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RESEARCH ARTICLE

Increasing the Production and Areas of Edible Oil Crop through Frontline Demonstration Approach in Rice Fallow Area

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ABSTRACT

Cluster Frontline Demonstrations on oilseed crop had conducted at farmers' fields in 210 ha area at 1235 farmers field during 2016 - 2020 by Krishi Vigyan Kendra Ramgarh Jharkhand. The farmers were motivated and provide the capacity building training for adopting the mustard cultivation. The Cultivation practices comprising under CFLD viz., use of improved variety, line sowing, balanced application of fertilizers, weed and insect-pest management result revealed that average yield of mustard increased from 30.91% to 41.62% during the demonstration period from 2016-2020. The technology gap of yield was minimum as 3.83 q/ha during 2019-20 and maximum 7.80q/ha during the year 2016-17. Therefore, result indicated that decreasing the technology gap and increasing trend in yield gap for production and productivity in rice fallow area and farmers were cultivated the second crop in rabi season with residual moisture and lifesaving irrigation.

Key words: *Cluster frontline demonstration; Mustard; Yield increase; Technology intervention, Rice fallow area.*

Mustard (*Brassica juncea*) is one of the first domesticated crops in rabi season. It is widely cultivated in tropical and sub-tropical areas of the world. Globally, it is mainly cultivated in India. The oilseeds contribute second largest agricultural commodity in India. Among the edible oilseeds crops, Rapeseed & mustard occupies an important position in Indian oilseeds scenario. Indian mustard is the most important member of the group, accounting for more than 70% of the area under rapeseed-mustard, followed by *toria*, yellow *sarson* and brown *sarson*. Rapeseed and mustard are the third most important edible oilseed crops of the world after soybean and oil. In India, it is grown in 26 states and union territories. The total production (9.34 m tonnes) of the country, Rajasthan, Uttar Pradesh and Haryana accounts for over 69.07 per cent during 2019-20. Nearly 30% area under rapeseed mustard is under rain-fed farming. The highest productivity is in Jharkhand (6.76 q/ha), with overall national yield of 14.99 q/ha. In Ramgarh district of Jharkhand, the productivity of Mustard was 7.92 q/ha during 2016-2020. Mustard is an important food crop of the district and still a vast yield gap exists between potential yield and the yield obtained under real farming situation. This may be due to partial adoption of recommended package of practices by the mustard growers. Technology gap is a major problem in increasing mustard production in the region of the State. Due to its low water requirement (80-240 mm), rapeseed-mustard crops fit well in the rain-fed cropping system. Rapeseed-mustard is the major source of income especially even to the marginal and small farmers in rain-fed areas. Since these crops are cultivated mainly in the rain-fed and resource scarce regions of the country, their contribution to livelihood security of the small and marginal farmers in these regions is also very important So far, not much systematic effort was made to study the technological gap existing in various components of mustard cultivation. The GoI has introduced National Mission on Oilseeds and Pulses, with a vision to increase production of vegetable oils sourced from oilseeds. Keeping this in view, front line demonstrations were organized in participatory mode with the objective to analyze the yield gaps in mustard cultivation on the newly recommended package of practice.

