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RESEARCH ARTICLE

CLUSTER FRONTLINE DEMONSTRATION: AN EFFECTIVE APPROACH FOR INCREASING PRODUCTIVITY AND PROFITABILITY OF MUSTARD (*BRASSICA JUNCEA*) CROP IN CHHATTISGARH PLAINS

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ABSTRACT

Cluster Frontline Demonstration were conducted to study the evaluating the performance of improved cultivar, seed treatment, sulphur application, diseases, insect and pest management on production as well as productivity and profitability of mustard. Cluster frontline demonstration (CFLD's) were conducted during 2015-16, 2016-17 and 2017-18 with evaluation the performance of Chhattisgarh Sarson-1, variety of mustard in Raigarh, Pussore and Kharsia blocks of the district and record the feedback information of farmer's. The results revealed that average yield of mustard under cluster frontline Demonstrations were 11.30, 10.65 and 10.40 qha-1 as compare to 8.25, 7.90 and 7.85 qha-1 recorded in farmer's practice, average yield increase of 36.99, 34.81 and 32.48 per cent, and additional return of 10440.00, 9525.00 and 8735.00 Rsha-1, respectively. Therefore, the results clearly indicates that the use of improved varieties and package and practices with scientific intervention under cluster frontline demonstration programme contribute to increase the productivity and profitability of oilseeds in Chhattisgarh state.

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INTRODUCTION

Indian mustard is important oilseed crop and determinant of agricultural economy of the country. However, productivity is low due to lack of awareness in farming community regarding improved package and practices of oilseed crops. Frontline demonstrations are important dissemination process for transfer of technology and to establish its production potentials on the farmer's fields. Rapeseed-mustard is the second most important edible oilseed crop in India, next only to groundnut and accounts for nearly 30 per cent of the total oilseeds produced in the country (Shivani and Kumar, 2002). India is one of the largest rapeseed- mustard growing country in the world, occupying the first position in Area and second position in production after China (Thakur and Sohal., 2014). In India, oilseeds account for 3 per cent to the Gross National Product and 10 per cent to the total value of all agricultural products. India is the largest producer of oilseeds in the world and accounts for about 14 per cent of the global oilseeds area, 7 per cent of the total vegetable oil production and 10 per cent of the total edible oil consumption. The total oilseed cultivated area, production and productivity of nine oilseed crops in India during 2014-15 were 25.6 mha, 27.5 mt and 1075 ha^{-1}, respectively (Anonymous, 2016). Presently, India's annual edible oil consumption is about 17.5 mmt, which in the last decades has increased steadily at a compounded annual growth rate of 4.6 per cent. The growth in per capita consumption is attributable to both rising income levels and living standards. However, the current per capita consumption of 14.3 kg $year^{-1}$ in 2012-13 in India is considerably lower than the global average of 24 kg $year^{-1}$. Indian mustard is an important oilseed crop of Indian subcontinent contributes more than 80 per cent of the total rapeseed-mustard production in India (Meena *et al*., 2014; Meena *et al*., 2015).This group of oilseed crops offers higher return with low cost of production and low water requirement, so it has greater potential to increase the availability of edible oil from the domestic production. In spite the high quality of oil and also its wide adaptability for varied agro-climatic conditions, the area, production and yield of rapeseed-mustard have been fluctuating due to various biotic and abiotic stresses together with domestic price support programme. In *Brassica* breeding programme is one of the most important objectives for improvement of seed quality. High yielding new varieties are also imperative to meet potential edible oil requirement of the country which is still increasing due to increase in population, increase in per capita consumption and slow increase in local production of oilseed crops (Shengwu *et al*., 2003).

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Krishi Vigyan Kendra are grass root level organization meant for application of technology through assessment, refinements and dissemination of proven technologies under different micro farming situation in the district (Das, 2007). Cluster front line demonstrations were conducted on mustard (Chhattisgarh Sarson-1) during 2015-16, 2016-17 and 2017-18 with disseminate the technology in the district, establish production potentials on the farmer's field's, assessment of adoption and yield gap's and record feedback information from farmer's for further improvement in the research and extension programme.

