International Journal of Statistics and Applied Mathematics 2023; SP-8(5): 587-590

ISSN: 2456-1452
Maths 2023; SP-8(5): 587-590

https://www.mathsjournal.com
Received: 02-07-2023
Accepted: 01-08-2023

Rajesh Chandra Verma
Krishi Vigyan Kendra (ANDUAT), Ankushpur Ghazipur, Uttar Pradesh, India

Jai Prakash Singh
Krishi Vigyan Kendra (ANDUAT), Ankushpur Ghazipur, Uttar Pradesh, India

Shashank Shekhar
Krishi Vigyan Kendra (ANDUAT), Ankushpur Ghazipur, Uttar Pradesh, India

Narendra Pratap
Krishi Vigyan Kendra (ANDUAT), Ankushpur Ghazipur, Uttar Pradesh, India

Avinash Kumar Rai
Krishi Vigyan Kendra (ANDUAT), Ankushpur Ghazipur, Uttar Pradesh, India

Shashank Singh and Nimit Singh
Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Corresponding Author:
Rajesh Chandra Verma
Krishi Vigyan Kendra (ANDUAT), Ankushpur Ghazipur, Uttar Pradesh, India

Increasing the productivity through cluster frontline demonstrations on mustard

Rajesh Chandra Verma, Jai Prakash Singh, Shashank Shekhar, Narendra Pratap, Avinash Kumar Rai, Shashank Singh and Nimit Singh

Abstract
The study was conducted by Krishi Vigyan Ghazipur district of Uttar Pradesh to find out the yield gaps between scientific package and practices under cluster front line demonstration (CFLD oilseeds) and farmer's practice (FP) of mustard crop. Cluster Front Line Demonstration on mustard were conducted on farmer's fields during *Rabi* season of two sequential years i.e. 2020-2021 and 2021-2022 under National Food Security Mission (NFSM), Govt. of India to demonstrate the impact of enriched agro-techniques on production and economic benefits under irrigated conditions. CFLD's were conducted in 12.0 ha and 21.2 ha area for two years with active involvement of 94 farmers and technical staff of Krishi Vigyan Kendra Ghazipur. According to observed data the highest grain yield was obtained in demonstrated plots with an average of 18.83 q/ha as compared to local check with an average of 15.69 q/ha. An average mean of extension gap, technology gap and technology index were calculated as 3.15 q/ha, 6.17q/ha, 24.68 percent, respectively. In Adoption of improved package of practices in mustard cultivation recorded average higher B:C ratio (5.97) as compared to Farmers Practice (5.43) during the period of study. Thus, the productivity of mustard could be increased with the adoption of recommended scientific package of practices. The study resulted in satisfying the farmers for maximum productivity and returns.

Keywords: Mustard, front line demonstration, technology gap, practices, yield, agriculture, production

Introduction
Mustard is an important *Rabi* oilseed crop of Ghazipur district of Uttar Pradesh. The productivity 1031 kg/ha of oilseed in the district is low as compared to National average (1203 Kg/ha) mainly due to poor crop management practices ultimately and inadequate availability of quality seed of improved mustard varieties and other inputs. Mustard is the second most important and most prominent *Rabi* season oilseed crops of India. It belongs to the group of cruciferae with several cousin species cultivated. In addition, mustard crop required 2-3 times less water (31-40 cm throughout the seasons) as compared to other cereal crops (Shekhar *et al*. 2017, 2019, 2020, 2021a, b, c, 2022, 2023; Shekhar 2022) [16, 12, 17, 18, 14, 10, 14].
The mustard crop of small brown or yellow seeds contains up to 45% of the de- oiled cake is used as animal feed. Giriraj & RH 749 is bold seeded variety crop duration 120-125 days depending on the environmental conditions. It is recommended for irrigated condition it contains 40-42% oil. Krishi Vigyan Kendra's are grass root level organizations meant for spreading of technology through refinement, assessment and demonstration of proven production technologies under different micro-farming situations. The main object of Krishi Vigyan Kendra is to minimize the time lag between generations of technology at the research and its transfer to the farmers for increasing productivity and income from agriculture and allied sectors. The main objective of Cluster Front Line Demonstration under National Food Security Mission was to demonstrate scientific crop production technologies of oilseeds on the farmers field and to popularize the newly notified improved varieties auto technologies for varietal diversification and efficient management of resources the present investigation was undertaken to study the impact of cluster frontline demonstration on yield enhancement of mustard (*Brassica juncea*) under irrigated condition in Ghazipur district of Uttar Pradesh with the objective of increasing productivity and executed to narrow down the time lag and insured speedy adoption of technologies in district.