METHODOLOGY

The present study was carried out by Krishi Vigyan Kendra, Ramgarh Jharkhand (ICAR Research Complex for Eastern Region Patna) during *Rabi* seasons from 2016-17 to 2019-20 (four consecutive years) in the farmers field of Ramgarh district. During this four year of study, in area of 210.0 ha was covered with plot size 0.4 ha under front-line demonstration with active participation of 1235 farmers. Before conducting FLDs, a list of farmers was prepared from group meeting and specific skill training was given to the selected farmers regarding package of practices of mustard. The difference between demonstration package and existing farmers practices are given in Table 1. The improved technology included modern high yielding varieties, seed treatment, timely sowing, line sowing, maintenance of optimum plant population, recommended fertilizer management, plant protection measures, etc. The sowing was done in the month of mid-October. The spacing was 45×15-20 cm apart and the seed rate of mustard was 6 kg/ha. The fertilizers were given as per soil testing value; however, the average recommended dose of fertilizer applied in the demo plots was 120 kg N, 60 kg P_2O_5, 30 kg K_2O and 20 kg S per hectare. The NPK & S fertilizers were applied through urea, DAP, MOP & elemental S respectively. Thinning and first-hand weeding within lines was done at 15-25 DAS and second-hand weeding was done at 45-50 DAS, if necessary. In demonstration plots, critical inputs in the form of quality seeds of improved varieties, timely weeding, need based of pesticides as well as balanced fertilization, irrigation at critical stages were emphasized by the KVK and comparison has been made with the existing practices (Table 1). The traditional practices were maintained in case of local check. The data were collected from both CFLD plots as well as control plots and finally the extension gap, technology gap, technology index along with the benefit cost ratio were worked out (*Samui et al., 2000*) as given below -

Technology gap= Potential yield - Demonstration yield

Extension gap= Demonstration yield - Farmer's yield

$$\text{Tech. index} = \frac{\text{Potential yield} - \text{Demo. yield}}{\text{Potential yield}} \times 100$$

RESULTS AND DISCUSSION

The improved package and practices is more important with technological intervention for productivity and profitability of mustard crop for rainfed areas where mono-cropping adopted and rice fallow area dominating in rabi season. The package and practices with technological intervention farmers were providing through training (Table 1) and regular follow-up and field day were organized. It was also observed that farmers adopted the injudicious and un-recommended insecticides and mostly farmer's didn't use fungicides. Similar observations were reported *by Singh et al., 2011*.

Yield performance of mustard CFLDs : The analysis depicted in Table 3 that the yield of mustard fluctuated successively over the years in demonstration plot. Data revealed that average grain yield of demonstrated fields was higher from farmer's practice in all blocks of Ramgarh district. The maximum seed yield of mustard was obtained under demonstrated plots 14.72 qha-1 during 2019-20 followed by 13.72 qha-1 (2018-19), 11.58 qha-1 (2017-18) and 10.45 qha-1 (2016-17) respectively with an average of 12.59 qha-

Table 1. Improved production technology and farmers practices

Particulars	Mustard		
farming situation	Improved production technology for CFLD	Farmers practice	Tech. gap
Variety	Pusa Bold	Local cultivar	100
Method of sowing	Line sowing, 40-45 cm (row to row) ,15-20 cm (plant to plant	Broad casting	50
Time of sowing	Mid October to Mid-November	November	50
Seed rate (kg/ha)	6 kg/ha	10 kg/ha	50
Fertilizer / vermin compost	120: 60: 30 (N:P:K) kg/ha and Sulphur (Gr) 20kg/ ha	Use of urea 40kg/ha and DAP 20 kg/ha	100
Use of bio fertilizer	PSB culture	Nil	100
Seed treatment	PSB culture and Trichoderma	No Seed treatment	100
Plant protection	Integrated pest management	Indiscriminate application	100
Interculture	Quizalofop-p-ethyl a.i.50gha^{-1} At 15-20 DAS	Nil	100

Table 2. Details of need-based input in mustard crop

Year	No. of Demonstration	Thematic of Technology demonstrated	Need based input
2016-17	75	variety Pusa Bold, INM &IPM	Pusa Bold @5kg/ha, Line sowing, (30X10cm) application of sulphur and foliar spray of NPK 19:19:19: @ 2.5kg/ha Spray of neem oil at the time of flowering @ 5ml/liter water
2017-18	50	variety Pusa Bold, INM & IPM	Pusa Bold @5kg/ha, Line sowing, (30X10cm) application of sulphur and foliar spray of NPK 19:19:19: @ 2.5kg/ha Spray of neem oil at the time of flowering @ 5ml/liter water
2018-19	50	variety Pusa Bold, INM & IPM	Pusa Bold @5kg/ha, Line sowing, (30X10cm) application of sulphur and foliar spray of NPK 19:19:19: @ 2.5kg/ha Spray of neem oil at the time of flowering @ 5ml/liter water
2019-20	325	variety Pusa Bold, INM & IPM	Pusa Bold @5kg/ha, Line sowing, (30X10cm) application of sulphur and foliar spray of NPK 19:19:19: @ 2.5kg/ha Spray of neem oil at the time of flowering @ 5ml/liter water

