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अखिल भारतीय समन्वित शोध परियोजना–मुलार्प
मूंग, उडद, मसूर, खेसारी, राजमा एवं मटर

ALL INDIA COORDINATED RESEARCH PROJECT ON MULLaRP

(Indian Council of Agricultural Research)

परियोजना समन्वयक द्वारा प्रतिवेदन

PROJECT COORDINATOR'S REPORT

Annual Group Meet on Rabi Pulses

August 17-18, 2022

held at

IGKV, Raipur

ICAR-Indian Institute of Pulses Research
Kanpur 208 024

1. About crops

Lentil, field pea, lathyrus, rajmash and some other minor pulses are secondary winter legumes which altogether contributing 19 % to the total pulses production. Further, there is ample scope of bringing additional area under these pulses in newer niches like rice fallows, *tal* areas, hill agriculture and under intercropping for remunerating cropping system. It is estimated that additional 3.0 million ha can be brought under these pulses. These secondary winter legumes have shown the phenomenal increase in productivity during last decade and it is still increasing. The productivity of lentil increased from 591 kg/ha in 2010-11 to 1017 kg/ha in 2020-21. Similarly, the productivity of fieldpea increased from 814 kg/ha to 1375 kg/ha in the same period.

The improvement work on these crops was initiated in the country at the beginning of the 20th century particularly with the establishment of the Imperial Agricultural Research Institute at Pusa, Bihar in 1910. However, the initial phase of research on pulses had been through isolated individual efforts aimed at improvement of locally adapted but genetically variable populations mainly by the methods of pure line and mass selections with major emphasis on traits other than yield. This resulted in the release of large number of pure lines, some of which are still cultivated in certain parts of the country. Establishment of All India Coordinated Pulses Improvement Project (AICPIP) in 1967 provided an opportunity to access of improved germplasm to pulse breeders and to evaluate their improved breeding lines in multi locations evaluation across the country. Later on these crops were brought under the ambit of separate AICRP on MULLaRP which got to be operational in November 1995. The coordinated research programme on MULLaRP crops (Lentil, Fieldpea, Rajmash and Lathyrus) in India is carried out through the All India Coordinated Research Project on MULLaRP administered by the Indian Council of Agricultural Research (ICAR). AICRP on MULLaRP is one of 65 coordinated projects working under the aegis of ICAR. The AICRP on MULLaRP has a large network of 28 AICRP centres in 21 major pulse growing states of the country (Annexure I). Three AICRP centres are located in 19 State Agricultural Universities (SAUs), two in central universities and two in ICAR institutes. These AICRP centres pursue activities and strategic research in the area of crop improvement, production and protection. Besides, AICRP on MULLaRP also coordinated nucleus and breeder seed production to meet out the demand of quality seed in the country. In order to transfer latest technologies, the project joins hand with DAC&FW, Government of India through Front Line Demonstrations (FLDs). The research capabilities and facilities of the cooperating centres are being strengthened through linking with various networks.

2. Weather and Crops

Lentil is rain fed crop and sensitive to climatic variations. While, fieldpea and rajmash are irrigated crop, however, excessive moisture at harvest and increased temperature at

reproductive stages leads to considerable loss in yield. During rabi season of 2021-22, in NWPZ the seasonal rainfall varied from 72.9 mm (Hisar) to 165.0mm (Pantnagar) where total number of rainy days varied from 5 to 11. In NEPZ, rainfall received during crop season ranged from no rainfall in Ranchi to 305 mm (Dholi). In Central Zone, the rainfall received at different centres ranged from no rainfall at Sehore to 150.1 mm (Raipur).

3. Production Scenario

Lentil, lathyrus, rajmash and peas are secondary winter legumes which are presently occupying nearly 3.0 million ha area in India.

Among rabi pulses, **lentil** is next to chickpea and was grown on an average of 1.47 m ha with average production of 1.49 m tonnes during 2020-21. It is generally grown as rain fed crop during rabi season after rice, maize, pearl millet or kharif fallow. In North-eastern parts of the country, lentil is also cultivated as paira crop with rice. Its cultivation is mainly concentrated in UP, Bihar, MP and West Bengal which together contribute more than 80% area and production of this crop. Statistics regarding area, production and productivity of the crop in India and in major states is given in Annexure II. This crop has a great promise in rice fallows of Assam, West Bengal, Bihar, Chhattisgarh, Eastern UP and Jharkhand. Traditionally northern region of the country has been the area of small seeded lentil. Several small seeded and high yielding varieties resistant to rust have been released for northern region. List of high yielding varieties developed during past 25 years is given in Annexure IV. Important varieties in seed chain are given in Annexure VI. Some state releases which are popular among farmers are also given in Annexure VII. L-4729, Kota Masoor 3, LL-1373, IPL 329, IPL 225, PL 164, IPL 220, LL-1373, Kota Masoor 3, IPL 534, Kota Masoor 4 and RL 305 **are** new releases of lentil.

Fieldpea is another important rabi pulse crop grown in 0.64 m ha with annual production of 0.88 m tonnes during 2020-21. The average productivity of this crop has increased considerably over the years which is now to the tune of 1.4 t/ha. UP, MP, Bihar, Assam and Orissa are the major fieldpea growing states. Statistics regarding area, production and productivity of the crop in India and in major states is given in Annexure IV. During sixties, the cultivation of field pea in northern regions was seriously affected by powdery mildew disease and the need for development of resistant varieties was felt. Subsequently, several powdery mildew resistant varieties were developed like Rachna, HFP 4, HFP 715, IPFD 10-12, HUDP 15, KPMR 400, IPF 99-25, IPFD 1-10, Pant P 42 and Aman. IPFD 9-2, IPF 16-13, IPFD 12-8, IPFD 13-2, HFP 1428, Pant P 347, VL 61, Pant P 195, Pant P 250, IPFD 11-5, IPFD 12-2, Pant P 243, IPFD 2014-2, RFP 4 (Keshwanand Matar 1), Kota Matar 1, RFP 2009-1 (Rice Fallow cultivation), TRCP 9 are new releases of field pea.

Lathyrus is a very hardy pulse crop capable of growing in extreme moisture stress condition. During 2020-21, it was grown in 0.28 m ha in the country. Statistics regarding area, production and productivity of the crop in India is given in Annexure III. Presence of a neurotoxin Beta N-oxalyl-L- alpha-beta diaminopropionic acid (ODAP) has been the major constraint for promotion of this crop. However, this crop is still being grown in traditional areas with local cultivars having relatively high level of ODAP. Efforts have been made in developing varieties with low ODAP content. Ratan, Prateek and Mahateora are candidate varieties with low ODAP level. These varieties are suitably introduced in traditional areas with an objective to replace local varieties. Lathyrus has a great promise in the rice fallows of north-eastern and central regions of the country including Tal areas of Bihar, Chhattisgarh and West Bengal.

Rajmash is a high productive and input responsive crop suitable for intensive cropping system. The crop has been successfully introduced in northern plains by developing suitable varieties. Recently Rajmash is becoming popular in central zone and two varieties have been released for cultivation in Maharashtra and Gujarat. Rajmash has a great potential and can contribute substantially to foreign exchange. The major bottleneck is the marketing which needs to be strengthened.

4. Major research accomplishments

4.1 Crop Improvement

Breeding programme focused on the development of high yielding varieties having resistance against major diseases like wilt and rust in lentil, rust and powdery mildew in field pea and BCMV resistance in rajmash has been the major objectives of plant breeding programme. Consequently more than 150 varieties of Lentil, Field pea, Rajmash and Lathyrus have been released which are adapted to various growing circumstances and have inbuilt resistance/resilience against key biotic and a biotic stresses predominant in the growing niches. These efforts have led to double the production of lentil in the country. The productivity of lentil has increased to >1.0 t/ha which was only 0.56 t/ha in 1995-96. In recent years, the secondary winter pulses have started experiencing terminal moisture and heat stresses. Therefore, the attention has been made to develop short duration, heat tolerant and high yielding varieties in these crops and minimizing yield penalties due to terminal stresses. . Efforts have also been made to develop varieties for value added traits in field pea, bio fortified lentil and lathyrus with low ODAP content. Since these secondary winter legumes offer great opportunities for their cultivation in rice fallow situation, efforts are directed to identify appropriate varieties for such situations.

Lentil is most important *rabi* pulse after chickpea which is mainly cultivated in U.P., M.P., Bihar and West Bengal. Traditionally northern region of the country has been the area of small seeded lentil. Several small seeded and high yielding varieties resistant to rust have been released for northern region. **A bio fortified lentil** variety **IPL 220** which

is resistant to wilt and rust has been recently released and notified for Eastern U.P., Bihar, West Bengal and Assam. It is resistant to wilt and rust. Bio fortified lentils with high iron, zinc and folate can be important ingredient in weaning food for growing children and health supplement for lactating and pregnant women thus are important for achieving goal of nutritional security.

Lentil has a great promise in **rice fallows** of Assam, West Bengal, Bihar, Chhattisgarh, Eastern UP and Jharkhand. Few releases like HUL 57, WBL 77, KLS 218, PL 6 and NDL 1 are well adapted to rice-fallow situations. Traditionally grown cultivars produce good harvest under normal rainfall, but fail to maintain their productivity in deficit rains and sudden rise in temperature and moisture stress at terminal stage. Therefore, efforts have been made to develop early maturing and high yielding cultivars in lentil. A good progress has been made in development of extra early duration and high yielding varieties of lentil. In recent years, the sudden rise in temperature during grain filling stage warranted to develop high yielding and extra-early varieties which could mature in 100 days. These efforts resulted in to development of new varieties L **4717 (Pusa Ageti)** and **RVL 11-6** which matures in around 100 days.

Concerted efforts were also made to emanate **large seeded lentils** and consequently a large number of such varieties suitable for central parts of India were developed and released e.g. IPL 406, DPL 62, PL 5, K 75, L 4076, LH 84-8, PL 7, JL 3 and IPL 316. Newly released varieties like L 4727, Kota Masoor 1, Kota Masoor 2, Kota Masoor 3 and Kota Masoor 4 have also revealed additional tolerance to wilt which are important for this region. The large seeded lentils are preferred for export. The large seeded lentil mostly suffers from susceptibility to wilt. New cultivars have been developed which showed resistance against wilt. A total of 56 high yielding varieties of lentil have been released since 1995. At present 45 varieties are in the **seed chain**. The popular varieties of lentil of this decade are: L 4717, KLS 09-3, IPL 316, KLS 122, IPL 220, KLB 345, KLB 2008-04, WBL 77, RLB 11-7 and Pant Lentil 9.

Field pea is another important rabi pulse crop grown in U.P., M.P., Bihar, Assam Chhattisgarh, Jharkhand and Maharashtra. The average productivity of this crop has increased considerably over the years which is now nearly 1.4 t/ha. This could be possible due to concerted breeding efforts towards changed plant architecture and in-built resistance against powdery mildew. Consequently, a number of varieties have been developed which combine resistance to powdery mildew with dwarf stature and leafless trait. Each of these characters has played a significant role in reverting the negative trend of area under the crop. The new plant type with leaflets converting into tendrils and retaining the normal stipules has several advantages such as penetration of sunlight to lower portion of the plant, natural mechanical support to prevent lodging and network of interlocked tendrils above crop canopy to prevent bird damage. Incorporation of the dwarfing gene has also enhanced the productivity through response to inputs like

fertilizers and irrigation and high plant population. HFP 4 (Aparna) was the first dwarf, leafless and powdery mildew resistant variety. The dwarf variety of fieldpea HUDP 15 has gained popularity owing to its resistance against powdery mildew and fairly good tolerance to rust. Field pea is also emerging as a candidate crop for rice fallow cultivation in Chhattisgarh, Bihar, West Bengal, Jharkhand and Assam. Efforts have been made to develop suitable varieties of field pea for rice fallow cultivation. Consequently, a short duration variety RFP 2009-1 was developed which matures in 105-110 days and has tolerance to powdery mildew. The seed coat texture of its seed makes amenable for *utera* cultivation. Field pea varieties Vikas, DDR 27 and IPFD 11-5 are other short duration varieties which have found new nitch of cultivation with the popularization of these varieties; it is possible to bring additional area under field pea cultivation in Eastern India. A new tall field pea variety **TRCP 9** has been released and notified for Tripura state which can make possible of increase in area in other North-Eastern states. Efforts are also being made to develop varieties with value added traits which would help in making diversified products. Green seeded field pea variety IPFD 10-12 has been released which remained green in colour on drying. This is suitable for various culinary preparations and can be stored without additional cost of freezing or canning. Since 1995, **54 high yielding varieties of field pea** both in Tall and dwarf groups were released for cultivation in different parts of the country. The field pea varieties in dwarf category namely Pant P 250 and IPFD 2014-2 and two other varieties in tall category viz. Pant P 243 and TRCP 9 are the recently released for cultivation in the country. Presently 25 varieties of fieldpea are in **seed chain**. The popular fieldpea varieties of the decade are: IPFD 12-2, SKNP 04-9, IPFD 9-2, IPFD 11-5, IPFD 6-3, DDR 23, IPF 16-13, IPF 4-9, Pant P 250 and IPFD 2014-2.

Lathyrus is a very hardy pulse crop capable of growing in extreme moisture stress condition. Presence of a neurotoxin Beta N-oxalyl-L- alpha-beta diaminopropionic acid (ODAP) has been the major constraint for promotion of this crop. However, this crop is still being grown in traditional areas with local cultivars having relatively high level of ODAP. Efforts have been made in developing varieties with low ODAP content. Ratan, Prateek and Mahateora are candidate varieties with low ODAP level. These varieties are suitably introduced in traditional areas with an objective to replace local varieties. Lathyrus has a great promise in the rice fallows of north-eastern and central regions of the country including Tal areas of Bihar, Chhattisgarh and West Bengal.

Rajmash is a highly productive and input responsive crop suitable for intensive cropping system. The crop has been successfully introduced in northern plains for rabi cultivation by developing suitable varieties. Subsequently, **Rabi Rajmash** has become popular in central zone with two varieties Arun and Gujarat Rajmash 1 for cultivation in Maharashtra and Gujarat. The Bean Common Mosaic Virus and susceptibility to low temperature are the major production constraints for Rajmash cultivation in plains. The Amber (IPR 96-4) was the first release which is resistant to BCMV. The progress has

been made in development of cold tolerant varieties and resultantly Utkarsh (IPR 98-5) cultivar was developed for rabi cultivation in plains. Since 1995, 16 varieties of Rajmash were released for cultivation. **Kota Rajmash 1** and **Shalimar Rajmash 2** are two recently released varieties of Rajmash which are becoming popular among farmers.

