00	188.00	1253.00
4.	SML-668	55.20	571.00	382.00	150.00	1000.00
Total		417.2	4271.00	2797.00	1158.00	7719.00

4.1.4 Scenario and disposal pattern of moth bean production during kharif 2016.

Moth bean is one of the important arid pulse crop of rainy season of Rajasthan. It is mainly confined in Bikaner, Nagaur, Jodhpur, Jaisalmer & Barmer districts of Rajasthan. Cluster Front Line Demonstrations were conducted in 112.00 ha area by involving improved technological packages. Farmers kept 195.00 quintals as seeds of RMO-257 and CZM-2 and same will be used in 1300.00 ha area during *Kharif*, 2017 in selected districts (Table 24).

Table-24 Scenario and disposal pattern of Moth bean production (4 KVKs).

S.No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Kept as seed for Kharif 2017-18	Area to be covered during Kharif 2017
1.	RMO-257	72.00	648.00	500.00	85.00	567.00
2.	CZM-2	40.00	350.00	218.00	110.00	733.00
Total		112.00	998.00	718.00	195.00	1300.00

4.1.5 Scenario and disposal pattern of black gram production during kharif 2016.

Urd bean (black gram) is also cultivated in rainy season in different parts of Rajasthan. Total 240.00 ha area was under CFLDs during *Kharif* 2016 and farmers have been mobilized to keep at least 30-35 percent produce as seeds of improved variety (s) of urd bean. Farmers have kept 679.00 quintals of PU-31, Azad-2 and Azad-3 varieties of black gram. Total 4526.00 ha is expected to be covered under improved varieties in coming *Kharif*, 2017.

Table-25 Scenario and disposal pattern of Black gram production (11 KVKs).

S.No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Kept as seed for Kharif 2017-18	Area to be covered during Kharif 2017
1.	PU-31	175.00	1780.00	1130.00	512.00	3413.00
2.	Azad-2 (KU-91)	20.00	215.00	170.00	42.00	280.00
3.	Azad-3 (KU-96-3)	45.00	510.00	376.00	125.00	833.00
Total		240.00	2505.00	1676.00	679.00	4526.00

4.1.6 Scenario and disposal pattern of chick pea production during *rabi*, 2016.

As chickpea is major *rabi* pulse crop of Rajasthan and out of 33 districts 25 districts with active involvement of 31 KVKs of Rajasthan were under covered CFLDs (Table-26). Total 780.00 ha area were covered during *rabi* 2016-17. Farmers have kept 3750.00 quintals seeds of GNG-1581, GNG-1958, GNG-669 and RSG-895 and as per report majority of farmers have committed to use seeds in next *rabi* 2017-18 in 5000.00 ha area.

Table-26 Scenario and disposal pattern of chickpea production (31 KVKs).

Sl. No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Kept as seed for <i>rabi</i> 2017-18	Area to be covered during <i>rabi</i> 2017-18
1.	GNG-1581	620.40	9920.00	565.00	3150.00	4200.00
2.	GNG-1958	110.00	1880.00	1340.00	328.00	434.00
3.	GNG-663	30.00	440.00	221.00	146.00	195.00
4.	RSG-895	20.00	312.00	170.00	125.00	165.00
Total		780.40	12552.00	2296.00	3749.00	4994.00

4.2 Scenario and disposal pattern of pulses in Gujarat.

Chickpea is cultivated in South and Sourashtra Gujarat during *rabi* season. Eleven KVKs laid out CFLDs on chickpea during *rabi* 2015-16 in 218.00 ha area. Farmers used 877.00 quintals as seeds of three varieties of chickpea in 1169.00 ha area during *rabi* 2016-17. This indicates that farmers could be mobilized for promotion of formal as well as informal seed system (s) for ensuring availability of quality seeds of chickpea at village level.

4.2.1 Scenario and disposal pattern of chick pea production in Gujarat.

CFLDs on chick pea covered 218.50 ha area in Gujarat state which produced 3058 q seeds. Of the total production, 1932 q seed sold as grain while 877q have been used as seed during *rabi* 2016-17 which covered 1169 ha area as depicted in table-27.

Table 27 Scenario and disposal pattern of chickpea production (11 KVKs).

Sl. No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Used as seed during <i>rabi</i> 2016-17	Area Covered during <i>rabi</i> 2016-17
1	GG-2	72.50	1080.00	670.00	295.00	393.50
2	GG-3	106.00	1378.00	920.00	320.00	426.50
3	GG-5	40.00	600.00	342.00	262.00	349.00
Total		218.50	3058.00	1932.00	877.00	1169.00

4.2.2 Scenario and disposal pattern of Green gram production in Gujarat.

Green gram is mainly cultivated as *spring/summer* season crop in Gujarat state. Whole package demonstrations were carried out in 331.00 ha area by 15 KVKs during *summer* 2016. Farmers have used 1036.00 quintals seed of green gram in 4144.00 ha area during *summer* 2017 in the selected villages and neighboring villages of identified districts of Gujarat.

Table 28 Scenario and disposal pattern of Green gram production (15 KVKs).

Sl. No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Used as seed during <i>summer</i> 2016-17	Area covered during <i>summer</i> 2017
1.	GM-4	129.00	1310.00	780.00	430.00	1720.00
2.	GM-5	61.30	717.00	510.00	185.00	740.00
3.	Meha (IPM-99-125)	115.00	1216.00	690.00	325.00	1300.00
4.	SML-668	26.00	272.00	160.00	96.00	384.00
Total		331.30	3515.00	2140.00	1036.00	4144.00

4.2.3 Scenario and disposal pattern of Green gram production in Gujarat.

Green gram (*Vigna radiata*) is also cultivated in rainy season in low rainfall region of Gujarat. Three KVKs organized 60.00 ha demonstrations and two varieties GM-4 and GM-5 were used during *Kharif* 2016. Farmers have kept 285.00 quintals seeds and it is expected that farmers will use the same in 1887.00 ha area in coming *Kharif* 2017.

Table-29 Scenario and disposal pattern of Green gram production (3KVKs).

Sl. No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Kept as seed for <i>Kharif</i> 2017-18	Area to be covered during <i>Kharif</i> 2017
1.	GM-4	40.00	355.00	215.00	95.00	620.00
2.	GM-5	20.00	367.00	156.00	190.00	1267.00
Total		60.00	722.00	371.00	285.00	1887.00

4.2.3 Scenario and disposal pattern of pigeon pea production in Gujarat.

Pigeon pea is cultivated in both South and North Gujarat. Medium duration pigeon pea is mainly grown which matures in 160-165 days. Two varieties of pigeon pea were demonstrated in 130.00 ha during *Kharif*, 2016. Farmers have been motivated and mobilized to cultivate pigeon pea and maintain minimum seed production norms as pigeon pea is often cross pollinated crop. Farmers have stored 354.00 quintals seeds of vaishali & AGT-2 varieties of pigeon pea and they have assured that more than 2300.00 ha area will be covered during rainy season 2017-18.

Table-30 Scenario and disposal pattern of Pigeon pea production (17 KVKs).

Sl. No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Kept as seed for <i>Kharif</i> 2017-18	Area to be covered during <i>Kharif</i> , 2017
1.	Vaishali (BSMR-853)	82.30	1238.00	1040.00	146.00	974.00
2.	AGT-2	47.70	390.00	425.00	208.00	1385.00
Total		130.00	1628.00	1465.00	354.00	2359.00

4.2.5 Scenario and disposal pattern of black gram production in Gujarat.

Black gram is also grown in *Kharif* season in different part of Gujarat. Six KVKs actively conducted CFLDs on Urd bean during rainy season 2016. PU-31 and GU-1 varieties of black gram were used in these demonstrations. Total 240.00 quintals seeds of three varieties have been kept by farmers. Farmers have assured that seeds will be used in 1600.00 ha in coming rainy season 2017.

Table-31 Scenario and disposal pattern of Black gram production (6 KVKs).

Sl. No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Kept as seed for <i>Kharif</i> 2017-18	Area to be covered during <i>Kharif</i> 2017
1.	PU-31	20.00	190.00	115.00	35.00	235.00
2.	GU-1	80.00	740.00	530.00	160.00	1066.00
3.	MASH-479 (KUG-479)	20.00	215.00	160.00	45.00	300.00
Total		120.00	1145.00	805.00	240.00	1601.00

1.2.6 Scenario and disposal pattern of chick pea production in Gujarat.

Farmers of Sourashtra & South Gujarat have kept 1540.00 quintals seeds of GG-2, GG-5 and GJG-3 varieties of chickpea. Farmers will multiply seeds of three varieties of chickpea in 2052.00 ha area in next *rabi* 2017-18 under different micro-farming situations.

Table-32 Scenario and disposal pattern of chickpea production (16 KVKs).

Sl. No.	Variety	Area (ha.)	Total production (q)	Sold as grain (q)	Kept as seed for <i>rabi</i> 2017-18	Area to be covered during <i>rabi</i> 2017-18
1.	GG-2	45.00	675.00	430.00	185.00	244.00
2.	GG-5	80.00	1240.00	870.00	235.00	314.00
3.	GJG-3	217.60	3340.00	1960.00	1120.00	1494.00
Total		342.60	5255.00	3260.00	1540.00	2052.00

4.3 Follow up of Technological Packages

4.3.1 Follow up of Technological Packages during *Rabi* 2016-17.

Accessibility, suitability, replicability, applicability of different technological packages are foremost requirement of any outreach programme. Front Line Demonstrations were carried out with active collaboration of farmers and KVK Scientists of selected districts of Rajasthan & Gujarat. CFLDs on Pulses have been started since *rabi* 2015-16 under National Food Security Mission. Major Pulses demonstrated under CFLD during *rabi* 2015-16 were chickpea in Rajasthan & Gujarat (Table-33). Total 2005 demonstrations by involving 1328 in Rajasthan 677 in Gujarat were laid out on chickpea crop by 39 KVKs. It has been noticed that 1633 farmers have used all the technological packages in 1143.00 ha area during *rabi* 2016-17 under chickpea crop. 1894 farmers partially adopted proven technological packages in 1282.00 ha during *rabi* 2016-17 in selected and neighboring villages.

Table-33 Follow up technological packages during *Rabi* 2016-17.

Sl. No.	State	Crop	No. of Demonstration laid out during <i>Rabi</i> 2015-16	No. of KVKs	Full follow up during 2016-17		Partial follow up (2016-17)	
					No. of farmers	Area (ha.)	No. of farmers	Area (ha.)
1	Rajasthan	Chickpea	1328	28	1103	854.20	1449	1056.20
2	Gujarat	Chickpea	677	11	530	289.60	445	226.00
Total			2005	39	1633	1143.80	1894	1282.20

4.3.2 Follow up of Technological Packages during *summer*, 2016-17.

Summer green gram was demonstrated at 1100 farmer's field during 2016 by involving 17 KVKs (2 from Rajasthan and 15 from Gujarat). Farmers have convinced with potentiality of different technological packages demonstrated during *summer* 2016. Total 342.00 ha area have been covered by 833 farmers by following full technological component during *summer* 2017. Total 673 farmers have also partially adopted technological packages at their fields under sesame and groundnut during *summer* 2017 at 244.70 ha area (Table-34).

Table-34 Follow up of Technological Packages during *Summer*, 2017.

State	Crop	No. of Demonstration laid out during <i>Summer</i> 2016	No. of KVKs	Full follow up during 2017		Partial follow up (2017)	
				No. of farmers	Area (ha.)	No. of farmers	Area (ha.)
Rajasthan	Green gram	90	2	50	20.00	70	30.00
Gujarat	Green gram	1010	15	783	322.80	603	214.70
Total		1100	17	833	342.80	673	244.70

5. Training/Workshop/Visits organized

5.1 Trainings organized on production technology of Pulses

Training constitutes a basic concept in human resource development. It is concerned with developing skills to a desired standard by instruction and practice. Training is a highly useful tool that can bring an individual into a position/place where they can do their job/work correctly. A total of 65 training courses in diverse field were organised by the KVKs of Rajasthan and Gujarat state for skill development of 5716 farmers and farm women (Table-35).

Table 35 Trainings programmes organised by KVKs.

Sl. No.	State	No. of Programmes	No. of Participants
1.	Rajasthan	36	3169
2.	Gujarat	29	2547
Total		65	5716

5.2 Extension Activities organized by KVKs.

The field day is an important extension activity whose significant role is to introduce farmers, agricultural professionals, extension personnel, extension workers, produce end users, local leaders and even school children to new farming technologies and techniques. It is also to make them see how these technologies/techniques can be practically used and applied to Increase agriculture productivity levels (yield per unit area), profitability levels and in broader global economic scope-leading to food security, economic and stability in the country. It is therefore imperatively prudent to encourage farmer to organize, attend, participate and learn from these farmer oriented platforms in their respective areas. In nut shell, field days are a platform to exchange experiences, expertise, ideas and an essential tool of extension. A total of 191 extension activities were organized by KVKs of Rajasthan while 130 activities were conducted by KVKs of Gujarat covering 9657 and 6098 farmers/farm women, respectively (Table-36).

Table-36 Extension activities organised by KVKs

Sl. No.	Activity	Rajasthan		Gujarat	
		No. of Programmes	No. of Participants	No. of Programmes	No. of Participants
1.	Field Days	70	5460	55	3740
2.	Kisan Gosthies	46	1926	24	1253
3.	Diagnostic Field Visits	15	437	9	163
4.	Monitoring visits	60	1834	42	942
Total		191	9657	130	6098

5.3 Brainstorming Meeting on Increasing *Kharif* Pulses Production

A Brainstorming Meeting on “Increasing *Kharif* Pulses Production” organized by ICAR-ATARI, Jodhpur on 6th August, 2016. In this meeting Dr. Shiv Sevak, Indian Institute of Pulse Research, Kanpur, V.K. Panday, Joint Director (Agriculture), Jodhpur, Dr. Ishwar Singh, Director of Extension Education, AU, Jodhpur, Senior Scientist & Heads of 6 KVKs of Rajasthan expressed his views and make strategy for increase pulse production in *Kharif* season.



5.4 Workshop-cum-training on Pulse Production Technology

A Two days' Zonal Workshop-cum-training programme on Production Technology of Pulse Crops for 57 Krishi Vigyan Kendras (KVKs) of Rajasthan and Gujarat states was organized during 24-25th October 2016 by ICAR-Agricultural Technology Application Research Institute (ATARI), Jodhpur at ICAR-CAZRI, Jodhpur (Rajasthan). Three Directors of Extension Education (DEEs) from State Agricultural Universities and 57 scientists from KVKs participated and discussed issues in pulse production in Rajasthan and Gujarat. Scientists & other staff of ICAR-ATARI, Jodhpur also participated in the workshop.

5.5 Group Meeting on Pulses under National Food Security Mission

A two-day Group Meeting (29-30th March, 2017) for 30 Nodal Officers of Krishi Vigyan Kendras (KVKs) of Rajasthan & Gujarat under National Food Security Mission (NFSM) was organized at ICAR-Agricultural Technology Application Research Institute (ATARI), Jodhpur (Rajasthan). Resource persons from ICAR institutes and SAUs were also invited for delivering interactive lectures on improved technologies and production practices of pulse crops.

5.6 Monitoring of CFLDs on Pulses during 2016-17.

Monitoring is an important activity in extension programmes. At programme level, the purpose of monitoring is to track implementation and outputs systematically, and measure the effectiveness of programmes. It helps determine exactly when a programme is on track and when changes may be needed. A number of officials visited in field for monitoring and data generation from the stakeholder where the cluster frontline demonstrations were conducted. The visits made by ICAR-ATARI officials during 2016-17 are given in Table-37.

Table-37 Visits made by ICAR-ATARI officials during 2016-17.

SL. No.	Date	Name of KVK	Name of Crops	Officials
1	25.08.2016	Sabarkantha	Pigeon pea	Director, ICAR-ATARI, Jodhpur
2	07.12.2016	Tonk	Chickpea	Director and Scientists
3	05.12.2016	Panchamahahal	Pigeon pea, Chickpea	SRF, DEOs
4	06.12.2016	Banswara	Chickpea	SRF, DEO
5	07.12.2016	Sabarkantha	Pigeon pea	SRF, DEO
6	14.12.2016	Dausa	Chickpea	Dr. M.S. Meena
7	15.12.2016	Karauli	Chickpea	Dr. M.S. Meena
8	16.12.2016	Sawai Madhopur	Chickpea	Dr. M.S. Meena
9	18.12.2016	Pali	Chickpea	SRF, DEO
10	30.12.2016	Dungarpur	Chickpea	SRF
11	31.12.2016	Chittorgarh	Chickpea	SRF
12	10.01.2017	Alwar	Chickpea	SRF
13	17.01.2017	Pali	Chickpea	Dr. R.B. Kale, Scientist



8

ICAR-ATARI, JABALPUR, ZONE – VII

(Madhya Pradesh, Chhattisgarh and Odisha)

1. Process & Methodology

The Department of Agriculture cooperation and farmers Welfare, Ministry of Agriculture & Farmers Welfare, Sanctioned the project “Cluster demonstration of pulses 2016-17 under National Food Security Mission. The cluster demonstrations were conducted through KVKs during 2016-17. The details of crop-wise FLDs conducted on *Kharif, Rabi and Summer* pulses in the Zone are given below (Table 1).