Materials and Methods

Cluster Frontline Demonstrations (CFLDs) on improved farm technology (Table 1) were conducted by Krishi Vigyan Kendra Ghazipur of ANDUAT, Kumarganj, Ayodhya in mustard (Giriraj) during *Rabi* 2020-21 and *Rabi* 2021-22 under irrigated conditions on 33.2 ha area of Ghazipur district covering 94 farmers. The soil of CFLDs was Sandy loam to Sandy clay loam and the pH of soil is near about 6.18 to 7.11. the scientific technology such as improved varieties seed (Giriraj, RH-749) method of line sowing with seed treatment with thirum and bio control agents weed management and integrated pest management practices was maintained during period of study seed treatment was done with thiram 3 gm/kg seed trichoderma at @ 5 gm/kg and PSB @ 5 gm/kg of seed before sowing to protect the crop against fungal diseases up to 15 - 20 days after sowing the seed rate of mustard was kept 5 kg/ha in demonstrations plot the sowing of mustard was done during 25th October to 10th November during the study period the spacing between row to row and plant to plant was kept 30x20 for the Cluster Frontline Demonstrations. The fertilizers were also given in the ratio of 160:60:40:25 kg/ha as basal dose. The data were collected from beneficiary farmers through personal interviews and after that data was tabulated and analysed to find out the findings and conclusions. The yield increase in demonstrations over farmers practice was calculated by using following formula.

Estimation of technology gap, extension gap and technology index

Extension gap means adoption of improved transfer technology in demonstrations practices resulted in maximum grain yield than traditional farmer's practices. The estimation of technology gap, extension gap and the technology index were worked out by using following formula (Kadian *et al*., (1997) [6] Samui *et al*., 2000) [9].

Technology yield gap = Potential yield – Demonstration plot average yield (1)

Extension yield gap = Demonstration plot average yield- Farmer's plot average yield (2)

$$\text{Technology index} = \frac{Technology\ yield\ gap}{Potential\ Yield} \times 100 \quad (3)$$

Results and Discussion

The findings of the study as well as relevant discussed as:

Grain Yield

Data presented in Table 2 revealed that transfer of improved technology under Cluster Frontline Demonstrations in mustard resulted in higher yield as compared to farmer's practice. The maximum yield in demonstration plot was due to improved variety of seed, seed treatment with bio control agent, integrated pest management practices. The average seed yield of demonstration plots was 18.83 q/ha (Table 2) which was higher as compared to farmers practice 15.69 q/ha. The increased yield percentage over control was 20.55% in Cluster Frontline Demonstration over local check. The yield enhancement through adoption of improved technology has also been reported in earlier studies of FLD's (Kothyari *et al*. 2018 and Kumar *et al*. 2019 and Jamwal Anamika *et al*. 2020) [7, 8]. Yield of the Frontline Demonstration trials and potential yield of the crop was compared to estimate the yield gaps which were further classified into technology and extension gaps (Hiremath & Nagarju; 2009 and Jamwal Anamika *et al*. 2020) [5, 22].

3 Extension Yield gap

An average extension gap between demonstrated practices and farmers practices was recorded 3.15 q/ha (Table2). Higher extension gap in present study suggested that there is a need to motivate and aware the farmers for adoption of improved technologies in mustard over existing local farm practices. The similar results were also reported by (Bairwa *et al*. 2013 Gangadevi *et al*. 2018 Jamwal Anamika *et al*. 2020) [2, 23, 22]

Technology Yield gap and Technology Index

The technological gaps generally appear even if the CFLD'S were conducted under the strict direction of farm scientists on the farmers field the data presented in table 2 showed that the value of technological gap was 6.17 q/ha. Technology index specified the feasibility of the generated Technology at the farmer's fields under existing agro climatic conditions (Vedna *et al*. 2007) [12]. The results of table 2 revealed that value of technology index was 31.20% and 18.16% during 2020-2021 and 2021-22 respectively. Where as the average value of technology index was recorded 24.68%. Lower the value of the technology index more is the feasibility and applicability of the tested technology. This showed that a gap existed between technology involved and technology adopted at farmer's field. The similar results were also recorded by Gangadevi *et al*. 2018 [23], Chaudhari *et al*. 2019 [24] and Jamwal Anamika *et al*. 2020 [22].