4.2 Status of Breeding Programme

4.2.1 Varieties identified, released and notified

A. Lentil

1. Kota Masoor-4 (RKL 58 F 3715): This large seeded variety is a derivative of spontaneous mutant of DPL-62. It is early maturing (105 days) with average grain yield of 1876 kg/ha. It has resistance to rust & *Stemphylium* blight and moderate level of resistance to wilt. It has been released and notified for central zone (CZ) comprising states of Madhya Pradesh, Maharashtra, Chhattisgarh, Gujarat, Bundelkhand region of Uttar Pradesh and Southern–East parts of Rajasthan.

2. Pant L 11 (PL 164): A large seeded lentil variety derived from the cross of DPL 15 × L 4188. It is resistant to rust and moderately resistant to pod borer. It matures in 122 days with average grain of yield 11-12 qt/ha. It has been released and notified in 2021 for cultivation in state of Uttarakhand.

3. IPL 329: This is a large seeded variety developed by crossing KL-178 and DPL 62 as parents. It matures in 115-134 days with 1012 kg/ha average grain yield. It has resistance to major diseases of lentil like wilt and rust. It has got released & notified for the cultivation in whole Uttar Pradesh.

4. IPL 225: This is a small seeded variety derived from three way cross (DPL 44 × DPL 62) × DPL 58. It matures in 105-120 days with an average yield of 10-11 qt/ha. It is resistant to wilt and rust disease. It is released & notified for cultivation in whole Uttar Pradesh**.**

5. Bidhan Lentil 16 (BL 16): A small seeded variety developed from the cross of LL56 ×L4710. It matures in 109-132 days with average yield 1552 kg/ha. It is resistant against Stemphyllium blight and Collar rot. It has 24.5 percent protein. Thus variety has been released and notified for cultivation in West Bengal.

6. Jammu Lentil 144: This is small seeded variety derived by crossing ILL10829 × ILWL 30 as parents. It takes 120-125 days to mature and produce 11-12 q/ha average grain yield. It is resistant to Wilt and Root rot. This variety has got released and notified for cultivation in Jammu and Kashmir.

7. Jammu Lentil 71: A medium seed size variety developed from the cross of ILL-8006 × ILWL-62. This variety matures in 140-145 days with average grain yield of 10-11 q/ha. It is resistant to major diseases like wilt and root rot. It has been released and notified for cultivation in Jammu and Kashmir.

B. Fieldpea

1. HFP 1428: It is dwarf type variety with grain yield potential of 25-26 q/ha and matures in 120-125 days. It is resistant to powdery mildew, ascochyta blight & root rot and moderately resistant to rust. This variety has been released and notified for North Western Plain Zone (NWPZ) comprising states of Punjab, Haryana, Delhi, Rajasthan, Uttarakhand, parts of J& K and western Uttar Pradesh.

2. Pant Pea- 347 (Pant P 347): This is a dwarf type variety derived from the cross of Pant P 13 × IPFD 08-3. The average yield of this variety is 25-26 qt/ha and it matures in 124 days. It is resistant to powdery mildew & ascochyta blight and moderately resistant to rust & root rot. This variety has been released and notified for North West Plain Zone comprised of Punjab, Haryana, Delhi, North-west & Central Rajasthan, Western Uttar Pradesh and Plains of Uttarakhand and Jammu & Kashmir.

3. Pant P-195: This variety is developed from the cross between Pant P-13 × IPFD 1-10. Its' average grain yield is 1479 kg/ha with maturity duration of 123 days. It is resistant to powdery mildew & rust disease and moderately resistant to pod borer. It is released and notified for cultivation in Uttarakhand.

4. IPFD 16-3: This variety is derived from the cross of IPFD 99-13 and VRP-3. It has yield potential of 2733 kg/ha with average grain yield of 1646 kg/ha. It is resistant to powdery mildew, rust and ascochyta blight diseases. It has medium, round, smooth and creamish white colour seed with yellow cotyledon. It has got released and notified for cultivation in entire Uttar Pradesh.

C. Rajmash

1. Badwerwah Rajmash 104 (BR 104): This variety is derived from the local germplasm line through selection. This variety matures in 125-130 days with average grain yield 6-8q/ha. It has tolerance to most of the prevailing diseases. It is released and notified for cultivation in *kharif* season in Jammu and Kashmir.

2. Sikkim Rajmash-1 (SKR 57A): This variety is also developed by selection from the local germplasm line. It matures between 100-105 days with average grain yield potential of 10-12 q/ha. It is tolerant to BCMV and anthracnose disease. It is released and notified for rabi season cultivation in Sikkim.

4.2.2 National Crossing Programme

In order to develop pool of segregating material, a national crossing programme was organized at 15 centres for lentil and 14 centres for fieldpea, two centres for rajmash and two centres for lathyrus. A total 406 crosses were attempted in lentil at BAU, Sabour (80), IARI, New Delhi (62), ARS, Kota (21), ARS, Sehore (34), GBPUAT, Pantnagar (10), IIPR, Kanpur (29), RARS, Sagar (18), RARI, Durgapura (37), IGKV, Raipur (10), PAU, Ludhiana (20), BAU, Ranchi (5), CCS HAU, Hisar (5), ANDUAT Ayodhya (3), VPKAS Almora (61) and BCKV, Mohanpur (11). Similarly, 223 new

crosses were attempted in field pea at RARS, Sagar (11), IIPR, Kanpur (25), CCS HAU, Hisar (30), GBPUAT, Pantnagar (21), IGKVV, Raipur (9), RARI, Durgapura (7), Srinagar (7), S.K.Nagar (31), BHU, Varanasi (9), BAU, Ranchi (6), ARS Kota (19), ANDUAT Ayodhya (4), TCA Dholi (38) and ARS, Shillongani (6). In lathyrus, total 16 new cross were attempted at IGKV, Raipur (8) and BCKV, Mohanpur (8) and 37 new crosses in Rajmash were attempted at ICAR- IIPR, Kanpur (6), MPKV Rahuri (10) and SDAUSK Nagar (21). The seed of these crosses will be advanced and segregating material will be shared among various centres for development of varieties and breeding materials.

4.2.3 Multi-location Evaluation

The multilocational trials were conducted to identify high yielding and disease resistant varieties of lentil, field pea, lathyrus and rajmash. At some locations, trials failed due to erratic weather conditions. Data from a few centres were not accepted either due to high and low CV or very poor yield (mean yield of the location being less than state average yield). Out of 179 trials allotted to different centres, data of 179 (100%) locations were received and 138 (77.09 %) were accepted for calculating zonal mean and judging the performance of the entries. The details of plant breeding trials conducted during 2021-22 are given in Table here under:

Lentil

Trial	Zone	Allocation	Responded	Accepted	Trial failed/ Data not received	Rejected due to	
						High/ Low CV%	Yield below state average
Lentil (Small Seed)							
AVT-2	NWPZ	7	7	7	-	-	-
AVT 1	NHZ	6	6	4	Agartala	-	Nagaland
	NEPZ	9	9	9	-	-	-
IVT	NHZ	5	5	4	Agartala	-	-
	NWPZ	7	7	6	-	-	Durgapura
	NEPZ	9	9	7	Mohanpur	-	Dholi
Lentil (Large Seed)							
AVT 2 + AVT 1	NWPZ	7	7	7	-	-	-
AVT 1	NHZ	6	6	4	Agartala	-	Nagaland
	CZ	7	7	5	-	-	Indore, Jabalpur
IVT	NHZ	5	5	5	-	-	-
	NWPZ	5	5	5	-	-	-
	CZ	6	6	4	-	-	Indore, Jabalpur
Lentil (Rice Fallow)		9	9	6	Mohanpur, Raipur	-	Ranchi
Total		**88**	**88**	**73**	**6**	**-**	**9**

Fieldpea

Trial	Zone	Allo-cation	Respon-ded	Acce-pted	Trial failed/ Data not received	Rejected due to	
						High/ Low CV%	Yield below state average
Field Pea (Tall)							
AVT 1	NWPZ	5	5	4	-	-	Durgapura
	CZ	8	8	7	-	-	Jabalpur
IVT+ AVT-1	NHZ	4	4	3	Berthin	-	-
IVT	NEPZ	7	7	4	-	CSA Kanpur	Varanasi, Ayodhya
	CZ	7	7	5	-	-	Jabalpur, Indore
	NWPZ	5	5	3	-	-	Ludhiana, Durgapura
Field Pea (Dwarf)							
AVT-2	NEPZ	8	8	5	Dholi	CSA Kanpur	Varanasi
IVT+ AVT 1	NHZ	4	4	3	Berthin	-	-
	NWPZ	5	5	4	-	-	Durgapura
	NEPZ	8	8	5	Dholi	-	Varanasi, Ayodhya
	CZ	7	7	6	-	-	Jhansi
Fieldpea Rice Fallow		7	7	4	Dholi, Raipur	-	Ranchi
Total		**75**	**75**	**53**	**6**	**2**	**14**

Rajmash

Trial	Zone	Allo-cation	Respon-ded	Acce-pted	Trial failed/ Data not received	Rejected due to	
						High/ Low CV%	Yield below state average
IVT+AVT-1	**-**	**7**	**7**	**6**	**-**	**Chintapalle**	**-**

Lathyrus

Trial	Zone	Allo-cation	Respon-ded	Acce-pted	Trial failed/ Data not received	Rejected due to	
						High/ Low CV%	Yield below state average
IVT	-	9	9	6	Dholi	-	Jagdalpur, Ambikapur
Grand Total		**179**	**179**	**138**	**13**	**3**	**25**

4.2.4 Promising entries

On the basis of 2021-22 yield data, the following entries out yielded the best check by more than 5% in IVT and 10% in AVTs. The mean yield (kg/ha) of the promising entries as well as best check has been mentioned in the table here under:

Lentil:

Trial	Zone	Entries	Yield (kg/ha)	% increase over best check	Best check	Yield (kg/ha)
AVT-1 (Small Seed)	NWPZ	PL 342	1708	27.27	LL 1373	1342
		PL 320	1661	23.77		
		LH 17-19 (S)	1605	19.60		
		LL-1655	1549	15.42		
IVT (Small Seed)	NHZ	LL 1732	1469	6.53	VL 148	1379
	NEPZ	DBGL 105	1421	8.56	IPL 220	1309
AVT -1(Large Seed)	NWPZ	RKL 20-26 (D)	1742	27.25	PL 024	1369
	CZ	RKL 20-26 (D)	1844	11.62	RKL 607-1	1652
IVT (Large Seed)	NHZ	PL 366	1425	41.50	VL 514	1007
		RLG 318	1318	30.88		
		PL 351	1311	30.18		
		RLG 327	1301	29.19		
		RKL 14-201	1282	27.31		
		IPLRS 703	1269	26.01		
		RLG 310	1254	24.52		
		PL 348	1238	22.93		
		IPL 349	1235	22.64		
		RKL 14-37	1179	17.08		
		LL 1769	1167	15.89		
		VL 535	1155	14.70		
		RKL 3-91	1147	13.90		
		IPLRS 704	1146	13.80		
		IPL 350	1142	13.40		
		RVL 20-3	1140	13.20		
		RKL 58F 111	1126	11.81		
		VL 536	1107	9.93		
	NWPZ	PL 348	1659	9.43	LL 1373	1516
	CZ	RKL 1437	2133	7.56	L 4727	1983

Fieldpea

Trial	Zone	Entries	Yield (kg/ha)	% increase over best check	Best check	Yield (kg/ha)
AVT-1 (Tall)	NWPZ	Pant P 501	1807	35.05	Aman (IPF 5-19)	1338
		Pant P 498	1794	34.08		
		Pant P 497	1542	15.25		
IVT (Tall)	NEPZ	IPF 21-16	1571	17.41	VL 42	1338
		Pant P 517	1500	12.11		
		HFP 1811	1485	10.99		
		Pant P 523	1469	9.79		
	NWPZ	IPF 21-13	2017	9.56	Pant P 42	1841
		Pant P 517	1968	6.90		
AVT 1 (Dwarf)	NWPZ	Pant P 484	2347	14.49	HFP 529	2050
IVT (Dwarf)	NEPZ	Pant P 514	1728	20.75	HUDP 15	1431
		Pant P 509	1719	20.13		
		IPFD 18-3	1669	16.63		
		HUDP 1802	1622	13.35		
		HFP 1817	1566	9.43		
		HFP 1709	1557	8.81		
		IPFD 21-4	1520	6.22		
IVT (Rice Fallow)		IPF 21-20	1307	20.24	Adarsh	1087

Weighted mean of yield (kg/ha) of AVT 2 entries of lentil and field pea

1. Lentil (Small seed)
Zone: NWPZ

S. No.	Entries	2019-20 (IVT)	2020-21 (AVT-1)	2021-22 (AVT-2)	W.M.	% increase best check	
						PL 063	L 4147
1	LL 1613	1653 (5)	1792 (5)	1467 (7)	1617 (17)	14.27	23.72
2	Pant L 063 (Ch)	1383 (5)	1576 (5)	1322 (7)	1415 (17)		
3	L 4147 (Ch)	1030 (5)	1603 (5)	1294 (7)	1307 (17)		
4	Pant L 9 (Ch)- Filler	-	1495 (5)	-	1495 (5)		
5	RLG 5 (Ch)- Filler	-	1647 (5)	-	1647 (5)		
6.	LL 1373 (Ch)	-	-	1342 (7)	1342 (7)		
7.	IPL 406 (Ch)	-	-	1151 (7)	1151 (7)		

2. Lentil (Large seed)
Zone: NWPZ

S. No.	Entries	2019-20 (IVT)	2020-21 (AVT-1)	2021-22 (AVT-2)	W.M.	% increase best check	
						PL 024	DPL 15
1	RKL 14-175	1480 (4)	1655 (4)	1644 (7)	1603 (15)	16.4	17.86
2	PL 289	1490 (4)	1641 (4)	1518 (7)	1543 (15)	12.1	13.45
3	Pant L 24 (Ch)	1314 (4)	1454 (4)	1369 (7)	1377 (15)		
4	IPL 406 (Ch)	1393 (4)	1226 (4)	1199 (7)	1258 (15)		
5	DPL 62 (Ch)	-	1458 (4)	1281 (7)	1345 (15)		
6.	DPL 15 (Ch)	-	1462 (4)	1301 (7)	1360 (15)		

3. Fieldpea (Dwarf)
Zone: NEPZ

S. No.	Entries	2019-20 (IVT)	2020-21 (AVT-1)	2021-22 (AVT-2)	W.M.	% increase best check	
						SKNP 04-9	HFP 4
1	IPFD 19-1	2225 (5)	1696 (5)	1829 (5)	1917 (15)	24.72	28.83
2	Pant P 462	2265 (5)	1641 (5)	1674 (5)	1860 (15)	21.01	25.00
3	HFP 1426	1921 (5)	1666 (5)	1828 (5)	1805 (15)	17.44	21.30
4	IPFD 19-3	1872 (5)	1740 (5)	1690 (5)	1767 (15)	14.96	18.75
5	Pant P 455	1651 (5)	1639 (5)	1593 (5)	1628 (15)	5.92	9.41
6	SKNP 04-9 (Ch)	1516 (5)	1469 (5)	1625 (5)	1537 (15)		
7	HFP 4 (Ch)	1443 (5)	1490 (5)	1532 (5)	1488 (15)		
8	HUDP 15 (Ch)	1315 (5)	1484 (5)	1190 (5)	1330 (15)		

4.2.5 Genetic Resources

A total of 13204 accessions including lentil (6104), fieldpea (1885), lathyrus (2553) and rajmash (2662) were maintained at different centres and many of them were evaluated for different traits during rabi 2021-22.

