J Krishi Vigyan 2022, 11 (1) : 270-275 DOI : 10.5958/2349-4433.2022.00131.3

Productivity and Profitability of Sesame (*Sesamum indicum* L.) in Western Rajasthan

Rakesh Choudhary#, Mamta Nehra and Seema Yadav

ARS-Mandor, Agriculture University, Jodhpur-342 304 (Rajasthan)

ABSTRACT

This investigation is an attempt to study the impact of improved practices through frontline demonstrations on productivity and profitability of sesame. The major constraint of its low productivity is non-adoption of improved technologies by the farmers. An increase in productivity was observed due to adoption of interventions like genetically improved variety, balance nutrient management, seed treatment, sowing method and plant protection measures. The impact of improved practices through frontline demonstration revealed that cultivation of improved variety of sesame (RT 351) recorded increased yield of 16.0, 18.8 and 18.9per cent during *kharif* 2018, 2019 and 2020, respectively over farmer's practices. Improved practices gave higher net returns ₹11265/-ha with additional net return average ₹ 4173/-ha as compared to farmer practices. The technology gap, which depicted the gap in the demonstration yield over potential yield was 290, 279 and 178 kg/ha during *kharif* 2018, 2019 and 2020, respectively. Technology index was ranged 41.44 – 25.43 per cent and average figure comes out to be 35.59 per cent. The FLD practices created greater awareness and motivated other farmers to adopt appropriate sesame production technologies.

Key Words: Farmer, Extension gap, Front line demonstration, Improved practices, Sesame, Yield, Technology gap.

INTRODUCTION

Sesame (*Sesamum indicum* L.) is the oldest indigenous oilseed crops in Indian agriculture. India is the major producer of sesame (*Sesamum indicum* L.) and ranks first in both area (1.78 M ha) and production (0.81 Mt). The average yield of sesame (463 kg/ ha) in India is low as compared with other countries in the world (535 kg/ha). Higher nutritional, medicinal value and cooking quality has recognized it as the queen of oilseeds. Rajasthan produces 0.09 million tonnes sesame seeds annually with an average productivity of 328 kg/ha (Anonymous, 2019). In general, average productivity of sesame continues to be lower than expected from agricultural technology for last 40 yr, there is a decline in productivity in sesame due to its cultivation in marginal and sub-marginal lands and also use of traditional crop management practice. However, Kumar *et al* (2017) mentioned that the major constraints responsible for lower yield are adoption of inappropriate production technologies by farmers *viz.,* broadcast method of sowing, imbalance use of fertilizer and untimely application, lack of awareness regarding plant protection measures and poor weed management.

The improved practices packages were also found to be financially attractive. Yet, adoption levels for several components of the improved technology were low, emphasizing the need for better dissemination (Kiresur *et al*, 2001). The extent of adoption of improved production technologies are a crucial aspect under innovation diffusion process and the most important for enhancing agricultural production at a faster rate.

Corresponding Author's Email address: rakeshnitharwal9@gmail.com

Table 1. Existing farmer's practices and improved practices demonstrated through frontline demonstration at farmer's field in Jalore district of Rajasthan.

Sr. No.	Technological intervention	Farmer's practice	Improved practice
1	Variety	Local variety	RT 351
2	Seed rate	3-4 kg ha^{-1}	2-3 kg ha^{-1}
3	Seed treatment	Not done	Carbendazim @ 2 gm kg^{-1} seed
4	Nutrient management	Imbalance use of fertilizers	Balance use of fertilizers (40:25:0 Kg NPK as per package of practices)
5	Sowing method	Broad casting	Line sowing
6	Time of sowing	July	First week of July
7	Weed management	Not done	Hand weeding at 25-30 DAS
8	Insect and pest management	Injudicious use of pesticides	Judicious use of pesticides (as per recommendations of package of practices)
9	Disease management	Not done	As per recommendations of package of practices
10	Harvesting and post harvesting	Traditional method	As per recommendations of package of practices

Figure 1: Distributed critical inputs of improved technologies for FLDs

Figure 2: Scientist interacted with farmers at sesame field

The yield of sesame can be increased substantially with adoption of improved practices such as improved variety, integrated nutrient management, seed treatment, sowing method and plant protection measure. The population of Jalore district dependent primarily on agriculture and allied activities. Bajra and mungbean are major crops grown in this area. With the start of technology mission on oilseeds, frontline demonstration on sesame using improved crop production technology was started with the objectives of showing the productive potentials of the improved production technologies through demonstrate the crop production technologies and management practices at the farmers' field under real farm situation over the locally cultivated sesame crop.

