The Journal of Rural and Agricultural Research Vol. 18 No. 2, 13-17 (2018)
Received August 2018; Acceptance November 2018

Enhancement of Area, Production and Productivity of Lentil Crop through Cluster Front Line Demonstrations in District Shajahanpur

K M SINGH, L B SINGH[1] AND U S GAUTAM[2]
Krishi Vigyan Kendra, Shahjahanpur, SVPUAT, Meerut (U.P.)
dhakrekms@rediffmail.com

Abstract

Lentil is a protein/calorie crop. Protein content ranges from 22 to 35%, and an excellent supplement to cereal grain diets because of its good protein/carbohydrate content. The country's area under Lentil was 13.90 lakh hectares with a production of 10.93 lakh tonnes. Madhya Pradesh is on first ranked with respect to acreage 39.59% (5.50 lakh ha) followed by UP 33.95 % and Bihar 11.29% respectively. While in terms of production UP is on first ranked 34.36% (3.76 lakh tonnes) followed by Madhya Pradesh (30.73%) and Bihar (17.35%). The study clearly revealed that Cluster front line demonstration at farmer's field resulted in more knowledge of improved package of practices by farmers and more number of farmers can be benefited. The average yield under recommended practice (CFLD) was obtained 22.19 q ha^{-1} as compared to farmers' practice 12.50 kg ha^{-1}, which was 77.52% higher. The three years average data of CFLD lentil on technology index II was higher (43.67%) than the farmers' practice. The average yield of district every year increase (9.42 to 13.70 q ha^{-1}). The average net returns 127.12% higher than that of farmers' practice. The B: C ratio exhibited the same trend as in gross and net return which was found 2.99 – 6.31 in CFLD demo and 2.11 – 3.44 in farmers' practice. Technology dissemination on advanced technology of lentil through CFLD on lentil crop growth area, production and productivity 283.04, 461.29 & 46.54 per cent in 2016-17, and 24.75, 52.06 & 21.89 per cent in 2017-18, respectively.

Key worlds: Protein content, productivity, demonstration, net return

Introduction:

Lentil is a protein/calorie crop. Protein content ranges from 22 to 35%, but the nutritional value is low because lentil is deficient in the amino acids methionine and cystine. Lentil is an excellent supplement to cereal grain diets because of its good protein/carbohydrate content. It is used in soups, stews, casseroles and salad dishes. Sometimes they are difficult to cook because of the hard seed coats that result from excessively dry production conditions.

Lentils which fail to meet food grade standards (graded #3 or below) can be used as livestock feed because of their high protein content and lack of digestive.

Lentil is a valuable human food, mostly consumed as dry seeds (whole decorticated, seed decorticated and split). In Indian sub continent it is mostly consumed as 'Dal' by removal of outer skin and separation of cotyledons, snacks and soup preparation etc. It is easy to cook and easily digestible with high biological value, hence also referred to patient. Dry leaves, stems, empty and broken pods are used as valuable cattle feed. Bold seeded, attractive shaped grains have high demand for export at premium prices

India ranked first in the Lentil area and second in the Lentil production with 43% and 37% of world area and production, respectively. The highest lentil productivity is recorded in New Zealand (2667 kg/ha) followed by China (2239 kg/ha). Canada ranked first in lentil production (38%) due to very high level of productivity (1971 kg/ha) as compared to India (600 kg/ha) (Tiwari and Shivhare 2016).

[1]Ex Head & Professor, KVK, Shahjahanpur, Presently Posted: Professor, SVPUAT, Meerut

[2]Ex Director ICAR-ATARI –III, Kanpur, Presently Posted: VC, BAU, Banda

The country's area under Lentil was 13.90 lakh hectares with a production of 10.93 lakh tonnes. Madhya Pradesh is on first ranked with respect to acerage 39.59% (5.50 lakh ha) followed by UP 33.95 % and Bihar 11.29% respectively. While in terms of production UP is on first ranked 34.36% (3.76 lakh tonnes) followed by Madhya Pradesh (30.73%) and Bihar (17.35%).The highest yield was recorded by the state of Bihar (1209 kg/ha) followed by Rajasthan (962 kg/ha) and W.B. (960 kg/ha). The National yield average was (786 kg/ha). The lowest yield was observed in the state of C.G. (327 kg/ha) followed by Maharashtra (400 kg/ha) and M.P. (610 kg/ha) (Tiwari and Shivhare 2016).