4.2.6 Molecular breeding and pre-breeding at ICAR-IIPR, Kanpur

Development and maintenance of mapping populations

Trait specific RIL mapping populations for root traits (IPL 98/193 × EC 208362) having 200 RILs has also been maintained and evaluated under drought conditions.

Pre-breeding

During 2021-22, a set of 149 pre-breeding lines derived from 31 crosses made between accessions of wild (*Lens curlinaris* subsp. *orientalis* and *L. curlinaris* subsp. *tomentosus*) and cultivated species are being evaluated for drought tolerance, heat stress and Fusarium wilt resistance. Two new cross [(IPLS 9-23× DPL 62) X BARI-5 × ILWL-131] & [IPL 406 × ILWL-131] were attempted. Single plant selection was made in one F4 (IPL 316 X ILWL 118): 12 SPS and 3F5: 36 SPS and 47 line bulks were made from 4F6. These lines had yield from 6 g to 367 g per line and among these, 5 high yielding lines were selected for evaluation in PYT. Twenty three pre-breeding entries were evaluated in PYT and 11 entries having yield potential 2063-2730 kg/ha were identified as promising for further evaluation. Small seeded entry IPL19-02 has been identified as promising entry on the basis of yield (1991 kg/ha) and early flowering (62 days) for evaluation in rice fallow trial.

4.2.7 Climate resilience and bio-fortification in lentil

ICAR-IARI, New Delhi
Variation for root traits under drought stress in lentil

Drought is the most critical environmental factor across the continents affecting food security. Roots are the prime organs for water and nutrient uptake. Fine tuning between water uptake, efficient use and loss determines the genotypic response to water limitations. Targeted breeding for root system architecture needs to be explored to improve water use efficiency in legumes. Hence, the present study was designed to explore root system architecture in lentil germplasm in response to drought. A set of 119 lentil (*Lens culinaris* Medik.) genotypes was screened in controlled conditions to assess the variability in root traits in relation to drought tolerance at seedling stage. We reported significant variation for different root traits in lentil germplasm. Total root length, surface area, root volume and root diameter were correlated to the survival and growth under drought. Among the studied genotypes, the stress tolerance index varied 0.19 –1.0 for survival and 0.09–0.90 for biomass. Based on seedling survival and biomass under control and drought conditions, 11 drought tolerant genotypes were identified, which may be investigated further at a physiological and molecular level for the identification

of the genes involved in drought tolerance. Identified lines may also be utilized in a lentil breeding program.

Growth and Antioxidant Responses in Iron-Biofortified Lentil under Cadmium Stress

Cadmium (Cd) is a hazardous heavy metal, toxic to our ecosystem even at low concentrations. Cd stress negatively affects plant growth and development by triggering oxidative stress. Limited information is available on the role of iron (Fe) in ameliorating Cd stress tolerance in legumes. This study assessed the effect of Cd stress in two lentil (*Lens culinaris* Medik.) varieties differing in seed Fe concentration (L4717 (Fe bio-fortified) and JL3) under controlled conditions. Six biochemical traits, five growth parameters, and Cd uptake were recorded at the seedling stage (21 days after sowing) in the studied genotypes grown under controlled conditions at two levels (100 µM and 200 µM) of cadmium chloride (CdCl2). L4717 had remarkably higher catalase (40.5%), peroxidase (43.9%), superoxide dismutase (31.7%), and glutathione reductase (47.3%) activities than JL3 under high Cd conditions. In addition, L4717 sustained better growth in terms of fresh weight and dry weight than JL3 under stress. JL3 exhibited high Cd uptake (14.87 mg g−1 fresh weight) compared to L4717 (7.32 mg g−1 fresh weight). The study concluded that the Fe-bio-fortified lentil genotype L4717 exhibited Cd tolerance by inciting an efficient antioxidative response to Cd toxicity.

Morphological, molecular and biochemical characterization of a unique lentil (*Lens culinaris* Medik) genotype showing seed-coat color anomalies due to anthocyanin pathway

This study reports the identification of a unique lentil (*Lens culinaris* Medik.) genotype L4717-NM, a natural mutant (NM) derived from a variety L4717, producing brown, black, and spotted seed-coat colored seeds in a single plant, generation after generation, in different frequencies. The genetic similarity of L4717 with that of L4717-NM expressing anomalous seed-coat color was established using 54 SSR markers. In addition, various biochemical parameters such as TPC (total phenolic content), TFC (total flavonoid content), DPPH (2,2-diphenyl-1-picrylhydrazyl), FRAP (ferric reducing antioxidant power), H2O2 (peroxide quantification), TCC (total carotenoids content), TAC (total anthocyanin content), and TAA (total ascorbic acid) were also studied in the seeds, sprouts, and seedlings of L4717, brown, black, and spotted seed-coat colored seeds. Stage-specific variations for the key biochemical parameters were recorded, and seedling stage was found the best for many parameters. Moreover, seeds with black seed coat showed better nutraceutical values for most of the studied traits. A highly significant ($p \leq 0.01$) and positive correlation was observed between DPPH and TPC, TAA, TFC, etc., whereas, protein content showed a negative correlation with the other studied parameters. The seed coat is maternal tissue and we expect expression of seed-coat color as per the maternal genotype. However, such an anomalous seed-coat expression, which seems to probably be governed by some transposable element in the identified genotype, warrants more detailed studies involving exploitation of the anthocyanin pathway.

4.2.8 Breeder Seed Production

The total breeder seed production was 1888.36 q against the indent of 1438.44 q for 74 indented varieties including lentil, field pea and lathyrus crops during *Rabi* 2021-22. The crop wise details are mentioned here under:

- In Lentil, the total breeder seed production was 857.36 q against the indent of 547.44 q for 45 indented varieties.
- In Field pea, the total breeder seed production was 940.45 q against the indent of 782 q for 25 indented varieties.
- In Lathyrus, the total breeder seed production was 90.55 q against the indent of 109 q for four varieties.

The popular varieties of lentil and field pea which are finding prominence in seed chain are mentioned in Annexure VIII.

4.3 Agronomy

4.3.1 Lentil

- AVT_2 small seeded genotypes viz. LL 1373 (Ch) and LL 1613, sown up to the 05^{th} November were found promising genotype for higher grain yield (1200 - 1300 kg/ha) in NWPZ.
- AVT_2 large seeded genotypes viz. PL 289 and RKL 14-175, sown up to the 05^{th} November were found promising genotype for higher grain yield (1400 - 1450 kg/ha) in NWPZ.
- Fortification of Zinc and iron in lentil either through foliar spray of 0.5 % ZnSO4 + 0.5 % FeSO4 at flowering and pod initiation or through soil application of ZnSO4 @ 20 kg/ha played important role in realizing higher grain yield (1388 kg/ha) and economic return (net return Rs. 50330/ha) and B:C ratio (2.39) at Pantnager, Mohanpur, Raipur, Shillongani, Ranchi, Sehore, Ludihana, Hisar, Kota, Durgapura, Dholi and Srinagar.

4.3.2 Fieldpea

- AVT_2 genotype, HFP 1426 sown with higher seed rate of 100 kg/ha was found promising for higher grain yield (1861 kg/ha) in NEPZ.
- Sowing of seeds either soaked in water for 6 hours or primed with 1 % KNO_3 in standing rice field as relay crop @ 120 kg/ha was found effective for enhancing grain yield (1000-1200 kg/ha).
- Fortification of Zinc and iron either through either foliar spray of 0.5 % ZnSO4 + 0.5 % FeSO4 at flowering and pod initiation or through soil application of ZnSO4 @ 20 kg/ha played important role in realizing higher grain yield (2074 kg/ha), economic return (net return Rs. 79159/ha) and B: C ratio (2.92) at Pantnagar, Mohanpur, Shillongani, Hisar, Kota, Durgapura, SK Nagar, Dholi and Srinagar.

4.2.3 Lathyrus

- Sowing of seeds (soaked in water for 3-4 hrs) in standing rice field as relay crop @ 80 kg/ha followed by foliar application of NPK 19:19:19 @ 0.5 % at pre flowering and pod initiation was found effective for enhancing grain yield.

4.4 Microbiology

- The isolated nodule endophytes differed in their functional traits.
- Two PGPRs viz. *Stenotrophomonas rhizophila* KB133 (Acc. No. NAIMCC-02912) and *Stenotrophomonas rhizophila* LK786 (Acc. No. NAIMCC-02914) have been submitted by Pantnagar centre to National Agriculturally Important Microbial Culture Collection at ICAR-NBAIM, Mau, U.P.
- *Rhizobium* inoculation + soil application of 20 kg P_2O_5 + 25 kg $ZnSO_4$/ha produced maximum grain yield of lentil than the dual inoculation of different nutrient mobilizing bacteria with *Rhizobium*, being 25.6 % more over uninoculated control and 8.4 % more over *Rhizobium* alone inoculation.
- Consortia biofertilizer application as fortified FYM of Pantnagar and Ludhiana gave higher mean grain yield of 4.7 % and 3.4 % respectively at 3 locations (Pantnagar, Ludhiana and Mohanpur) than their seed treatment. These treatments at these locations showed 12.1 and 8.9 % more mean grain yield, respectively as compared to seed treatment through *Rhizobium* alone.
- Application of *Rhizobium* + Bioformulation *Archaea Halolamina* sp CD7 + BioNPK (NBAIM) was found superior to other evaluated formulations by recording highest root nodulation and mean grain yield of 13.0% over inoculation by *Rhizobium* alone and 26.6% over farmer's practice across the locations.

4.5 Pathology

4.5.1 Lentil

- Entries IPL 702, IPL 243 and IPL 542 showed resistance to rust at all locations, whereas PLR 20-1, PLS 20-2 and RKL 14-37 showed resistance to Stemphylium blight.
- Fungicides propiconazole and tebuconazole were effective for lowering the disease severity of rust and increasing the yield. Whereas the fungicide amistar was highly effective against Stemphylium blight.

4.5.2 Fieldpea

- The entries HFP 1426, HFP 1709, IPF 21-14, IPF 21-16, KPMR 907, RFPG 181, Pant P 25 and IPF 20-17 showed multiple resistance to rust and Ascochyta blight, whereas TRCP 9 showed multiple resistance to powdery mildew, Ascochyta blight and root rot at all locations.

4.5.3 Rajmash

- All the entries showed multiple disease resistance to Rust, Collar rot, Alternaria leaf spot and Leaf crinkle virus (LCV), however, against Sclerotinia blight (SB) all the entries showed susceptible reaction.

4.5.4 Lathyrus

- All the entries showed multiple disease resistance to rust, powdery mildew and downy mildew, however, against Collar rot all the entries showed susceptible reaction.

4.6 Entomology

4.6.1 Lentil

- In the field evaluation of germplasm lines against aphid, 16 entries of lentil at Ranchi and 27 entries at Mohanpur were found promising with very low aphid incidence of 0.00-1.00 aphids/10 cm of shoot. Out of these, the entries PL 345 and RKL 14-201 were found promising at both Ranchi and Mohanpur. Against pod borer, 13 entries at Pantnagar, and 10 at Dholi recorded pod damage up to 5 per cent and were found promising. RLV 11-6 was found promising both against the aphid and pod borer at Dholi, Mohanpur and Pantnagar. Entries LH 84-8, IPL 347 and RLG 325 performed well in terms of aphid, pod borer as well as yield.
- Incidence of insect-pests in relation to weather parameters in lentil revealed that the aphid incidence was significantly positively correlated with minimum & maximum temperature as well as sunshine hours and significantly negatively correlated with minimum RH at Mohanpur. Pod borer incidence had non-significant correlation with the weather parameters at all other locations.

4.6.2 Fieldpea

- In the field evaluation of germplasm against aphid, 16 entries of fieldpea at Ranchi, 4 entries at Pantnagar and 22 entries at Varanasi were found promising with very low aphid incidence of 0.00-1.00 aphids/10 cm shoot. Out of these, the entries IPF 21-17, IPF 21-16, IPF 21-21, KPMR 954 and Adarsh (IPF 99-25) were found promising at both Ranchi and Varanasi, whereas, TRCP 9 was found promising at Pantnagar and Varanasi. Against leaf miner (0-3% infestation), one entry at Pantnagar and six entries at Ranchi were found promising, whereas 10 entries were found promising against jassid (2-3 adults/trifoliate) at SK Nagar. Against pod borer, 9 entries at Varanasi, 8 at Shillongani, 7 at Mohanpur and 5 at Pantnagar were promsing as these entries recorded pod damage only up to 5 per cent. Entries HFP 1809, IPF 21-14 and IPF 21-21 were found promising against the pod borer at both the locations. Pant P 516 was found promising against all the major sucking pests of fieldpea at three locations.
- Evaluation of the bio-intensive IPM module (BIPM) against major insect pests of fieldpea revealed that the BIPM module was more effective as compared to the

farmers' practice. The BIPM module resulted in reducing the population of the sucking pests (aphid, leaf miner, jassid, etc.) and pod borer, as well as pod damage due to the pod borer. The BIPM module gave higher yield as well as higher benefit-cost ratio as compared to the Module-II (farmers' practice).

- Incidence of insect-pests in relation to weather parameters in fieldpea indicated that aphid incidence was significantly positively correlated with maximum RH and evening RH at Pantnagar and Varanasi, respectively and significantly negatively correlated with maximum temperature and sunshine hours at Varanasi. Pod borer infestation was significantly positively correlated with minimum & maximum temperature as well as wind speed at Mohanpur and Varanasi and significantly negatively correlated with maximum temperature at both Varanasi and SK Nagar.

