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# Production and Productivity Enhancement in Lentil through Cluster Front Line Demonstrations in Azamgarh District

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**Abstract**

*The cluster front line demonstration (CFLD) on lentil was conducted by Krishi Vigyan Kendra, Kotwa, Azamgarh at farmer's field during rabi 2018-19 to 2019-20. The country's total acreage under lentil was 1.46 million hectares with a production of 1.32 million tonnes. Madhya Pradesh is leading state and ranked first with respect to area 36.19 percent (0.53 million ha.) followed by UP 33.47 percent (0.49 million ha.) and Bihar 10.00% (0.15 million ha.) respectively, While in terms of production MP is on first ranked 36.54% (0.45 Million tonnes) followed by Uttar Pradesh 30.42% (0.37 million tonnes) and Bihar 12.00% (0.15 million tonnes). The study clearly revealed that cluster front line demonstrations at farmers field resulted in more yield due to gain in knowledge of improved package of practices by farmers. The average yield under recommended practice (CFLD) was obtained 14.53 q/ha as compared to farmers' practices 10.65 q/ha, which was 36.12% higher. The average yield of district is increasing every year (10.26 to 12.61 q ha$^{-1}$). The B: C ratio showed the same trend as in gross and net return which was found 3.01 to3.30 in CFLD and 2.51 to 2.70 in farmers' practice. The average net return is 50.82 percent higher than that of farmers' practice.*

*Key words:* Cluster Front Line Demonstration, B: C ratio, lentil, net return

## Introduction

Lentil (*Lens culinaris*) is a small annual legume of the pea family (Fabaceae) and seed is edible. It is a valuable human food, mostly consumed as dry seeds (whole decorticated, seed decorticated and split). In Indian sub-continent, mostly consumed as 'Dal' by removal of outer skin and separation of cotyledons, snacks and soup preparation etc. Pulses are the important sources of proteins, vitamins and minerals and are popularly known as "Poor man's meat" which contributes significantly to the nutritional security of the country.

Besides, pulses possess several other qualities such as they improve soil fertility and physical structure, fit in mixed/inter-cropping system crop rotations and dry farming and provide green pods for vegetable and nutritious fodder for cattle as well. It is easy to cook and easily digestible with high biological value, hence also referred to patient. Lentil are high in protein (24-26%), carbohydrate (57-60%), fibre (3.2%) and calorie (343 Kcal/100gm) content, while low in fat (1.3%). Their high protein content makes lentils a perfect option for those looking to boost their protein intake. Lentil is an excellent supplement to cereal grain diets because of its good protein/carbohydrate content. India ranked first in the Lentil area and second in the Lentil production with 43 and 37 percent of world area and production, respectively. The highest lentil productivity is recorded in New Zealand (2667 kg/ha) followed by China (2239kg/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). 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, diseases 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 (Masur) in Azamgarh district KVK, Azamgarh conducted Cluster front line demonstration (CFLD) on improved agro technologies of lentil crop in scientific manner at farmers' fields during *rabi* season during 2018-19 and 2019-20.

## Methodology

The study was carried out by Krishi Vigyan Kendra, Kotwa, Azamgarh during *rabi* season from 2018-19 to 2019-20 (two consecutive years) at farmer's field of selected villages (Kishundaspur, Roshanpur, Deviet, Sema, Jairampur, Harakhpur, Mahuwari, Kotwa, Tamauli, Dharwara, Daulatpur, Basahiyan, Khalishpur, Khemaupur and Rampur Kathrawan ) of Azamgarh district. The knowledge level of the farmers in these villages was also evaluated by random sample of 10 farmers in each village. Thereby, sample included 150 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 (Masur). 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 cluster front line demonstration conducted in an area of 20.4 ha involving 41 farmers during 2018-19 to 2019-20. Before conducting CFLDs, a list of farmers was prepared through group meeting and specific skill training was given to the selected farmers regarding package of practices of lentil. The difference between demonstration package and existing farmer's practices is given in Table 1. In general the soils under study were sandy loam soil in texture with a pH range in between 6.8 to 8.0. The available nitrogen is low to medium, with low phosphorous and medium potassium in nature. However, the soils were deficient in micro nutrients particularly zinc and ferrous as rice-wheat cropping system prevails in the village since last 40 years.

CFLDs on lentil (Masur) 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 doses of Nitrogen, Phosphorus, Potash and Sulphur were applied at the time of sowing. Nitrogen was use as a starter dose of crop. Seed treatment done by using carbendazim @ 2 g/kg seed. 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 season.

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 CFLDs farmers and analysed to compare the yield of farmers' 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.