Table 3. Productivity, technology gap, extension gap, technology index and benefit-cost ratio of mustard grown under CFLDs and existing package of practices

Year	Area (ha)	No. of farmers	Seed yield (Q/ha)			% increase over control	Tech. gap (Q/ha)	Extension gap (q/ha)	Technical index (%)
			Potential	CFLD	F P				CFLD
2016-17	30	115	18.25	10.45	6.10	41.62	7.80	4.35	42.73
2017-18	30	135	18.25	11.58	6.90	40.41	6.67	4.68	36.54
2018-19	20	85	18.25	13.62	9.41	30.91	4.63	4.21	25.36
2019-20	130	900	18.25	14.72	9.27	37.02	3.53	5.45	19.34
Total	210	1235	Av.	12.59	7.92	37.49	5.65	4.67	30.99

Table 4. Effect of frontline demonstrations on yield and economics

Year	Farmer's Existing plot				Demonstration plot			
	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
2016-17	12500.00	27450.00	14950.00	1.19:1	18750.00	47025.00	28275.00	1.50:1
2017-18	13250.00	31050.00	17800.00	1.34:1	20900.00	52110.00	31210.00	1.49:1
2018-19	15800.00	42345.00	26545.00	1.68:1	21800.00	61290.00	39490.00	1.81:1
2019-20	16850.00	41715.00	24865.00	1.47:1	23850.00	66240.00	42390.00	1.77:1
Average	14600.00	35640.00	21040.00	1.42:1	21325.00	56666.25	35341.25	1.64:1

1 as compared to farmer practices 9.27 qha-1 during 2019-20 followed by 9.41 qha-1 (2018-19) and 6.90 qha-1 (2017-18) and 6.10 qha-1 respectively with an average of 7.92 qha-1 which was increased with an average value of 37.49 % percent for mustard production. The similar results were in accordance with findings of other workers (*S.N Singh et al., 2007, G. Singh et al., 2011*). The better yield in cluster frontline demonstrations (CFLD's) field may be due to awareness and adoption of package and practices accordingly (Table 1). In general, during all the years grain yield of CFLDs plots was higher as compared to local check which was due to good variety, seed treatment, recommended fertilizer doses, plant protection measures were followed by the demonstrators and scientists in the demonstrations plots. The similar results were also observed by *Singh, Ishwar (2013), Dayanand et al. (2014)*. The present findings are also in accordance with the findings of *Sharma (2014)* who found that the yield levels under farmers' practices were always lower than obtained under frontline demonstration. The results revealed

that extension gap ranged from 4.21 -5.45 q/ha which indicated that farmers should be aware for adoption of improved production technology in mustard. There is a vast gap between the farmer's yield and improved variety yield as per recommended practice through cluster frontline demonstrations on farmers' field. *Vittal et al. (2005)* also supported those frontline demonstrations is better than farmer practices *Raghav et al (2021)* These gaps may be attributed to the variation in soil fertility status. Similarly, technology index was ranged 19.34-42.73 per cent and average figure comes out to 30.99 per cent. The results revealed that return of mustard under cluster frontline demonstrations were ranged from Rs 28275.0/ha to Rs 42390.00/ha. However, the adoption levels for the improved technology in oilseeds necessitate the need for better dissemination (*Kiresur et al. 2001*). The program of large-scale cluster frontline demonstration being popularized for other oilseed crops also in order to increase farmer's income and attain self-sufficiency in oilseeds production.