4.6.3 Lathyrus

- Among the bio rational and chemical insecticide treatments, T4 comprising of foliar spray of Imidacloprid 17.8 SL @ 0.3 ml per litre was found significantly superior over rest of the treatments in terms of per cent reduction of aphid population. Significantly highest yield was also obtained from the treatment T4 comprising of foliar spray of Imidacloprid 17.8 SL @ 0.3 ml per litre at both the locations.
- In the lathyrus germplasm screening trial, aphid incidence was low in all the test entries in Mohanpur and test entry Biol 212 recorded lowest aphid incidence of 2.2 per 10 cm shoot. BCK 19-13 recorded lowest pod damage of 2.96 per cent at Shillongani, however, the differences were non-significant. In terms of yield, Pusa 24 recorded the highest yield at both the locations.

4.6.4 Rajmash

- Entry GR 1 recorded lower pod damage and was found to be promising against the pod borer at both the locations (SK Nagar and Varanasi). Test entry GR1 also recorded significantly highest yield in Varanasi.

4.7 Nematology

4.7.1 Lentil

- **Entry IPLB 702** showed moderately resistant reaction against *M. incognita* at AAU Anand and AAU Jorhat
- **Genotype LL 1698** showed moderately resistant reaction against *M. incognita* at AAU Anand and NDUAT Ayodhya
- **Genotype RKL 20F-32** showed moderately resistant reaction against *M. incognita* at AAU Jorhat, Pusa Samastipur and NDUAT Ayodhya

4.7.2 Fieldpea

- Eight entries showed Moderately Resistance against *M. incognita* at AAU Jorhat.
- Five entries showed Moderately Resistance against *M. incognita* at Pusa Samastipur,
- Three entries showed Moderately Resistance against *M. incognita* at NDUAT Ayodhya and only two (2) entries showed Moderately Resistance against *M. javanica* at IIPR Kanpur.

4.7.3 Rajmash

- Variety, PDR 14 showed moderately resistant reaction against *M. incognita* at AAU Anand, Pusa Samastipur and against *M. javanica* at AAU Anand
- Variety, IPR 236-20 showed moderately resistant reaction against *M. incognita* at AAU Anand, AAU Jorhat and NDUAT Ayodhya
- Variety, IPR 205-19 showed moderately resistant reaction against *M. incognita* at AAU Anand, AAU Jorhat and against *M. javanica* at AAU Anand

4.8 Front line demonstrations

4.8.1 Lentil

- Package technology showed 23 per cent increase in grain yield over the farmer's practices with 32 per cent more monetary benefits in terms of net return.
- Under rice fallow situation, 32 per cent increase in grain yield was recorded over the farmer's practices with 32 per cent more monetary benefits in terms of net return.

4.8.2 Fieldpea

- Package technology exhibited 36 per cent growth in grain yield over the farmer's practices with more than 35 per cent monetary benefits in terms of net return.

5. Research Strategies

- Development of short duration, early vigour coupled with high biomass, rust and wilt resistant varieties of lentil for NWPZ and NEPZ for sequential cropping in rice-fallows.
- Development of large seeded and wilt resistant lentil varieties for rainfed areas of Central India.
- Developing high yielding and short duration, high temperature tolerant varieties of peas with resistance to powdery mildew, rust and stemfly.
- Developing high yielding rajmash genotypes resistant to BCMV and Sclerotinia, tolerant to low and high temperatures.
- Developing high yielding varieties of lathyrus with near zero level of ODAP content.
- Refinement of technologies for lentil and lathyrus under Utera cultivation in rice fallows.

- Development of resource conservation techniques for improving input use efficiency.
- Development of IPM module against major pests and diseases

6. New Initiatives

Lentil and lathyrus are ideal candidate crops for rice fallow cultivation. Exploratory studies suggested fieldpea as suitable crop in rice fallow situation. Emphasis is being given to develop suitable varieties and appropriate technology for their cultivation in rice fallows. The new centre opened at BCKV, Kalayani and few other centres as ARS, Shillongani and IGKVV, Raipur are pursuing this work.

As lentil is poor competitor of weed, the efforts are being made to identify suitable post-emergence herbicides for lentil and other rabi crops. Similarly foliar nutrition and priming are considered most beneficial agro-techniques for increased production of secondary winter legumes.

Efforts are also being made to develop specialty pulses for value addition. In fieldpea, a green seeded cultivar has been developed, which is being popularized as it may receive premium price in the market. Lentil could be developed as bio fortified food. Programmes are already continued to identify genotypes with higher Zn, Fe and foliate contents. Organic cultivation of Rajmash may fetch premium prices in the market.

7. Budget

Head-wise break-up of Plan Budget in respect of AICRP on MULLaRP during 2021-22 is mentioned here under:

(Rs. in lakh)

Head	**Expenditure**
Grants in Aid-Salaries	1238.58
Grants in Aid-General	275.67
Total	**1514.25**

8. Recommendations and Action Taken Report

S.No.	Recommendations	Action Taken
1.	Separate trial for *kharif* rajmash to be formulated for hill states (Uttarakhand, Himachal Pradesh and Jammu & Kashmir) at the earliest, cooperating centres in hill states may take up germplasm collection, evaluation, hybridization and conduct of yield trials on priority	Trials on *kharif* rajmash have been formulated and allotted to hill states (Uttarakhand, Himachal Pradesh and Jammu & Kashmir) for current Kharif season of 2022.
2.	For a biotic stress tolerant entries, initial evaluation for claimed trait to be conducted at respective national institute (CSSRI Karnal for salinity tolerance, NIASM, Baramati for heat & drought). After initial validation, entries may be tested for yield performance in AICRP on MULLaRP.	As and when any such claim will be made by a centre /scientist for genotype(s) of any crop, a report/certificate of approval of the claim received from concerned institute (CSSRI Karnal for salinity tolerance, NIASM, Baramati for heat & drought) has to be submitted to the head quarter of AICRP MULLaRP before evaluation of yield performance of that genotype in multilocation trials.
3.	Lathyrus & rajmash breeding programmes need to be expanded and strengthened.	Action for this recommendation has got started and in this regard IIPR has provided the released varieties and advance genotypes of Rajmash to Chintapalli center of Andhra Pradesh in order to carry out and strengthen the breeding programme on Rajmash.
4.	In microbiology, Co chairman suggested that some more microbial formulation of NBAIM be included in a micro IV trial proposed for alleviating moisture stress in lentil.	Microbial formulations have been received from NBIAM and utilized in the experiments and trials on lentil.
5.	The improvement in yield and income over the farmers' practice in demonstrations must be documented.	Improvement in yield and income over the farmers' practice under demonstrations are being documented.
6.	Time to time review and monitoring of FLD demonstrations should be done.	Due to pandemic of COVID 19 monitoring could not be performed during last two *rabi* seasons but in coming *rabi* season review and proper monitoring of FLDs will be done.

ACKNOWLEDGEMENTS

I acknowledge with thanks the efforts of the cooperating scientists for carrying out the coordinated trials and experiments. I express my deep sense of gratitude to Vice Chancellors, Directors of Research, scientific and technical staff of different centers, officers of State Agricultural Universities and state departments of Agriculture for facilitating and implementing the envisaged programme. I wish to place on records my sincere thanks and gratitude to Dr. T. R. Sharma, Deputy Director General (Crop Science) and Dr. Sanjeev Gupta, ADG (O&P), ICAR who have been a constant source of inspiration, encouragement and advice. I would like to express my deep sense of gratitude to Dr. Bansa Singh, Director, and ICAR-IIPR for guidance, support and providing requisite facilities. The help rendered by all the Principal Investigators of the project, scientists, technical officers and staff members of administration & accounts is gratefully acknowledged for their significant contributions.

Place: Kanpur **(I.P. Singh)**
Date: August 06, 2022 **Project Coordinator**

Annexure-I

Allocation of MULLaRP crops to net-work centres

S.No.	Centre	Mandate crops
1.	Pantnagar	Urdbean, mungbean, lentil, Pea
2.	Raipur	Lathyrus, lentil
3	Durgapura	Mungbean, urdbean, lentil
4.	Berhampur (O)	Mungbean, urdbean
5.	Lam	Mungbean, urdbean
6.	Vamban	Mungbean, urdbean
7.	Srinagar	Rajmash, fieldpea, urdbean
8.	Palampur	Rajmash, fieldpea,urdbean
9.	Imphal	Rajmash, mungbean, urdbean
10.	Agartala	Rajmash, mungbean, urdbean
11.	Shillongani	Fieldpea, lentil, mungbean, urdbean
12.	Ludhiana	Mungbean, urdbean, lentil
13.	Hisar	Mungbean, urdbean, fieldpea
14.	Faizabad	Lentil, fieldpea,Urdbean
15.	Varanasi	Mungbean, fieldpea, rajmash, lentil
16.	Dholi	Lentil, Lathyrus, mungbean
17.	Ranchi	Urdbean, mungbean
18.	BCKV, Mohanpur	Mungbean, lentil, lathyrus and fieldpea
19.	S.K. Nagar	Mungbean, Rajmash, fieldpea
20.	Akola	Mungbean, urdbean
21.	Sehore	Urdbean, mungbean, lentil
22.	Dharwad	Mungbean, urdbean
23.	Kota	Urdbean, lentil, fieldpea
24.	Keonjhar	Urdbean, mungbean
25.	Sagar	Urdbean, mungbean, lentil
26.	Ghantshala	Urdbean, Mungbean
27.	Adhiturai	Urdbean, Mungbean
28.	Badnapur	Mungbean, Urdbean

Annexure- II

All India area, production and yield of Lentil

Year	Area (million ha)	Production (million tonnes)	Yield (kg/ha)
1980-81	0.91	0.45	499
1981-82	0.92	0.49	528
1982-83	0.97	0.48	497
1983-84	0.98	0.53	544
1984-85	1.06	0.54	510
1985-86	1.07	0.65	610
1986-87	1.07	0.67	621
1987-88	1.05	0.65	620
1988-89	1.09	0.74	680
1989-90	1.10	0.77	700
1990-91	1.16	0.83	727
1991-92	1.15	0.80	692
1992-93	1.20	0.79	657
1993-94	1.18	0.75	632
1994-95	1.16	0.78	675
1995-96	1.26	0.71	566
1996-97	1.34	0.88	660
1997-98	1.29	0.80	624
1998-99	1.39	0.94	675
1999-2000	1.44	1.05	732
2000-01	1.48	0.92	619
2001-02	1.47	0.97	664
2002-03	1.37	0.87	634
2003-04	1.40	1.03	743
2004-05	1.48	0.99	675
2005-06	1.51	0.95	629
2006-07	1.50	0.91	621
2007-08	1.31	0.82	622
2008-09	1.38	0.96	693
2009-10	1.48	1.03	697
2010-11	1.59	0.94	591
2011-12	1.56	1.06	678
2012-13	1.42	1.13	797
2013-14	1.34	1.02	759
2014-15	1.47	1.04	705
2015-16	1.28	0.98	765
2016-17	1.46	1.22	838
2017-18	1.55	1.62	1047
2018-19	1.36	1.23	901
2019-20	1.30	1.10	847
2020-21	1.47	1.49	1017
2021-22		1.44*	

*** Third advance estimate (Directorate of Economics &Statistics)**

Area, Production and Productivity of Lentil in major states of India

Assam				**Bihar**		
Year	**Area**	**Production**	**Yield**	**Area**	**Production**	**Yield**
1991-95	16.12	7.90	490	177.26	150.22	849
1996-2000	21.40	11.10	519	172.12	136.70	792
2001-05	20.80	11.20	542	174.74	150.04	859
2005-06	18.60	9.90	532	162.50	114.50	705
2007-08	19.00	10.00	532	163.00	115.00	705
2008-09	21.70	11.10	512	163.80	128.60	785
2009-10	21.40	10.80	503	171.10	150.50	880
2010-11	23.98	11.80	494	238.60	214.70	900
2011-12	23.00	11.50	502	168.5	171.6	1019
2012-13	28.90	17.0	586	159.7	183.2	1147
2013-14	30.00	22.4	747	154.1	196.1	1272
2014-15	29.05	22.52	775	196.4	194.1	989
2015-16	28.33	19.65	693	150.7	140.4	932
2016-17	23.78	15.66	658	146.1	146.9	1005
2017-18	28.02	21.03	746	138.2	147.6	1068
2018-19	26.73	19.57	732	147.9	148.1	1001
2019-20	24.10	18.40	764	143.0	90.1	630
2020-21	23.27	16.96	729	136.6	124.5	912
Chattisgarh				**Jharkhand**		
2006-07	16.50	5.4	327	16.70	11.20	671
2007-08	17.30	5.8	335	17.00	11.00	671
2008-09	15.60	5.1	327	19.50	15.80	810
2009-10	16.00	4.9	306	22.90	12.80	559
2010-11	13.90	4.2	302	20.90	17.20	882
2011-12	14.90	5.0	336	48.7	40.9	840
2012-13	12.9	4.2	326	40.8	45.7	1121
2013-14	14.9	4.9	329	44.0	36.5	829
2014-15	17.5	9.5	542	42.4	39.3	926
2015-16	17.2	5.7	331	15.1	11.6	768
2016-17	18.7	7.0	374	62.1	53.7	864
2017-18	13.0	4.6	352	69.4	62.5	900
2018-19	13.7	5.0	364	57.3	50.1	875
2019-20	13.8	4.5	323	62.3	52.9	849
2020-21	14.4	5.8	404	72.4	63.8	880

M.P.				**Rajasthan**		
1991-95	376.92	180.00	478	13.78	11.56	837
1996-2000	500.36	237.76	474	34.70	38.06	1068
2001-05	486.56	223.20	458	19.92	20.86	1031
2005-06	564.10	287.50	510	18.50	16.80	908
2007-08	564.00	288.00	510	19.00	17.00	908
2008-09	531.40	268.40	505	20.60	17.90	869
2009-10	541.30	284.40	525	27.00	24.20	895
2010-11	590.50	177.90	301	44.10	38.40	872
2011-12	620.5	230.0	371	31.9	35.9	1126
2012-13	570.5	333.4	584	27.6	30.4	1100
2013-14	530.1	338.3	638	34.3	29.2	851
2014-15	613.7	416.0	678	42.9	39.4	919
2015-16	546.0	392.4	719	74.5	64.0	859
2016-17	528.8	447.2	846	75.7	75.9	1003
2017-18	596.0	679.0	1139	31.4	33.7	1074
2018-19	421.0	329.6	783	19.8	23.0	1164
2019-20	379.0	294.5	777	17.0	23.4	1375
2020-21	542.0	615.2	1135	20.1	26.8	1332
Uttar Pradesh				**West Bengal**		
1981-85	346.40	205.72	594.0	77.84	35.64	467
1986-90	459.36	325.94	709.0	83.72	54.32	653
1991-95	515.84	392.98	762.0	56.84	37.20	645
96-2000	537.72	402.52	748.0	56.10	42.34	745
2001-05	606.06	472.84	784.0	69.64	48.06	685
2005-06	607.90	434.90	715.0	61.50	47.00	764
2007-08	608.00	435.00	715.0	62.00	47.00	764
2008-09	521.00	460.00	883.0	49.70	32.40	652
2009-10	592.40	475.90	803.0	51.70	47.10	911
2010-11	586.00	411.00	701.0	57.40	53.40	929
2011-12	573.00	505.00	881.0	59.30	41.20	695
2012-13	495.00	441.00	891.0	64.00	61.50	960
2013-14	449.00	310.00	690.0	65.50	62.8	959
2014-15	438.0	235.00	537.0	66.00	63.5	963
2015-16	335.0	238.00	710.0	95.50	94.0	985
2016-17	489.0	372.30	761.0	83.00	81.0	976
2017-18	484.0	498.0	1029.0	158.0	154.9	980
2018-19	476.0	488.4	1026.0	170.2	141.4	831
2019-20	463.0	452.8	978	172.0	143.8	836
2020-21	472.0	478.6	1014	159.0.	142.6	897