Table 1: Technology demonstrated in CFLD's and Farmer's practices

S/No.	Intervention	Demonstrated Intervention	Farmers intervention
1	Field preparation	2 ploughings	Single plough
2	Seed sowing	Line sowing by seed drill & Nari	Broad casting
3	Seed Variety	Arpan	Local Lotini Rai
4	Seed treatment	Thirum @ 2,5 gm/kg seed, PSB & Trichoderma @ 5gm/kg seed	Not treated
5	Seed rate	5 kg/ha	10-15 kg/ha
6	Manures and fertilizers	PSB 500 ml, Rhizobium 500 gm with 100kg vermicompost and sulphor 100:60:40:25	Nil
7	Weed management	Pendimethaline @ 2,5-3.5 lit/ha	No pre emergence used
8	IPM measures	spray of Neem oil and pheromone traps, yellow sticky traps	Imbalance use of pesticides
9	Technical guidance	Time to time	Nil

Table 2: Year wise productivity, extension gap, technology gap and technology index of mustard under Demonstration and farmer's practices.

Year	Yield q/ha		Increase yield % over Control	Extension gap (q/ha)	Technology gap (q/ha)	Technology Index %
	Demo	Farmer's Practice				
2020-21	17.20	13.80	24.64	3.40	7.80	31.20
2021-22	20.46	17.57	16.45	2.89	4.54	18.16
Mean	18.83	15.69	20.55	3.15	6.17	24.68

Table 3: Cost of cultivation, Gross return and B:C ratio of mustard under Demonstration and farmer's practices.

Year	Cost of Cultivation (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		B:C Ratio	
	Demo	Farmer's Practice	Demo	Farmer's Practice	Demo	Farmer's Practice	Demo	Farmer's Practice
2020-21	18650	16495	103200	82800	84550	70305	5.53	5.01
2021-22	19110	18015	122760	105420	103650	91305	6.42	5.85
Mean	18880	17255	112980	94110	94100	80805	5.97	5.43

Economic analysis of Cluster Front Line Demonstrations

Average cultivation cost of demonstration plot (Rs 18880/ha) is more as compared to Farmer's practice (Rs 17255/ha). The data in table 3 clearly clarified the implication of Cluster Frontline Demonstration at Farmer's field during the period of investigation in which higher average net return rupees 94100 were acquired under Demonstration plots as compared to farmer's practice (Rs 80805 /ha). Benefit cost ratio recorded was also higher in demonstration plots (5.97) as compared to farmer's practice (5.43) increased monetary returns as well as Benefit cost (B:C) ratio through improved farm technology have also been reported by various scientists (Vedna *et al*. 2007, Bairwa *et al*. 2013 and Jamwal Anamika *et al*. 2020) [21, 2, 22].

Conclusion

This study indicated that the incorporation of scientific farm technology practices along with active participation of farmer's of the area has positive effect on increasing the yield and economic return of mustard in Mandla district the economic viability of suitable technology for increasing the productivity of mustard motivated the farmers towards adoption of technologies demonstrated at farmer's field.

