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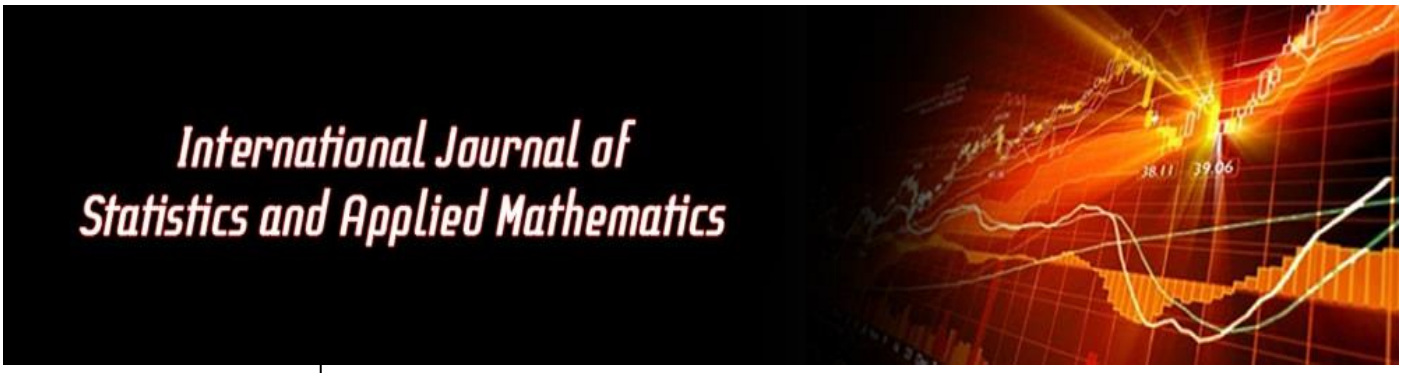

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Effect of frontline cluster exhibitions on mustard (*Brassica juncea*) yield and income in the Ratlam District of Madhya Pradesh

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Abstract
The objective of the study, carried out by the Krishi Vigyan Ratlam in Madhya Pradesh, India, was to determine the yield variances among scientific packages and adherents used in the farmer's practise (FP) of mustard plants and the group of front-line demonstration (CFLD) oilseeds. Frontline Corps On farmer's fields throughout the Rabi season of two consecutive years, notably 2021-22 and 2022-23, demonstrations on mustard took place to show the impact of enhanced agro-techniques on results and financial benefits. A 40.46-hectare region received CFLDs for two years with the full involvement of 100 farmers. Compared to the local check, where it averaged 16.51 q/ha, the highest possible yield of grains was apparent in the plots shown, where it averaged 19.92 q/ha. The mean gap between the extension and technology gaps The growing gap and technology index have been calculated as 5.37 q/ha and 3.36 q/ha, respectively, and to be 21.28 percent. The median gross and net profitability of worth were 104317 Rs/ha and 85466 Rs/ha, respectively, in comparison with other farmers' follows (86667 Rs/ha and 68479 Rs/ha). Compared to farmers' practises (3.76), mustard cultivation all over the study period using a better package of practises had an average higher B:C ratio (4.52). Thus, mustard results might be raised by adopting the recommended scientific collection of practises in reality. The findings of the research met farmers' expectations for most produce and profits.

Keywords: CFLD, yield, mustard, technology gap, after soybean and palm oil, mustard

Introduction
After soybean and palm oil, mustard (*Brassica juncea*) is the third-most important class of oilseed crops in the world (28.6), (Singh *et al.*, 2020) [14]. In India, mustard was sown on 6.69 M ha, producing 10.11 MT and produced 1511 kg ha-1 on average. India's initial states to grow mustard are Rajasthan, Madhya Pradesh, Uttar Pradesh, Haryana, West Bengal, Jharkhand, Assam, Gujarat, Maharashtra, Karnataka, and Andhra Pradesh. The biggest portion of the oilseed crop in Northern Madhya Pradesh is grown in the parts of Tikamgarh, Satna, Ratlam, Morena, Bhind, Gwalior, Sheopur, and Datia, accounting for more than 80% of the state's output. An anonymous source claims the the mustard field in Madhya Pradesh delivered 1.31 MT of results per ha at a productivity of 1713 kg. For their oil painting and protein conflation, oilseed crops keep added sculpture, which is demonstrated by major improvements in the output and its quality (Chauhan *et al.*, 2002) [2]. The usage of high seed rates, moderate factory protection measures, small and borderline holdings, and inadequate relinquishment of improved package of practices are some of the main causes of the quarter's decline in mustard yield potential. The Department of Husbandry, Cooperation, and Farmer Welfare has approved the design of "Cluster frontline demonstrations on oilseeds" at ICAR-ATARI, Jabalpur, as part of the National Food Security Mission, a project supported by the Government of India and carried out through KVKs for the welfare of farmers. Through giving better seeds, Integrated Nutrient Management, sculpture, storage diseases, weed control, Integrated Pest Disease Management, extension conditioning like training, and media campaigns, the programmer is to enhance the level of life in the village (Singh *et al.*, 2019) [13].