Haryana				**Himachal Pradesh**		
2014-15	3.4	3.4	1000	0.6	0.27	475
2015-16	2.6	2.5	962	0.8	0.21	263
2016-17	4.4	4.5	1023	0.6	0.36	619
2017-18	1.5	0.9	579	0.4	0.39	875
2018-19	1.1	0.8	722	0.5	0.43	880
2019-20	0.8	0.9	1125	0.1	0.50	930
2020-21	1.2	0.9	795	0.3	0.20	657
Tripura				**Punjab**		
2014-15	2.49	1.74	699	0.80	0.50	625
2015-16	-	-	-	-	-	-
2016-17	3.80	2.54	667	0.70	0.40	571
2017-18	2.89	2.07	716	0.80	0.45	565
2018-19	2.52	1.88	746	0.70	0.48	681
2019-20	2.2	1.66	748	0.80	0.40	543
2020-21	1.56	1.14	728	0.60	0.36	598
Uttarakhand				**Manipur**		
2014-15	12.40	8.75	706	-	-	-
2015-16	10.24	7.47	729	-	-	-
2016-17	10.00	8.00	800	0.70	0.66	943
2017-18	10.00	6.96	696	0.72	0.67	927
2018-19	11.00	9.70	882	0.76	0.70	923
2019-20	11.00	11.20	1014	0.66	0.61	923
2020-21	12.00	9.01	751	0.81	0.75	923

A = Area ('000 ha) P = Production ('000 tonnes) Y = Yield (kg/ha)

Annexure- III

All India area, production and yield of Fieldpea

Year	Area (million ha)	Production (million tonnes)	Yield (kg/ha)
1979-80	0.49	0.23	470
1980-81	0.41	0.28	688
1981-82	0.43	0.29	689
1982-83	0.44	0.32	720
1983-84	0.44	0.37	822
1984-85	0.45	0.34	757
1985-86	0.49	0.42	860
1986-87	0.48	0.43	892
1987-88	0.47	0.41	869
1988-89	0.46	0.44	941
1989-90	0.59	0.46	777
1990-91	0.54	0.59	1093
1991-92	0.54	0.54	1000
1992-93	0.61	0.55	903
1993-94	0.69	0.64	927
1994-95	0.76	0.67	879
1995-96	0.76	0.64	836
1996-97	0.73	0.72	947
1997-98	0.74	0.66	891
1998-99	0.83	0.71	855
99-2000	0.80	0.83	1034
2000-01	0.65	0.54	819
2001-02	0.67	0.61	906
2002-03	0.64	0.59	891
2003-04	0.71	0.73	1022
2004-05	0.79	0.78	993
2005-06	0.77	0.71	913
2006-07	0.75	0.62	816
2007-08	0.63	0.48	771
2008-09	0.72	0.66	919
2009-10	0.76	0.67	886
2010-11	0.72	0.59	814
2011-12	0.76	0.71	933
2012-13	0.76	0.84	1100
2013-14	0.96	0.92	960
2014-15	0.97	0.89	912
2015-16	0.90	0.74	821
2016-17	1.06	1.01	955
2017-18	0.83	0.99	1204
2018-19	0.61	0.81	1338
2019-20	0.60	0.86	1440
2020-21	0.64	0.88	1375

Area, Production and Productivity of Fieldpea in major states of India

Rajasthan				Uttar Pradesh		
Year	**Area**	**Production**	**Yield**	**Area**	**Production**	**Yield**
1976-80	11.22	6.2	595	410.90	309.00	734
1981-85	8.28	7.94	977	240.62	239.80	999
1986-90	6.48	13.06	2269	275.28	311.92	1134
1991-95	7.14	13.38	1804	385.78	472.14	1233
1996-2000	11.78	24.62	2085	435.28	518.80	1197
2001-05	12.16	25.18	2077	365.90	449.30	1220
2005-06	13.40	31.70	2366	413.00	483.30	1170
2006-07	11.40	23.90	2096	420.00	406.00	967
2007-08	4.10	5.30	1293	320.00	300.00	938
2008-09	3.70	5.80	1568	351.00	424.00	1208
2009-10	2.80	4.90	1775	312.00	400.40	1263
2010-11	11.30	11.60	1029	304.00	353.00	1761
2011-12	2.70	4.70	1777	323.00	463.00	1433
2012-13	2.70	5.90	2162	307.00	459.00	1495
2013-14	13.6	22.8	1676	357.00	354.00	992
2014-15	17.0	30.9	1817	416.0	314.0	755
2015-16	19.5	39.0	1998	286.0	285.0	997
2016-17	-	-	-	384.0	418.0	1089
2017-18	14.32	36.58	2643	294.0	432.0	1469
2018-19	13.00	26.00	2000	333.0	539.0	1619
2019-20	13.59	32.02	2356	344.0	566.0	1645
2020-21	5.85	14.24	2434	361.0	562.0	1557
Assam				**Bihar**		
1976-80	11.62	3.82	334	40.86	20.38	503
1981-85	20.00	7.30	365	31.42	18.90	604
1986-90	-	-	-	33.96	24.14	715
1991-95	32.75	16.25	500	32.06	21.38	664
1996-2000	26.80	15.75	588	30.54	18.80	661
2001-05	24.14	14.44	599	23.86	22.26	932
2005-06	17.90	11.30	631	24.10	21.50	892
2006-07	19.00	12.00	632	23.70	22.00	928
2007-08	23.00	14.00	609	23.40	22.80	974
2008-09	20.90	13.00	622	23.80	22.90	962
2009-10	20.90	12.80	615	22.20	22.40	1009
2010-11	22.40	13.80	614	20.00	21.00	1051
2011-12	21.80	13.30	608	18.7	19.2	1031
2012-13	31.00	19.80	640	18.5	19.3	1041
2013-14	31.30	26.50	848	17.3	18.4	1060
2014-15	30.0	27.7	924	22.1	18.2	824
2015-16	15.7	14.1	901	17.0	17.9	1053
2016-17	29.0	26.0	897	16.4	16.7	1020
2017-18	31.0	29.0	935	16.4	16.9	1063
2018-19	30.0	28.0	933	17.0	17.0	1000
2019-20	28.0	26.0	935	17.4	18.1	1039
2020-21	28.0	26.0	921	18.6	19.4	1042
Chhattisgarh				**Maharashtra**		
1976-80	-	-	-	9.86	3.88	399
1981-85	-	-	-	13.24	3.46	258
1986-90	-	-	-	8.76	3.02	356
1991-95	-	-	-	8.90	3.34	345

1996-2000	-	-	-	15.28	7.06	465
2001-05	13.38	4.92	366	15.50	6.28	394
2005-06	18.20	6.40	352	19.70	8.70	442
2006-07	16.60	5.90	355	20.30	9.00	443
2007-08	16.80	6.00	357	20.00	11.00	550
2008-09	15.00	5.60	373	15.00	8.00	533
2009-10	17.20	5.90	343	16.50	8.60	519
2010-11	14.80	5.00	338	33.00	17.00	515
2011-12	15.5	5.4	348	25.8	11.8	457
2012-13	14.7	5.5	374	29.3	12.1	412
2013-14	14.5	5.3	366	-	-	-
2014-15	17.0	10.3	602	26.3	9.6	366
2015-16	15.5	5.9	381	-	-	-
2016-17	18.5	7.4	389	-	-	-
2017-18	14.2	5.4	357	-	-	-
2018-19	12.0	4.0	333	-	-	-
2019-20	12.0	5.0	387	-	-	-
2020-21	10.7	4.6	434	-	-	-
Jharkhand				**Madhya Pradesh**		
1970-75	-	-	-	86.10	23.44	272
1976-80	-	-	-	99.92	26.82	268
1981-85	-	-	-	114.74	34.82	303
1986-90	-	-	-	115.86	38.96	339
1991-95	-	-	-	134.00	49.14	365
1996-2000	-	-	-	189.12	79.04	415
2001-05	6.50	5.25	784	192.08	87.08	452
2005-06	7.70	6.20	805	229.20	111.9	488
2006-07	9.20	8.30	902	198.70	89.70	451
2007-08	10.50	9.30	886	166.50	66.50	399
2008-09	25.80	34.90	1353	222.90	111.00	498
2009-10	42.70	34.50	807	288.70	146.70	508
2010-11	36.20	34.20	746	226.50	52.50	276
2011-12	39.9	44.3	1135	263.9	94.2	357
2012-13	30.3	54.9	1811	280.9	194.8	693
2013-14	31.7	37.6	1186	307.1	295.1	961
2014-15	33.3	40.4	1212	355.5	362.9	1021
2015-16	41.6	31.9	766	450.0	267.3	594
2016-17	53.0	64.5	1208	465.3	356.8	768
2017-18	59.1	71.0	1203	312.0	322.0	1032
2018-19	50.0	62.0	1240	65.0	50.0	769
2019-20	59.1	75.0	1263	58.0	48.0	828
2020-21	60.1	70.2	1168	86.0	90.0	1047

West Bengal				**Himachal Pradesh**		
2016-17	14.0	15.0	1071	13.0	5.0	3846
2017-18	18.0	21.0	1167	2.0	5.0	2500
2018-19	17.0	20.0	1176	3.0	5.0	1667
2019-20	20.0	19.0	950	11.7	41.5	3562
2020-21	18.2	20.3	1115	14.7	38.0	2592

A = Area (‘000 ha) P = Production (‘000 tonnes) Y = Yield (kg/ha)

Annexure IV

All India area, production and yield of Lathyrus

Year	Area (million ha)	Production (million tonnes)	Yield (kg/ha)
1980-81	1.27	0.44	348
1981-82	1.31	0.50	381
1982-83	1.19	0.48	404
1983-84	1.17	0.48	409
1984-85	1.14	0.53	436
1985-86	1.23	0.49	460
1986-87	1.05	0.49	460
1987-88	1.06	0.52	489
1988-89	0.89	0.43	483
1989-90	0.93	0.48	514
1990-91	0.94	0.52	554
1991-92	0.85	0.52	609
1992-93	0.88	0.51	580
1993-94	0.97	0.62	641
1994-95	0.99	0.60	605
1995-96	0.93	0.42	455
1996-97	0.85	0.49	576
1997-98	0.85	0.53	627
1998-99	0.66	0.41	621
99-2000	0.70	0.51	726
2000-01	0.52	0.33	639
2001-02	0.69	0.44	640
2002-03	0.57	0.35	617
2003-04	0.63	0.44	698
2004-05	0.64	0.30	474
2005-06	0.63	0.35	552
2006-07	0.62	0.38	615
2007-08	0.60	0.39	640
2008-09	0.54	0.34	636
2009-10	0.45	0.31	698
2010-11	0.52	0.35	675
2011-12	0.48	0.32	671
2012-13	0.58	0.43	742
2013-14	0.40	0.28	707
2014-15	0.49	0.45	921
2015-16	0.39	0.33	842
2016-17	0.42	0.41	993
2017-18	0.38	0.29	804
2018-19	0.33	0.24	729
2019-20	0.31	0.19	594
2020-21	0.28	0.26	903

Area, Production and Productivity of Lathyrus in major states of India

Chhattisgarh				**Bihar**		
Year	**Area**	**Production**	**Yield**	**Area**	**Production**	**Yield**
2010-11	349.3	212.4	608	73.8	73.7	998
2011-12	307.6	172.3	560	72.8	92.1	1265
2012-13	417.0	270.7	649	71.1	83.8	1179
2013-14	308.7	176.0	570	63.2	70.6	1116
2014-15	362.5	340.6	939	80.6	69.8	867
2015-16	275.8	198.4	719	54.6	51.0	934
2016-17	308.9	288.8	935	52.1	55.2	1059
2017-18	222.72	128.5	577	47.6	50.3	1057
2018-19	183.16	113.56	620	50.5	51.4	1018
2019-20	172.81	67.22	389	43.8	33.3	760
2020-21	152.32	95.96	630	39.5	42.8	1083
West Bengal						
2010-11	25.8	30.2	1172			
2011-12	25.8	15.4	595			
2012-13	28.5	35.3	1240			
2013-14	30.7	38.1	1241			
2014-15	33.0	41.1	1244			
2015-16	65.4	84.0	1284			
2016-17	55.0	69.0	1255			
2017-18	87.0	108.3	1245			
2018-19	52.5	72.9	788			
2019-20	57.1	85.9	885			
2020-21	52.9	118.4	1273			

A = Area (‘000 ha) P = Production (‘000 tonnes) Y = Yield (kg/ha)

Annexure V

Area, Production and Productivity of Kharif Rajmash in major states of India

Jammu & Kashmir				Uttarakhand		
Year	**Area**	**Production**	**Yield**	**Area**	**Production**	**Yield**
2016-17	3.46	2.51	725	6.00	6.00	1000
2017-18	3.42	2.81	820	6.00	6.00	1000
2018-19	3.32	2.51	756	5.00	6.00	1200
2019-20	12.13	37.71	3109	6.00	6.00	1000
2020-21	3.88	3.10	800	6.00	7.00	1167

A = Area ('000 ha) P = Production ('000 tonnes) Y = Yield (kg/ha)

