Popularization of Improved Mustard Production Technology Through Frontline Demonstrations InMahrajganj of Eastern Uttar Pradesh

Abstract

Mustard is one of the most important oilseeds crop in India, which plays a major role in supplementing the income of small and marginal farmers in Mid Eastern Part of Uttar Pradesh. The Present study was carried out at Mahrajganj district of Eastern Uttar Pradesh during the year 2020-21 and 2021-22.Keeping in view of an effective extension approach of FLDs for popularization of improved mustard production technology by KrishiVigyan Kendra, Mahrajganjunder Acharya Narendra Deva University of Agricultural & Technology, Ayodhya(UP) were conducted at farmer's fields of block-Nichlol village- Bisokhore and block-Ghughli, village- PakriyarBishunpur with mustard variety RH 0749 . The impact assessment was based on the comparison of beneficiary and non-beneficiary respondents with reference to increase in knowledge level of beneficiary farmers, extent of adoption of improved mustard production technologies and attitude of beneficiary farmers towards FLDs. Cultivation practices comprised under FLD viz., use of improved variety, line sowing, balanced application of fertilizers, timely weed management and control of insect-pest through insecticide -pesticides at economic threshold level showed that the yield of mustard increased from 62.38 to 74.49 percent over farmer's practice during the demonstration period from 2020-21 to 2021-22…..it means the existing Agriculture system is failure…….how to get rid from it?. The technology gap was observed (3.60,2.90)…….Great gap …..it was the productivity level in 1960s.?. The demonstrations fetched higher average additional return (Rs.33080/ha)……..not agree? and C: B ratio (1.68) ……? extent of farmer's satisfaction.

Key Words: Frontline demonstrations, Extension gap, Technology gap, Technology index, Mustard & transfer of technology

Introduction

Mustard (*Brassica juncea*L.) is an important Rabi season oilseed crop; belongs to family Cruciferae and genus Brassica. The demand for rapeseed and mustard oil outstrips the production and as a result, India is importing on an average 46.8 lakh tonnes of edible oil to meet its requirement during the last five-six years at a cost of around 10,000 crores annually. Rapeseed-mustard is the second most important edible oilseed crop in India, next only to groundnut and accounts for nearly 30 percent of the total oilseed produced in the country (Shivani and Kumar,2002).

India is the third largest rapeseed-mustard producer in the world and the fourth foremost mustard consuming Nation (Verma*et al*., 2012), 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 percent to the total value of all In India it is grown on the 35 per cent area of the total cultivated area of the world with a 16 per cent share in production (Darekar and Reddy, 2018) 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 percent 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 respectively (Anonymous, 2016). 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 2014; Meena*et al*., 2015). Conducting of front line demonstrations at farmers' field help to identify the constraints and potential of rapeseed-mustard in specific area as well as it helps in improving the economic and social status of the farmers. However, (Manan and Sharma 2017). Frontline Demonstration is the new concept of demonstration evolved by the Indian Council of Agricultural Research, New Delhi with the inception of the Technology Mission on Oilseed Crops during mid eighties (Ghintala*et al*., 2018). Frontline demonstration is one of the most powerful tools of extension because farmers, in general, are driven by the perception that '*Seeing is believing'* (Sharma *et al*., 2011).The main objective of FLD is to demonstrate newly released crop production and protection technologies at the farmers' field under different agro-climatic conditions and farming situations (Chaudhary *et al*., 2018) . The available agricultural technology does not serve its purpose till it reaches and adopted by its ultimate user, the farmer. The production and productivity of the rapeseed-mustard are not adequate in the district due to use of poor quality of seeds, infestation of diseases

and attack of insect-pests from sowing to harvesting. Amongst, the insect-pests mustard aphid, *L. erysimi*is considered as limiting factors in the successful cultivation of rapeseed-mustard. The colonies of mustard aphid feed on the new shoots, inflorescence and underside of leaves which cause loss in yield up to 75-91.3 per cent (Kumar *et al*., 2011; Singh and Sachan, 1994; Sharma and Kashyap, 1998) and 15 percent in oil content (Verma and Singh, 1987). As such there always appears to be a gap between the recommended technology by the scientist and it's modified from at the farmer's level. The technology gap is thus the major problem in the efforts of increasing agricultural production in the country. A need of the day is to reduce the technological gap between the agricultural technology recommended by the scientist and its acceptance by the farmers on their field. In view of the above factors, frontline demonstrations were undertaken in a systematic manner on farmer's field to show the worth of a new variety and convince the farmers to adopt improved cultivation practices of Mustard for increasing productivity of Mustard. Keeping in view the present investigation attempts to study the yield gap between frontline demonstration trails and farmers yield, extend of technology adoption and benefit cost ratio.