KVK's main objective is to reduce the time between technology development and its introduction to growers, with the objective of steadily boosting productivity and income from the husbandry and agricultural industries. CFLDs are a long term educational effort carried out prudently at producers' fields to show the benefits of a new technology (Rana *et al.*, 2017) [10]. With the goal of raising the output of mustard in the district, efforts have been made through CFLDs to carry out a novel package of mustard procedures.

Materials and Method

The present CFLD study was carried out by KVK Ratlam all over the Rabi seasons of 2021-2022 and 2022-2023 under similar circumstances. The cluster process is being promoted using FLDs to demonstrate the tangible impact of technological advances over an expanded area, that will help an array of producers expand scared of the technology and be able to borrow it over time. Results in terms of productivity and profitability per unit area achieved by the farmers are provided in this report. A comprehensive inquiry was carried out to collect knowledge sequentially from preferred growers so they could possibly get improved implementation packages. The constraints that farmers of mustard plants had to contend with were divided based on the way those in privileged positions achieved. The immoralities experienced by the growers served as a basis for the cluster frontline demonstrations. The manufacturing data for each demonstration was carefully recorded, and the farmers' yields of crops were also noted at the same time. Data on the growth of the crop, yield characteristics, and yield values were gathered at the crop and statistically analysed. According to the net return and cost of civilization for each treatment, the BC rate was determined. Using the technique suggested by Samui *et al.* (2000), the extension gap (q/ha), technology gap (q/ha), and technology index (%) have been computed.

Extension gap (q/ha) = DY (q/ha)-LY (q/ha)

Technology gap (q/ha) = PY (q/ha)-DY (q/ha)

$$\text{Technology index (\%)} = \frac{\text{Technology gap (q/ha)}}{\text{PY (q/ha)}} \times 100$$

Where is DY=Demonstration Yield, LY=Original check yield, PY = Implicit yield of Variety

Ratlam region of Madhya Pradesh provided assurance of the information. The climate of the region is tropical, with arid winters and summers. The monthly temperature in the quarter was28.68ºC (83.62 ºF), which is 2.71% more than India's average. For this assignment, a total of 100 producers have been chosen in a 40.46 ha geographical area and divided into four different clusters (25 growers in 2021-2022, and 75 growers in 2022-23).Through on- and off lot training, system disclosure, distribution of circulars, grouping and kishan gosthi, growers scientist dispatches, and every piece of grounded input provided to the growers, the growers were trained to follow the set up and exercise for methodical civilization of soybean (Table 1).

The original check or the farmers' practices of mustard have been considered to be its traditional civilization with its own varieties. Data from the CFLD and grower exercises was analysed to find out the impact of the cluster frontline demonstrations.

Results and Discussion

The data presented in Table 2 is a summary of the results. Indicated that the mustard yield changed significantly over time in the demonstration plot. The greatest mean yield (20.01 q/ha) and smallest average yield (19.74 q/ha) were measured in the years 2021-2022 and 2022-2023, respectively. The mean yield throughout the two seasons was 19.92 q/ha, this was a greater amount than the growers' practice of 16.51 q/ha during cluster frontline unrest. According to the two studies, the percent increase over growers' practices varied from 19.82 to 20.88%, and on average, demonstrations with improved technological practices resulted in 20% greater yield advantages than growers' usual methods of mustard civilization.

Mitra and Samajdar (2010) [9] and Katare *et al.* (2011) [7] showed the same results from yield improvements in mustard crops in frontal line demonstrations. Research results revealed that since the livestock husbandry community of this quarter was encouraged by the increased technology for agriculture used in the front line demonstrations, the cluster front line demonstrations had a beneficial effect on it.