At farm-level, most important problem in lentil production is its poor land preparation, input cost, dieses and weed infestation. Providing effective extension service is inevitable to break the existing resistance by awareness creation through demonstration at farmers training centre. Complementary lentil technologies including tillage frequency, seed treatment, planting techniques, genetically improve seed, disease, insect and weed management practice have to be provided to boost lentil production and to be change the livelihood of Indian farmers.

With the unabated population increase, Pulses production also have to be paralleled for the vegetarian Indian Society, as these are the prime source of balanced diet and protein particularly for the rural mass. Thus there is need to increase production and productivity of pulse by more intensive interventions. Lentil grain yield can be increased by demonstrating improved agro techniques at farmers' fields with active participation of farmers with technical experts. Keeping the importance of lentil (Masoor) in Shahjahanpur, KVK, Shahjahanpur conducted Cluster front line demonstration (CFLD) improved agro technologies of lentil crop in scientific manner at farmers' fields during rabi season in the year 2015-16, 2016-17 and 2017-18.

Methodology

Farmers' operational area of Krishi Vigyan Kendra, Shahjahanpur was selected as per guide line of Cluster Front Line Demonstration to KVK by ICAR-ATARI, Kanpur Zone –III. Accordingly CFLDs under Lentil (Masoor) crop laid out in villages; namely Babauri, Prahladpur, Penakhurd, Jeba, Gulamkhera, Pingra Pingari, Seharamau Daxini, Sunderpur, Khera Bajhera, Barapur, Akhityarpur, Murchha, Benipur, Sainjana and Niyamatpur. The knowledge level of the farmers in these villages was also evaluated by random sample of 20 farmers each village. Thereby sample included 300 numbers of farmers in the study. The farmers were asked to reply questions about the improved agro techniques including the high yielding varieties of lentil (Masoor).The score so obtained under various questions were summed up. On the basis of the total score obtained, respondents were categorized on to three classes' i.e. low, medium and high level of knowledge.

The soil samples were taken and analyses before sowing of CFLDs demonstration. The soils of CFLDs field were found sandy loam to clay loams having 0.4 to 0.6 per cent available organic carbon, 250 to 300 kg/ha nitrogen, 31 to 53 kg/ha available P_2O_5 and 60 to 120 kg/ha available potassium with pH range from 7.5 to 8.1. CFLDs on lentil (Masoor) were cultivated during rabi season and sown first fortnight of November. Lentil crop was sown in line and fertilize with a common dose of N: P: K: S @ 20:60:40:25 kg/ ha. Full Nitrogen, Phosphorus, Potash and Sulphur applied at sowing time. Nitrogen was use as a starter dose of crop. Seed treatment done by using carbendazim @ 2 g/kg seed 2 to 3 days sowing. Soil treatments of CFLDs Demonstration fields were taken by using trichoderma @ 4 kg/ha before sowing the crop and plant protection measures adopted during crop.

The participating farmers were provided with all advance technical know how about advanced cultivation of lentil crop. KVK scientist also visited regularly to the demonstrations fields and continuously guides the farmers. The varieties (PL 08, HUL 57 and Pusa Masoor 5) were also utilized for collection of feedback information for more improvements in technology transfer programme. Field days and group meeting were also organised at demonstration sites to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. The data on lentil productivity (q/ha) were collected from the demonstration and control plots (Farmers Practice) for further analysis. The critical inputs were duly supplied to the farmers by KVK. Data were collected from the field of FLDs farmers and analysed to compare the yield of farmers' field and CFLDs field. The Technology gap, extension gap and technology index I

and technology index II were estimated by formulae provided by Samui *et.al.* 2000.

1ogy gap = Potential yield – demonstration yield

Extension gap = demonstration yield – farmers practice yield (control)

$$\text{Technology index - I (\%)} = \frac{\text{Potential yield – Demo yield}}{\text{Potential yield}} \times 100$$

$$\text{Technology index - II(\%)} = \frac{\text{Demo yield – Check yield}}{\text{Demo yield}} \times 100$$

Data on District production, productivity and area were taken from agriculture department. Data were interpreted on three years average bases.