Materials And Methods

Frontline demonstrations on rapeseed-mustard (Var. RH 0749) were conducted by KrishiVigyan Kendra, Mahrajganj district of Eastern Uttar Pradesh during the year 2020-21 and 2021-22.Keeping in view of an effective extension approach of FLDs for popularization of improved mustard production technology by KrishiVigyan Kendra, Mahrajganj under Acharya Narendra Deva University of Agricultural & Technology, Ayodhya (UP) were conducted at farmer's fields of block-Nichlol village- Bisokhore and block- Ghughli, village- PakriyarBishunpurwith mustard variety RH 0749 . For conducting frontline demonstration farmers were selected from adopted villages following the bench mark survey. Prior to conducting FLD's a training programme on production and protection technologies of rapeseed-mustard crop were also organized. The sowing was done during end of October under assured irrigated conditions. Seeds were sown in rows 45 cm apart with plant to plant distance of 10 cm by drill. Frontline demonstrations were conducted at fields of 50 farmers in the area of 20 hectare each. In demonstration quality seeds of improved variety and insect-pest management techniques were demonstrated on the farmer's field through frontline demonstration at different locations. The farmer's practices were maintained in case of local checks. Regular visits to the FLD's field by the KVK scientists for ensuring proper guidance to the farmers were done. For the management of mustard aphid, *L. erysimi*, foliar spray of Thiamethoxam 25 WG @ 100 gm/ ha was given with the help of a knapsack sprayer at Economic

threshold level (ETL) of 50 aphids/10 cm terminal portion of the central shoot. The population of mustard aphid was recorded from10 cm top portion of the terminal shoot of 10 randomly selected and tagged plants from each field. Pre-treatment counts of the aphids were made 24 hours prior to insecticide application while post-treatment counts were made at 1, 3, 7 and 10 days after the spraying. Percent aphid mortality at each interval after spray was calculated. The data were subjected to analysis of variance for interpretation of results. . From front line demonstration plots and farmers practice plot (control plot) and finally extension gap, technology gap, and technology index were calculated as given as formula suggested by (Samui et al. 2000 and Dayanand et al. 2012) as given below.

1. % increase over farmers practices = Improved practices – Farmers practices / farmers practices x 100
2. Technology gap = Potential yield – Demonstration yield
3. Extension gap = Demonstration yield – farmers yield
4. Technology index = [(Potential yield – Demonstration yield) /Potential yield] x 100

All the technological intervention were taken as per prescribed package and practices for improved variety of mustard crop (Table 1).

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).

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 frontline demonstrations were 16.40 and 17.10 qha-1 as compare to 10.10 and 9.80 qha-1 recorded in farmer's practice, average yield increase of 62.38 and 74.99 percent, and additional return of

29295 and 36865Rs.ha-1 , respectively. The Potential grain yield (q/ha) of RH0749 from 20.00 qha-1 as compared to 16.40-10.10 qha-1 of existing variety in all blocks indicating suitability of variety and farming system of district. The similar results were in accordance with findings of other workers (Singh et al., 2007, Singh et al., 2011). The better yield in frontline demonstrations (FLD'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 6.30-7.30 qha-1 of Mahrajganj 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 from 3.60-2.90 qha-1 . These gaps may be attributed to the variation in soil fertility status. Similarly technology index were 18.00-14.50 percent. 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 (FLD's) were 81308.00 Rs.ha-1 as compared to 48228.00 Rs.ha-1 in farmer's practice of Mahrajganj district. The net returns from 33080 Rs.ha-1 in recommended practice. Recommended practice proved beneficial in respect of yield and economics of mustard in consecutive blocks of Mahrajganj District In Eastern Uttar Pradesh.

The present study revealed that RH0749, variety of mustard gave higher yield and net returns in recommended practice (FLD's) than farmers practice in all block's Mahrajganj 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 (FLD's). The study was

concluded that RH0749 in recommended practice proved beneficial in respect of yield and economics of mustard.

Table 1. Detail of package and practices for mustard cultivation

Sl No.	Technological intervention	Farmer's practice	Recommended Practice (FLD's)
1	Variety	Existing / old recommended cultivar	New Variety RH 0749
2	Seed rate (kgha-1)	6.00	5.00
3	Seed treatment.	Not practice.	Carbendazime50 WP @ 3gkg-1 seed, Thiamethoxam 25WG 2gkg-1 and 5-10 ml PSB culture
4	Sowing method/Spacing.	Broadcasting / un uniform plant population	Sowing with seed cum fertilizer drill
5	Time of Sowing	November- December	15 October- 15 November
6	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
7	Weed management.	No weeding/ manually	Quizalofop-p-ethyl a.i.50gha-1 at15-20 DAS
8	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: Performance of Front Line Demonstrations (FLD) of mustard

Year	Area (ha)	Potential grain yield (q/ha)	Grain Yield (q/ha)		% increase over FP	Extension gap (q/ha)	Technology gap (q/ha)	Technology index
			FLD	FP				
2020-21	10	20	16.40	10.10	62.38	6.30	3.60	18.00
2021-22	10	20	17.10	9.80	74.49	7.30	2.90	14.50
Mean	**10**	**20**	**16.75**	**9.95**	**68.43**	**6.80**	**3.25**	**16.25**