Table 1: Achievements of CFLDs on pulses under ICAR-ATARI, Jabalpur

S. No.	State	Season	Sanctioned		Implemented	
			Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
1	Chhattisgarh (19 KVKs)	<i>Kharif</i>	2975	1190	2556	1076
		<i>Rabi</i>	2725	1090	2383	1156
		<i>Summer</i>	275	110	300	156.3
		Total	5975	2390	5239	2388.3
2	Madhya Pradesh (41 KVKs)	<i>Kharif</i>	3450	1380	2846	1148.8
		<i>Rabi</i>	3100	1240	2980	1245.2
		<i>Summer</i>	425	170	1170	475.6
		Total	6975	2790	6996	2869.6
3	Odisha (30 KVKs)	<i>Kharif</i>	2500	1000	1197	490
		<i>Rabi</i>	2625	1050	3064	1231
		<i>Summer</i>	200	80	430	185
		Total	5325	2130	4691	1906
Zone Total			18275	7310	16926	7163.9

2. State and Season-wise area and no. of demonstration conducted in 2016-17

Out of 7310 ha allotted demonstrations, coverage was made in 7163.90 ha through 16926 demonstrations. Area under black gram was 1212.40, chickpea was 1644.56 ha, lentil 322.6 ha, green gram 2005.90 ha, field pea 290 ha, horse gram 130 ha, Lentil 420, Lathyrus 76ha and pigeon pea 1385 ha. Out of these areas coverage in Madhya Pradesh was 2869.56 ha, Chhattisgarh 2388.30ha and Odisha 1906 ha

Table 2 Crop-wise achievements of CFLDs on pulses during *Kharif* 2016-17.

S. No.	State	Crops	Sanctioned		Implemented	
			Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
1	Chhattisgarh (17 KVKs)	Black gram	850	340	821	360
		Green gram	475	190	530	186
		Horse gram	275	110	282	130
		Lathyrus	275	110	-	-
		Pigeon pea	1100	440	923	400
		Total	2975	1190	2556	1076
2	Madhya Pradesh (33 KVKs)	Black gram	1000	400	763	328.8
		Green gram	675	270	354	120
		Horse gram	75	30	-	-
		Lytharus	125	50	-	-
		Pigeon pea	1575	630	1729	700
		Total	3450	1380	2846	1148.8
3	Odisha (21 KVKs)	Black gram	725	290	589	240
		Green gram	600	240	50	20
		Horse gram	175	70	-	-
		Pigeon pea	1000	400	558	230
		Total	2500	1000	1197	490
		Zone Total	8925	3570	6599	2714.8

Table 3 Crop-wise achievements of CFLDs on pulses during Rabi 2016-17.

S. No.	State	Crops	Sanctioned		Implemented	
			Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
1	Chhattisgarh (17 KVKs)	Black gram	50	20	-	-
		Chickpea	1475	590	1233	629.4
		Field pea	325	130	484	180
		Green gram	150	60	164	65.6
		Lentil	650	260	276	150
		Lytharus	75	30	153	76
		Pigeon pea	-	-	73	55
Total		2725	1090	2383	1156	
2	Madhya Pradesh (34 KVKs)	Chickpea	2275	910	2247	935.16
		Field pea	100	40	90	40
		Green gram	275	110	-	-
		Lentil	450	180	643	270
		Total	3100	1240	2980	1245.16
3	Odisha (26 KVKs)	Black gram	350	140	556	200
		Chickpea	650	260	200	80
		Field pea	125	50	197	70
		Green gram	1500	600	2111	881
		Total	2625	1050	3064	1231
Zone Total		8450	3380	8427	3632.16	

Table 4 Crop-wise achievements of CFLDs on pulses during summer 2016-17.

S. No.	State	Crops	Sanctioned		Implemented	
			Demo (No.)	Area (ha)	Demo (No.)	Area (ha)
1	Chhattisgarh (04 KVKs)	Black gram	50	20	85	40
		Green gram	225	90	215	116.3
		Total	275	110	300	156.3
2.	Madhya Pradesh (8 KVKs)	Black gram	75	30	99	43.6
		Green gram	350	140	1071	432
		Total	425	170	1170	475.6
3	Odisha (03 KVKs)	Black gram	-	-	-	-
		Green gram	200	80	430	185
		Total	200	80	430	185
Zone Total		900	360	1900	816.9	

3. Performance of Black gram CFLDs during Kharif 2016-17 in Chhattisgarh.

Chhattisgarh state under the black gram crop 12 districts 340 ha area and 850 demonstrations are allotted in which 774 demonstrations conducted in 360ha area. Azad 3, Indira urd 1 and PU 31 varieties were assessed under different KVKs.

Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Bilaspur	2.5	30	85	6.58	8.2	24.62	28950	38630	2.09	2.72
	Janjgir-Champa	7.03	40	50	6.12	8.86	44.77	15800	27350	2.07	2.61
	Kanker	3.40	30	58	3.8	4.84	27.37	12300	18500	1.75	2.05
	Mahasamund	4.06	40	89	3.6	5.52	53.33	6350	13350	1.55	1.94
	Raigarh	5.65	40	76	6.86	9.15	33.38	18919	30545	2.23	3.01
	Rajnandgaon	3.80	40	51	2.25	4.55	102.22	24400	26100	3.48	3.11
North Hills of Chhattisgarh	Balrampur	8.60	20	50	2.83	3.39	19.79	4200	8540	1.41	1.72
	Jashpur	3.70	30	75	7.1	9.32	31.27	21530	29276	2.39	2.71
	Korea	3.86	10	19	3.35	5.3	58.21	11625	21500	2.71	3.8
	Surguja	5.40	30	96	4.2	8.55	103.57	19000	45920	2.54	3.52
Bastar Plateau	Bastar	6.00	30	75	5.02	8.35	66.33	12500	27600	1.99	2.92
	Bijapur	4.75	20	50	6.5	8.31	27.85	28200	47600	2.16	2.64



3.1. Performance of Green gram CFLDs during *Kharif* 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on HUM 16, SML 668, SML-66, Sweta & Swati varieties of Green gram along with packages were demonstrated in 186 ha area by KVK, Dhamtari, Kawardha, Mahasamund, Rajnandgon, Surguja and Bastar. A total of 530 demonstrations were laid out during *Kharif* season in Chhattisgarh.

Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Dhamtari	4.8	126	420	4.76	6.39	34.33	12762	20824	1.80	2.31
	Kawardha	3.66									
	Mahasamund	4.9									
	Rajnandgaon	2.5									
North Hills of Chhattisgarh	Surguja	4.1	30	71	3.6	6.67	85.28	13300	30490	1.9	2.88
Bastar Plateau	Bastar	5.8	30	75	4.9	7.5	53.06	24012	40419	2.58	3.06

3.2. Performance of Horse gram CFLDs during *Kharif* 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on Indira Kulthi 1 and BK 48 varieties of horse gram along with packages were demonstrated in 130 ha area by KVK, Bastar, Jashpur, Kanker and Korea. A total of 282 demonstrations were laid out during *Kharif* season in Chhattisgarh.



Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Kanker	3.4	30	63	3.9	5.5	41.03	11000	19200	2.29	2.39
North Hills of Chhattisgarh	Jashpur	2.75	80	169	3.295	5.51	67.30	8325	17519	1.84	2.98
	Korea	3.39									
Bastar Plateau	Bastar	5.6	20	50	4.12	7.1	72.33	10100	21200	1.96	2.48

3.3 Performance of Pigeon pea CFLDs during Kharif 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on Rajiv lochan, ICPL-87119, ICPL 85063, LRG 41 and Asha varieties of Pigeon pea along with packages were demonstrated in 400 ha area by KVK, Balrampur, Bilaspur, Dantewada, Durg, Jashpur, Kawardha, Korba, Korea, Rajnandgaon and Surguja. A total of 923 demonstrations were laid out during Kharif season in Chhattisgarh.



Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Bilaspur	6.39	209.04	473.00	10.69	13.91	30.14	30627	44130	2.13	2.79
	Durg	14									
	Kawardha	13.1									
	KORBA	6.39									
North Hills of Chhattisgarh	Rajnandgaon	5.5	140	336	7.0525	10.715	51.931939	19463	36018.63	2.4175	3.1725
	Balrampur	10.4									
	Jashpur	5.8									
	Korea	9.79									
Bastar Plateau	Dantewada	10.5	52	130	9.5	14	47.37	42550	63500	1.3	1.27
		5.4									

4. Performance of Black gram CFLDs during Kharif 2016-17 in Madhya Pradesh.

During 2016-17, CFLDs on PU 31, PU 30, Sekhar-2, PU 19, Shakher-3 and Azad 3 varieties of Black gram along with packages were demonstrated in 328.80 ha area by KVK, Ashok nagar, Bhind, Chhatarpur, Damoh, Datia, Dhar, Jabalpur, Jhabua, Mandsaur, Panna, Raisen, Sagar, Shivpuri and Tikamgarh. A total of 763 demonstrations were laid out during Kharif season in Madhya Pradesh.



Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Bundelkhand Region	Chhatarpur	5.32	60	125	5.77	10.80	87.07	16442	52341	1.66	2.66
	Datia	3.3									
	Tikamgarh	6.4									
Gird Zone	Ashoknagar	4.32	60	162	5.66	8.72	54.15	15167	30623	2.00	2.77
	Bhind	3.6									
	Shivpuri	3.38									
Kymore Plateau and Satpura Hills	Jabalpur	2.5	50	81	6.90	9.93	43.84	31656	50894	3.00	3.70
	Panna	6									
Jhabua Hills	Jhabua	5.15	30	75	5.50	8.42	53.09	16120	31890	1.95	2.71
Malwa Plateau	Dhar	6.9	58.8	147	6.48	11.49	77.45	23063	52595	3.02	4.68
	Mandsaur	5.5									
Vindhya Plateau	DAMOHI	8.2	70	172	3.76	6.90	83.42	12144	25791	2.22	3.20
	Raisen	2.5									
	SAGAR	3.25									

4.1 Performance of Green gram CFLDs during Kharif 2016-17 in Madhya Pradesh.

During 2016-17, CFLDs on HUM-12, TJM 3 and PDM-139 varieties of green gram along with packages were demonstrated in 120 ha area by KVK, Ashok nagar, Khargone, Rewa, Shajapur and Sidhi. A total of 354 demonstrations were laid out during Kharif season in Madhya Pradesh.



Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Gird Zone	Ashoknagar	3.8	20	58	6.8	10.18	49.71	22000	37090	2.33	2.95
Kymore Plateau and Satpura Hills	Rewa	3.3	60	192	3.96	6.87	73.36	7539	17663	1.50	1.98
	Sidhi	3.29									
Malwa Plateau	Shajapur	2	10	25	8.06	10.2	26.55	43582	58780	3.72	4.52
Nimar Valley	khargone	3.2	30	75	5.69	7.75	36.2	21067	30750	3.86	4.86

4.2 Performance of Pigeon pea CFLDs during Kharif 2016-17 in Madhya Pradesh.

During 2016-17, CFLDs on JKM-189, TJT 501, LRG 41, ICPL 88039, Rajiv lochan, RA6 and Pusa 992 varieties of pigeon pea along with packages were demonstrated in 700 ha area by KVK, Badwani, Balaghat, Burhanpur, Chhindwara, Dindori, Hoshanagabad, Jabalpur, Jhabua, Katni, Mandla, Morena, Narsinghpur, Panna, Raisen, Rewa, Sagar, Satna, Seoni, Shahdol, Shajapur, Sidhi and Umari. A total of 1729 demonstrations were laid out during Kharif season in Madhya Pradesh.

Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Balaghat	6.89	20	50	p.00	14.27	256.75	10000	31935	1.63	2.73
	Dindori	6.5									
North Hills of Chhattisgarh	Mandla	7.35	130	315	7.80	15.34	96.79	25356	53317	2.17	2.92
	Shahdol	10.18									
	Umari	4.2									
Gird Zone	Morena	8.3	40	100	13.20	21.36	61.82	4802	77390	2.40	3.56
	Jabalpur	11.1									
Kymore Plateau and Satpura Hills	katni	16	211	518	8.38	15.98	90.81	27675	61456	2.59	3.78
	Panna	6.3									
	Rewa	4.7									
	Satna	3.5									
	Seoni	12.5									

	Sidhi	8.17									
Jhabua Hills	Jhabua	8.3	20	50	12.72	17.21	35.30	31924	47767	2.48	3.06
Malwa Plateau	Shajapur	7.11	10	25	9.20	11.00	19.57	36985	47920	3.30	3.87
Nimar Valley	Barwani	9	60	150	11.55	16.25	40.69	44080	64563	4.08	4.68
	Burhanpur	13									
Satpura Plateau	Chhindwara	22	90	225	10.50	14.50	38.10	19760	33100	1.88	2.32
Vindhya Plateau	Raisen	2.5	40	94	5.92	8.34	40.91	8850	14846	1.79	2.16
	SAGAR	4.4									
Central Narmada Valley	Hoshangabad	7.4	80	200	10.85	18.80	73.27	42133	60637	3.24	3.77
	Narsinghpur	18									



5 Performance of Black gram CFLDs during *Kharif*2016-17 in Odisha.

During 2016-17, CFLDs on PU 35 and 31 varieties of black gram along with packages were demonstrated in 240 ha area by KVK, Angul, Ganjam-I I, Jajpur, Kalahandi, Nawapada, Rayagada, Sundargarh I and Sundargarh II. A total of 589 demonstrations were laid out during *Kharif* season in Odisha.

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Mid Central Table Land Zone	Angul	4.32	20	50	4.20	5.10	21.43	16400	20700	2.26	2.38
North Eastern Coastal Plain	Jajpur	3.19	30	61	3.00	8.50	183.33	10510	20725	1.50	1.93
North Eastern Ghat	Ganjam-II	2.7	60	150	5.40	7.55	39.81	15850	29465	1.68	2.12
	Rayagada	5.7									
North Western Plateau Zone	Sundargarh II	4.98	60	150	5.20	7.55	45.19	15565	28570	1.86	2.38
	Sundargarh-I	4.98									
West Undulating Zone	Kalahandi	3.6	70	168	5.15	6.71	30.19	17350	24625	2.16	2.43
	Nuapada	2.2									

5.1 Performance of Green gram CFLDs during *Kharif*2016-17 in Odisha

During 2016-17, CFLDs on IPM-02-14 variety of green gram along with packages were demonstrated in 20 ha area by KVK, Bargarh. A total of 50 demonstrations were laid out during *Kharif* season in Odisha.



Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Western Central Table Land Zone	Bargarh	1.5	20	50	3	5.53	84.33	3000	10000	1.2	1.5

5.2 Performance of Pigeon pea CFLDs during *Kharif* 2016-17 in Odisha

During 2016-17, CFLDs on LRG 41, ICPL 88039, Parvati and Maruti varieties of pigeon pea along with packages were demonstrated in 230ha area by KVK, Bargarh, Deogarh, Dhenkanal, Kalahandi, Keonjhar, Mayurbhanj-II and Rayagada. A total of 558 demonstrations were laid out during *Kharif* season in Odisha.

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Mid Central Table Land Zone	Dhenkanal	7.2	30	75	8.8	13.3	51.14	15500	33300	0	0.04
North Central Plateau	KEONJHAR	7.8	30	75	9.3	12.7	36.56	19450	30550	1.87	2.15
	Mayurbhanj II	7.5	40	123	6.25	9.3	48.80	7200	15300	1.4	1.69
North Eastern Ghat	Rayagada	10.85	40	100	7.5	11.26	50.13	18380	33170	1.8	2.14
North Western Plateau Zone	Deogarh	5.97	30	75	7.2	12.2	69.44	25200	48200	2.4	2.93
West Undulating Zone	Kalahandi	7.8	30	63	10.8	13.7	26.85	33550	46200	2	2.28
Western Central Table Land Zone	Bargarh	2.7	30	65	5.2	10.7	105.77	19700	29600	1.57	2

Rabi Season

6. Performance of Chick pea CFLDs during *Rabi* 2016-17 in Chhattisgarh

During 2016-17, CFLDs on JAKI 9218, JG 74, JG 130, JG 6, Janki, RVG-1, JG14, JG11 and JG226 varieties of Chick pea along with packages were demonstrated in 629.40 ha area by KVK, Balrampur, Bastar, Bhatapara, Bilaspur, Dantewada, Dhamtari, Durg, Janjgir-champa, Kanker, Kawardha, Korba, Korea, Mahasamund, Narayanpur Rajnandgaon and Surguja. A total of 1262 demonstrations were laid out during *Rabi* season in Chhattisgarh.

