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Cluster frontline demonstration for enhancing the productivity of sesame at Chirang district of Assam

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Abstract
The present study was carried out at different villages of Chirang district of Assam where cluster front line demonstration (CFLD) of high yielding variety (HYV) of sesame (ST-1683) was conducted by Krishi Vigyan Kendra, Chirang, Assam during kharif 2020-21 to 2022-23 in 60 ha area covering 161 farmers to evaluate the impact of CFLD on productivity and profitability of sesame. Yield data of both demonstration and farmers practice were recorded and their yield gap, technology gap, extension gap and technology index were analyzed. The yield of sesame was registered 12.33 to 37.88 percent higher over farmer's variety. However, the yield and B:C ratio was recorded maximum in CFLD plots than the farmer's practices. On an average the technology gap, extension gap and technology index were recorded as 1.21 qha^{-1}, 2.63 qha^{-1} and 29.26 percent respectively.

Keywords: Yield gap, technology gap, extension gap, technology index, frontline demonstration

Introduction
Sesame is one of the important oilseed crop grown extensively in almost all district of Assam. The crop has the highest oil content (46-64%) and seeds are a good source of food, nutrition, edible oil, and bio-medicine due to the presence of beneficial antioxidants. India leads the globe with a sown area of 51.66 thousand ha and a production of 17.64 thousand tons. It is a versatile crop, and the average production of sesame (413 kg/ha) in India is low as compare to other countries (535 kg/ha).
Biotic stresses, rainfall uncertainty, and low soil fertility levels are important reasons for low production of sesame in Assam. Majority of farmers of Assam are unaware of new and high yielding varieties and they generally don't follow the improved production technology which ultimately reduces the production. Under the National Food Security Mission, the Government of India has designed a program to promote cluster oilseed cultivation through KVKs to meet the oilseeds demand. The primary goal of CFLD is to showcase production technology and management strategies on farmer fields in a variety of farming conditions. In this regard KVK, AAU, Chirang has conducted CFLD programme on sesame using high yielding variety ST-83. The objective of this study is to increase the general availability of oilseed and spread knowledge about improved production techniques among the sesame farmers of the district.

Methodology
The study was carried out by Krishi Vigyan Kendra (KVK), Chirang, Assam using sesame variety ST 1683 in different villages during Kharif from 2020-21 to 2022–23. A total area of 60 ha covering 161 farmers were selected for the study. The treatments were selected following the recommended practice of packages. The farmer's method was used as a control plot or local check (Table 1). For demonstration plots, farmers were supplied essential inputs and technical assistance by the KVK Scientist. The data were collected from both CFLD plots and farmers' practice plots and their technological gap, the extension gap and the technology index were calculated by using the specified formula as stated below

a) Technology gap = Potential yield – Demonstration yield
b) Extension gap = Demonstration yield – Farmer's yield

$$\text{c) Technology index} = \frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}}$$

Table 1: Details about the package and practices for cultivation of Sesame

Sl. No	Cultural practices	Farmer's practice	CFLD employed improved cultivation practices
1.	Variety	Local	ST-1683
2.	Seed rate	6 kg/ha	4 kg/ha
3.	Seed treatment	Nil	Seed treated with commercial formulation of *Trichoderma* spp. @ 5 g/kg of seed for control of stem rot and phytophthora blight
4.	Sowing time	Last week of Aug to 10th of Sept	15th July to 10th Aug
5.	Method of sowing	Broadcasting	Line sowing (Spacing 30 cm × 15 cm)
6.	Nutrient management	FYM and lower rate of NPK	30:20:20 NPK kg/ha along with compost @ 10 t/ha
7.	Weed management	Nil	One weeding at 20 days after sowing
8.	Plant protection measures	Nil	Spray of flubendiamide 39.35% m/m SC @ 300 g a.i./ha for control of leaf hopper

Table 2: Production, technology gap, extension gap, technology index and benefit cost ratio of sesame grown under CFLD and existing farmer's package of practices

Year	Potential yield q/ha)	Demonstration yield (q/ha)	Local check yield (q/ha)	No. of demonstration	B:C ratio		% increased over control	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
					Demonstration	Farmer's practice				
2020-21	9	6.2	5.08	75	2.73	1.98	37.88	1.12	2.8	31.11
2021-22	9	6.5	5	32	3.27	2.71	20.66	1.50	2.5	27.78
2022-23	9	6.4	5.4	47	3.28	2.92	12.33	1.00	2.6	28.89
Average	9	6.4	5.2	-	3.1	2.54	23.62	1.21	2.63	29.26

Results and Discussion

The results of all demonstrations conducted at farmers' fields of Chirang district throughout the kharif season of 2020-21 to 2022-23 has been given in Tables 2. The technological interventions of CFLDs during the three years of demonstrations were found to have a beneficial impact on the production of sesame over FP. The average seed yield of sesame under CFLDs ranged from 6.2 to 6.4 q ha^{-1} as compared to 5.0 to 5.4 q ha^{-1} in case of FP which was 12.33 to 37.88 percent higher over the FP during 2020-21 to 2022-23. The use of improved variety, a proper seed rate, nutrient inputs and weed control may be responsible for the increase in grain production of sesame under CFLDs over FP. Similar yield enhancement in different crops in cluster frontline demonstrations were reported by Kumar *et al*., (2010) [4] in bajra; Kumar *et al*., (2020) [4] in sesame; Deka *et al*., (2021) [2] in rapeseed and Jakhar and Kumar (2022) [3] in green gram. During the three years of the investigation, an average extension gap and technological gap was recorded as 1.21 qha^{-1} of 2.63 qha^{-1} respectively. Likewise, the technology index varied from 27.78 to 31.11 percent during 2020-21 to 2022-23. The technology index indicates whether a particular variety or technology is feasible for use in a farmer's field. The viability of a certain technology is increased by a decrease in the technology index value (Table 2). Similar results were also observed by Bamboriya and Singh (2020) [1]. However, higher benefit-cost ratio was observed in CFLD plots compare to the farmer's practice plot (Table 2). Hence, higher benefit cost ratios proved the economic viability of the cultivation practices and convinced the farmers to adopt the cultivation practices of new variety of rapeseed (Deka *et al*., 2021 and Kumar *et al*., 2022) [2, 6].

Conclusion

The present study concludes that adopting improved sesame production technology can narrow the technological gap to a significant level, increasing sesame productivity in the Chirang district of Assam. In order to close the gap between farmer practices and demonstrations for increased sesame production in the Chirang district, Krishi Vigyan Kendra, Chirang also offers appropriate technical help through various extension and educational methods. Implementing different extension activities, such as training programs, field days, method demonstrations, etc., under CFLD programs in farmer's fields, can also help to achieve the horizontal expansion of improved sesame production technology. In addition, Krishi Vigyan Kendra should encourage the locals to adopt improved varieties and production techniques to narrow the extension gap.

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