MATERIALS AND METHODS

The study was carried out in the Jalore district located in South Western Rajasthan state. Cluster frontline demonstrations on oilseed crop sesame were conducted consecutive three years in *kharif* season

Table 2. Effect of improved practices on yield attributing traits of sesame

Year	No. of capsules/plant		IP % increase over FP	No. of seed/capsule		IP % increase over FP
	IP*	FP*		IP	FP	
2018	64.0	48.0	33.3	68.0	57.5	18.3
2019	67.0	50.0	34.0	72.0	59.0	22.0
2020	74.0	57.0	29.8	75.4	62.0	21.6
Average	68.3	51.7	32.4	71.8	59.5	20.6

*IP= Improved practices; FP= Framer practices

of 2018 to 2020. A total of 30 ha area was covered under CFLDs on sesame under rainfed conditions in 4 villages on 75 farmers' fields during all the years under study. Each demonstration was conducted on an area of 0.4 ha, and 0.1 ha area adjacent to the demonstration plot was kept as farmers' practice. The package of improved practices like improved variety, nutrient management, seed treatment, sowing method and plant protection measures were used in the demonstrations. The variety of sesame RT 351 was included in demonstrations. In frontline demonstrations, whole package of practice was adopted whereas in the farmers' practice, existing practices being used by the farmers of the area was followed (Table 1). Some important pictures of farmers' field which showed over all view of crop expression in frontline demonstrations (Figure 1 and 2).

In this approach, all the improved practices demonstrated at farmers' field, such as quality seed, fertilizer, weed, insects and disease management were according to recommended package of practices. The crop was harvested at maturity stage with suitable method. To accomplish the integrated approach of demonstrations, Agriculture University, Jodhpur scientists of Agricultural Research Station, Mandor conducted various monitoring visits on farmer fields. In addition to this, these visits were helpful in providing valuable feedback from different farmers that can be utilized for further improvement in research and extension programme. Other extension activities including training programmes, group meetings and field days were also organized at demonstration sites to create awareness among farming community of neighbouring areas about the advantages of demonstrated technologies. To estimate the technology and extension gap and the technology index the formulae used (Samui *et al*, 2000).

RESULTS AND DISCUSSION

Effect of improved practices on yield attributing traits

The number of capsules per plant with improved practices were 64.0, 67.0 and 74.0 as compare farmer's practices 48.0, 50.0 and 57.0 during the year 2018, 2019 and 2020, respectively (Table 2). There were 33.3, 34.0 and 32.4per cent higher capsules during three years (2018, 2019 and 2020, respectively) with demonstration of improved practices over farmer's practices. The average number of capsules per plant was 68.3 with improved practices and 51.7 under farmer's practices, thus there were 32.4 per cent more capsules per plant under improved practices. The average number of seeds per capsule in improved practice was 71.8 as compared to 59.5 in farmers' practice. The number of seeds per capsule under improved practices and farmers practice were 68.0, 72.0 and 75.4 and 57.5, 59.0 and 72.0 during the year 2018, 2019 and 2020, respectively. The percentages increased in seeds per capsule during the three years were 18.3, 22.0 and 21.6, respectively with an average of 20.6per cent seeds per capsule. Higher weed infestation under farmers' practices as evident from the higher weed cover and reduced supply of nutrients and water

Table 3. Seed yield of sesame as affected by improved and farmer practices at farmer fields

Year	Yield (kg ha^{-1})		Additional yield (kg/ha) over farmer practices	Per cent increase in yield over farmer practices
	IP*	FP*		
2018	410	353	57	16.0
2019	421	354	67	18.8
2020	522	428	94	21.9
Average	451	379	72	18.9

*IP= Improved practices; FP= Framer practices

under farmers' practice led to lower yield due to less capsule as compared improved practices. Adoption of improved practices increased sesame yield attributing traits as compared to farmer practices. The *yield attributing traits* have also been reported in sesame crop by Meena *et al* (2018) and Kumar *et al* (2014).

Effect of improved practices on seed yield

The seed yield of sesame was 410, 421 and 522 kg/ha with improved practices as compared farmer practices 353, 354 and 428 kg/ha during 2018, 2019 and 2020, respectively (Table 3) and the average seed yield was 451 kg/ha with improved practices over 379 kg/ha. The additional yield under improved technologies over farmers' practice ranged from 57 to 94 kg/ ha with a mean of 72 kg/ha. in comparison to farmer practices, there was an increase of 16.0, 18.8 and 18.9per cent in productivity of sesame under improved practices in 2018, 2019 and 2020, respectively. The increased seed yield with improved practices was mainly because of line sowing, improved variety, use of nutrient management, weed management and use of plant protection measures. Singh *et al* (2018) also reported higher productivity in improved practices as compared to farmer practices. Similar results have been reported by Raikwar and Srivastva (2013).

Effect of improved practices on economics

The economic viability of improved practices over farmer practices was calculated depending on prevailing prices of inputs and output costs (Table 4). It was found that, cost of cultivation of sesame under improved practices was ₹ 18296 ha^{-1} as compared with farmer practices ₹ 17707/-ha during three years. The improved practices registered an additional cost of cultivation between ₹ 276 to 767/- ha over farmer practices. The additional cost

Table 4. Cost of cultivation, net return and benefit cost ratio of sesame as affected by improved and farmers practices

Year	Cost of cultivation (₹/ha)		Net returns (₹/ ha),		Additional cost of cultivation (₹/ ha)	Additional net return (₹/ha)	BC ratio	
	IP*	FP*	IP*	FP*			IP*	FP*
2018	18267	17500	7353	4583	767	2770	1.40	1.26
2019	18784	18060	8492	4897	724	3595	1.45	1.27
2020	17836	17560	17950	11796	276	6154	2.00	1.67
Average	18296	17707	11265	7092	589	4173	1.62	1.40