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Bhatapara	12.4	407.4	701	10.64	13.62	28.05	31083	45453	2.33	2.95
	Bilaspur	9.5									
	Dhamtari	17.76									
	Durg	9.92									
	Janjgir-Champa	10.8									
	Kanker	7.8									
	Kawardha	10.35									
	KORBA	10									
	Mahasamund	9.56									
	Rajnandgaon	9.7									
North Hills of Chhattisgarh	Balrampur	9.2	110	262	4.86	8.11	66.99	8705	23743	1.54	2.31
	Korea	5.34									
	Surguja	6.7									
Bastar Plateau	Bastar	9.5	110	275	8.14	10.47	28.67	19671	32098	2.06	2.55
	Dantewada	7.5									
	Narayanpur	7.2									



6.1 Performance of Field pea CFLDs during *Rabi* 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on Paras, Prakash and Vikas varieties of Field pea along with packages were demonstrated in 180ha area by KVK, Balrampur, Bastar, Korea, Narayanpur and Surguja. A total of 484 demonstrations were laid out during *Rabi* season in Chhattisgarh.

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
North Hills of Chhattisgarh	Balrampur	7	110	307	5.13	8.16	58.90	9228	19497	1.74	2.35
	Korea	5.25									
	Surguja	4.55									
Bastar Plateau	Bastar	6.3	30	75	6.30	8.20	30.16	8400	12600	1.80	2.05

6.2 Performance of Green gram CFLDs during *Rabi* 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on HUM 16 and PDM 139 varieties of green gram along with packages were demonstrated in 65.60ha area by KVK, Bastar, Mahasamund. A total of 164 demonstrations were laid out during *Rabi* season in Chhattisgarh.

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Mahasamund	4.9	45.6	114	4.2	5.65	34.52	7395	10437.5	1.51	1.57
Bastar Plateau	Bastar	6.6	20	50	6.6	7.5	13.64	36112	45600	3.16	3.9

6.3 Performance of Lathyrus CFLDs during *Rabi* 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on Mahatiwada and Pratik varieties of lathyrus along with packages were demonstrated in 76ha area by KVK, Bijapur, Dhamtari and Janjgir-Champa. A total of 153 demonstrations were laid out during *Rabi* season in Chhattisgarh.

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Dhamtari	7.5	48	83	5.43	7.29	34.38	14965	22205	2.38	2.86
	Janjgir-Champa	6.6									
Bastar Plateau	Bijapur	3.12	28	70	3.12	4.06	30.13	5920	9740	1.16	1.49

6.4 Performance of Lentil CFLDs during *Rabi* 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on KLS-218 and PL-8 varieties of lentil along with packages were demonstrated in 150 ha area by KVK, Durg, Jashpur, Kanker, Kawardha Rajnandgaon, Surguja. A total of 276 demonstrations were laid out during *Rabi* season in Chhattisgarh.

Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Durg	6.2	100	178	6.50	9.27	42.59	17525	30849	1.31	2.09
	Kanker	3.5									
	Kawardha	5									
	Rajnandgaon	3.3									
North Hills of Chhattisgarh	Jashpur	3.2	50	99	5.40	8.35	54.63	8171	15441	1.64	2.07
	Surguja	3.36									
Bastar Plateau	Bijapur	2.7	28	70	3.12	4.06	30.13	5920	9740	1.16	1.49

6.5 Performance of Pigeon pea CFLDs during Rabi 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on Asha and Laxmi varieties of Pigeon pea along with packages were demonstrated in 55ha area by KVK, Bhatapara, Durg, Kawardha and Rajnandgaon. A total of 73 demonstrations were laid out during Rabi season in Chhattisgarh.



Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Bhatapara	5.95	55	73	8.50	10.40	31.53	20816	35507	2.07	2.54
	Durg	14									
	Kawardha	13.1									
	Rajnandgaon	4.2									
North Hills of Chhattisgarh	Jashpur	5.25	50	99	5.40	8.35	57.81	8171	15441	1.64	2.07
	Surguja	4.4									
Bastar Plateau	Bijapur	2.8	28	70	3.12	4.06	30.13	5920	9740	1.16	1.49

7. Performance of Chick pea CFLDs during Rabi 2016-17 in Madhya Pradesh.

During 2016-17, CFLDs on JG 11, JG 16, JAKI 9218, JG 63, JG 14, JG-130 and RVG 201 varieties of chick pea along with packages were demonstrated in 929.16ha area by KVK, Badwani, Balaghat, Betul, Bhind, Burhanpur, Damoh, Dewas, Dhar, Harda, Hoshangabad, Indore, Jabalpur, Jhabua, Khandwa, Kargone, Mandla, Mandsaur, Morena, Narsinghpur, Neemuch, Panna, Raisen, Ratlam, Sagar, Satna, Sehore, Seoni, Shahdol, Shajapur, Shivpuri, Tikamgarh, Ujjain and Umariya. A total of 2248 demonstrations were laid out during Rabi season in Madhya Pradesh.



Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Balaghat	9.7	40	100	9.75	15.44	58.36	20600	39260	2.11	2.87
North Hills of Chhattisgarh	Mandla	7.63	100	250	8.82	13.74	55.82	21272	38883	2.23	2.92
	Shahdol	12.31									
	Umaria	5.8									
Bundelkhand Region	Tikamgarh	12	20	50	8.00	15.00	87.50	8750	38500	1.50	2.71
Gird Zone	Bhind		52.8	132	14.37	20.60	43.38	51880	80867	2.98	3.95
	Morena	17									
	Shivpuri	10.11									
Kymore Plateau and Satpura Hills	Jabalpur	12.33	112.8	226	11.50	17.28	50.22	35962	56504	1.67	2.32
	Panna	12.9									
	Satna	4.8									
	Seoni	9.8									
Jhabua Hills	Jhabua	8.6	30	75	9.80	12.48	27.35	19297	33160	2.07	2.65
Malwa Plateau	Dewas	11.57	289.76	731	11.68	16.05	37.43	28257	55985	2.35	3.34
	Dhar	11.5									
	Indore	10.48									
	Mandsaur	6.4									
	Neemuch	10.1									
	Ratlam	9.08									
	Shajapur	11.88									
Ujjain	9.2										
Nimar Valley	Barwani	8	70	175	11.75	17.39	47.98	43807	63254	2.53	3.11
	Burhanpur	16									
	Khandwa	13.75									
	khargone	8.4									
Satpura Plateau	Betul	12.7	40	92	11.50	16.18	40.70	43550	66567	3.68	4.80
Vindhya Plateau	Damoh	12	130	291	9.07	14.09	55.29	31657	56730	2.87	3.96
	Raisen	6.35									
	SAGAR	6.2									
	Sehore	12.65									
Central Narmada Valley	HARDA	13.69	80	200	14.59	22.29	52.78	45933	80133	2.97	4.23
	Hoshangabad	11									
	Narsinghpur	13.2									

7.1 Performance of Field pea CFLDs during Rabi 2016-17 in Madhya Pradesh.

During 2016-17, CFLDs on Prakash and Rachna varieties of field pea along with packages were demonstrated in 40ha area by KVK, Datia and Jabalpur. A total of 90 demonstrations were laid out during Rabi season in Madhya Pradesh.



Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Bundelkhand Region	Datia	16.8	20	50	17	23.61	38.88	18084	31251	1.91	2.51
Kymore Plateau and Satpura Hills	Jabalpur	17	20	40	12.5	17	36.00	23200	36620	2.97	3.34

7.2 Performance of Lentil CFLDs during Rabi 2016-17 in Madhya Pradesh.

During 2016-17, CFLDs on JL-3, HUL-57, IPL – 81 and PL- 8 varieties of lentil along with packages were demonstrated in 270ha area by KVK, Jabalpur, Katni, Narsinghpur, Panna, Raisen, Ratlam, Rewa, Sagar, Satna, Shahdol and Shajapur. A total of 643 demonstrations were laid out during *Rabi* season in Madhya Pradesh



Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
North Hills of Chhattisgarh	Shahdol	7	20	50	7.50	11.58	54.40	12910	28870	1.83	2.65
Kymore Plateau and Satpura Hills	Jabalpur	9.5	171.2	393	7.92	13.85	74.86	22998	40757	2.42	3.22
	katni	14									
	Panna	10.9									
	Rewa	4.5									
	Satna	3.2									
Malwa Plateau	Ratlam	8.55	30	75	7.12	10.73	50.77	23985	34729	2.55	3.14
	Shajapur	7.65									
Vindhya Plateau	Raisen	6.3	50	125	6.96	11.69	67.89	19812	39571	2.76	4.12
	SAGAR	5.5									
Central Narmada Valley	Narsinghpur	8.49	20	50	8.13	13.30	63.59	22900	38650	2.16	2.82

8. Performance of Black gram CFLDs during Rabi 2016-17 in Odisha

During 2016-17, CFLDs on PU 30 and 35 varieties of black gram along with packages were demonstrated in 200ha area by KVK, Bolangir, Dhenkanal, Kandhamal Kendrapara, Khordha and Puri . A total of 556 demonstrations were laid out during *Rabi* season in Odisha

Agro- climatic Zone/ Climate	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
East and South Eastern Coastal Plain	Kendrapara	4.15	110	297	5.21	7.70	47.70	15148	19640	2.14	2.06
	Khordha	4.76									
	Puri	3.7									
Mid Central Table Land Zone	Dhenkanal		40	100							
North Eastern Ghat	Kandhamal	2.2	30	146	3.90	7.20	84.62	9250	21800	1.90	2.50
Western Central Table Land Zone	Bolangir	2	20	59	4.20	7.10	69.05	9000	21500	1.50	2.00

8.1 Performance of Chick pea CFLDs during Rabi 2016-17 in Odisha

During 2016-17, CFLDs on JG 11 and JAKI 9218 varieties of Chick pea along with packages were demonstrated in 80 ha area by KVK, Keonjhar, Nabrangpur and Bolangir. A total of 200 demonstrations were laid out during *Rabi* season in Odisha

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
North Central Plateau	KEONJHAR	9.5	30	75	11.5	15.6	35.65	23825	37130	2	2.68
Eastern Ghat High Land	Nabarangpur	4.4	40	100	4.75	12	152.63	11500	48000	1.68	3
Western Central Table Land Zone	Bolangir	4.35	10	25	5.2	12.5	140.38	6700	36600	1.3	2.4

8.2 Performance of Field pea CFLDs during Rabi 2016-17 in Odisha

During 2016-17, CFLDs on Adarsh and Vikas varieties of Field pea along with packages were demonstrated in 70ha area by KVK, Mayurbhanj II, Kandhamal and Sundargarh II. A total of 197 demonstrations were laid out during *Rabi* season in Odisha

Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
North Central Plateau	Mayurbhanj II	7.8	30	57	9.41	13.7	45.59	5235	15415	1.18	1.47
North Eastern Ghat	Kandhamal	6.33	10	55	15.6	22.7	45.51	34810	55520	2.6	3.1
North Western Plateau Zone	Sundargarh II	9.1	30	85	12.3	15	21.95	18450	26000	1.75	1.98

8.3 Performance of Green gram CFLDs during Rabi 2016-17 in Odisha

During 2016-17, CFLDs on TARM 1, PUSA 9072, IPM -02-03 and IPM-02-14 varieties of green gram along with packages were demonstrated in 881ha area by KVK, Angul, Bargarh, Bhadrak, Bolangir, Boudh, Cuttack, Deogarh, Gajapati, Ganjam - I, Ganjam-II, Jagatsingpur, Jajpur, Kendrapara, Khordha, Mayurbhanj, Nayagarh, Puri, Rayagada, Sambalpur, Sonepur and Sundargarh I. A total of 2111 demonstrations were laid out during *Rabi* season in Odisha

Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
East and South Eastern Coastal Plain	jagatsinghpur	5.35	220	563	4.69	6.83	45.78	12527	18851	2.07	2.12
	Kendrapara	3.9									
	Khordha	4.98									
	Nayagarh	2.8									
	Puri	3.7									
Mid Central Table Land Zone	Angul	4.34	30	75	3.95	7.20	82.28	22100	32900	2.47	2.88
North Central Plateau	Mayurbhanj-1	5.08	40	100	4.70	6.50	38.30	10900	18700	1.63	1.92
North Eastern Coastal Plain	Jajpur	2.9	65	162	5.30	7.10	33.96	4400	12300	1.19	1.53
North Eastern Ghat	Gajapati	4.98	345	826	4.79	6.80	41.79	12291	20011	1.81	2.10
	Ganjam- I	2.25									
	Ganjam-II	2.5									
	Rayagada	5.25									
North Western Plateau Zone	Deogarh	3.2	30	75	4.90	6.80	38.78	11900	19300	1.68	1.89
Western Central Table Land Zone	Sundargarh-I	3.3	216	490	5.30	7.64	44.15	10313	19977	1.53	1.89
	Bargarh	6.5									
	Bolangir	3.95									
	Boudh	5.12									
	Sambalpur	4.65									

SUMMER SEASON

9. Performance of Black gram CFLDs during Summer 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on Azad 3 variety of black gram along with packages were demonstrated in 40ha area by KVK, Balrampur and Surguja . A total of 85 demonstrations were laid out during *summer* season in Chhattisgarh

Agro-climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
North Hills of Chhattisgarh	Balrampur	8.8	20	52	2.35	5.7	142.55	6150	28000	1.6	3.35
	Surguja	4.8	20	33	2.95	5.21	76.61	3775	10900	1.4	1.87

9.2 Performance of Green gram CFLDs during Summer 2016-17 in Chhattisgarh.

During 2016-17, CFLDs on HUM-16, HUM -12 and PDM-139 variety of green gram along with packages were demonstrated in 116.30ha area by KVK, Bastar Korea Surguja, Dhamtari, Bijapur and Rajnandgaon. A total of 206 demonstrations were laid out during *summer* season in Chhattisgarh

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Dhamtari	7.08	34	58	3.79	7.67	102.37	11855.5	25405	1.44	2.10
	Rajnandgaon	2.2									
North Hills of Chhattisgarh	Korea	2.17	40	92	2.41	4.91	104.16	2263	8425	1.55	2.29
	Surguja	3.98									
Bastar Plateau	Bastar	6.6	42	74	5.43	7.53	38.80	24100	38286	2.21	2.74
	Bijapur	4.9									

10. Performance of Black gram CFLDs during Summer 2016-17 in Madhya Pradesh.

During 2016-17, CFLDs on PU 31 variety of black gram along with packages were demonstrated in 43.60ha area by KVK, Balaghat, Jabalpur and Ratlam. A total of 99 demonstrations were laid out during *summer* season in Madhya Pradesh.

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Balaghat	6.02	20	50	6.5	10.97	68.77	23500	48320	2.52	3.76
Kymore Plateau and Satpura Hills	Jabalpur	5.5	20	40	8	14.34	79.25	25200	54936	2.4	3.44
Malwa Plateau	Ratlam	7.95	3.6	9	4	6.7	67.50	15740	21960	2.62	3.15

10.1 Performance of Green gram CFLDs during Summer 2016-17 in Madhya Pradesh.

During 2016-17, CFLDs on PDM 139, HUM 12, TJM-3 and IPM 2-3 variety of green gram along with packages were demonstrated in 432ha area by KVK, Balaghat, Harda, Hoshangabad, Mandla, Narsinghpur, Rewa, Sagar, Seoni, Bhind, Dewas, Jhabua, Khandwa and Morena. A total of 1071 demonstrations were laid out during *summer* season in Madhya Pradesh.

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
Chhattisgarh Plain	Balaghat	2.8	20	48	5.50	9.04	64.36	18500	42100	2.28	3.72
North Hills of CG	Mandla	2.5	20	50	4.20	7.00	66.67	14900	28000	2.82	3.67
Gird Zone	Bhind	12.5	16	40	6.50	7.60	55.97	12700	18069	1.61	1.80
	Morena	6.5									
Kymore Plateau and Satpura Hills	Jabalpur	3.5	146	365	7.62	11.89	55.97	22636	40120	2.40	3.00
	Panna	5.8									
	Rewa	3.15									
	Seoni	2.1									
Jhabua Hills	Jhabua	4.5	20	50	5.75	8.17	42.09	16469	29144	1.98	2.60
Malwa Plateau	Dewas	3.98	10	25	6.60	8.20	24.24	16160	23200	2.07	2.48
Nimar Valley	Khandwa	4.93	20	50	4.93	10.57	114.40	7970	23510	0.00	0.00
Vindhya Plateau	SAGAR	2.8	40	100	7.64	7.64	0.00	17915	31520	2.95	4.00
Central Narmada Va	HARDA	12.5	140	341	10.92	12.68	16.12	23464	44260	1.38	1.76
	Hoshangabad	4.5									
	Narsinghpur	10									

11. Performance of Green gram CFLDs during *Summer* 2016-17 in Odisha

During 2016-17, CFLDs on TARM 1 variety of green gram along with packages were demonstrated in 185ha area by KVK, Bargarh, Bhadrak, Kandhamal, Rayagada and Jharsuguda. A total of 430 demonstrations were laid out during *summer* season in Odisha.

