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Productivity enhancement in Sesame (*Sesamum indicum* L.) as influenced by different improved production technologies

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ABSTRACT

Sesame is one of the important oilseed crops in India. The major constraint of its low productivity is non-adoption of improved technologies by the farmers. Cluster Frontline demonstrations to highlight the impact of different improved technologies like method of sowing, nutrient management, weed management and adoption of whole package of practices of improved technologies for the crop were conducted at 125 farmers' fields during Kharif 2017 and 2020 under rainfed conditions. The improved technologies improved the yield attributing traits as well as seed yield of the crop. The improved technology recorded a mean yield of 476 kg/ha which was 44.68% higher than that obtained with farmer's practice yield of 329 kg/ha. Higher mean net returns of 33,363/ha with a benefit: cost ratio of 3.28 was obtained with improved technologies in comparison to farmer's practice (mean net returns of 18,222/ha and benefit: cost ratio of 2.25).

KEYWORDS

Cluster Frontline Demonstration, Improved Technology, Net Return, Productivity, Sesame

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Sesame (*Sesame indicum* L.) is an ancient oilseed crop of India. The crop is grown in a wide range of environments, extending from semi-arid tropics and subtropics to temperate regions. Therefore, the crop has a large diversity in cultivars and cultural systems. India ranks first in the world in terms of sesame-growing area (23%) and second largest producer of sesame in the world after Myanmar. But the productivity is only 335 kg/ha (FAO, 2012) which is lower than most of the sesame growing countries. This probably indicates great opportunity for a higher increase in sesame productivity in India. Potential yields are probably as high as 2000 kg/ha (Mkamilo and Bedigian, 2007).

In general, average productivity of sesame continues to be lower than expected from agricultural technology for the last 40 years, mainly due to its cultivation on marginal lands, poor management practices and low input application except seed. The major constraint responsible for lower yield is adoption of inappropriate production technologies by farmer's *viz*., broadcast method of sowing, no use of fertilizer and untimely or poor weed management (Khaleque and Begum, 1991). The yield of sesame can be increased substantially with adoption of improved technologies such as improved variety, recommended dose of fertilizer, weed management and plant protection.

Keeping this in view, cluster frontline demonstrations on sesame were conducted in the farmer's fields to demonstrate the production potential and economic benefits of latest improved technologies to the farmers.

Materials and Methods

One hundred twenty five Cluster frontline demonstrations (CFLDs) to demonstrate the effect of improved production technologies on the productivity of sesame were conducted during kharif season from 2017-2020 on farmers' fields under rainfed conditions in villages such as Bamaniya, Ghotra, Khudi, Aspalsar (Churu-District) of Rajasthan. The soils of the farmer's fields were light to medium with low to medium fertility status. Each demonstration was conducted on an area of 0.4 ha adjacent plot to the demonstration plot was kept for assigning farmer's practices. The package of improved technologies like line sowing, nutrient management, weed management and whole package were used for the demonstrations.

The RT 346 and Rt-351 variety of sesame was used for sowing in the demonstrations and the details of the improved practices demonstrated to the farmers through the CFLDs are given in table 1. The crop was harvested in the month of September after the leaves turn yellow and start dropping while the capsules are still greenish-yellow. Data on yield attributing traits and seed yield were recorded. Economic analysis was done on the basis of prevailing market price of input used and the output obtained from farmer's practice and improved technology demonstrated fields.

Results and Discussion

Yield Attributing Traits

The number of productive capsule per plant under improved technologies were 44.2, 45.3, 48.2, and 46.2 as against that of farmer's practice, 35.2, 34.2, 34.1 and 36.4 (table 2) under line sowing, weed management, nutrient management and whole package CFLDs, respectively. There was increase of 25.56%, 32.45%, 41.34% and 41.34% in number of productive capsules under demonstration of improved technologies over farmer's practice. The number of seeds/capsule under improved technologies *i.e.* line sowing, weed management, nutrient management and whole package and farmer's practice were 70.5, 69.2, 71.2, 70.8, 65.2, 64.8, 65.6 and 63.2 respectively. The percentage increase in number of seeds/capsule ranged from 6.79 to 12.02 under different improved technologies. Test weight (g/1000-seed) observation showed that during the test weight also increased under the improved technologies in comparison to farmer practice and it was 2.78, 2.65, 2.74 and 2.87 under line sowing, weed management, nutrient management and whole package, respectively, whereas it was 2.16, 2.18, 2.21 and 2.23, respectively under farmer's practice. Overall, there was 31.08, 8.84 and 26.02% increase in number of productive capsules/plant, number of seeds/capsule and test weight under the improved technologies in comparison to farmer's practice.