Sale price of sesame: ₹ 62.5 kg^{-1} (2018), ₹ 64.85 kg^{-1} (2019) and ₹ 68.55 kg^{-1} (2020)

Table 5. Gap analysis of cluster frontline demonstrations on sesame

Year	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
2018	57	290	41.44
2019	67	279	39.91
2020	94	178	25.43
Average	72	249	35.59

incurred in the improved practices was mainly due to more cost involved in balanced fertilizer, improved seed, weed management practices and integrated pest and disease management. Sesame under improved practices gave higher net returns which ranged from ₹ 7353-17950/-ha with additional net returns average ₹ 4173/ha (3 years) as compared to farmer practices which were ranged between ₹ 4583 to 11796/ha. The highest BC ratio was obtained 1.62 with improved practices over farmer practices (1.40). This finding was in corroboration with the findings of Singh *et al* (2018), Choudhary *et al* (2021), Choudhary R and Nehra M (2021) and Raikwar and Srivastva (2013).

Gap analysis of cluster frontline demonstrations on sesame

The results revealed that extension gap ranged from 57–94 kg/ha in blocks Jalore district which indicated that farmers should be aware for adoption of improved production technology in sesame. There is a vast gap between the farmer practice yield and improved practice yield as per recommended practice through cluster frontline demonstrations at farmers' field. Improved practices through frontline demonstrations are better than farmer practices (Kumar *et al*, 2014). Technology gaps were also recorded of the average of three years 249 kg/ha (2018, 2019 and 2020, respectively). These gaps may be attributed to the variation in soil fertility status. Similarly, technology index was ranged 41.44 – 25.43 per cent and average figure comes out to be 35.59 per cent. This will accelerate the adoption of newer technologies to increase the productivity of sesame in this area. These results are in conformity with the findings of Rohit and Singh (2019), Zimik *et al* (2020) and Choudhary *et al* (2021).

CONCLUSION

The improved practices through frontline demonstrations conducted on sesame at the farmers' field revealed that the adoption of improved practices significantly increased the yield as well as yield attributing traits of the crop and also the net returns to the farmers. So, there is a need to disseminate the improved technologies among the farmers with effective extension methods like training and demonstrations. The farmers should be encouraged to adopt the recommended package of practices realizing for higher returns.

ACKNOWLEDGEMENT

We acknowledge the financial support received from ICAR-Indian Institute of oilseeds Research and Agriculture University Jodhpur under the All-India Coordinator Research Project on sesame and Niger. We also acknowledge the facilities provided by Agricultural Research Station, Mandor (AU Jodhpur) Rajasthan, India to carry out this research.

REFERENCES

Anonymous (2019). Fourth advance of DES, Department of Agriculture, Govt. of Rajasthan.

Kumar V, Sharma V and Sharma S C (2014). Impact of improved technologies on productivity enhancement of sesame (*Sesamum indicum* L.). *Indian J Dryland Agri Res and Dev* **29**(2): 41–44.

Kiresur V R, Rao S V R and Hedge D M (2001). Improved technologies on oilseeds production- An assessment of their economic potentials in India. *Agril Econ Res Rev* **14**: 95–108.

Samui S K, Maitra S, Roy D K, Mondal A K, Saha D (2000). Evaluation on frontline demonstration on groundnut. *J Indian Soc Coastal Agri Res* **18**:180–183.

Singh S P, Paikra K K and Patel C R (2018). Cluster frontline demonstration: An effective approach for increasing productivity and profitability of mustard (*brassica juncea*) crop in chhattisgarh plains. *Int J Curr Res* **10**(03):67354–67357.

Raikwar R S and Srivastva P (2013). Productivity enhancement of sesame (*Sesamum indicum* L.) through improved production technologies. *African J Agri Res* **8**(47): 6073–6078.

Meena R, Singh B, Meena K C, Meena R K, Singh B and Gurjar P (2018). Performance of frontline demonstrations on sesame (*Sesamum indicum* L.) in Karauli district of Rajasthan, India. *Int J Curr Microbiol Appl Sci* **7**(3):1507–1511.

Rohit and Singh J (2019). Impact of frontline demonstrations on sesame (*Sesamum indicum* L.) in Agra district of Uttar Pradesh. *J Pharmacognosy and Phytochem* **8**(6): 339–341.

Choudhary M, Dular R K, Asiwal B L, and Kumari A (2021). Evaluation of technology for cultivation of *kharif* onion in Sikar district of Rajasthan. *J Krishi Vigyan* **9**(2): 57–67.

Zimik L, Singh S G, Devi H N, Singh I M and Prakash N (2020). Impact assessment of front line demonstration on Toria. *J Krishi Vigyan* **9**(1):160–163.

Choudhary R and Nehra M (2021). Enhancing mustard production through frontline demonstration. *Bhartiya Krishi Anushandhan Patrika* **36**: 285–288.

Received on 6/5/2022 *Accepted on 10/9/2022*