Agro- climatic Zone	KVKs	Dist. Avg. (q/ha)	Area (ha)	No. of Demo	Yield (q/ha)		% increase	Net Return (Rs./ha)		BCR	
					Check	Demo		Check	Demo	Check	Demo
North Eastern Coastal Plain	Bhadrak	5.7	50	86	7.00	9.66	38.00	23275	37641	2.30	2.85
North Eastern Ghat	Kandhamal	2.2	45	107	4.80	6.64	38.33	10810	17278	1.79	2.04
	Rayagada	2.8									
Western Central	Baragarh	3.5	90	237	4.95	7.95	60.61	16050	25400	2.13	2.35
	Jharsuguda	3.75									



9

ICAR-ATARI, BANGLORE, ZONE – VIII

(Karnataka, Tamil Nadu and Kerela)

1. Background

India is known for production as well as consumption of pulses in the world. A positive and sustained pulses production has been observed in the country since last four years. Encouragingly in this regard, the National Food Security Mission (NFSM) on Pulses under Government of India, Ministry of Agriculture & Farmers' Welfare, Department of Agriculture, Cooperation & Farmers' Welfare (DAC & FW) is one among other Schemes/Programme striving hard through Cluster Frontline Demonstrations (CFLDs) towards escalating pulses production in the country. As a part of it, DAC & FW sanctioned ICAR Project entitled Cluster Frontline Demonstrations on Pulses 2016-17 under NFSM to be implemented by KVKs under eight ICAR-ATARIs in the Country. The ICAR-ATARI, Zone VIII, Bengaluru is one among them to implement CFLDs on pulse crops viz., Blackgram, Greengram, Pigeonpea and Chickpea through identified KVKs in the states of Karnataka, Tamil Nadu, Kerala and Puducherry for increasing pulses production. State wise scenario of CFLD pulse crops is presented hereunder:

1.1 Scenario of CFLD pulse crops in Karnataka

In Karnataka, pulses are being cultivated in an area of about 24.97 lakh ha with the production and productivity of 17.76 lakh tons and 749 kg/ha, respectively (2013-14). Important pulse crops of the state are pigeonpea, chickpea, greengram, blackgram and cowpea. In addition, horsegram and field bean (Avaré) need a special mention here, as they occupy unique position among pulse crops especially in Karnataka. Area, production and productivity of CFLD pulse crops viz., Blackgram, Greengram, Pigeonpea and Chickpea in Karnataka for the year 2013-14 are presented in Table 1. Data shows that Chickpea was cultivated in more area (879791 ha) with the production and productivity of 702953 t and 799 kg/ha, respectively followed by Pigeonpea (782551 ha), Greengram (303458 ha) and Blackgram (97060 ha).

Table 1: Area, production and productivity of CFLD pulse crops in Karnataka (2013-14)

CFLD pulse crops	Area (ha)	Production (t)	Productivity (kg/ha)
Blackgram	97060	50568	521
Greengram	303458	78899	260
Pigeonpea	782551	755161	965
Chickpea	879791	702953	799

Source: Directorate of Economics and Statistics, Karnataka

1.2 Scenario of CFLD pulse crops in Tamil Nadu

In Tamil Nadu, pulses are being cultivated in an area of about 8.84 lakh ha with the production and productivity of 7.67 lakh tons and 868 kg/ha, respectively (2014-15). Major pulse crops of the state are Blackgram, Greengram, Pigeonpea, Chickpea, Horsegram and other pulses. Area, production and productivity of CFLD pulse crops viz., Blackgram, Greengram, Pigeonpea and Chickpea in Tamil Nadu for the year 2014-15 are presented in Table 2. Data shows that Blackgram was cultivated in more area (373782 ha) with the production and productivity of 358895 t and 960 kg/ha, respectively followed by Greengram (229561 ha), Pigeonpea (72389 ha) and Chickpea (6820 ha).

Table 2: Area, production and productivity of CFLD pulse crops in Tamil Nadu (2014-15)

CFLD pulse crops	Area (ha)	Production (t)	Productivity (q/ha)
Blackgram	373782	358895	960
Greengram	229561	180726	787
Pigeonpea	72389	90950	1256
Chickpea	6820	4177	645

Source: Directorate of Economics and Statistics, Tamil Nadu

1.3 Scenario of CFLD pulse crops in Kerala

In Kerala, pulses are being cultivated in an area of about 3764 ha with the production and productivity of 4265 t and 1133 kg/ha, respectively as per Directorate of Economics and Statistics, Kerala 2015-16. Major cultivation of pulses is in Palakkad district and contributes to 30 per cent of the total production in the state. Apart from Pigeonpea, the other main pulses grown in Kerala are Cowpea, Blackgram, Horsegram, Greengram and others. Area under CFLD pulse crops viz., Blackgram and Greengram in Kerala for the year 2015-16 is 555 ha and 168 ha, respectively. As area under pulses shows a declining trend in the state, more proactive steps are needed to augment pulse production.

1.4 Scenario of CFLD pulse crops in Puducherry

In Puducherry, pulses are being cultivated in an area of 1925 ha with the production and productivity of 974 t and 506 kg/ha, respectively (2014-15). Greengram and Blackgram are major pulse crops in Puducherry. Area, production and productivity of CFLD pulse crops viz., Greengram and Blackgram in Puducherry for the year 2014-15 are presented in Table 3. Data shows that Greengram was cultivated in more area (1079 ha) with the production and productivity of 481 t and 446 kg/ha, respectively followed by Blackgram (775 ha).

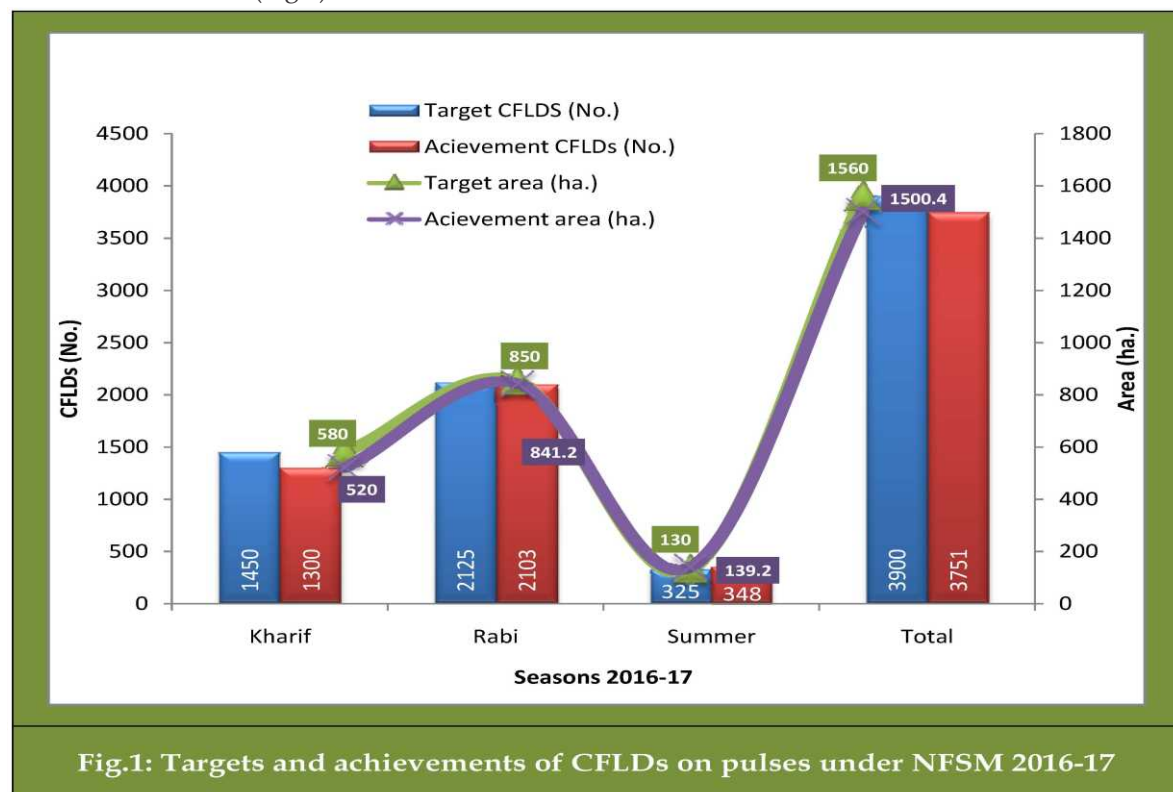
Table 3: Area, production and productivity of CFLD pulse crops in Puducherry (2014-15)

CFLD pulse crops	Area (ha)	Production (t)	Productivity (kg/ha)
Blackgram	775	432	557
Greengram	1079	481	446

Source: Directorate of Economics and Statistics, Puducherry

2. Target and achievement of CFLDs on Pulses

A total of 3900 CFLDs were targeted in an area of 1560 ha on pulses under NFSM 2016-17 for the Zone VIII, out of which 1450 CFLDs in 580 ha during *kharif*, 2125 CFLDs in 850 ha during *rabi* and 325 CFLDs in 130 ha during *summer*. Target was more in *rabi* followed by *kharif* and *summer* and overall target of 96.18% was achieved (Fig.1).



2.1 KVK and state wise CFLDs on pulses

2.1.1 Blackgram: A total of 1100 CFLDs in 440 ha were conducted on Blackgram by KVKs of Karnataka, Tamil Nadu, Kerala and Puducherry. Out of 7 KVKs in Karnataka, Uttara Kannada conducted 50 demos and remaining KVKs conducted 25 demos each. Out of 21 KVKs in Tamil Nadu, more demos (75) were conducted by Pudukottai followed by 6 KVKs viz., Cuddalore, Kancheepuram, Nagapattinam, Sivagangai, Thiruchirapalli and Virudhunagar conducted 50 demos each and rest of the KVKs conducted 25 demos each. All 6 KVKs of Kerala and one KVK of Puducherry conducted 25 demos each (Fig.2).

2.1.2 Greengram: A total of 1383 CFLDs in 553.20 ha were conducted on Greengram by KVKs of Karnataka, Tamil Nadu, Kerala and Puducherry. Out of 11 KVKs in Karnataka, Dharwad conducted highest demos (100) while Dakshina Kannada conducted least demos (23). Out of 15 KVKs in Tamil Nadu, more demos (75) were conducted by Namakkal while Erode conducted least demos (10). Out of 6 KVKs in Kerala, Palakkad conducted 50 demos and rest of the KVKs conducted 25 demos each. Karaikal KVK of Puducherry conducted 25 demos (Fig.3).

2.1.3 Pigeonpea: A total of 700 CFLDs in 280 ha were conducted on Pigeonpea by KVKs of Karnataka and Tamil Nadu. Out of 18 KVKs in Karnataka, 7 KVKs viz., Vijayapura-I, Kalaburagi-I, Kalaburagi-II, Kolar, Koppal, Raichur and Tumakuru-II conducted 50 demos each and rest of the KVKs conducted 25 demos each. Whereas in case of Tamil Nadu, all 3 KVKs conducted 25 demos each (Fig.4).

2.1.4 Chickpea: A total of 568 CFLDs in 227.20 ha were conducted on Chickpea by KVKs of Karnataka and Tamil Nadu. Out of 17 KVKs in Karnataka, 4 KVKs viz., Vijayapura-I, Dharwad, Gadag and Raichur conducted 50 demos each and Bengaluru Rural conducted least demos (18). Coimbatore and Dindigul KVKs of Tamil Nadu conducted 25 demos each (Fig.5).

2.2 Crop, season and state wise CFLDs on pulses

2.2.1 Blackgram: A total of 200 demos in 80 ha were conducted by KVKs of Karnataka, out of which 75 demos (30 ha) each in *kharif* and *rabi*, and 50 demos (20 ha) in *summer*. Similarly, KVKs of Tamil Nadu conducted 725 demos in 290 ha, out of which 25 demos (10 ha) in *kharif*, 575 demos (230 ha) in *rabi* and 125 demos (50 ha) in *summer*. In Kerala, 150 demos in 60 ha were conducted, out of which 125 demos

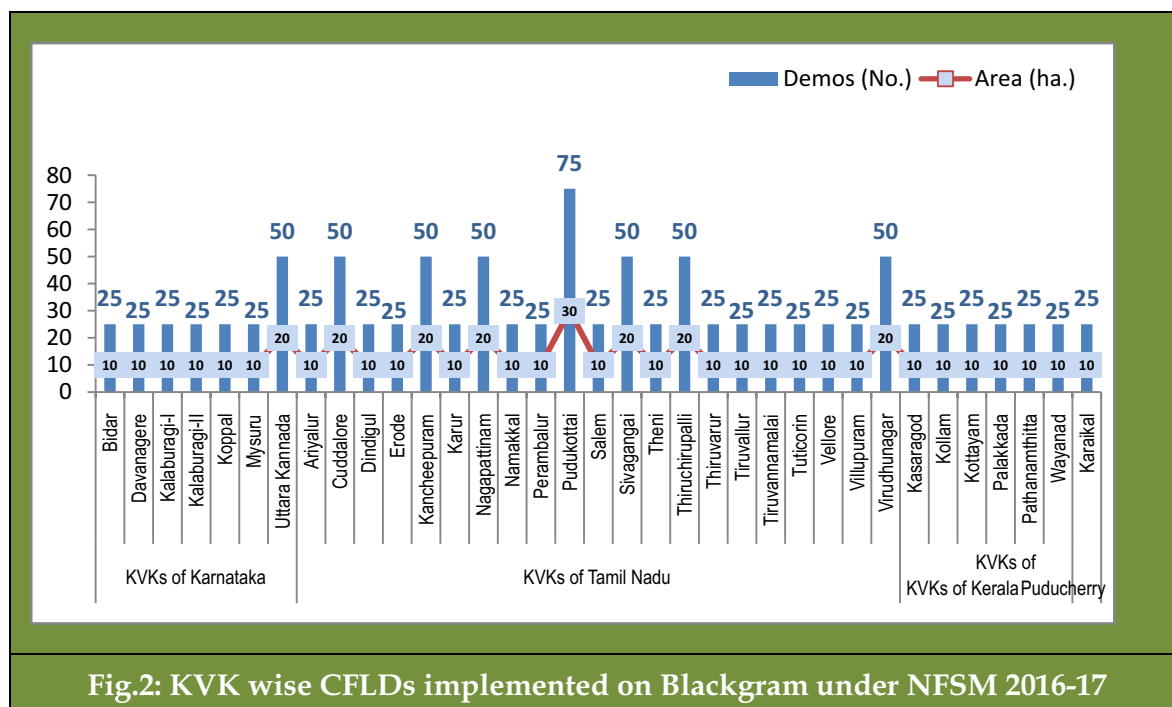


Fig.2: KVK wise CFLDs implemented on Blackgram under NFSM 2016-17

(50 ha) in *rabi* and 25 demos (10 ha) in *summer*. Where as in Puducherry, 25 demos (10 ha) conducted in *rabi* (Table.4).

2.2.2 Greengram: A total of 523 demos in 209.20 ha were conducted by KVKs of Karnataka, out of which 300 demos (120 ha) in *kharif*, 200 demos (80 ha) in *rabi* and 23 demos (9.20 ha) in *summer*. Similarly, KVKs of Tamil Nadu conducted 660 demos in 264 ha, out of which 175 demos (70 ha) in *kharif*, 435 demos (174 ha) in *rabi* and 50 demos (20 ha) in *summer*. In Kerala, 175 demos in 70 ha were conducted, out of which 25 demos (10 ha) in *kharif*, 75 demos (30 ha) each in *rabi* and *summer*. Where as in Puducherry, 25 demos (10 ha) conducted in *rabi* (Table.4).