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

Year	Area (ha)	Potential grain yield (q/ha)	Cost of cash input		Additional cost in demonstrations (Rs./ha)	Sale price of grain (MSP) (Rs./qt)	Grain Yield (q/ha)		Total returns Rs. (ha		Extra returns	Incremental Benefit: Cost ratio	
			FLD	FP			FLD	FP	FLD	FP		FLD	FP
2020-21	10	20	28750	24493	4257	4650	16.40	10.10	76260	46965	29295	1.64	1.92
2021-22	10	20	29970	26321	3649	5050	17.10	9.80	86355	49490	36865	1.71	1.88
Mean	**10**	**20**	**29360**	**25407**	3953	**4850**	**16.75**	**9.95**	**81308**	**48228**	**33080**	**1.68**	**1.90**

References

1. Anonymous, 2016. Agricultural statistics at a glance. DAC Government of India. p. 118.
2. Chaudhary RP, Choudhary KG, Prasad R, Singh R, Chaturvedi AK. Impact of assessment of frontline demonstration on mustard crop. International Journal of Microbiology and Applied Sciences. 2018; 7:4737-4742.
3. Darekar A, Reddy AA. Oilseeds price forecasting: case of mustard in India. Agricultural Situation in India. 2018; 2:32-37.
4. Ghintala A, Singh B, Verma MK. Impact of front line demonstration on mustard productivity in Hanumangarh district of Rajasthan, India. International Journal of Current Microbiology and Applied Sciences. 2018; 7(9):1942-1946.

5. Kiresur, V.R., Ramanna Rao, S.V. and Hedge, D.M. 2001. Improved technologies in oilseeds production-An assessment of their economic potentials in India. Agric Econ Res Review 14: 95-108.
6. Kumar S, Atri C, Sangha MK, Banga SS. Screening of wild crucifers for resistance to mustard aphid, *Lipaphiserysimi*(Kaltenbach) and attempt at introgression of resistance gene(s) from *Brassica fruticulosa*to *Brassica juncea*. Euphytica. 2011; 179:461-470.
7. Manan Jatinder and Sharma M (2017). Yield realization of different *Brassica* cultivars under central plain zone of Punjab. *J KrishiVigyan*6(1) : 221-223.
8. Meena, H.S., Kumar, A., Ram, B., Singh, V.V., Singh, B.K., Meena, P.D. and Singh, D.2015. Combining ability and heterosis for seed yield and its components in Indian mustard (*B. juncea*). *J AgriSci Tech,* 17: 1861-1871.
9. Meena, H.S., Ram, B., Kumar, A., Singh, B.K., Meena, P.D., Singh, V.V. and Singh, D. 2014. Heterobeltiosis and standard heterosis for seed yield and important traits in *B.juncea*. *J Oilseed Brassica,* 5: 134-140.
10. Sharma AK, Kumar V, Jha SK, Sachan RC. Frontline demonstration on Indian mustard: An impact assessment. Indian Research Journal Extension Education. 2011; 11(3):25-31.
11. Sharma PK, Kashyap N. Estimation of losses in three different oil seed Brassica Crops in Himachal Pradesh (India). Journal of Entomological Research. 1998; 22:22-25.
12. 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.
13. Shivani and Kumar, S. 2002. Response of Indian mustard *(B.juncea)* to sowing date and row spacing in midhills of Sikkim under rainfed conditions. *Indian J. Agron*47: 405-410.
14. Singh CP, Sachan GC. Assessment of yield losses in yellow Sarson due to mustard aphid, *Lipaphiserysimi*(Kaltenbach). Journal of Oilseed Research. 1994; 11:179-184.
15. 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: 230-33.
16. 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. Indain Res J Ext Edu, 7: 79-81

17. Verma S, Verma DK, Giri SP, Vats AS. Yield gap analysis in mustard crop through front line demonstration in Faizabad district of Uttar Pradesh. Journal of Pharmacognosy and Phytochemistry. 2012; 1(3):79-83.
18. Verma SN, Singh OP. Estimation of avoidable losses to mustard by the aphid, *Lipaphiserysimi*in Madhya Pradesh. Indian Journal of Plant Protection. 1987; 15:87-89.
19. Vittal, K.P.R., Kerkhi, S.A., Chary, G.R., Sankar, G.R.M., Ramakrishna, Y.S., Srijaya. T. and Samra, J.S. 2005. Districtwise Promising Technologies for Rainfed Linseed based Production System in India. A Compendium by NARS, State Department (s) of Agriculture and AgroIndustries. All India Coordinated Research Project for Dryland Agriculture Central Research Institute for Dryland Agriculture Santoshnagar, Hyderabad -500 059.