Technology gap (q/ha): An analysis of the data presented in Table 2 shows that the technological gap enhanced to 5.51 q/ha to till per hectare during the period from 2021 2022, 5.24 per ha during 2022 2023, and 5.37 q/ha set up on average in that period of time. If the CFLDs were spread out in the grower's field and closely monitored by ranch scientists, the data would demonstrate the same pattern. The decimal variation in soil in the state not having infrastructure for irrigation, unpredictable rainfall, reports of insect attacks, and frequent changing of demonstration plot positions may all be attributed to the observed technological advancement gap. Based on a technology indicator, the created technology could potentially be used in planters' fields using present-day agro climatic conditions.

Extension Yield gap (q/ha): The average extension gap between the farmers' practices and those that were actually shown was 3.36 q/ha (Table 2). The advanced extension gap in the present research showed that there is a need to intimidate and persuade mustard makers to pass up technological advances in favor of conventional ranch procedures. This disparity may be associated with the abandonment of advances in demonstrations that led to greater yields of grains than the usual cultivation method.

This worrisome trend of female bounding extension gap will ultimately move if we utilize earlier product technologies that are more resulting in varieties. The arrival of new technologies will ultimately require producers to give up their current approaches and accept fresh ones. Ganga Devi *et al.* (2018) [4] noticed similar outcomes.

Technology Index (%): Based on the data presented in Table 2, the technology index has values of 20.75 in 2021-2022 and 21.82 in 2022 2023, where the average value was 21.28. This variation shows how crop infestations by non-entities, the amount of rainfall, the fertility of the soil, and the availability of irrigation water all determine what happens. The advanced technology indexes included a lack of accepted, proven technology for farmers to apply, along with appropriate extension services for technology transfer. The technology index measures how modern technology can be utilised in the agricultural sector, and the more practical a technology is, the lower its rating. The findings were in agreement with Mitra and Samajdar's (2010) [9] and Jeengar *et al.* (2006) [6] findings Table 3. The outcomes showed that the cost of the product and the price of the required mustard seed closely correlated

with the financial returns across the duration of the demonstrations. Cluster frontline demonstrations recorded total advanced gross returns of Rs. 107583 per ha and net income of Rs. 88670 per ha, with the greatest fresh return of Rs. 17926 per ha and the greatest advanced benefit cost rates of Rs. 4.68 in comparison with the original checks. The findings are summarized in the profitable analysis of the mustard product.

Table 1: Shows the adoption by farmers of a number of scientific follows for mustard under CFLD

S. No.	Technology	Improved practice	Farmers practice
1.	Field preparation	Two plowings are taking place in a field.	single plough
2.	Seed Variety	RH-725	Local/Old variety
3.	Seed sowing	Plant lines can be created with a seed drill.	Broad casting
4.	Spacing	45x10 cm (RxP)	Broad casting
5.	Seed treatment	Carbendazim+mancozeb @ 2.5 gm/kg seed	Without treatment
6.	Seed rate	5 kg/ha	10-12 kg/ha
7.	Manures and fertilizers	Apply 15-20 tonnes of FYM or compost and N:P:K:S; 80:60:40:25	Nil/ Imbalance use of fertilizers
8.	Weed management	Pendimethaline @2.5-3.5 lit/ha	No pre-emergence was used in this experiment.
9.	IPM measures	Neem oil and pheromone traps can be used to attract birds.	The most important idea is to balance the use of pesticides.
10.	Technical Direction	Time to time	Nil

Table 2: Gap analysis and cluster frontline demonstration's effect on mustard yields at farmers' fields

Year	No. of demo.	Area (ha)	Variety	Potential yield (kg ha$^{-1)}$	Yield performance (q/ha)		% Increase	Technology gap (q/ha)	Extension gap (q/ha)	Technology Index (%)
					DP	FP				
2021-22	25	10.11	RH-725	2525	20.01	16.70	19.82	5.24	3.31	20.75
2022-23	75	30.35	RH-725	2525	19.74	16.33	20.88	5.51	3.41	21.82
Total/Average	100	40.46		2525	19.92	16.51	20.35	5.37	3.36	21.28

Table 3: Mustard cultivation expenses, ROI, net profit, and for B:C ratio are presented by the farmer and the model

Year	Cost of cultivation (Rs ha^{-1})		Gross return (Rs ha^{-1})		Net return (Rs ha^{-1})		Additional return (Rs ha^{-1})	B: C Ratio	
	DP	FP	DP	FP	DP	FP		DP	FP
2021-22	18789	18121	101051	84335	82262	66214	16048	4.37	3.65
2022-23	18913	18254	107583	88998	88670	70744	17926	4.68	3.87
Average	18851	18187	104317	86667	85466	68479	16987	4.52	3.76

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