2.2.3 Pigeonpea: KVKs of Karnataka and Tamil Nadu conducted 625 demos (250 ha) and 75 demos (30 ha), respectively during *kharif*(Table.4)

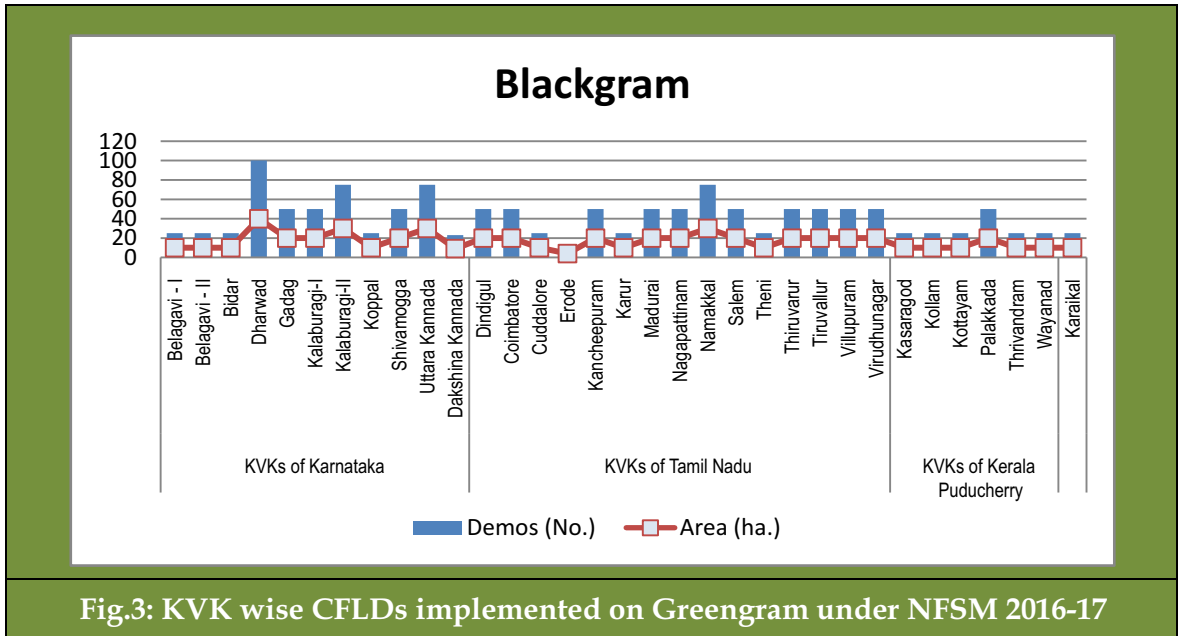


Fig.3: KVK wise CFLDs implemented on Greengram under NFSM 2016-17

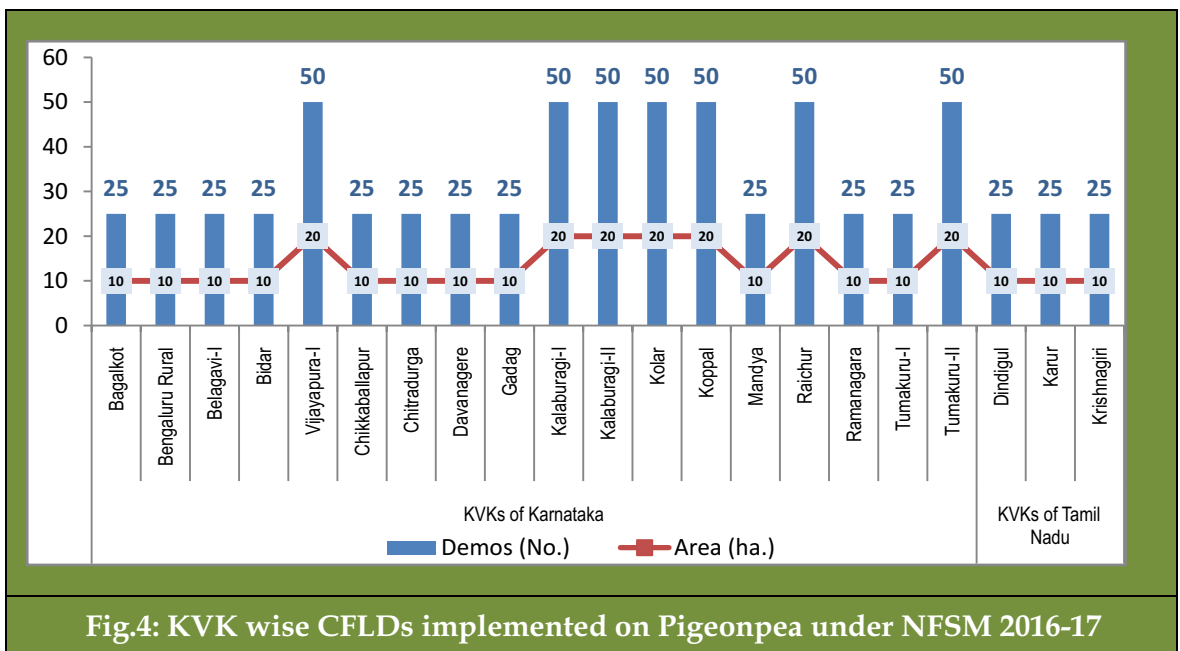
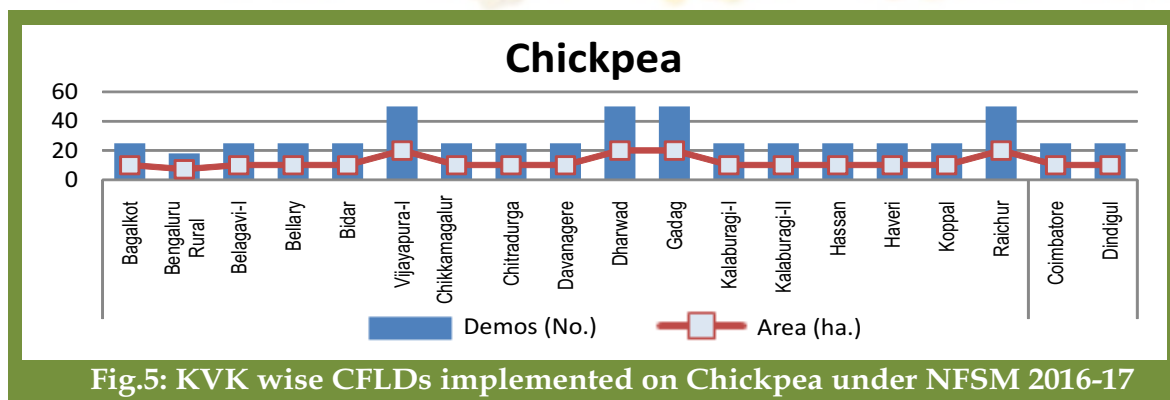


Fig.4: KVK wise CFLDs implemented on Pigeonpea under NFSM 2016-17



2.2.4 Chickpea: KVKs of Karnataka and Tamil Nadu conducted 518 demos (207.2 ha) and 50 demos (20 ha), respectively during *rabi* (Table.4).

Table 4: Crop and state wise CFLDs conducted on pulses under NFSM 2016-17

Crop/state	Seasons 2016-17						Total	
	Kharif		Rabi		Summer			
	Demos (No.)	Area (ha)	Demos (No.)	Area (ha)	Demos (No.)	Area (ha)	Demos (No.)	Area (ha)
Blackgram								
Karnataka	75	30	75	30	50	20	200	80
Tamil Nadu	25	10	575	230	125	50	725	290
Kerala	-	-	125	50	25	10	150	60
Puducherry	-	-	25	10	-	-	25	10
Sub-total	100	40	800	320	200	80	1100	440
Greengram								
Karnataka	300	120	200	80	23	9.2	523	209.2
Tamil Nadu	175	70	435	174	50	20	660	264
Kerala	25	10	75	30	75	30	175	70
Puducherry	-	-	25	10	-	-	25	10
Sub-total	500	200	735	294	148	59.2	1383	553.2
Pigeonpea								
Karnataka	625	250	-	-	-	-	625	250
Tamil Nadu	75	30	-	-	-	-	75	30
Sub-total	700	280	-	-	-	-	700	280
Chickpea								
Karnataka	-	-	518	207.2	-	-	518	207.2
Tamil Nadu	-	-	50	20	-	-	50	20
Sub-total	-	-	568	227.2	-	-	568	227.2
Grand total	1300	520	2103	841.2	348	139.2	3751	1500.4
Total sanctioned	1450	580	2125	850	325	130	3900	1560

3. Performance of CFLDs on Pulses

3.1 KVK wise performance of CFLDs on pulses

3.1.1 Blackgram: Among 7 KVKs implemented CFLDs on Blackgram, Bidar recorded highest average demo yield of 11.47 q/ha and lowest by Uttara Kannada (4.86 q/ha) but with higher per cent yield increase (47.27 %) over check. In Tamil Nadu, Pudukottai recorded highest average demo yield of 9.61 q/ha and lowest by Karur (4.59 q/ha) among 20 KVKs implemented. The per cent average demo yield increase over check was ranged from 2.84 (Tiruvallur) to 71.23 (Vellore). Six KVKs of Kerala implemented first time CFLDs on Blackgram under NFSM. Out of which, 4 KVKs viz., Kasaragod,

Kottayam, Palakkad and Pathanamthitta conducted CFLDs where Blackgram cultivation does not exist as farmers practice. However average demo yield range from 2.66 q/ha to 7.65 q/ha and it indicate there is potential for Blackgram production in these KVK districts. Among other two KVKs, Wayanad recorded highest average demo yield of 9.75 q/ha. Karaikal KVK of Puducherry recorded average demo yield of 6.00 q/ha with 46.70% increase over check (Fig.6).

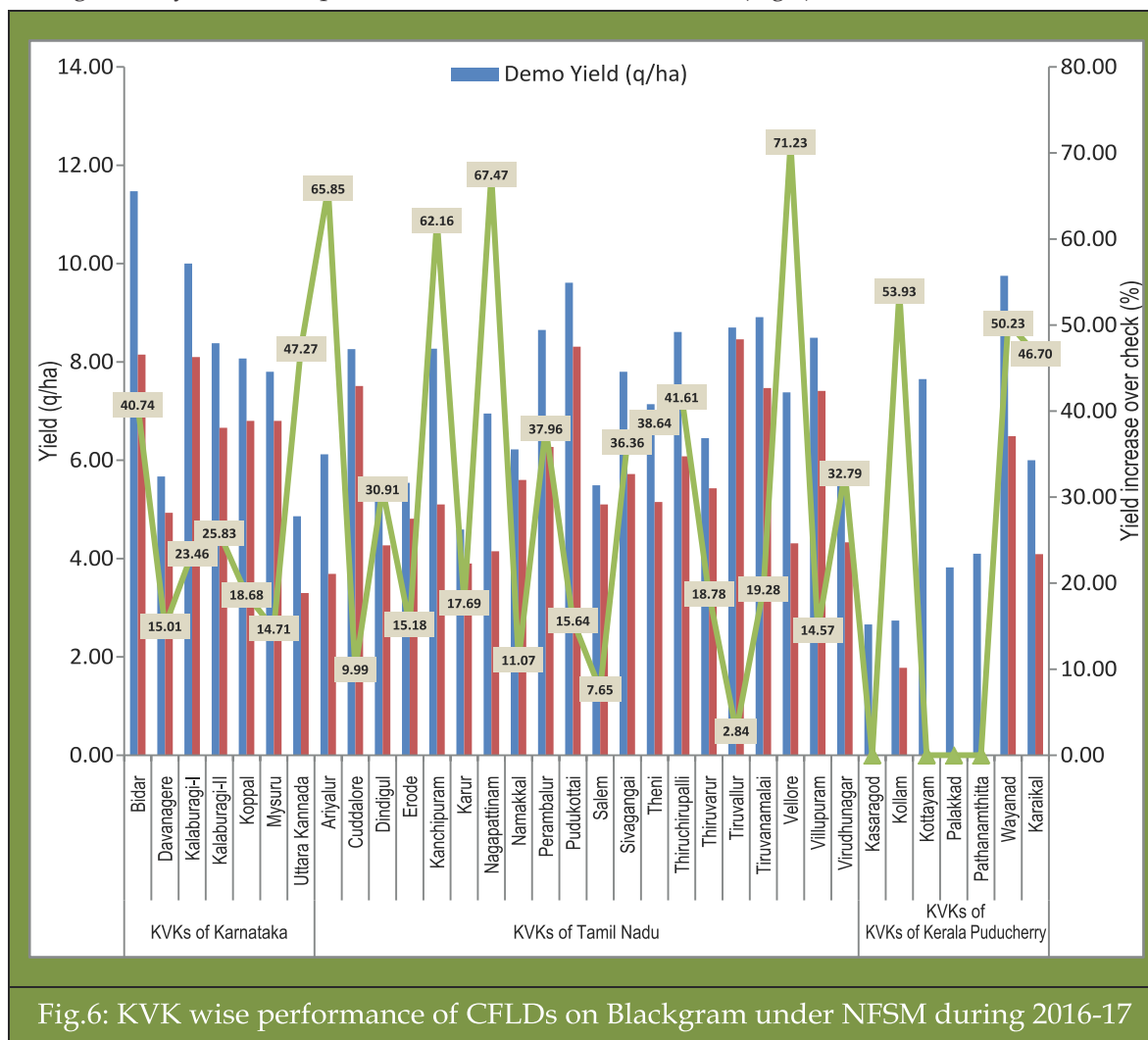


Fig.6: KVK wise performance of CFLDs on Blackgram under NFSM during 2016-17

3.1.2 Greengram: Among 11 KVKs implemented CFLDs on Greengram, highest average demo yield (11.72 q/ha) as well as highest yield increase (39.86%) over check was recorded by Bidar while lowest average demo yield by Dakshina Kannada (2.32 q/ha) and lowest yield increase by Dharwad (13.57%). In Tamil Nadu, Tiruvallur recorded highest average demo yield of 11.23 q/ha and lowest by Karur (4.00 q/ha) among 15 KVKs implemented. The per cent average demo yield increase over check range from 12.33 (Namakkal) to 75.39 (Nagapattinam). Five KVKs of Kerala implemented first time CFLDs on Greengram under NFSM. Out of which, 2 KVKs viz., Kottayam and Palakkad conducted CFLDs where Greengram cultivation does not exist as farmers practice. However average demo yield range from 5.32 q/ha to 7.59 q/ha and it indicate there is potential for Greengram production in these KVK districts. Among other 3 KVKs, Wayanad recorded highest average demo yield of 13.75 q/ha. Karaikal KVK of Puducherry recorded average demo yield of 4.10 q/ha with 58.91% increase over check (Fig.7).

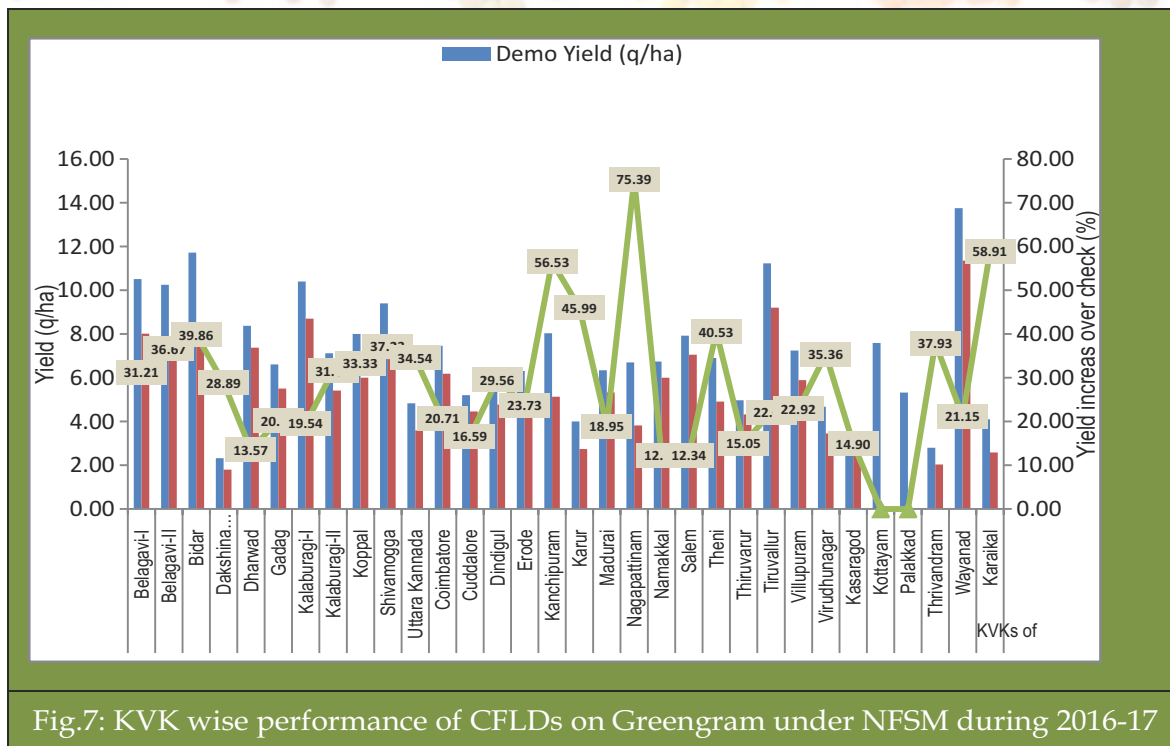


Fig.7: KVK wise performance of CFLDs on Greengram under NFSM during 2016-17

3.1.3 Pigeonpea: Among 18 KVKs implemented CFLDs on Pigeonpea, highest average demo yield (23.75 q/ha) as well as highest yield increase (75.93%) over check was recorded by Bidar while lowest average demo yield by Tumakuru-II (2.04 q/ha) and lowest yield increase by Ramanagara (7.61%). In Tamil Nadu, 3 KVKs implemented CFLDs on Pigeonpea wherein average demo yield range from 6.82 q/ha to 10.37 q/ha and per cent yield range from 13.67 to 97.52 over check (Fig.8).