Annexure VI

All India area, production and yield of total pulses

Year	Area (million ha)	Production (million 36ones)	Yield (kg/ha)
1960-61	23.56	12.70	539
1961-62	24.24	11.76	485
1962-63	24.27	11.53	475
1963-64	24.18	10.07	416
1964-65	23.88	12.42	520
1965-66	22.72	9.94	438
1966-67	22.12	8.35	377
1967-68	22.65	12.10	534
1968-69	21.26	10.42	490
1969-70	22.02	11.69	531
1970-71	22.54	11.82	524
1971-72	22.15	11.09	501
1972-73	20.92	9.91	474
1973-74	23.43	10.01	427
1974-75	22.03	10.02	455
1975-76	24.45	13.04	533
1976-77	22.98	11.36	494
1977-78	23.50	11.97	510
1978-79	23.66	12.18	515
1979-80	22.26	8.57	385
1980-81	22.46	10.63	473
1981-82	23.84	11.51	483
1982-83	22.83	11.86	519
1983-84	23.54	12.89	548
1984-85	22.74	11.96	526
1985-86	24.42	13.36	547
1986-87	23.16	11.71	506
1987-88	21.27	10.96	515
1988-89	23.15	13.85	598

1989-90	23.41	12.86	549
1990-91	24.66	14.26	578
1991-92	22.54	12.02	533
1992-93	22.36	12.82	573
1993-94	22.25	13.30	598
1994-95	23.03	14.04	610
1995-96	22.28	12.31	552
1996-97	22.45	14.24	635
1997-98	22.87	13.10	567
1998-99	23.50	14.90	634
99-2000	21.19	13.35	630
2000-01	20.35	11.08	544
2001-02	22.01	13.37	607
2002-03	20.50	11.13	543
2003-04	23.44	14.94	637
2004-05	22.48	13.39	595
2005-06	22.40	13.38	598
2006-07	23.19	14.19	612
2007-08	23.63	14.76	625
2008-09	22.09	14.57	659
2009-10	23.35	14.66	625
2010-11	26.40	18.24	691
2011-12	24.78	17.20	694
2012-13	23.47	18.34	785
2013-14	25.21	19.25	764
2014-15	23.55	17.15	726
2015-16	25.26	16.47	652
2016-17	29.46	22.95	779
2017-18	29.36	25.42	865
2018-19	27.87	23.02	826
2019-20	27.99	23.03	823
2020-21	28.78	25.46	885
2021-22		27.75*	

***Source: Agricultural Statistics Division, Directorate of Economics and Statistics, Department of Agriculture and Cooperation, New Delhi**

Annexure-VII

List of varieties of lentil, fieldpea, lathyrus and rajmash released by All India Coordinated Pulses Improvement Project (1985 to 2020)

1. Lentil

S. No.	Name of Variety	Source Centre	Pedigree	Year of release	Average yield (q/ha)	Days to maturity	Reaction to major diseases	Area of adaptation	Any other relevant information
1.	K 75 (Malika)	CSAU, Kanpur	Local sel. From Bundelkhand region	1986	13-14	130-135	-	NEPZ, CZ	Foliage dark green; semi spreading seeds gray mottled large (2.7 g/100 seed wt.)
2.	LH 84-8 (Sapna)	CCS HAU, Hissar	L 9-12 x JLS 2	1991	15-16	130-135	Resistant to rust	NWPZ	Plant semi-spreading; seeds gray mottled bold (2.7 g/100 seed)
3.	Pant lentil 4	GBPUA&T, Pantnagar	VPL 175 x (PL 184 x P 288)	1993	16-17	135-140	Resistant to rust& wilt	NWPZ	Plant semi-spreading, dark-green, foliage, small seed
4.	Lens 4076	IARI, New Delhi	PL 234 x PL 639	1993	14-15	135-140	Resistant to rust	NWPZ & CZ	Dark green foliage, semi spreading, large seed
5.	DPL 15 (Priya)	IIPR, Kanpur	PL 406 x L 4076	1995	15-16	135-140	Resistant to rust & tolerance to wilt	NWPZ	Large seeded
6.	PusaVaibhav (L 4147)	IARI, New Delhi	(L 3875 x P 4) x PKVL	1996	17-18	130-135	Resistant to rust	NWPZ	Small seed
7.	DPL 62 (Sheri)	IIPR, Kanpur	JLS 1 x LG 171	1997	17-18	130-135	Resistant to rust & tolerance to wilt	NWPZ	Large seed
8.	JL 3	JNKVV, Sehore	Land race Sel. From Sagar	1999	14-15	110-115	Resistant to wilt	CZ	Large seed
9.	IPL 81 (Noori)	IIPR, Kanpur	K 75 x PL 369	2000	12-13	110-115	Tolerant to rust and wilt	CZ	Large seed
10.	KLS 218	CSAU, Kanpur	KLS 133 x L 9362	2005	13-14	120-125	Resistant to rust	NEPZ	Small seed
11.	HUL 57	BHU, Varanasi	Mutant of HUL –11	2005	14-15	120-125	Rust Resistant	NEPZ	Small seed
12.	VL 507	VPKAS. Almora	Sel. From ILL-7978	2006	12-13	160-170	Resistant to wilt	NHZ	Large seed

13.	VL 126	Almora	LL 498 x LH 84-8	2006	13-14	160-170	Resistant to rust	NHZ	Small seed
14.	IPL 406	IIPR, Kanpur	DPL 35 x EC 157634/ 382	2007	17-18	125-130	Resistant to rust	NWPZ	Large seed
15.	WBL 77	Berhampore (W.B)	ILL 7723 x BLX 88176	2008	14-15	115-120	Resistant to rust	NEPZ	Small seed
16.	Pant L 6	GBPUA&T, Pantnagar	Pant L 4 x DPL 55	2009	16-18	125-145	Resistant to rust	Uttarakhand	Small seed
17.	Pant L 7	GBPUA&T, Pantnagar	L 4076 x DPL 15	2009	16-18	125-145	Resistant to rust	Uttarakhand	Large seed
18.	Pant L 8 (Pant L 063)	GBPUA&T, Pantnagar	DPL 59 x IPL 105	2010	15-16	130-135	Moderately resistant to rust and wilt	NWPZ	Small seed
19.	IPL 316	IIPR, Kanpur	Sehore 74-3 x DPL - 58	2013	14-15	110-115	Tolerance to wilt and rust	Central Zone	Large seed
20.	RVL 11-6	RAK College, Sehore	JL 3 x DPL 62	2017	11-12	107-113	Tolerant to Wilt.	Central Zone	Large seed
21.	L 4717 (Pusa Ageti Masoor)	IARI New Delhi	ILL 7617 x 91516	2017	12-13	96-106	Resistant to wilt and Ascochyta blight	Central Zone	Extra early type
22	Kota Masoor 1 (RKL 607-1)	AU, Kota	KLB 339 x SL 94-09	2017	10-14	98-107	Tolerant to drought and high temperature	Central Zone	Suitable for normal sown conditions
23.	RKL 14-20 (Kota Masoor 2)	AU, Kota	LL 1049 x RKL 11	2018	12-15	97-104	Tolerant to drought, high temperature	Central Zone	Large seed
24	L 4727	IARI, New Delhi	Sehore 74-3 x Precoz	2018	11-15	92-128	Moderately resistant to wilt	Central Zone	Suitable for timely planting under rainfed conditions, Large seeded
25	IPL 220	IIPR, Kanpur	(DPL 44 x DPL 62) x DPL 58	2018	14-18	119-122	Resistant to rust and Fusarium wilt	NEPZ	Suitable for normal sown conditions, small seeded
26	L- 4729	IARI, New Delhi	SKL 259 x L 4147	2019	17-18	96-110	Moderately resistant to wilt	Central Zone	Suitable for timely planting under rainfed conditions. Large seeded

27	LL 1373	PAU Ludhina	IPL406 x FLIP 2004-7L	2019	15-16	125-130	Moderately resistant to wilt & rust	NWPZ	Suitable for rabi season under irrigated conditions. Large seeded.
28	VL Masoor-148	VPKAS Almora	DPL-15 x L-4076	2019	11-12	145-160	Moderately resistant to wilt & rust	NHZ	Suitable under rainfed conditions. Small seeded
29	Kota Masoor 3 (RKL 605-03)	AU, Kota	L 4682 x SL 73-3	2020	18-19	105-110	Moderately resistant to wilt & Tolerant to drought and high temperature	Central Zone	Suitable for normal sown conditions. Large seeded
30	RKL 58 F 3715 (Kota Masoor 4)	AU, Kota	Mutant of DPL 62	2020	18-19	110-115	Resistant to rust & *Stemphylium* blight, moderately resistant to wilt and less incidence of pod borer and aphids.	CZ	Suitable for normal sowing conditions (10 th November)

2. Fieldpea

S. No.	Name of variety	Source Centre	Pedigree	Year of release	Average yield (q/ha)	Days to maturity	Reaction to major disease	Area of adaptation	Any other relevant information
1.	Pant P 5	GBPUA&T, Pantnagar	T 10 x T 163	1987	20-21	140-145	Resistant to powdery mildew	NWPZ	White round smooth large
2.	HFP 4 (Aparna)	CCS HAU, Hisar	T 163 x EC 10916	1988	26-27	140-145	Resistant to powdery mildew	NWPZ	Dwarf leafless
3.	MalviyaMatar2	BHU, Varanasi	(Alfaknud x C 5064) x S 143	1988	21-22	120-130	Resistant to powdery mildew	NEPZ	Tall leafless
4.	JP 885	JNKVV Jabalpur	(T 163 x 6588-1) x 46C	1992	21-22	135-140	Resistant to powdery mildew	CZ	Erect tall creamy white large seed.
5.	(KFP 103) Shikha	CSAU, Kanpur	KPMR 83 x KPMR 9	1993	20-21	130-140	Resistant to powdery mildew	NWPZ	Tall
6.	DMR 7 (Alankar)	IARI, New Delhi	6587 x L 116	1996	23-24	115-135	Resistant to powdery mildew	NWPZ	Tall, large seed
7.	Sapna KPMR 144-1	CSAU, Kanpur	Rachna x HFP 4	1997	24-25	125-130	Resistant to powdery mildew	CZ	Dwarf leafless
8.	Uttra (HFP 8909)	HAU, Hisar	EC 109185 x HFP 4	1996	22-23	128-130	Resistant to powdery mildew	NWPZ	Dwarf
9.	Swati (KFPD-24)	CSAU, Kanpur	Flavanda x HFP-4	1999	28-29	115-120	Resistant to powdery & tolerance to rust		Dwarf leafless
10.	HUDP 15 (Malviya Mattar 15)	BHU, Varanasi	F2[PG 3 x S 143)] x FC 1	1999	23-24	125-130	Resistant to powdery mildew, rust and tolerance to leaf miner	NEPZ, NHZ	Resembles HFP 4 but is slightly taller
11.	DDR 23 (Pusa Prabhat)	IARI, New Delhi	HFP 4 x Pusa 10	2000	15-16	105-110	Resistant to powdery mildew	NEPZ	Very early variety
12.	Ambika	JNKVV, Raipur	DMR 22 x HUP 7	2000	18-19	100-125	Resistant to powdery mildew	CZ	Tall plants
13.	Adarsh (IPF 99-25)	IIPR, Kanpur	PDPD 8 x Pant P 5	2000	23-24	110-115	Resistant to powdery mildew	CZ	Tall type
14.	DDR 27 (Pusa Panna)	IARI, New Delhi	HFP 4 x P 1542	2001	17-18	105-110	Resistant to powdery mildew	NWPZ	Very early

15.	KPMR 400	CSAU,Kanpur	Rachna x HFP 4	2001	20-22	105-110	Resistant to powdery mildew	CZ	Dwarf type
16.	KPMR 522	CSAU, Kanpur	KPMR 156 x HFP 4	2001	22-23	130-135	Resistant to powdery mildew	NWPZ	Dwarf type
17.	Vikas (IPFD 99-13)	IIPR, Kanpur	HFP 4 x LFP 80	2005	23-24	100-105	Resistant to powdery mildew	CZ	Dwarf type
18.	Prakash (IPFD 1-10)	IIPR, Kanpur	POPD 8 x HUDP 7	2006	22-23	110-115	Resistant to powdery mildew and rust	CZ, NHZ	Dwarf type
19.	HFP 9907 B	HAU, Hisar	Rachna x Bonneville	2007	23-24	125-130	Resistant to powdery mildew	NWPZ	Dwarf green seed
20.	VL 42	Almora	VL Matar 1 x P 388	2007	19-20	125-130	Resistant to powdery mildew	NEPZ	Tall
21.	Pant P 42	GBPUA&T, Pantnagar	(HUDP 7 x HFP 4) x EC 1	2007	22-23	130-135	Resistant to powdery mildew& moderately resistant to rust	NWPZ & NHZ	Tall, wider Adaptability
22.	HFP 9426	HAU, Hisar	KPMR 84-2 x EC 109195	2008	25-26	135-140	Resistant to powdery mildew & tolerance to root rot	Haryana & NHZ	Shining green seed , tall type with good cooking quality
23.	Pant P 74	GBPUA&T, Pantnagar	HUDP 6 x Pant P 11	2009	22-23	120-130	Resistant to powdery mildew & moderately resistant to rust	NWPZ	Dwarf type
24.	IPF 5-19 (Aman)	IIPR, Kanpur	KPMR 144-1 x EC 8495	2009	22-23	120-130	Resistant to powdery mildew & moderately resistant to rust	NWPZ	Tall type
25.	TRCP 8 (Gomati)	ICAR Res. Complex Agartala	T 163 x DMR 4	2009	14-15	125-135	Resistant to powdery mildew	NEHZ	Tall type
26.	Dantiwada Fieldpea 1 (SKNP 04-09)	SDAU, S.K. Nagar	Sel. From DDR 49	2011	17-18	120-130	Resistant to powdery mildew	NEPZ	Dwarf type

27.	HFP 529	CCS HAU, Hisar	HUDP 9 x Arkel x(HUDP 12 x Arkel)	2012	22-25	120-125	Resistant to powdery mildew & tolerance to rust	NWPZ	Dwarf type
28.	IPFD 10-12	IIPR, Kanpur	IPF 99-25 x EC 384275	2014	22-25	110-115	Resistant to powdery mildew	CZ	Dwarf type, green dry seeds
29.	HFP 715	CCS HAU, Hisar	DMR 50 x HFP 9948	2014	15-16	115-120	Resistant to powdery mildew	NHZ	Dwarf type
30.	IPFD 12-2	IIPR, Kanpur	HUDP 15 x EC 342002	2017	22-25	110	Resistant to Powdery mildew, pod borer and moderately resistant to aphids and leaf miner	CZ	Dwarf type
31.	IPFD 11-5	IIPR, Kanpur	(DDR 16 x HUDP 7) x DDR 16	2016	19-20	105-110	-	CZ	Dwarf type
32.	IPFD 2014-2	IIPR, Kanpur	IPFD 99-13 x P 1297-97	2018	22-23	105-110	Moderately resistant to pod borer, aphid, leaf miner and nematode	CZ	Dwarf and early vigour
33.	Pant Pea 250	GBPUAT, Pantnagar	Pant P 14 x Pant P 41	2018	23-24	120-125	Resistant against powdery mildew and moderately resistant to rust, Ascochyta blight and root rot diseases	NWPZ	Dwarf
34.	Pant Pea 243	GBPUAT, Pantnagar	Pant P 14 x Pant P 41	2018	19-20	105-110	Moderately resistant against powdery mildew, rust, Ascophyta blight and root rot diseases	CZ	Tall