MATERIALS AND METHODS

The study was carried out in the Raigarh district is located on the Northern part of Chhattisgarh state and lies at 21°54'N latitude and 83°24' E longitude with an altitude of 215 m above the mean sea level (MSL). Cluster frontline demonstrations (CFLD's) were conducted during 2015-16, 2016-17 and 2017-18 with evaluation the performance of Chhattisgarh Sarson-1, variety of mustard in Raigarh, Pussore and Kharsia blocks of the district. In this study, 175 farmer's were selected from aforesaid block's during consecutive years under cluster frontline demonstration of mustard. All the technological intervention were taken as per prescribed package and practices for improved variety of mustard crop (Table 1). The grain yield, gap analysis, input cost, net return and additional gain parameters were recorded (Table 2 and 3).

Assessment of gaps in adoption of recommended technology before laying out the cluster frontline demonstrations (CFLD's) through personal discussion with selected farmer's. The awareness programme (training) was organized for selection of farmer's and skilled development about detailed technological intervention with improved package and practice for successful mustard cultivation. Scientists visited regularly cluster frontline demonstrations fields and farmer's field also. The feedback information from the farmer's was also recorded for further improvement in research and extension programmes.

The extension activities i.e. awareness programme (training), farmer's seminar and field days were organized at the cluster frontline demonstrations sites. The basic information were recorded from the farmer's field and analyzed to comparative performance of frontline demonstrations (FLD's) and farmer's practice. Different parameters were calculated to find out technology gaps (Yadav *et al*., 2004).

Extension gap = Demonstrated yield-Farmers' practice yield

Technology gap= Potential yield- Demonstration yield

Additional return = Demonstration return – Farmers practice return

$$\text{Technology index} = \frac{\text{Potential yield-Demonstration yield}}{\text{Potential yield}} \times 100$$

Table 1. Detail of package and practices for mustard cultivation

S.No.	Technological intervention	Farmer's practice	Recommended Practice (CFLD's)
01.	Variety	Existing / old recommended cultivar	Chhattisgarh Sarson-1
02.	Seed rate (kgha$^{-1)}$	6.0	5.0
03.	Seed treatment.	Not practice.	Carbendazime50 WP @ 3gkg^{-1} seed, Thiamethoxam 25WG 2gkg^{-1} and 5-10 ml PSB culture.
04.	Sowing method/Spacing.	Broadcasting / un uniform plant population	30 x 10 cm, Sowing with seed cum fertilizer drill.
05.	Time of Sowing	November- December	15 October- 15 November
06.	Nutrient management.	Imbalance use of fertilizers and 150 kg urea/ha at first and second irrigation and 100 kg DAP at sowing.	Balance fertilization as per soil test values (STV) 275 kg Urea/ha (in 3 split application at Ist, IInd and IIIrd irrigation), 525 kg SSP and 60 kg MOP at sowing.
07.	Weed management.	No weeding/ manually	Quizalofop-p-ethyl a.i.50gha^{-1} at15-20 DAS.
08.	Insect, pest and disease management.	No/ injudicious use of and insecticides and fungicides.	Two sprays of Thiamethoxam 25WG @ 0.5ml l^{-1} of water at 45 &85 days for sucking pest and one spray of Metalaxyl 35% WS 2gl^{-1} of water for white blister.