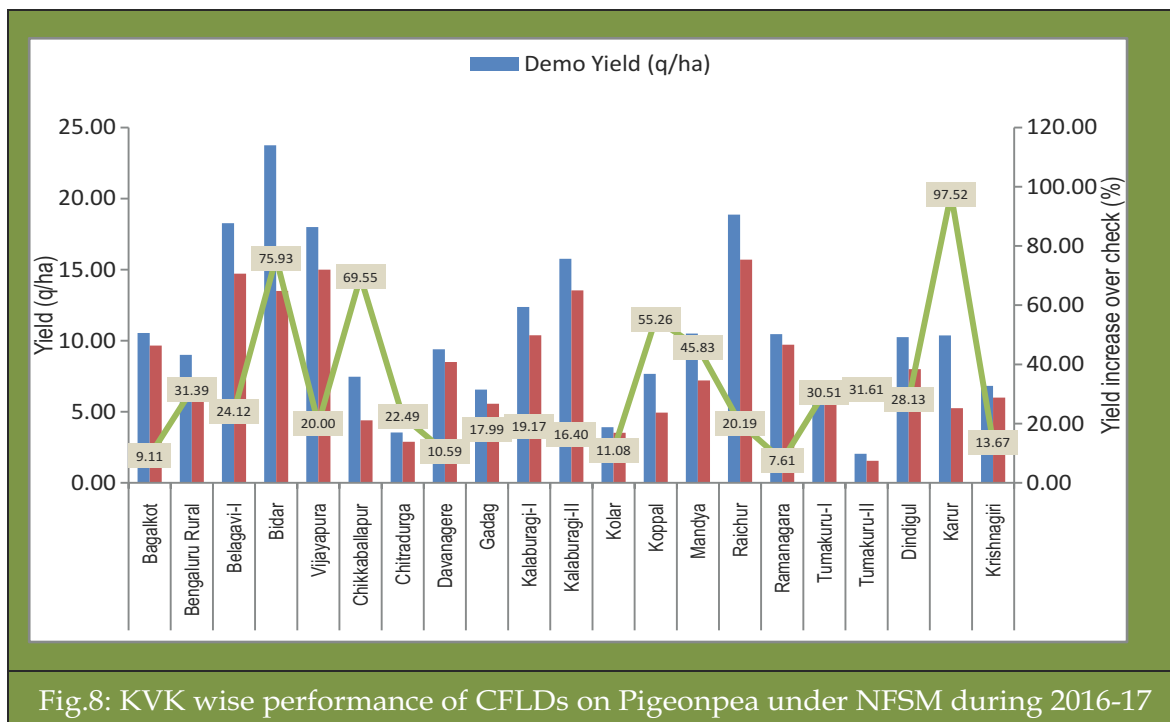


Fig.8: KVK wise performance of CFLDs on Pigeonpea under NFSM during 2016-17

3.1.4 Chickpea: Among 17 KVKs implemented CFLDs on Chickpea, Kalaburagi-II recorded highest average demo yield (18.66 q/ha) and lowest by Gadag (4.76 q/ha). The per cent yield increase was range from 10.22 (Kalaburagi-II) to 60.08 (Haveri). In Tamil Nadu, Coimbatore and Dindigul implemented CFLDs on Chickpea and recorded average demo yield of 11.40 q/ha and 11.01 q/ha, respectively (Fig.9).

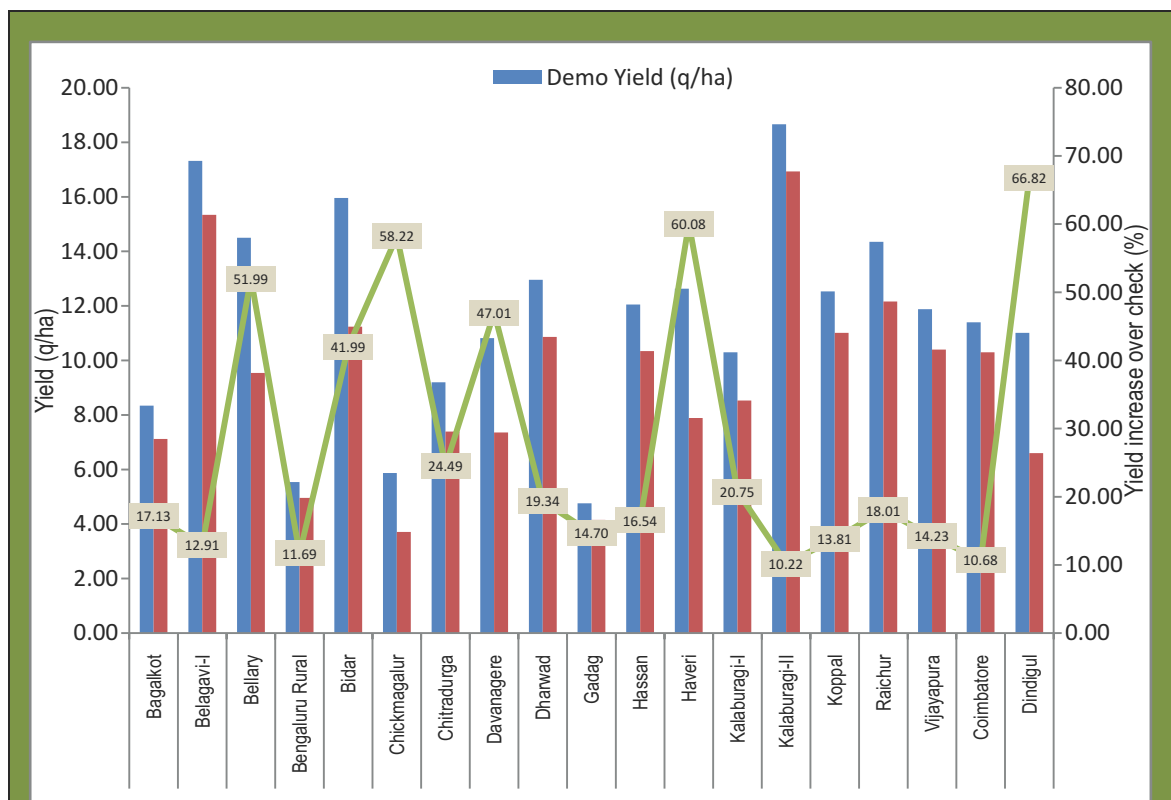


Fig.9: KVK wise performance of CFLDs on Chickpea under NFSM during 2016-17

3.2 State wise performance of CFLDs on pulses

3.2.1 Blackgram: In Karnataka, average demo yield of Blackgram was higher during *kharif* (10.33 q/ha) followed by *Summer* (6.73 q/ha) and *rabi* (5.93 q/ha). Similarly in Tamil Nadu, higher average demo yield was recorded during *summer* (8.51 q/ha) followed by *kharif* (7.38 q/ha) and *rabi* (6.98 q/ha). Demonstrations under taken by the KVKs of Kerala and Puducherry during *rabi* recorded higher average demo yield of 9.75 q/ha and 6.00 q/ha, respectively (Table 5).

3.2.2 Greengram: The trend of average demo yield of Greengram was higher during *kharif* followed by *rabi* and *summer* in Karnataka, Tamil Nadu and Kerala. Karaikal KVK of Puducherry undertaken demonstrations during *rabi* and recorded an average demo yield of 4.10 q/ha (Table 5).

3.2.3 Pigeonpea: KVKs of Karnataka and Tamil Nadu implemented CFLDs on Pigeonpea during *kharif* and recorded an average demo yield of 10.93 q/ha and 9.15 q/ha with yield increase of 26.95% and 42.52% over check, respectively (Table.5).

3.2.4 Chickpea: KVKs of Karnataka and Tamil Nadu implemented CFLDs on Chickpea during *rabi* and recorded an average demo yield of 11.91 q/ha and 11.20 q/ha with yield increase of 23.55% and 32.54% over check, respectively (Table.5).

Table. 5: Crop and state wise performance of CFLDs on pulses 2016-17

Crop/state	Average yield (q/ha)								
	Kharif			Rabi			Summer		
	Demo	Check	% increase	Demo	Check	% increase	Demo	Check	% increase
Blackgram									
Karnataka	10.33	7.77	32.95	5.93	4.46	32.96	6.73	5.87	14.65
Tamil Nadu	7.38	4.31	71.23	6.98	5.71	22.24	8.51	5.82	46.22
Kerala	-	-	-	9.75	6.49	50.23	2.74	1.78	53.93
Puducherry	-	-	-	6.00	4.09	46.70	-	-	-
Greengram									
Karnataka	9.31	7.30	27.53	7.10	5.43	30.76	2.32	1.80	28.89
Tamil Nadu	7.06	5.95	18.66	6.72	5.18	29.73	4.97	4.32	15.05
Kerala	13.75	11.35	21.15	4.40	3.02	45.70	2.80	2.03	37.93
Puducherry	-	-	-	4.10	2.58	58.91	-	-	-
Pigeonpea									
Karnataka	10.93	8.61	26.95	-	-	-	-	-	-
Tamil Nadu	9.15	6.42	42.52	-	-	-	-	-	-
Chickpea									
Karnataka	-	-	-	11.91	9.64	23.55	-	-	-
Tamil Nadu	-	-	-	11.20	8.45	32.54	-	-	-

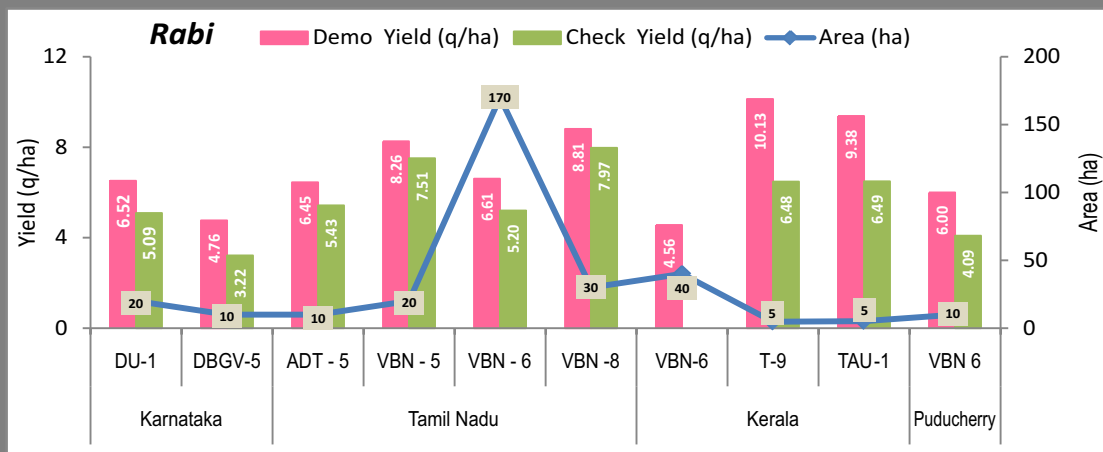
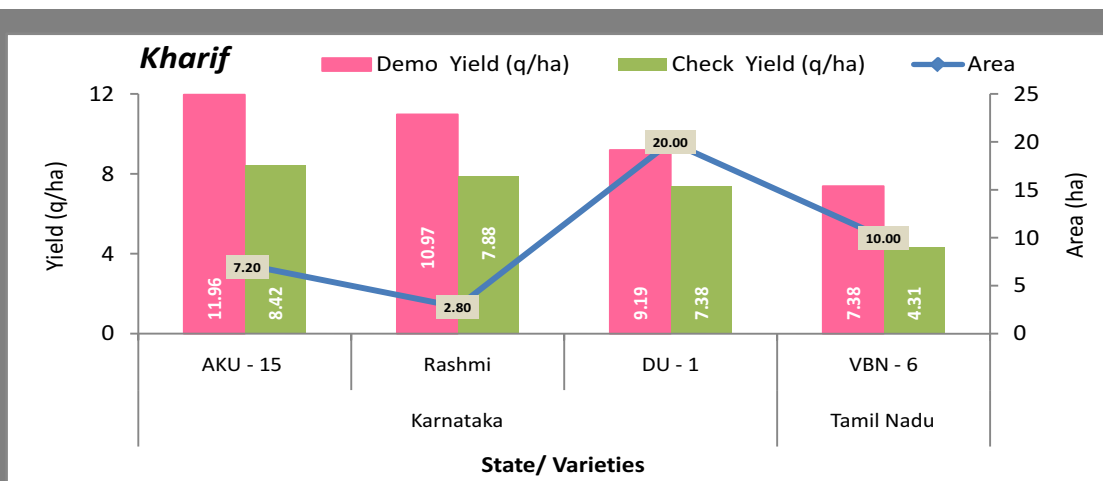
3.3 Variety wise performance of CFLDs on pulses

3.3.1 Blackgram: Four varieties viz., AKU – 15, Rashmi, DU – 1 and DBGV-5 of Blackgram were demonstrated under NFSM by the KVKs of Karnataka. DU-1 was demonstrated in more area of 40 ha (20 ha in *kharif* and 20 ha in *rabi*) followed by DBGV-5 in 20 ha (10 ha in *rabi* and 10 ha in *summer*), Rashmi in 12.8 ha (2.8 in *kharif* and 10 ha in *summer*, and AKU – 15 in 7.2 ha in *kharif* by involving 200 farmers. Among these varieties, AKU – 15 recorded highest average demo yield of 11.96 q/ha with net returns of Rs.63962 and 4.99 BCR in *kharif*, while DBGV-5 recorded lower average demo yield of 4.76 q/ha with net returns of Rs.10799 and 1.54 BCR in *rabi*. In Tamil Nadu, 5 varieties viz., VBN-5, VBN-6, VBN-8, ADT-5 and MDU-1 of Blackgram were demonstrated by KVKs by involving 725 farmers. Out of these varieties, VBN-6 covered in 210 ha (10 ha in *kharif*, 170 ha in *rabi* and 30 ha in *summer*) followed by VBN-8 in 30 ha during *rabi*, VBN-5 and MDU-1 in 20 ha each during *rabi* and *summer*, respectively, and ADT-5 in 10 ha during *rabi*. Among these varieties, VBN-8 performed better and yielded an average demo yield of 8.81 q/ha with net returns of Rs.40273 and 2.54 BCR. ADT-5 recorded lowest average demo yield of 6.45 q/ha with net returns of Rs.36425 and 2.98 BCR. In Kerala, out of four varieties demonstrated VBN-6 covered more area of 40 ha in *rabi* followed by DU-1 (10 ha in *summer*), TAU-1 (5.2 ha in *rabi*) and T-9 (4.8 ha in *rabi*) in 150 farmers fields. Higher average demo yield of 10.13 q/ha was observed with T-9 during *rabi* and lowest was with DU-1 (2.74 q/ha) during *summer*. VBN 6 was demonstrated by Karaikal KVK of Puducherry and yield recorded was 6.00 q/ha in *rabi* with net returns of Rs. 14238 and 1.64 BCR (Table.6 and Fig.10).