Results and discussion

1. Knowledge level of advanced agronomic practices of Lentil (Masoor)

To know the need of the technological intervention the knowledge level of the farmers in 15 villages were estimated from 300 farmers 20 farmers each village. Over all maximum number of farmers fall in category of medium level knowledge, while very few were with high knowledge level (Table 01). Thus need was felt to introduce latest varieties

Table 1: Overall knowledge level of farmers in respect of cultivation of Lentil (Masoor) N= 300

Category of knowledge level	Score range	No. of farmers	%tage of respondents
Low	30-35	102	34
Medium	36-54	153	51
High	55-75	45	15

and nutrient management in CFLDs programme in the fifteen villages. CFLDs are good extension tool to demonstrated the impact of new agro technique to the farmers.

2. Yield and Technological index I & II

Implementation of improved production technology remarkably increased the yield (71.88 – 87.20) over farmers' practice during the tree years of CFLD demonstration. The average yield under recommended practice (CFLD) was obtained 22.19 q ha^{-1} as compared to farmers' practice 12.50 kg ha^{-1}, which was 77.52% higher (table 2). Although yield obtained under CFLD demonstration higher than potential yield of variety. It may be due to cumulative effect of several biotic and a biotic factors in micro climatic conditions that varying year to year.

Yield enhancement under recommended practice might be due to balance nutrition as per soil test value, integrated approach, involving fertilizers and bio-fertilizers which play a vital role in making availability of plant nutrient. Similar results were observed by Tomar *et al.* (2003), Tiwari and Saxena (2001) and tiwari *et al.* (2003).

Table 3 showed that by adopting advance production technology under CFLD demonstrations produced higher yield than the potential yield of varieties and it reflected technology index I (1.64 to – 3.05). The three years average yield of CFLD demonstration technology index I was found – 0.86 per cent. The technology index II of CFLD lentil was found higher (41.82 – 46.58) over the farmers' practice. The three years average data of CFLD lentil on technology index II was higher (43.67%) than the farmers' practice. The average yield of district every year increase (9.42 to 13.70 q ha^{-1}).

Data presented in table 3 revealed that demonstration technology had impact over farmers' practices. It might be due to cumulative effect on average yield of district, technology index I and technology index II due to good management of CFLD and technological spread among the farmers of the district. The average yield increased in CFLD demo field due to technological intervention may happen in

Table 2: Performance of technological intervention (CFLD) on Yield (q/ha) of Lentil

Year	Yield Potential (qha^{-1})	Yield obtained (q/ha)						Yield increase (%)
		Check			Demo			
		Max.	Min.	Av.	Max.	Min.	Av.	
015-16	22.00	16.70	10.30	12.11	26.75	18.50	22.67	87.20
2016-17	22.00	14.30	7.50	12.81	26.75	18.30	22.28	73.92
2017-18	22.00	15.20	9.30	12.59	25.30	16.40	21.64	71.88
Average	22.00	15.40	9.03	12.50	26.27	17.73	22.19	77.52

Table 3: Performance of technological intervention (CFLD) on technology index I & II of Lentil

Name of the crop	year	Area (ha)	Demos (No.)	Variety Check	Variety Demoav.	National yield (q/ha)	State av. yield (q/ha)	District av. yield (q/ha)	Potential yield of the demo variety (q/ha)	Technology index – I (%)	Technology Index – II (%)
Lentil	2015-16	20	50	IPL 81	PL 08	7.86	7.96	9.42	22.00	-3.05	46.58
Lentil	2016-17	45	112	IPL 81	HUL 57	7.86	7.96	12.68	22.00	- 1.27	42.50
Lentil	2017-18	50	125	IPL 81	PL 08	7.86	7.96	13.70	22.00	1.64	41.82
Avrage	-	38.33	95.67	-	-	7.86	7.96	11.93	22.00	- 0.86	43.67

Table 4: Economical comparison between CFLD demo and farmers' practice

Year	Sale Price (Rs q^{-1})	Expenditure and returns (Rs./ha)								Net returns increase (%)
		Check				Demo				
		Gross Cost (Rs/ ha)	Gross return (Rs/ ha)	Net Return (Rs/ ha)	B:C ratio	Gross Cost (Rs/ ha)	Gross return (Rs/ ha)	Net Return (Rs/ ha)	B:C ratio	
2015-16	7000	24650	84770	60120	3.44	29700	187250	157550	6.31	162.05
2016-17	5500	24700	70455	45755	2.85	29900	122540	92640	4.10	102.47
2017-18	4250	25300	53508	28208	2.11	30800	91970	61170	2.99	116.85
Average	5583	24883	69578	44694	2.80	30133	133920	103787	4.47	127.12