Economics analysis : Economic analysis of cluster frontline demonstration on mustard revealed that the average return from recommended practice (CFLD's) were 35341.25 Rs ha^{-1} as compared to average return 20140.00 Rs ha^{-1} in farmer's practice. The net returns ranged from 28275.00 to 42390.00 Rsha-1 in recommended practice in comparison to 14950.00 to 24865.00 Rsha-1 in farmer's practice. It was economically observed that additional gain ranged from 12945.00-17525.00 Rs ha^{-1} in recommended practice proved beneficial in respect of yield and economics of mustard in consecutive Ramgarh District in Jharkhand.

CONCLUSION

The present study revealed that Chhattisgarh Sarson-1, variety of mustard gave higher yield and net returns in recommended practice (CFLD's) than farmers practice in Ramgarh district. The highest grain yield was attributed to higher potential with improved variety, timely sowing, nutrient management, weed management and insect, pest and disease management in accordance of package and practice. Economic analysis of different parameter's revealed that net returns and additional gain were recorded highest with recommended practice (CFLD's). The study was concluded that Pusa Bold and Pusa Mustard -30 in recommended practice proved beneficial in respect of yield and economics of mustard.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES

A Compendium by NARS, State Department (s) of Agriculture and Agro- Industries. All India Coordinated Research Project for Dryland Agriculture Central Research Institute for Dryland Agriculture Santoshnagar, Hyderabad -500 059

Dayanand, Verma R.K. and Mehta S.M. (2014). Assessment of technology gap and productivity gain through front line demonstration in chickpea. *Legume Res.*, **37**(4), 430-433.

Kiresur, V.R., Rao, S.V.R. and Hedge, D.M. (2001). Improved technologies in oilseeds production-An assessment of their economic potentials in India. *Agri. Eco. Res.Review*, **14** : 95-108.

Oilseed Productivity Enhancement through Identified Agro-Technologies in Eastern Region. Published by: Dr. S.S. Singh Director, ICAR-ATARI, Kolkata.

Raghav, D.K., Indrajeet, Kherwar. Dharmjeet., Kumar, Anjani., Singh,A.K.,and Chauhan,Jitendra K. (2021). Role of Frontline Demonstration on Chick Pea for Enhancing the Production in District Ramgarh of Jharkhand . *Indian Res. J. Ext. Edu*., **21** (1) : 30-34.

Samui, S.K., Mitra, S., Roy, D.K., Mandal, A.K. and Saha, D. (2000). Evaluation of front line demonstration on ground nut, *J. Indian Society of Coastal Agri. Res.,* **18** (2) : 180-183.

Sharma, V.P.(2014). Problems and prospects of oilseeds production in India, Centre for Management in Agriculture (CMA), Indian Institute of Management (IIM), Ahmedabad, November, 2014.

Singh, G., Dhaliwal, N.S., Singh, J. and Sharma, K.(2011). Effect of frontline demonstrations on enhancing productivity of mustard, *Asian J. Soil Sci.,* **6** : 230-233.

Singh, Ishwar.(2013). Impact of frontline demonstration on yield and economics of gram in Burhanpur district of MP, *Indian J. Ext. Edu.*, **21** : 68-71.

Singh, S.N., Singh, V.K., Singh, R.K. and Singh, R.K. (2007). Evaluation of on farm frontline demonstrations on the yield of mustard in central plains zone of Uttar Pradesh, *Indian J. Ext. Edu.*, **7** : 79-81.

Vittal, K.P.R., Kerkhi, S.A., Chary, G.R., Sankar, G.R.M., Ramakrishna, Y.S., Srijaya. T. and Samra, J.S. (2005). District wise Promising Technologies for Rainfed Linseed based Production System in India.

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