Table. 6: Variety wise performance of CFLDs on Blackgram under NFSM 2016-17

Season	State/ variety	CFLDs		Average yield (q/ha)			Net returns (Rs./ha)		BCR	
		Demos (No.)	Area (ha)	Demo	Check	% increase	Demo	Check	Demo	Check
Blackgram kharif 2016-17	Karnataka									
	AKU - 15	18.00	7.20	11.96	8.42	42.04	95807	63962	6.37	4.99
	Rashmi	7.00	2.80	10.97	7.88	39.21	86318	58786	5.84	4.66
	DU - 1	50.00	20.00	9.19	7.38	24.53	34372	45663	3.13	3.6
	Tamil Nadu									
VBN - 6	25.00	10.00	7.38	4.31	71.23	43358	21688	3.53	2.69	

Blackgram <i>rabi</i> 2016-17	Karnataka									
	DU-1	50	20	6.52	5.09	28.09	23943	17038	2.54	2.34
	DBGV-5	25	10	4.76	3.22	47.83	10799	3202	1.54	1.27
	Tamil Nadu									
	ADT - 5	25	10	6.45	5.43	18.78	36425	27080	2.98	2.42
	VBN - 5	50	20	8.26	7.51	9.99	36555	32516	2.24	2.18
	VBN - 6	425	170	6.61	5.20	27.12	31281	18815	2.35	1.96
	VBN - 8	75	30	8.81	7.97	10.54	40273	30900	2.54	2.17
	Kerala									
	VBN-6	100	40	4.56	-	-	7300	-	1.40	-
	T-9	12	4.8	10.13	6.48	56.33	60560	25810	2.86	1.79
TAU-1	13	5.2	9.38	6.49	44.53	52937	25810	2.50	1.79	
Puducherry										
VBN 6	25	10	6.00	4.09	46.70	14238	5536	1.64	1.29	
Blackgram <i>summer</i> 2016-17	Karnataka									
	DBGV-5	25	10	5.67	4.93	15.01	22890	18816	2.58	2.37
	Rashmi	25	10	7.80	6.80	14.71	22510	19050	2.27	2.16
	Tamil Nadu									
	VBN-6	75	30	8.46	5.69	48.68	40065	19498	2.52	1.80
	MDU-1	50	20	8.61	6.08	41.61	37002	15318	1.91	1.73
	Kerala									
DU - 1	25	10	2.74	1.78	53.93	8276	4107	1.50	1.35	



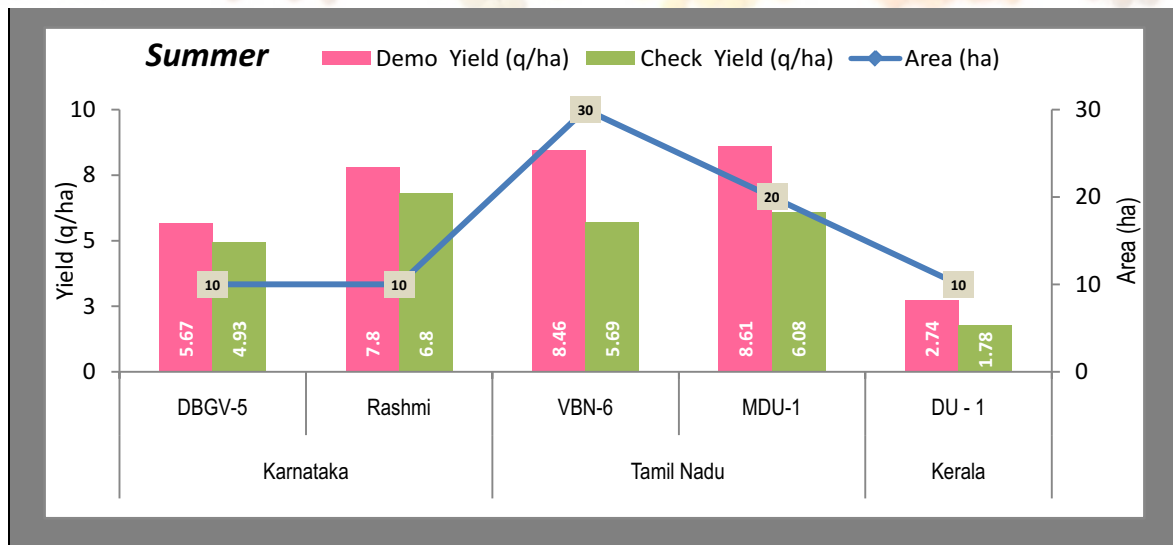


Fig.10 : Variety wise performance of CFLDs on Blackgram under NFSM 2016-17



DU-1 (KVK Gulabarga-II) during Kharif



VBN-5 (KVK Cuddalore) during rabi



VBN-8 (KVK Thiruvannamalai) during rabi



VBN-6 (KVK Kottayam) during rabi



VBN-6 (KVK Shivangai) during rabi



VBN-6 (KVK Perambalur) during summer

A view of CFLDs on Blackgram varieties under NFSM 2016-17

3.3.2 Greengram: Five varieties viz., BGS-9, DGGV-2, IPM-02-14, KKM-3 and WGG-42 of Greengram were demonstrated under NFSM by the KVKs of Karnataka. BGS-9 and DGGV-2 was demonstrated in more area of 60 ha each in *kharif* followed by IPM-02-14 in 59.2 ha (50 ha in *rabi* and 9.20 ha in *summer*), KKM-3 in 50 ha during *rabi* and WGG-42 in 10 ha during *rabi* by involving 523 farmers. Among these varieties, BGS-9 recorded highest average demo yield of 9.54 q/ha with net returns of Rs.28920 and 2.44 BCR in *kharif*, while IPM-02-14 recorded lower average demo yield of 2.32 q/ha with net returns of Rs.5130 and 1.33 BCR in *summer*. KVKs of Tamil Nadu demonstrated two varieties of Greengram of which Co-8 covered more area of 244 ha (70 ha in *kharif*, 154 ha in *rabi* and 20 ha in *summer*) and Co-6 in 20 ha in *rabi* by involving 660 farmers. Co-6 performed better with an average demo yield of 7.46 q/ha with net returns of Rs.30338 and 2.68 BCR during *rabi*. Co-8 also equally performed better with an average demo yield of 7.06 q/ha with net returns of Rs.28403 and 2.72 BCR during *kharif*. In Kerala, out of two varieties demonstrated Co-8 covered more area of 40 ha (30 in *rabi* and 10 in *summer*) and PDM-139 in 20 ha (10 ha in *kharif* and 10 ha in *summer*) by involving 175 farmers. PDM-139 gave high average demo yield of 13.75 q/ha with net returns of Rs.71056 and 2.80 BCR in *kharif*. Co-8 was demonstrated by Karaikal KVK of Puducherry and yield recorded was 4.10 q/ha in *rabi* with net returns of Rs. 11638 and 1.80 BCR (Table.7 and Fig.11).

Table.7 : Variety wise performance of CFLDs on Greengram under NFSM 2016-17

Season	State/ variety	CFLDs		Average yield (q/ha)			Net returns (Rs./ha)		BCR	
		Demos	Area (ha)	Demo	Check	% increase	Demo	Check	Demo	Check
Greengram <i>kharif</i> 2016-17	Karnataka									
	BGS - 9	150	60	9.54	7.36	29.62	28920	18067	2.44	2.05
	DGGV - 2	150	60	9.08	7.24	25.41	23734	15170	2.02	1.72
	Tamil Nadu									
	Co - 8	175	70	7.06	5.95	18.66	28403	20881	2.72	2.31
	Kerala									
	PDM-139	25	10	13.75	11.35	21.15	71056	56104	2.80	2.36
Greengram <i>rabi</i> 2016-17	Karnataka									
	IPM-02-14	125	50	6.31	5.19	21.58	22332	15514	2.29	1.89
	KKM - 3	50	20	9.40	6.85	37.23	37597	23979	3.51	2.78
	WGG-42	25	10	6.40	4.48	42.86	13924	3845	1.83	1.22
	Tamil Nadu									
	Co - 6	50	20	7.46	6.18	20.71	30338	21661	2.68	2.17
	Co - 8	385	154	6.65	5.09	30.65	24962	15241	2.32	1.85
	Kerala									
	Co-8	75	30	4.40	-	-	7925	-	1.40	-
Puducherry										
	Co - 8	25	10	4.10	2.58	58.91	11638	4475	1.80	1.35
Greengram <i>summer</i> 2016 -17	Karnataka									
	IPM-02-14	23	9.2	2.32	1.80	28.89	5130	2450	1.33	1.18
	Tamil Nadu									
	Co - 8	50	20	4.97	4.32	15.05	25490	18640	2.67	2.11
	Kerala									
	Co - 8	25	10	7.59	-	-	15158	-	1.26	-
	PDM 139	25	10	2.80	2.03	37.93	8390	2340	1.60	1.17



Fig.11 : Variety wise performance of CFLDs on Greengram under NFSM 2016-17



DGGV-2 (KVK Dharwad) during Kharif



BGS-9 (KVK Koppal) during kharif



Co-8 (KVK Dindigul) during kharif



DGGV-2 (KVK Gadag) during kharif



KKM-3 (KVK Shivamogga) during rabi



IPM-02-14 (KVK Uttara Kannada) during rabi

A view of CFLDs on Greengram varieties under NFSM 2016-17

3.3.3 Pigeonpea: KVKs of Karnataka demonstrated six varieties of Pigeonpea by involving 625 farmers, of which TS-3R covered more area of 120 ha followed by BRG-5 (70 ha), BRG-1 and 2 (20 ha each), BSMR-736 and GRG-811 (10 ha each) during *kharif*. Among these varieties, BSMR-736 recorded highest average demo yield of 23.75 q/ha with net returns of Rs. 99130 and 5.07 BCR. While demonstration of BRG-1 resulted in lowest average demo yield of 3.91 q/ha with net returns of Rs.2052 and 1.15 BCR. KVKs of Tamil Nadu demonstrated three varieties viz., TS-3R, BRG-2 and BRG-4 in 10 ha each during *kharif*. Among these varieties BRG-4 performed better with average demo yield of 10.37 q/ha with net returns of Rs.50380 and 3.94 BCR followed by TS-3R (10.25 q/ha) and BRG-2 (6.81 q/ha) (Table.8 and Fig.12).

Table.8 : Variety wise performance of CFLDs on Pigeonpea under NFSM 2016-17

Season	State/ variety	CFLDs		Average yield (q/ha)			Net returns (Rs./ha)		BCR	
		Demos (No.)	Area (ha)	Demo	Check	% increase	Demo	Check	Demo	Check
Pigeonpea <i>kharif</i> 2016-17	Karnataka									
	BRG - 1	50	20	3.91	3.52	11.08	2052	716	1.15	1.05
	BRG - 2	50	20	7.02	5.05	39.01	6705	1787	1.53	1.14
	BRG-5	175	70	7.60	6.09	24.79	16912	9649	1.98	1.67
	BSMR-736	25	10	23.75	13.50	75.93	99130	51290	5.07	3.71
	GRG- 811	25	10	12.97	10.93	18.66	52046	41822	3.70	3.29
	TS - 3R	300	120	13.43	11.12	20.77	49828	38494	2.88	2.53
	Tamil Nadu									
	TS - 3R	25	10	10.25	8.00	28.13	44012	31476	3.52	2.91
	BRG 4	25	10	10.37	5.25	97.52	50380	21783	3.94	2.34
BRG - 2	25	10	6.81	6.00	13.67	21075	14851	1.79	1.55	

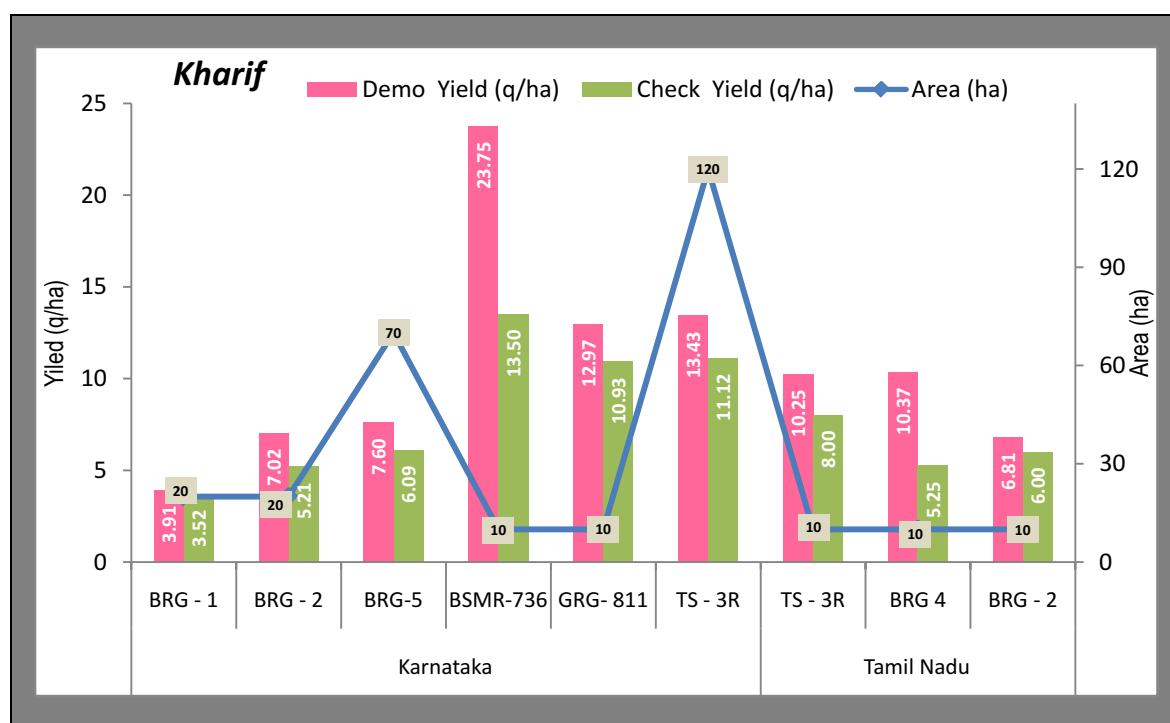


Fig.12 : Variety wise performance of CFLDs on Pigeonpea under NFSM 2016-17



BRG-4 (KVK Karur)



TS-3R (KVK Dindigul)



BRG-5 (KVK Bengaluru Rural)



TS-3R (KVK Belagavi-1)



BRG-5 (KVK Tumakuru-I)



BRG-2 (KVK Mandya)



BRG-2 (KVK Chitradurga)



TS-3R (KVK Koppal)

A view of CFLDs on Pigeonpea varieties during *kharif* under NFSM 2016-17

3.3.4 Chickpea: KVKs of Karnataka demonstrated five varieties of Chickpea by involving 518 farmers, of which JG-11 covered more area of 100 ha followed by JAKI-9218 (63.20 ha), GBM-2 (29.20 ha), BGD-103 (10.80 ha) and NBeG-3 (4.00 ha) during *rabi*. NBeG-3 gave highest average demo yield of 16.07 q/ha with net returns of Rs.73701 and 4.99 BCR. Similarly other demonstrated varieties viz., BGD-103, GBM-2, JG-11 and JAKI-9218 were performed better with average demo yield of 15.70 q/ha, 13.43 q/ha, 11.79 q/ha and 9.87 q/ha, respectively. In Tamil Nadu, Co-4 and JAKI-9218 were demonstrated in 10 ha each during *rabi* by involving 50 farmers. Both the varieties performed equally good with an average demo yield of 11.40 q/ha (Co-4) and 11.01 q/ha (JAKI-9218) (Table.9 and Fig.13).

Table 8: Variety wise performance of CFLDs on Pigeonpea under NFSM 2016-17

Season	State/ variety	CFLDs		Average yield (q/ha)			Net returns (Rs./ha)		BCR	
		Demos (No.)	Area (ha)	Demo	Check	% increase	Demo	Check	Demo	Check
Chickpea <i>rabi</i> 2016-17	Karnataka									
	JG-11	250	100	11.79	10.09	16.85	48828	39414	3.60	3.04
	JAKI 9218	158	63.2	9.87	7.99	23.53	34383	22582	2.46	1.97
	NBeG-3	10	4	16.07	11.95	34.48	73701	50892	4.99	3.76
	BGD-103	27	10.8	15.70	10.40	50.96	52951	27886	3.41	2.32
	GBM-2	73	29.2	13.43	10.34	29.88	38856	29825	3.13	2.68
	Tamil Nadu									
	Co - 4	25	10	11.40	10.30	10.68	32900	24386	1.53	1.39
	JAKI 9218	25	10	11.01	6.60	66.80	67072	37016	4.19	2.76

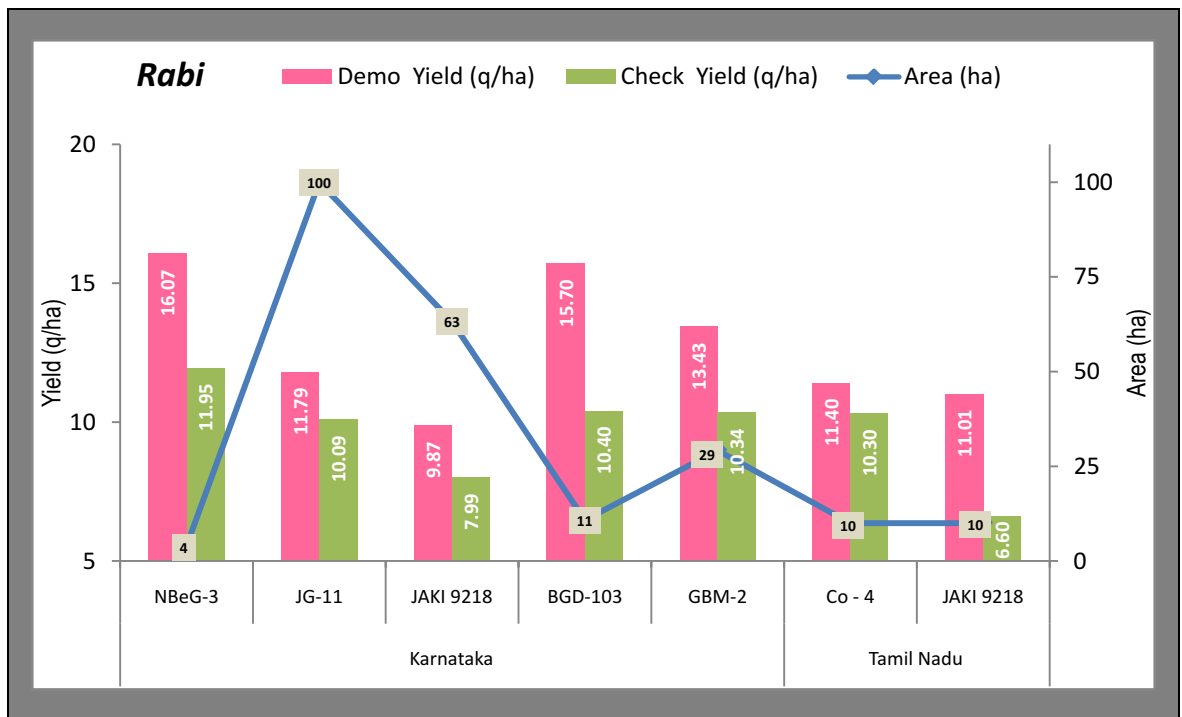


Fig.13 : Variety wise performance of CFLDs on Chickpea under NFSM 2016-17



JG-11 (KVK Hassan)



JG-11 (KVK Vijayapura)



JG-11 (KVK Koppal)



BGD-103 (KVK Bellary)



JAKI-9218 (KVK Dharwad)



BGD-103 (KVK Bidar)

A view of CFLDs on Chickpea varieties during *rabi* under NFSM 2016-17

3.4 Performance of production technologies through CFLDs on pulses

3.4.1 Blackgram

(a) Blackgram variety AKU-15 under rainfed black soil Shri Rajappa Patil S/o Kantappa Patil Markhal village Bidar district KVK, Bidar demonstrated AKU-15 variety of Blackgram along with production technologies under rainfed black soil field of Shri Rajappa Patil during *kharif* and it was recorded 12.54 q/ha yield as against check variety TAU-1 (8.52 q/ha) that gave an increase of 47.18 % yield and 56.08% net returns over check with Rs.101280 under demo and Rs.64890 under check. Yield gap over check is 32.06%. Shri. Rajappa Patil opined that AKU-15 was less affected with diseases and gave high yield. Seeds are bold and shiny that fetches higher market rate.