Techno1ogy gap = Potential yield – demonstration yield

Extension gap

= demonstration yield – farmers practice yield (control)

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

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

## Results and discussion

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

Selection of suitable cultural practices in different agro climatic zones can improve productive of respective crop in the zone. To know the need of the technological intervention the knowledge level of the farmers in 15 villages was estimated from 150 farmers 10 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 1).

Table 1: Overall knowledge level of farmers in respect of cultivation of Lentil (Masoor) (N= 150)

| Category of knowledge level | Score range | No. of farmers | %tage of respondents |
|---|---|---|---|
| Low | 30-35 | 37 | 24.67 |
| Medium | 36-59 | 84 | 56.00 |
| High | 60-75 | 29 | 19.33 |

Thus, need was felt to introduce latest varieties and nutrient management in CFLDs programme in the fifteen villages. CFLDs are good extension tool to demonstrated the impact of new agro techniques to the farmers.

*2. Yield and Technological index I & II*

Implementation of improved production technology remarkably increased the yield (32.50% – 39.74%) over farmers' practice during the two years of CFLD demonstration. The average yield under recommended practice (CFLD) was obtained 14.53 q $ha^{-1}$ as compared to farmers' practice 10.65 q $ha^{-1}$, which was 36.12% higher (table 2). Although yield obtained under CFLD demonstration higher than Farmers practices yield. It may be due to cumulative effect of advance agronomic practices and improved varieties.

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 check yield of varieties and it reflected technology index I (20.7 to 34.0). The two years average yield of CFLD demonstration technology index I was found 27.35 per cent. The technology index II of CFLD lentil was found (24.54 to 28.43 %) over the farmers' practice. The two years average data of CFLD lentil on technology index II was higher (26.48%) than the farmers' practice. The average yield of district every year increase (10.26 to 12.70 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

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. | |
| 2018-19 | 20.0 | 12.50 | 10.20 | 11.35 | 18.10 | 13.60 | 15.86 | 39.74 |
| 2019-20 | 20.0 | 11.15 | 8.35 | 9.95 | 14.40 | 12.00 | 13.20 | 32.50 |
| Average | 20.0 | 11.82 | 9.27 | 10.65 | 16.25 | 12.80 | 14.53 | 36.12 |

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

| Name of the crop | Year | Area (ha) | Demos (No.) | Variety | | National average yield (q/ha) | State average yield (q/ha) | District average vield (q/ha) | Potential yield of the demo variety (q/ha) | Technology index -I (%) | Technology index -II (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Check | Demo | | | | | | |
| Lentil | 2018-19 | 10.0 | 15 | K 75 | IPL 316 | 7.86 | 10.29 | 10.26 | 20.00 | 20.70 | 28.43 |
| Lentil | 2019-20 | 10.4 | 26 | K 75 | KL 320 | 7.86 | 10.26 | 12.27 | 20.00 | 34.0 | 24.54 |
| Average | - | 10.2 | 20.5 | - | - | 7.86 | 10.27 | 11.26 | 20.00 | 27.35 | 26.48 |

Table 4: Economical comparison between CFLD and farmers' practice

| Year | Sale Price (Rs/q) | Expenditure and returns (Rs./ha) | | | | | | | | Av Net returns increase (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Check | | | | Demo | | | | |
| | | Gross Cost (Rsha$^{-1}$) | Gross return (Rsha$^{-1}$) | Net Return (Rsha$^{-1}$) | B:C ratio | Gross Cost (Rsha$^{-1}$) | Gross return (Rsha$^{-1}$) | Net Return (Rsha$^{-1}$) | B:C ratio | |
| 2018-19 | 4475 | 18800 | 50791 | 31991 | 2.70 | 21500 | 70974 | 49474 | 3.30 | 54.64 |
| 2019-20 | 4800 | 19050 | 47808 | 28758 | 2.51 | 21080 | 63360 | 42280 | 3.01 | 47.01 |
| Average | 4637.5 | 18925 | 49299.5 | 30374.5 | 2.60 | 21290 | 67167 | 45877 | 3.16 | 50.82 |

and technological spread among the farmers of the district. The average yield increased in CFLD Demo field due to technological intervention may happen in 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 comparatively higher (Rs 21080 - 21500) as compared to farmers' practice (Rs 18800 – 19050) because of additional input applied in CFLD demo. The gross return (Rs 67167) and net return (Rs 45877) in CFLD demo were found higher than the gross return (Rs 49299.5) and net return (30374.5). The B: C ratio exhibited the same trend as in gross and net return which was found 3.01 – 3.30 in CFLD and 2.51 – 2.70 in farmers' practice (table 4). Results suggested economics viability and agronomic feasibility of technology for lentil cultivation as reported Deshmukh *et al.* (2005) and Pathak (2005).

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