35	IPF-16-13	IIPR, KANPUR	IPF 99-25 x VRP-22	2019	18-20	115-120	Moderately resistant to PM, rust & resistant to pod borer, aphid and leaf minor	NEPZ	Tall
36	HFP 1428	HAU, Hisar	HFP 529 x Pant P 25	2020	25-26	120-125	Resistant to powdery mildew, Ascochyta blight & root rot and moderately resistant to rust and less incidence of pod borer and aphids	NWPZ	Dwarf
37	Pant Pea- 347 (Pant P 347)	G.B. Pant University of Agriculture and Technology, Pantnagar (Uttarakhand)	Pant P 13 x IPFD 08-3	2021	25-26	120-125	It is resistant to powdery mildew & Ascochyta blight and moderately resistant to rust & root rot diseases.	Rabi season in NWPZ	Dwarf type, suitable under rainfed/ irrigated condition

3. Lathyrus

S. No.	Name of variety	Source Centre	Pedigree	Year of release	Average yield (q/ha)	Days to maturity	Tolerance to moisture stress	Area of adaptation	Any other relevant information
1.	Bio L 212 Ratan	IARI, New Delhi	Somaclone of P 24	1997	15-16	110-115	Tolerant to moisture stress	NEPZ	Low ODAP large seed Blue flower
2.	Prateek	IGKV, Raipur	LS 8246 x a-60	2006	15-16	110-115	Tolerant to stress & PM	Chhattisgarh	Low ODAP (0.109%)
3.	Mahateora	IGKV, Raipur	Ratan x JRL-2	2008	15-16	110-115	Tolerant to stress	Chhattisgarh	Low ODAP (0.074 %) large seed

4. Rajmash

S. No.	Name of variety	Source Centre	Pedigree	Year of release	Average yield (q/ha)	Days to maturity	Reaction to major disease	Area of adaptation	Any other relevant information
1.	PDR 14 (Uday)	IIPR, Kanpur	Sel. From EC 94453	1987	16-20	125-130	Tolerance to BCMV	NEPZ	100 seed wt. 44 g white red variegated
2.	HUR 15 (Malviya Rajmash 15)	BHU, Varanasi	Sel. from Kolkladhar 1989 local, Kokladhar Solan	1989	16-20	120-125	Moderately susceptible to BCMV	NEPZ	Erect determinate white seeded
3.	HUR 137 (Malviya Rajmash-137)	BHU, Varanasi	(HUR 37 x HUR 9) x 991 HUR 37	1991	18-22	112-120	Susceptibility to BCMV	NEPZ	Erect semi-dwarf seeds deep pink seed
4.	IPR 96-4 (Amber)	IIPR, Kanpur	Sel. From ET 8447	2002	15-16	139 -145	Res. to BCMV & leaf crinckle	NEPZ	100 seed 39 g
5.	GR-1	Main Pulses Research Station GAU, , S.K.Nagar	Selection from DPR-88-1	2004	18-19	85-90	Moderately resistance to Bean common mosaic virus	Central zone of the country	Medium seed size
6.	IPR 98-5 (Utkarsh)	IIPR, Kanpur	Selection from EC 400431	2005	17-18	122-125	Tolerance to BCMV	NEPZ	Gulf red seed
7.	IPR 98-3-1 (Arun)	IIPR, Kanpur	Selection from EC 400418	2007	16-18	120-125	Tolerance to BCMV	CZ	Gulf red seed
8.	RKR 1033 (Kota Rajmash 1)	AU, Kota	IIPR 98-3-1 x HUR 203	2018	15-18	98-104	Res. to angular leaf spot, anthracnose and tolerant to wilt, BCMV and alternaria leaf spot	CZ	Medium seed size

Annexure VIII

List of state release varieties of Lentil, Fieldpea and Rajmash (1990-2017)

1. Lentil

S. No.	Name of Variety	Source Centre	Pedigree	Year of release	Average yield (q/ha)	Days to maturity	Reaction to major diseases	Area of adaptation	Any other relevant information
1.	JL 1	JNKVV, Jabalpur	Selection from local collections	1991	11-15	110-120	-	M.P.	Suitable for rainfed condition
2.	Narendra Masoor 1	NDUA&T, Faizabad	Precoz x L 9-12	1996	20-22	134-140	Rust and wilt tolerant	U.P.	Medium seed
3.	Garima	CCS HAU, Hisar	Pusa 2 x No. 4	1997	12-14	140-145	Tolerant to rust	Irrigated areas of Haryana	Large seeds
4.	LL 699	PAU, Ludhiana	PL 639 x PL77-2	2002	14-15	140-145	Tolerance to pod borer, Moderately res. to rust and blight	Punjab state	
5.	KL 320 (Shekhar 3)	CSAUA&T, Kanpur	PL 405 X P237	2004	20-22	120-125	Tolerance to wilt	Whole U.P.	
6.	KLB 303 (Shekhar2)	CSAUA&T, Kanpur	LG 60 X Sagar local	2004	15-18	125-130	Tolerance to wilt	Whole U.P.	
7.	Shalimar Masoor-1	Srinagar Centre, SKUAST-K	Single plant selection from EC-2216	2005	10-11	190-200	Moderately resistant to root rot and res. to leaf spot and pod blight	Rainfed marginal Karewa land of Kashmir	Bold seeded
8.	Markanday	CSK HPKV, HAREC, Dhaulakuan	Selection from Exotic material	2005	10-12	160-170	Res. to rust, root rot, wilt & blight	Low & Mid Hills	
9.	HM-1	CCS HAU, Hisar	K 75 x L 4076	2006	14-16	135-140	Resistant to rust	Irrigated areas of Haryana	Small seeded, widely adapted and mod. res. to diseases and insect pest
10.	LL 931	PAU, Ludhiana	LH90-103 x LL608	2009	12-13	145-150	Resistant to lentil rust and tolerant to pod borer	Punjab state	

11.	VL Masoor 129	VPKAS, Almora	VL 101 x VL 1	2009	7-11	145-150	Resistant against wilt and root rot.	Uttarakhand hills	Small seeded
12.	VL Masoor 514 (VL 514)	VPKAS, Almora	VL 501 x VL Masoor 103	2011	8-10	155-160	Moderately resistant to wilt and rust	Uttarakhand hills	Bold seeded
13.	RVL 31	RAK, Sehore	Selection from local collection from Shajahpur	2014	18-19	110-115	Resistant to wilt	M.P.	Large seeds, high biomass
14.	Shalimar Masoor-2 (SKUAL 9)	Srinagar Centre, SKUAST-K	EC-3109 (Selection from ICARDA material)	2015	12.85	200-205	Moderately resistant to wilt and rust, resistant to white grub	Kashmir Valley up to an altitude of 1850 m amsl	Large Seeds Protein content of 23.03%
15.	KLB 2008-4 (Krati)	CSAUA&T, Kanpur	LG 362 xDPL 62	2015	18-20	115-120	Resistant to wilt	Whole U.P.	Large seed
16.	KLS 09-3 (Krish)	CSAUA&T, Kanpur	L9-12 x WBL 58	2015	18-20	105-110	Resistant to wilt and rust	Whole U.P.	Small seed
17.	RLG 5 (Keshwanand Masoor 1)	RARI, Durgapura	Sel. from local germplasm	2016	15-16	130	Mod. resistant to root knot nematode.	Rajasthan	Double poded and for rainfed condition
18.	Pant Lentil – 9 (PL 098)	GBPUA&T, Pantnagar	Pant L 5 x IPL 105	2017	13-14	113-135	Resistant to rust, wilt and *ascochyta* blight diseases	Uttrakhand	Small seed
19.	KLB 345 (Shekhar 4)	CSAUA&T, Kanpur	Precoz x KLB 231	2017	18-20	111	Resistant to rust and wilt	U.P.	Bold seeded
20.	KLS 122 (Shekhar 5)	CSAUA&T, Kanpur	KLS 564 x KL 320	2017	16-18	105-115	Resistant to rust and wilt	U.P.	Small seeded
21.	IPL 526	IIPR, Kanpur	DPL 62 x DPL 58	2018	10-12	101-110	Tolerance to rust and wilt	UP	Large seeded
22.	IPL 315	IIPR, Kanpur	PL 4 x DPL 62	2018	12-13	135-140	Resistant to rust & tolerant to wilt	U.P.	Large seed
23.	IPL 321	IIPR, Kanpur	DPL 62 x K 75	2018	9-10	130-135	Resistant to wilt	U.P.	Large seed
24.	Shalimar Masoor -3 (SKUA-L_2-96	SKUAST-K, Srinagar	KLS 221 (Sel. from IIPR germplasm)	2019	11.5-12.5	204	Tolerant to frost and winter chilling	Kashmir valley	Bold seeded 100 seed wt. 5.5g
25.	IPL 534	IIPR, Kanpur	KL 178 x DPL 62	2019	16-18	100-107	Resistant to rust & wilt	M.P.	Large seed
26.	Chhattisgarh Masoor -1 (RL 3-5)	IGKV, Raipur	Selection from Germplasm	2020	10-11	90-95	Resistant to rust & wilt	Chhattisgarh	Large seed

27.	IPL 329	IIPR, Kanpur	KL 178 x DPL 62	2020	10-11	120-125	Resistant to Fusarium wilt and rust	Uttar Pradesh	Large seed
28.	IPL 225	IIPR, Kanpur	(DPL 44 x DPL 62) x DPL 58	2020	10-11	105-120	Resistant to Fusarium wilt and rust	Uttar Pradesh	Small seed
29.	Pant Lentil 11 (P L 164)	Pantnagar	DPL 15 x L 4188	2021	11-12	101-132	Resistant to rust disease and moderately resistant to pod borer	Uttarakhand Plains	Medium seed
30.	Jammu Lentil 144	SUKAST, Jammu	ILL10829 x ILWL 30	2021	11-12	120-125	Resistant to wilt and Root rot. Also resistant to Pod borer and aphids	J&K	
31.	Jammu Lentil 71	SUKAST, Jammu	ILL-8006 x ILWL-62	2021	10-11	140-145	Resistant to major diseases like Wilt and Root Rot and also resistant to Pod borer and Aphids	J&K	Medium seed
32.	Bidhan Lentil 16 (BL 16)	BCKV, Mohanpur	LL56 ×L4710	2022	15-16	109-132	It has resistant against Stemphyllium blight and Collar rot	West Bengal	Small seeded

2. Fieldpea

S. No.	Name of Variety	Source Centre	Pedigree	Year of release	Average yield (q/ha)	Days to maturity	Reaction to major diseases	Area of adaptation	Any other relevant information
1.	Jayanti (HFP 8712)	CCS HAU, Hisar	HFP 4 X PG 3	1998	20-25	120-125	Resistant to PM	Irrigated areas of Haryana	First dual purpose pea variety. High yield, long pods, resistant to powdery mildew.
2.	Subhra (IM9101)	IGKV Raipur	Rachna x JP 885	2001	15-20	90-100	Resistance to powdery mildew	Chhattisgarh	
3.	Pant Pea 14	GBPUA&T, Pantnagar	HFP 4 x Longittee	2004	15-20	125-130	Resistant to PM & rust	Hills and plains of Uttrakhand	Dwarf
4.	Paras	IGKV Raipur	DDR 12 x Rachna	2006	15-20	100-105	Resistance to powdery mildew	Chhattisgarh	
5.	Pant Pea 25	GBPUA&T, Pantnagar	(EC 32410 x FC 1) x FC 1	2006	15-20	125-130	Resistant to Powdery mildew & rust	Hills and plains of Uttrakhand	Dwarf
6.	HFP-9426	CCS HAU, Hisar	KPMR 84-2 x EC 109195	2008	25-26	135-140	Resistant to PM; tolerant to rust	Irrigated areas of Haryana	Shining green seeded; tall growing variety.
7.	GDF-1	SDAU, S.K.Nagar	Selection from DDR-49	2010	18-20	100-110	Resistant to powdery mildew; tolerant to rust	Gujarat	-
8.	VL Matar 47	VPKAS, Almora	JPV 14 x HFP 4	2010	10-14	142-162	Resistant against wilt, rust and powdery mildew disease.	Uttarakhand hills	-
9.	IPF 4-9	IIPR, Kanpur	KPMR 144-1 x EC 8495	2010	8-10	125-130	Resistant to Powdery mildew and moderately to rust.	U.P.	Tall and tendril type
10.	Shalimar Pea-1	Srinagar Centre, SKUAST-K	Selection of KFPD-8	2015	13-14	210-215	Resistant to Powdery Mildew and moderately resistant to rust, moderately resistant to pod borer and white grub	Suitable for Kashmir Valley up to an altitude of 1850 meters amsl	Higher protein content 20.65%

11.	Pant Pea - 155	GBPUA&T, Pantnagar	Pant P 13 x DDR 27	2016	18-20	120-135	Resistant to rust and powdery mildew diseases and tolerant to pod borer pest	Uttarakhand	Dwarf type
12.	RFP 2009-1 (Indira Matar 1)	IGKV, Raipur	Rachna x EC 334160-1	2016	17-18	100-105	Tolerant to powdery mildew and rust	Madhya Pradesh and Chhattisgarh	Suitable for rice fallow cultivation
13.	IPFD 6-3	IIPR, Kanpur	KPMRD 389 x HUDP 7	2016	19-20	110-115	Resistant to Powdery mildew and moderately resistant to rust.	U.P.	Tendril typed.
14.	RFP 4 (Keswanand Matar 1)	RARS, Durgapura	Bonneville x NPL	2016	17-18	110-120	Moderately resistant to Powdery mildew, rust , root rot & root knot nematode.	Rajasthan	Seed medium bold
15.	TRCP 9	ICAR Res. Complex Agartala	BMR 7 x P 163	2018	21-22	85-90	Resistant to rust and root knot nematode	Tripura	Tall
16.	IPFD 9-2	IIPR, Kanpur	IPFD 98-1 x HUDP 15	2018	15-16	105-110	Resistant to powdery mildew & tolerant to rust	U.P.	Dwarf
17.	VL Matar -61	VPKAS, Almora	DDR-23 x VL-1	2019	11-12	150-160	Resistant to powdery mildew & rust	Uttarakhand	Dwarf
18.	IPFD 12-8	IIPR, Kanpur	IPFD 1-10 x DDR-27	2020	16-17	115-130	Resistant to powdery mildew & tolerant to rust	U.P.	Dwarf
19.	IPFD 13-2	IIPR, Kanpur	IPFD 1-10 x DDR-23	2020	16-17	115-120	Resistant to powdery mildew & tolerant to rust	U.P.	Dwarf
20.	Kota Matar - 1 (KPF 101)	AU, Kota	(Jayanti x EC-398602) x (Uttra x EC-502159)	2020	18-20	110-115	Resistant to powdery mildew & downey mildew	Rajasthan	Dwarf
21.	Pant Pea - 195 (Pant P 195)	G.B. Pant University of Agriculture and Technology, Pantnagar	Pant P 13 x IPFD 1-10	2021	14-15	114-135	It is resistant to powdery mildew & rust diseases and moderately resistant to pod borer.	Uttarakhand Plains	Suitable for rainfed/ irrigated condition,
22.	IPFD 16-3	IIPR, Kanpur	IPFD 9913 x VRP 3	2021	16-17	115-125	Resistant to powdery mildew & downey mildew	Uttar Pradesh	Dwarf