Table 2 . Grain yield and gap analysis of cluster frontline demonstrations on mustard

S. No.	Block	No. of demonstration	Average yield (ha)		% Increase in Recommended Practice (RP)	Extension gap (q ha^{-1})	Technology gap (q ha^{-1})	Technology index
			Recommended Practice (RP)	Farmer's Practice (FP)				
01.	Raigarh	50	11.30	8.25	36.99	3.05	3.70	24.66
02.	Pussore	50	10.65	7.90	34.81	2.75	4.35	29.00
03.	Kharsia	75	10.40	7.85	32.48	2.55	4.60	30.66

Table 3. Economic analysis of the cluster frontline demonstrations on mustard

S. No.	Block	Total returns(Rs.ha^{-1})		Input cost(Rs.ha^{-1})		Net return(Rs.ha^{-1})		Additional gain (Rs.ha^{-1}) FLD's
		Recommended Practice (RP)	Farmer's Practice (FP)	Recommended Practice (RP)	Farmer's Practice (FP)	Recommended Practice (RP)	Farmer's Practice (FP)	
01.	Raigarh	41810	30525	13060	12215	28750	18310	10440
02.	Pussore	39405	29230	12500	11850	26905	17380	9525
03.	Kharsia	38480	29045	12075	11375	26405	17670	8735

RESULTS AND DISCUSSION

The improved package and practices is more important with technological intervention for productivity and profitability of oilseeds. Detailed package and practices with technological intervention for recommended practice (Table 1). Sulphur is an important supplement for oilseed crops and it is recommended that farmer's should apply single super phosphate fertilizers to meet the requirement of both phosphorus and sulphur in mustard. It was also observed that farmer's use injudicious and un-recommended insecticides and mostly farmer's didn't use fungicides. Similar observations were reported by Singh *et al.,* 2011.

Grain Yield

The grain yield of demonstrated field's and farmer's practice is presented in table 2. Data revealed that average grain yield of demonstrated field's was higher from farmer's practice in all blocks of Raigarh district. The results revealed that average yield of mustard under cluster frontline demonstrations were 11.30, 10.65 and 10.40 qha^{-1} as compare to 8.25, 7.90 and 7.85 qha^{-1} recorded in farmer's practice, average yield increase of 39.99, 34.81 and 32.48 per cent, and additional return of 10440.00, 9525.00 and 8735.00 Rsha^{-1}, respectively. The average yield of Chhattisgarh Sarson-1 ranged from 10.40-11.30 qha^{-1} as compared to 7.85-8.25 qha^{-1} of existing variety in all blocks indicating suitability of variety and farming system of district. The average yield of cluster frontline demonstrations (CFLD's) field's was highest in Raigarh block (11.30 qha^{-1}) followed by Pussore (10.65 qha^{-1}) and Kharsia block (10.40 qha^{-1}). The similar results were in accordance with findings of other workers (Singh *et al*., 2007, 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).

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 2.55-3.05 qha^{-1} in blocks of Raigarh district which indicated that farmer's 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 that frontline demonstrations is better than farmer practices. Technology gaps were also recorded of each blocks and these ranged from 3.70-4.60 qha^{-1}. These gaps may be attributed to the variation in soil fertility status. Similarly technology index were ranged 24.66-30.66 per cent and average figure comes out to be 27.66 per cent. The results revealed that additional return of mustard under cluster frontline demonstrations were ranged 8735.00-10440.00 Rsha^{-1} of each block. However, the adoption levels for the improved technology in oilseeds necessitate the need for better dissemination (Kiresur *et al.* 2001). The programme of large scale frontline demonstration could be 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 total return from recommended practice (CFLD's) were 41810.00 Rsha^{-1} as compared to 30525.00 Rsha^{-1} in farmer's practice of Raigarh block. The net returns ranged from 26405.00-28750.00 Rsha^{-1} in recommended practice in comparison to 17380.00-18310.00 Rsha^{-1} in farmer's practice. It was economically observed that additional gain ranged from 8735.00-10440.00 Rsha^{-1} in recommended practice proved beneficial in respect of yield and economics of mustard in consecutive blocks of Raigarh District In Chhattisgarh Plains.

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 all block's Raigarh 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 Chhattisgarh Sarson-1 in recommended practice proved beneficial in respect of yield and economics of mustard.

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