**Shri Rajappa Patil
S/o Kantappa Patil
Markhal village
Bidar district**



Farmer –scientist interaction at demo field



**Dr.P.M.Salimath, VC of UAS Raichur
visiting demo field**

(b) Blackgram variety Rashmi under irrigation

KVK, Mysuru demonstrated Rashmi variety of Blackgram along with production technologies under irrigated field of Shri Mahadevayya during *summer* and it was recorded 8.80 q/ha yield as against check (7.50 q/ha) that gave an increase of 17.33 % yield and 21.16% net returns over check with Rs.26050 under demo and Rs.21500 under check. Yield gap over check is 14.77%. Shri Mahadevayya expressed that heavy rains in later stage of the crop have caused excessive vegetative growth of Rashmi variety. In general, the spreading type variety rashmi is relatively more susceptible to yellow vein mosaic disease.



A view of demo field of Shri Mahadevayya

(c) Yellow sticky trap in Blackgram variety VBN-6 under rice fallow



KVK, Nagapattinam demonstrated Yellow sticky trap in Blackgram variety VBN-6 under rice fallow field of Shri C.Karthikeyan during *rabi*. Installation of Yellow sticky trap @ 12 No./ha reduced the sucking pest damage to an extent of 35%. Farmers were excited on this technology by seeing the insect trapped and killed. Further, VBN-6 recorded 7.50 q/ha yield as against check variety ADT-3 (3.50 q/ha) that gave an increase of 114.29 % yield and 294.68% net returns over check with Rs.41880 under demo

and Rs.10611 under check. Yield gap over check is 53.33%. Shri C.Karthikeyan opined that VBN 6 variety is short duration, non shattering and synchronized maturity, highly resistant to YMV, suitable for rice fallow condition and gave high yield. By seeing the performance farmers are interested to go for next year.



A view of installation of Yellow Sticky Trap in demo field

A view of field day at demo field

(d) Line sowing of Blackgram with seed drill

KVK, Vellore demonstrated line sowing of blackgram variety VBN-6 with seed drill on the field of Shri G.Rajendran during *khari*. With seed drill, plant population was maintained @ 28 plants/m² as well as addressed the labour shortage. VBN-6 recorded 9.60 q/ha yield as against check variety VBN-4 (5.70 q/ha) that gave an increase of 68.42 % yield and 30.42% net returns over check with Rs.23504 under demo and Rs.18021 under check. Yield gap over check is 40.62%. Shri G.Rajendran expressed that the VBN-6 has more number of branches, synchronized maturity, cluster pods with bold grains, free from YMV incidence and gave high yield.



Shri G.Rajendran
S/o Govindaraj
Kalapalampattu
Panappakkam
Vellore district



A view of seed drill operation at demo field



Field visit by scientists

(e) KAU package of practices of Blackgram with TAU-1 variety

KVK, Wayanad demonstrated TAU-I variety of Blackgram along with KAU package of practices on the field of Smt Pushpa Anil during *rabi* and it was recorded 10.45 q/ha yield as against check (6.55 q/ha) that gave an increase of 59.54 % yield and 105.10% net returns over check with Rs.52937 under demo and Rs.25810 under check. Yield gap over check is 37.32%. Smt Pushpa Anil expressed that most of the other crops were highly affected by low rainfall. But pulse crops almost survived the condition and they got good yield and remunerative income when compared to other main crops.



Smt Pushpa Anil
Nellattuparambil(H)
Andoor
Vaduvanchal (P.O)
Wayanad district



A view of demo field



A view of check field

(f) Blackgram introduction under rainfed situation of Pathanamthitta district, Kerala

KVK, Pathanamthitta introduced the cultivation of Blackgram crop in the district. Blackgram variety VBN-6 along with production technologies was successfully demonstrated under rainfed field of Shri Jacob Joseph during *rabi* and it was recorded 8.80 q/ha yield with net returns of Rs.17600. Shri Jacob Joseph expressed that the introduction of new crop Blackgram with VBN-6 variety gave good remuneration.



Shri Jacob Joseph
Gilgal Aswasa Bhavan
Eraviperoor
Pathanamthitta district



A view of herbicide application



Farmers during field day at Demo field

(g) KAU package of practices of Greengram with PDM-139 variety

KVK, Wayanad demonstrated PDM-139 variety of Greengram along with KAU package of practices on the field of Smt Dally Sabu during *kharif* and it was recorded 13.75 q/ha yield as against check variety K - 851 (11.35 q/ha) that gave an increase of 21.14 % yield and 60.17% net returns over check with Rs.74000 under demo and Rs.46200 under check. Yield gap over check is 17.45%.

Smt Dally Sabu expressed that most of the other crops were highly affected by low rainfall. But pulse crops almost survived the condition and they got good yield and remunerative income when compared to other main crops.



Smt Dally Sabu
Thaipparambil (H)
Kaarachal (P.O)
Ambalavayal
Wayanad district



A view of demo field



Performance of PDM-139

3.4.3 Pigeonpea

(a) Wider spacing with nipping in Pigeonpea variety BRG-5

Chikkaballapura demonstrated BRG-5 variety of Pigeonpea along with production technologies with emphasis on wider spacing with nipping on the field of Shri Doddakale Gowda during *kharif*. It was observed that 18-23 branches/plant due to nipping twice during crop season @ 45 and 90 DAS. BRG-5 recorded 9.50 q/ha yield as against check variety BRG – 5 (6.50 q/ha) that gave an increase of 46.15% yield and 49.54% net returns over check with Rs. 32900 under demo and Rs. 22000 under check. Yield gap over check is 31.57%. Shri Venkatesh expressed that BRG-5 has good crop performance in rainwater conserved fields, no wilting and sterile plants, and number of seeds/pod varied from 4-7. However, expected yields could not achieve due to drought during critical period of crop growth.



A view of wider spacing demo crop at pod filling stage



KVK Scientists interaction with farmers in demo field

(b) Wilt resistant variety BRG-5 of Pigeonpea with emphasis on pulse magic spary

KVK, Ramanagar demonstrated BRG-5 variety of Pigeonpea along with production technologies with emphasis on foliar application of pulse magic on the field of Shri Doddakale Gowda during *kharif*. It was noticed that less flower drop, more pods, good pod filling and high seed yield with foliar spary of pulse magic @ 5kg/ha once at 50 % of flowering and second at 15 days after first spray. BRG-5 recorded 12.20 q/ha yield as against check variety BRG – 2 (10.20 q/ha) that gave an increase of 19.61% yield and 50.30% net returns over check with Rs. 29505 under demo and Rs. 19631 under check. Yield gap over check is 16.39%. Farmer expressed that BRG-5 has good crop stand, no incidence of wilt, very less flower drop, more number of pods per plant, bold seeds and gave higher yield. Further, he said that this variety can be used for dual purpose both vegetable and dal (seed).



Observation of plants in demo field



Foliar application of pulse magic in demo field

(c) Integrated Pest Management (IPM) in Pigeonpea variety BRG-2 under rainfed

KVK, Krishnagiri demonstrated IPM in Pigeonpea variety BRG-2 under rainfed field of Shri Anjaneya during *kharif*. It was recorded that pest infestation was less (5.20%) in demo as compared to check variety BRG-1 (12.50%) due to IPM practices like foliar application of Azadirachtin 2.5 l/ha, funnel traps @ 5 Nos./ha, and spraying of Chlorantraniliprole @150 ml/ha along with other production technologies. Demo recorded 7.82 q/ha yield as against check (6.58 q/ha) that gave an increase of 18.84% yield and 50.46% net returns over check with Rs. 28677 under demo and Rs. 19060 under check. Yield gap over check is 15.85%. Shri Anjaneya opined that lack of rain during critical stages of crop greatly influenced the yield. However, performance and growth of BRG 2 variety along with IPM and other production technologies gave satisfactory yield and income.



Shri Anjaneya
S/o Sanjeevappa
B. Kurubarapalli
Muthukurih village
Shoolagiri Taluk
Krishnagiri district



Field visit by KVK Scientists to demo field



Observations on pods of demo variety

3.4.4 Chickpea

(a) JAKI-9218 variety of Chickpea under rainfed

KVK, Dindigul demonstrated JAKI-9218 variety of Chickpea along with production technologies under rainfed field of Shri R.Karuppanan during *rabi* and it was recorded 15.00 q/ha yield as against check variety A- 1 (6.50 q/ha) that gave an increase of 130.77% yield and 189.47% net returns over check with Rs. 99000 under demo and Rs. 34200 under check. Yield gap over check is 56.67%. Shri Karuppanan expressed that the demonstrated variety JAKI-9218 was well suited for his field condition and therefore performed better and gave more yield as well as income.



Shri R.Karuppanan
Palaniyur village
Palaiyakannivadi
Reddiyarchatirum taluk
Dindigul district



A view of demo crop with farmer



Participation of farmers in field day

(b) Integrated Crop Management (ICM) in Chickpea with GBM-2 variety

KVK, Haveri demonstrated GBM-2 of variety of Chickpea along ICM practices like seed treatment with biofertilizers and bio-fungicides, application vermicompost before sowing, nipping at 35 to 40 DAS, foliar application of NAA at 35 DAS on the field of Shri Sannappa T. Malagoudru during *rabi* and it was recorded 13.45 q/ha yield as against check variety A-1 (8.50 q/ha) that gave an increase of 58.24% yield and 124.27% net returns over check with Rs. 18390 under demo and Rs. 8200 under check. Yield gap over check is 36.80%. Farmer expressed that GBM-2 has big pod, high yielding ability, less pest incidence and suitable for machine harvesting.



Shri Sannappa
T Malagoudru
Benkankonda
village & post
Rannebennur taluk
Haveri district



Observations of KVK Scientists & farmer in demo field



A view of farmers during field day in demo field

(c) JG-11 variety of Chickpea with eco-friendly technologies under irrigated black soil

KVK, Chikkamagaluru demonstrated JG-11 variety of Chickpea with eco-friendly technologies under irrigated black soil field of Shri Sridhar during *rabi*. Observations indicate that average number of moth trapped were 22 and bird damage was 6.21% due to eco-friendly technologies like trap crop coriander @ 12.5 kg/ha (10:1 row), pheromone traps @ 20/ha, bird perches @15/ha, spray of neemazol @ 1 litre/ha. Further, it was observed that JG-11 performed better with average plant height (33.77 cm), tillers (7), pods (134) and gave 20.00 q/ha yield as against check (15.00 q/ha) that gave an increase of 33.33% yield and 35.82% net returns over check with Rs. 91000 under demo and Rs. 67000 under check. Yield gap over check is 25.00%. Shri Sridhar expressed that eco-friendly technologies have effectively controlled pest and bird damage thereby reduced the use of pesticides. JG-11 performed with better growth and gave high yield.



Shri Sridhar
S/o Revanna
Kanabagatte
Ajjampur, Tarikere
Chikkamagaluru district



A view of demo field with pheromone traps



Observations on pods of demo variety JG-11

4. Capacity building of farmers in CFLD villages

Various training programmes on production technologies of CFLD pulse crops were organized by CFLD KVKs for farmers of CFLD villages under NFSM 2016-17 and details are presented in Table 10. Data shows that a total of 328 training programmes were organized with the participation of 13008 CFLD farmers (10319 male and 2689 female) on production technologies of CFLD pulse crops viz., Blackgram, Greengram, Pigeonpea and Chickpea. Out of which, off-campus training programmes are more (227) with the participation of 8564 farmers (6723 male and 1841 female) as compared to on-campus training programmes (101) with the participation of 4444 farmers (3596 male and 848 female).

With regard to crop wise training programmes, a total of 104 trainings (31 on-campus and 73 off-campus) were conducted on production technologies of Blackgram wherein 4065 CFLD farmers (2882 male and 1183 female) were trained. Similarly, 103 training programmes (29 on-campus and 74 off-campus) on production technologies of Greengram with the participation of 4108 CFLD farmers (3147 male and 961 female) were organized. Further, KVKs organized a total of 73 training programmes (24 on-campus and 49 off-campus) on production technologies of Pigeonpea with the participation of 2737 CFLD farmers (2431 male and 306 female) as well as 48 training programmes (17 on-campus and 31 off-campus) on production technologies of Chickpea with the participation of 2098 CFLD farmers (1859 male and 239 female).

Table 10: Training programmes organized for farmers in CFLD villages under NFSM 2016-17

Crop	On campus				Off campus				Total			
	No. of trainings	Farmers participated (No.)			No. of Trainings	Farmers participated (No.)			No. of trainings	Farmers participated (No)		
		Male	Female	Total		Male	Female	Total		Male	Female	Total
Blackgram	31	953	404	1357	73	1929	779	2708	104	2882	1183	4065
Greengram	29	998	276	1274	74	2149	685	2834	103	3147	961	4108
Pigeonpea	24	818	46	864	49	1613	260	1873	73	2431	306	2737
Chickpea	17	827	122	949	31	1032	117	1149	48	1859	239	2098
Total	101	3596	848	4444	227	6723	1841	8564	328	10319	2689	13008



Off campus training programme on ICM in Greengram and Blackgram (KVK, Uttara Kannada)



Off campus training programme on production technologies of Greengram and Blackgram (KVK Kottayam)

5. Extension activities organized for farmers in CFLD villages

CFLD KVKs have conducted different extension activities for the farmers of CFLD villages under NFSM 2016-17 and details are presented in Table 11. From the Table, it is observed that a total of 688 extension activities were conducted for the benefit of 15841 farmers (12826 male and 3015 female) and 1194 extension personnel (886 male and 308 female) towards the production technologies of CFLD pulse crops viz., Blackgram, Greengram, Pigeonpea and Chickpea. Out of which, more extension activities (230) were organized for Pigeonpea by involving 5663 farmers and 246 extension personnel followed by Blackgram (175) with the participation of 3620 farmers and 315 extension personnel, Greengram (169) with the participation of 3858 farmers and 409 extension personnel, and Chickpea (114) with the participation of 2700 farmers and 224 extension personnel.

Table 11: Extension activities organized for farmers in CFLD villages under NFSM 2016-17

Crop	No. of activities	Farmers participated (No.)			Extension personnel participated (No.)		
		Male	Female	Total	Male	Female	Total
Blackgram	175	2770	850	3620	218	97	315
Greengram	169	2942	916	3858	286	123	409
Pigeonpea	230	4795	868	5663	201	45	246
Chickpea	114	2319	381	2700	181	43	224
Total	688	12826	3015	15841	886	308	1194





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