3. Rajmash

S. No.	Name of Variety	Source Centre	Pedigree	Year of release	Average yield (q/ha)	Days to maturity	Reaction to major diseases	Area of adaptation
1.	Kanchan	CSK HPKV HAREC, Dhaulakuan	Selection from local material	1992	12-15	90-100	-	Mid Hills & High hills
2.	Baspa	CSK HPKV HAREC, Dhaulakuan	Selection from local material	1994	18-20	110-120	Resistant to bean Anthracnose	High hills
3.	Triloki	CSK HPKV HAREC, Dhaulakuan	Selection from local material	1998	25-27	98-100	Resistant to bean Anthracnose	High hills
4.	Kailash	CSK HPKV HAREC, Dhaulakuan	Selection from local material	2003	30-32	120-125	Resistant to bean Anthracnose	District Kinnaur
5.	Shalimar Rajmash-1	Srinagar Centre, SKUAST-K	Local Red x Canadian Red	2005	12-13	105-110	Moderately resistant to Anthracanose and resistant to root rot and common mosaic	Suitable for Kashmir valley upto 1850 m amsl
6.	Shalimar Rajmash 2 (SKU-A-R13-2)	Srinagar Centre, SKUAST-K	Selection from IIPR germplasm IHR 9	2017	12-13	100-115	Resistant to Angular leaf spot and moderately resistant to bean common mosaic virus	Suitable for Kashmir valley upto 1850 m amsl
7	Badwerwah Rajmash 104 (BR 104)	SUKAS, Jammu	Local Germplasm line selection	2021	6-8	125-130	Tolerant to all the diseases.	Suitable for J&K (kharif season)
8	Sikkim Rajmash-1 (SKR 57A)	ICAR-NOFRI, Tadong, Gangtok	Local Germplasm line selection	2021	10-12	100-105	Tolerant to BCMV, anthracnose	Sikkim for rabi season

Varieties recommended for different states

1. Lentil

State	Varieties
Uttar Pradesh & Uttarakhand	Pant L 406, PL 639, Malika (K 75), Lens 4076, NDL 1, NDL 2, PL 62 (Sheri), Narendra Masoor 1, DPL 15 (Priya), PL 5, L 4147, IPL 81 (Noori), IPL 406, HUL 57, KLS 218, WBL 77, Pant L 4, KLB 2008-4 (Krati), KLS 09-3(Krish), IPL 526, IPL 316, Shekhar 4, Shekhar 5, IPL 220, L 4727, IPL 315, IPL 321**, L-4729, Kota Masoor 3, LL-1373, IPL 329, IPL 225, PL 164**
Bihar	Pant L 406, PL 639, Malika (K 75), Arun (PL 77-12), NDL 2, WBL 58, HUL 57, KLS 218, WBL 77, **IPL 220**
Madhya Pradesh & Chhattisgarh	Malika (K 75), Lens 4076, IPL 81 (Noori), JL 3, IPL 406, RVL 31, IPL 316, RVL 11-6, L 4717 (Pusa Ageti Masoor), Kota Masur 1, L 4727, Kota masur 2, **L-4729,Kota Masoor 3,IPL 534, IPL 534, Kota Masoor 4, RL 305**
Haryana	Pant L 639, Lens 4076, Pant L 406, Pant L 4, DPL 15 (Priya), Sapna, L 4147, DPL 62 (Sheri), IPL 406, Pant L 8 (Pant L 063)**, LL-1373**
Punjab	Pant L 406, PL 639, Lens 4076, LL 147, Sapna, DPL 15 (Priya), Pant L 4, L 4147, DPL 62 (Sheri), LH 84-8, IPL 406, Pant L 8 **(**Pant L 063), LL 93**, LL-1373**
Delhi	PL 639, Lens 4076, Sapna, Pant L 4, DPL 15 (Priya), L 4147, PL 4, DP 62 (Sheri), LH 84-8, Pant L 8 (Pant L 063**), LL-1373**
Gujarat	Malika (K 75), Lens 4076, JL 3, IPL 81, IPL 316, RVL 11-6, L 4717 (Pusa Ageti Masoor), Kota Masur 1, L 4727, Kota masur 2**, Kota Masoor 3, Kota Masoor 4**
Himachal Pradesh	Pant L 406, Pant L 639, VL 507, HUL 57,**VL 148**
J&K	Pant L 406, Pant L 639, VL 4, VL 507, HU 57, Shalimar Masoor 1, Shalimar Masoor 2, Shalimar Masoor 3 **,VL 148, JL 144, JL 71**
West Bengal	Ranjan (B 256), Asha (B 77), Malika, WBL 58, Pant L 406, Pant L 639, HUL 57, KLS 218, WBL 77, **IPL 220, BL 16**
NEH Region	Pant L 406, PL 639, B 77 (Asha), DPL 62, HUL 57 **,VL 148**
Maharashtra	Malika (K 75), Lens 4076, IPL 81 (Noori), JL 3, IPL 316, RVL 11-6, L 4717 (Pusa Ageti Masoor), Kota Masur 1, L 4727, Kota Masoor 2**, Kota Masoor 3, Kota Masoor 4**
Assam	Asha (B 77), HUL 57, KLS 218, WBL 77, **IPL 220**
Rajasthan	K 75, L 4076, DPL 62, IPL 406, Pant L 8 (Pant L 063), RLG 5 **(**Keshwanad Masoor 1), L 4717 (Pusa Ageti Masoor), Kota Masur 1, Kota masur 2**, LL-1373, L -4729, Kota Masoor 3, Kota Masoor 4**

2. Fieldpea

States	Varieties
Uttar Pradesh & Uttarakhand	Adarsh, Vikas, Prakash, Rachna, KPMR 400, KPMR 522, KFP 103, DMR 7, HFP 8909, VL Matar 3, Sapna, HUDP 15, Pant Pea 42, VL 42, Hariyal, Dantiwada Fieldpea 1, IPFD 10-12 (Green dry Seeds), IPFD 11-5, IPFD 6-3**, IPFD 9-2, IPF 16-13, IPFD 12-8, IPFD 13-2, HFP 1428, Pant P 347, VL 61, Pant P 195, IPFD 16-3**
Bihar	Rachna, HFP 4 (Aparna), HUDP 15, DDR 23, VL 42, Dantiwada Fieldpea 1, **IPF 16-13**
West Bengal	Rachna, HUDP 15, DDR 23, VL 42, Dantiwada Fieldpea 1, **IPF 16-13**
Delhi	Rachna, KFP 103, DMR 7, KPMR 522, HFP 8909, DMR 11, KPMR 522, DDR 27, Hariyal, IPF 5-19, HFP 715, **Pant P 250, HFP 1428, Pant P 347**
Maharashtra	Adarsh, Vikas, Prakash, Rachna, Ambika, KPMR 400, IPFD 10-12, **IPFD 11-5, IPFD 12-2, Pant P 243, IPFD 2014-2**
Himachal Pradesh	Prakash, Rachna, VL Matar 3, HFP 9426, VL 45, HFP 715, **Pant P 250**
Punjab	Rachna, Pant P 5, KFP 103, DMR 7, HFP 8909, KPMR 522, DDR 27, HFP 529, IPF 5-19, HFP 715, **Pant P 250, HFP 1428, Pant P 347**
Haryana	Rachna, Hariyal, KFP 103, DMR 7, HFP 8909, KPMR 522, DDR 27, HFP 9426, Pant Pea 42, HFP 529, IPF 5-19, **Pant P 250, HFP 1428, Pant P 347**
Rajasthan	Rachna, Hariyal, HFP 8909, KFP 103, DMR 7, KPMR 522, DDR 27, HFP 529, IPF 5-19, **RFP 4 (Keshwanand Matar 1), Pant P 250, Kota Matar 1, HFP 1428, Pant P 347**
Madhya Pradesh & Chhattisgarh	Adarsh, Vikas, Prakash, Rachna, Ambika, KPMR 400, IPFD 10-12, **IPFD 11-5**, **IPFD 12-2, Pant P 243, IPFD 2014-2**
Jammu & Kashmir	Prakash, Rachna, HUDP 15, IPFD 1-10, VL 45, HFP 715, Shalimar Matar 1
Assam	Rachna, Malviya Matar 15, IPFD 1-10, VL 45, HFP 715, **IPF 16-13**
Chhattisgarh	**RFP 2009-1 (Rice Fallow cultivation), IPFD 11-5, IPFD 12-2, Pant P 243, IPFD 2014-2**
Tripura	TRCP 8, **TRCP 9**

Varieties in bold are new releases

Annexure-VIII

Varieties in Seed Chain

Lentil		Fieldpea		Lathyrus	
Sl. No.	**Variety**	**S. No.**	**Variety**	**S. No.**	**Variety**
1.	Asha (B-77)	1.	Aman (IPF 5-19)	1.	Mahateora
2.	Azad Masoor 1	2.	Dantiwada Fieldpea 1	2.	Pratik
3.	Chhattisgarh Masoor-1	3.	HFP 1428	3.	Ratan (Bio L-212)
4.	HUL 57 (Malviya Vishwanath)	4.	HFP 529	4.	Bidhan Khesari -1
5.	IPL 220	5.	HFP 715		
6.	IPL 225	6.	Indira Matar 1		
7.	IPL 315	7.	IPF 16-13 (Harit)		
8.	IPL 316	8.	IPF 4-9		
9.	IPL 321	9.	IPFD 10-12		
10.	IPL 329	10.	IPFD 11-5		
11.	IPL 406	11.	IPFD 12-2		
12.	IPL 526	12.	IPFD 12-8		
13.	IPL 534	13.	IPFD 13-2		
14.	Kota Masoor 1	14.	IPFD 6-3		
15.	Kota Masoor -2 (RKL 14-20)	15.	IPFD 9-2		
16.	Kota Masoor 3	16.	IPFD2014-2(Central Field Pea)		
17.	Kota Masoor 4	17.	Pant Pea 243		
18.	Krati (KLB-2008-04)	18.	Pant Pea 347		
19.	Krish (KLS-09-3)	19.	Pant Pea 14		
20.	L 4717	20.	Pant Pea 155		
21.	L 4727	21.	Pant Pea 250		
22.	L 4729	22.	Pant Pea 42		
23.	LL 1373	23.	Shalimar Pea 1		
24.	LL 931	24.	TRCP 8 (Gomti)		
25.	Markandey	25.	TRCP 9		
26.	Moitree (WBL-77)				
27.	Pant Lentil 6				
28.	Pant Lentil 7				
29.	Pant Lentil 8				
30.	Pant Lentil 9				
31.	PDL-1				
32.	PSL-9				
33.	Ranjan (B-256)				
34.	RVL 11-6				
35.	RVL 13-5 (Raj Vijay Lentil 13-5)				
36.	RVL 13-7 (Raj Vijay Lentil 13-7)				
37	RVL -31				
38.	Sekhar Massor 3				
39.	Shekhar Massor 4				
40.	Shekhar Massor 5				
41.	Subrata (WBL-58)				
42.	VL 126				
43.	VL 133				
44.	VL 148				
45.	VL 507				

Addresses of Project Coordinator & Principal Investigators

Dr. Indra Prakash Singh

Project Coordinator
Indian Institute of Pulses Research
Kanpur 208 024

Phones : 0512-2580985 (O), 9935168113 (Mob.)
Fax : 0512-2580992
E-mail: mullarpkanpur@yahoo.com
Website : www.aicrpmullarp.res.in

Principal Investigators/ Resource Person

DISCIPLINE	NAME & ADDRESS	PHONE& FAX
Plant Breeding	Dr. A.K. Parihar Sr. Scientist (Plant Breeding) Division of Crop Improvement ICAR-IIPR, Kanpur-208 024	Ph : (off) : 0512-2580985 Fax : 0512-2580992 Mobile : 07376301342 E-mail: ashoka.parihar@gmail.com
Agronomy	Dr. D. K. Chandrakar Sr. Scientist (Agronomy) & I/C AICRP on MULLaRP Deptt. of Agronomy, College of Agriculture I G K.V,Krishak Nagar, Raipur, Chhattisgarh – 492 012	Mobile : 09826177967 08839146451 E-mail: dk_chandrakar@rediffmail.com
Plant Pathology	Dr. K.P.S.Kushwaha Professor (Plant Pathology) G.B.Pant University of Agriculture & Technology, Pantnagar 263 145 (Utarakhand)	Ph : (off) : 09411160014 (Res.): 08475008884 Fax: 05944 234 564 E-mail: kps.kushwaha@gmail.com pi.mullarp.pathology@gmail.com
Entomology	Dr. G.K.Taggar Principal Scientist (Entomology) Pulses Section, Department of Plant Breeding & Genetics, Punjab Agricultural University, Ludhiana (Punjab) - 141 004	Mobile : 09814422183 E-mail: gauravtaggar@pau.edu
Microbiology	Dr. Ramesh Chandra Professor Cum Programme Coordinator (Pulses), Deptt. of Soil Science G. B. P.U.A &T Pantnagar-263 145 (Uttrakhand)	PhNo. 05944 – 234401 (O) 05944-233733)F) 09412982048 (M) E-mail: rc.pantnagar@gmail.com
Nematology	Dr. R. Jagadeeswaran Scientist (Nematology) Division of Crop Protection ICAR-IIPR, Kanpur 208 024	Mobile :08400147435 Email : iari.nema@gmail.com
Genetics resources, Breeder Seed Production and Front Line Demonstrations	Dr. Debjyoti Sen Gupta Sr. Scientist (Plant Breeding) Division of Crop Improvement ICAR-IIPR, Kanpur 208 024	Ph : (off) : 0512-2580985 Fax : 0512-2580992 Mobile : 09565982744 E-mail: debgpb@gmail.com