References

1. Anonymous. Agricultural statistics at a glance. DAC Government of India; c2016. p. 118.
2. Bairwa RK, Verma SR, Chayal K, Meena NL. Popularization of Improved Blackgram Production production through Front line demonstration in humid southern plain of Rajasthan, Indian Journal of Extension Education and R.D. 2013;21:98-101.
3. Bhati R, Sharma RC. Efficacy of newer chemicals against mustard aphid. Biolife. 2014;2:1165-1169.
4. Devi Ganga M, Kumar CH, Anil, Kumar Yugandhar M. Performance Evaluation of Cluster Front Line Demonstration in Blackgram. India Int. J Curr. Microbial App. Sci. 2018;7(8):4349-4354.
5. Hiremath SM. Evaluation of front line demonstration trials on onion in Haveri District of Karnatka, Karnatka J Agric Sci. 2009;22(5):1092-1093
6. Kadian KS, Sharma R, Sharma AK. Evaluation of frontline demonstration on oilseeds in Kangra valley of Himachal Pradesh, Annals of Agric. Res. 1997;18(1):40-43.
7. Singh K, Hukam, Meena KC, Meena BL, Ram A. Evaluation of Cluster Front Line Demonstration on Black gram in Sawai Madhopur District of Rajasthan, India. Int. J Curr. Microbial App. Sci. 2018;7(1):1569- 1573.
8. Kumar S, Mahajan V, Sharma KP, Suraj P. Impact of front-line demonstrations on the production and productivity of moong (*Vigna radiata* L.) mash (*Vigna mungo* L.) rajmash (*Phaseolus vulgaris*), Lentil (*Lens culnaris* L) and Chickpea (*Cicer aeritinum* L) under rainfed ecology in mid hills of J & K, India. Leg. Res. 2019;42(1):127-133.
9. Samui SK, Maitra S, Roy DK, Mondal AK, Saha D. Evaluation of font line Demonstration on groundnut (*Arachis hypogea* L.) in Sundarbans, Journal of Indian Society of Coastal Agriculture Resources. 2000;18(2):180-183.
10. Shekhar S. Water and Nutrient Management in Rice under Alternate Wetting and Drying Irrigation Practice: Field and Modeling Studies. Doctoral dissertation, IIT Kharagpur; c2022. http://www.idr.iitkgp.ac.in/jspui/bitstream/123456789/12050/1/NB17320_Abstract.pdf. Accessed 10 August 2023
11. Shekhar S, Dubey A, Pohshna C. Estimation of irrigation scheduling for different cropping pattern at different growth stage of crop by using the CROPWAT model. International Journal of Current Microbiology and Applied S1ciences. 2018;7(8):3855-3862.
12. Shekhar S, Mailapalli DR, Raghuwanshi NS. Potassium transport through paddy soils under alternate wetting and drying irrigation practice. AGUFM, San Francisco, USA, GC51N–1161; c2019.
13. Shekhar S, Mailapalli DR, Raghuwanshi NS. Simulating nitrogen transport in paddy crop irrigated with alternate wetting and drying practice. Paddy and Water Environment. 2021b;19:499-513.
14. Shekhar S, Mailapalli DR, Raghuwanshi NS. Effect of alternate wetting and drying irrigation practice on rice crop growth and yield: A Lysimeter Study. ACS Agricultural Science & Technology. 2022;2(5):919-931.
15. Shekhar S, Mailapalli DR, Das BS, Mishra A, Raghuwanshi NS. Hydrus-1D for Simulating potassium transport in flooded paddy soils. Communications in Soil Science and Plant Analysis. 2021;52(22):1-18.
16. Shekhar S, Mailapalli DR, Das BS, Raghuwanshi NS. Modelling water flow through paddy soils under alternate wetting and drying irrigation practice. AGUFM, New Orleans, Louisiana, USA; c2017. p. H43Q-07.
17. Shekhar S, Mailapalli DR, Raghuwanshi NS, Das BS. Hydrus-1D model for simulating water flow through paddy soils under alternate wetting and drying irrigation practice. Paddy and Water Environment. 2020;18:73-85.
18. Shekhar S, Tamilarasan R, Mailapalli DR, Raghuwanshi NS. Estimation of evapotranspiration for paddy under alternate wetting and drying irrigation practice. Irrigation and Drainage. 2021a;70(2):195-206.
19. Singh AK, Kinjulck C, Singh YP, Singh, Singh DK. Impact of Frontline Demonstration on Adoption of Improved Practices of Oilseed Crops. Indian Research Journal of Extension Education. 2014;14(3):75-77.
20. Singh D, Kumar C, Chaudhary MK, Meena ML. Popularization of Improved Mustard (*Brassica juncea* L.) production technology through frontline demonstrations in Pali district of Rajasthan, Indian Journal of Extension Education. 2018;54(3):115-118.
21. Vedna Kumari, Kumar A, Bhateria S. Demonstration an effective tool for increasing productivity of repeseed-mustard in Kangra district of Himachal Pradesh. J Oilseeds Res. 2007;33(2):257-261.
22. Jamwal A, Mahajan V, Ajrawat B, Kumar A, Sharma VK. Impact of cluster frontline demonstrations (CFLD) on yield of black gram (*Vigna mungo*) under rainfed

conditions in Kathua district of Jammu and Kashmir. IJCS. 2020;8(4):3314-6.
23. Gangadevi R, Vinayagam BK, Senthilraja S. Effects of sonication time and temperature on thermal conductivity of CuO/water and Al2O3/water nano fluids with and without surfactant. Materials Today: Proceedings. 2018 Jan 1;5(2):9004-11.
24. Chaudhari P, Choromanska A, Soatto S, LeCun Y, Baldassi C, Borgs C, *et al*. Entropy-sgd: Biasing gradient descent into wide valleys. Journal of Statistical Mechanics: Theory and Experiment. 2019 Dec 20;2019(12):124018.