Table 5: District Growth on Area (ha), Production (Mt) and Productivity (q/ha) of Lentil:

Year	Area		Production		Productivity	
	(ha)	% over the last year	(mt)	% over the last year	q/ha	% over the last year
2015-16	6203	-	4758	-	7.67	-
2016-17	23760	283.04	26706	461.29	11.24	46.54
2017-18	29642	24.75	40609	52.06	13.70	21.89

Source: JDA Statics, Krishi Bhawan Lucknow

other similar situation. The results are in agreement with the finding as reported by Tomar *et al.* (2003)

3. Economical Assessment:

The cost of cultivation in CFLD demonstration comparatively higher (Rs 29700 - 30800) as compared to farmers' practice (Rs 24650 – 25300) because of additional input applied in CFLD demo. The gross return (Rs 133920) and net return (Rs 103787) in CFLD demo were found higher than the gross return (Rs 69578) and net return (44578). The average net returns 127.12% higher than that of farmers' practice. It showed that the adaption of demonstration technology by farmers would be higher economically and gainful proposition. The B: C ratio exhibited the same trend as in gross and net return which was found 2.99 – 6.31 in CFLD demo and 2.11 – 3.44 in farmers' practice (table 4). Years to year ups in cost of cultivation and decrease in sale price of lentil grains, which consequently reflect the benefit cost ratio in decreasing trends in both the demonstration and farmers' practice. Results suggested economics viability and agronomic feasibility of technology for lentil cultivation as reported Deshmukh *et al.* (2005) and Pathak (2005).

4. Impact of CFLD on technology dissemination in the Districts:

Data presented table 5 revealed that the impact of CFLD on lentil in the district increased in cultivated area, production and productivity from 6203 to 29642 ha, 4758 to

40609 mt and 7.67 to 13.7 q ha^{-1}, respectively. Technology dissemination on advance technology of lentil through CFLD on lentil crop growth area,

production and productivity 283.04, 461.29 & 46.54 per cent in 2016-17, and 24.75, 52.06 & 21.89 per cent in 2017-18, respectively. In Second year found higher dissemination rate due to acceptability of technology and un-saturation of area under lentil crop, it also might be sale price.

Reference

Anonymous (2015); Lentil (*Lens culinaris Medicus*) current status and future prospect of production in Ethopia. Advances in Plants & Agriculture Research. 2(**2**):45-51

Anonymous, (2018); *Changing Scenario of Pulses in India - An..* https://www.researchgate.net/publication/280596310 Changing Scenario of Pulses in India An Analytical View [accessed May 04 2018].

Deshmukh, K.K.; Saraiya, A.B. and Dubey, D.P. (2005). Effect of intefrated nutrient management on productivity trends, economics and soil fertility in soyabean-chick cropping system. JNKVV Research Journal. 39 (**2**): 29-32

Pathak, Jagannath (2017). Evaluation of yield performance of gram (Cicer arietinum) through front line demonstration. *The Journal of Rural and Agricultural Research.* 17 (**2**): 6-10

Samui, S.K.; Maitra, S.; Roy, D.K.; Mandal, A.K. and Saha, D. (2000). Evaluation on front line de,onstration on groundnut.*Journal of the Indian Society Castal Agriculture Research.*18(**2**): 180-183

Tiwari, A. K. and Shivhare, A. K. (2016). Lentil (Masur). *Pulse in India: Retrospect and Prospect,* 1 (**2**): 86-94

Tiwari, K.B. and Saxena, A. (2001). Economic analysis of FLD of oil seed in Chhindwara. *Bhartiya Krishi Anusandhan Patrika,* 16(**3&4**): 185-189

Tiwari, R.B.; Singh, Vinay and Parihar, Pushpa (2003). Role of FLD in transfer of gram production technology. *Maharastra Journal of Extension Education.* 22(**1**):19.

Tomar, L.S.; Sharma, B.P. and Joshi, K. (2003). Study on yield gap and adoption level of potato production technology in grid region. *Maharshtra Journal of Extension Education.*22 (**1**): 15-18