Seed Yield

The productivity of sesame under improved production technologies ranged between 324 and 650 kg/ha with mean yields of 487 kg/ha (table 3). The productivity under improved technologies varied from 341 to 564, in case of line sowing and there was 36.69% enhancement in yield over farmer's practice. This agrees with the findings (Imoloame *et al*., 2007) who reported the superiority of row planting over broad casting to control weed and this factor resulted in considerable yield increased and also grain yield increased significantly. Under the cluster frontline demonstrations on weed management, the productivity varied from 323 to 568 and it was 36.50% higher in comparison to farmer's practice.

Singh *et al*. (1992) and Upadhyay (1985) reported weed-induced reductions of sesame yield up to 55% and a need for a critical weed-free period up to 50 days after planting. Under weedy conditions (Eagleton *et al*., 1987) recorded a weed biomass six times that of sesame 45-48 days after planting, (Bennett, 1993) reported a weed biomass 1.4 fold that of sesame 42 days after planting. The higher weed infestation under farmer's practice reduced the amount of nutrients and water available to the cultivar under farmer's practice. The productivity varied from 345 to 615 kg/ha under cluster frontline demonstrations on nutrient management and the increase in productivity was to the tune of 49.53% over farmer's practice.

Table 1. Particulars showing the details of sesame growing under CFLD and existing practices

Operation	Local Check	Improved Practice Demonstrated
Line Sowing	Broadcasting of seed	Spacing was 30 cm between rows and 10 cm between plants in the row.
Weed Management	No weed management	Weed management by using herbicide Pendimethaline 30 EC at 3.3liters/ha in 500-600litre of water as pre emergence treatment for effective control of weeds within two days of sowing. The thinning and weeding was done invariably 30 -35 days after sowing to ensure recommended plant spacing within a row.
Nutrient Management	Only FYM and no fertilizer application	10 tones farm yard manure and 35 kg N/ha.
Whole Package	Farmers are cultivating the sesame crop without adoption of any improved technology	All the crop management practices as per the package of practices for kharif crops by SKRAU, Bikaner were followed for raising the crop.

Table 2. Yield attributing traits of sesame as an affected by improved and local check in farmers fields

Types of CFLD	Yield Attributing Characters								
	No. of Production Capsules/Plant			No. of Seeds/Capsule			Test Weight (g)		
	Improved Technology	Local Check	% Increase	Improved Technology	Local Check	% Increase	Improved Technology	Local Check	% Increase
Line Sowing	44.2	35.2	25.56	70.5	65.2	8.12	2.78	2.16	28.70
Weed Management	45.3	34.2	32.45	69.2	64.8	6.79	2.65	2.18	21.55
Nutrient Management	48.2	34.1	41.34	71.2	65.6	8.53	2.74	2.21	23.98
Whole Package	46.2	36.4	26.92	70.8	63.2	12.02	2.87	2.23	28.63
Average	45.97	35.07	31.08	70.42	64.7	8.84	2.76	2.19	26.02

Table 3. Seed yield of sesame as affected by improved and local check in farmer's fields

Type of CFLD	Demonstration (No)	Yield (Kg/Ha)			Local Check	% Increase in Yield over Local Check
		Improved Technology (IT)				
		Maximum	Minimum	Average		
Line Sowing	50	564	341	452	330	36.96
Weed Management	25	568	323	445	326	36.50
Nutrient Management	25	615	345	480	321	49.53
Whole Package	25	650	410	530	341	55.42
Average	25	599	354	476	329	44.68

Table 4. Economics of sesame as affected by improved and local check in farmers fields

Type of CFLD	Cost of Cultivation (Rs./ha)		Net Returns (Rs./ha)		B: C Ratio	
					IT	FP
	IT	FP	IT	FP		
Line Sowing	14400	13605	33400	15735	3.31	2.03
Weed Management	14823	13254	40977	24846	3.76	2.87
Nutrient Management	14510	13125	31177	18012	3.14	2.14
Whole Package	14410	13605	27900	14295	2.93	1.97
Average	14533	13397	33363	18222	3.28	2.25

Fertilizer response has been widely studied in other countries and the extent of the response depends on many factors: with high yielding varieties higher fertilizer rates are needed and also in cases of lower soil fertility (Tripathi and Rajput, 2007). The increase in productivity was 55.42% under the cluster frontline demonstration on whole package in comparison to farmer's practice and productivity ranged from 410 to 650 kg/ha with an average productivity of 509 kg/ha under improved technology as compared to 341 kg/ha, in case of farmer's practice. The increased grain yield with improved technologies was mainly because of line sowing, use of nutrient management, weed management and adoption of these improved technologies as a whole. Adoption of improved technology increased sesame yield by 38% as compared to farmer's practice (Raikwar and Srivastava, 2013). Improved technology produced higher grain yield this could be the inter plant competition for the moisture and nutrients which could be more severe under farmer's practice.

Economics

The economic viability of improved technologies over traditional farmer's practices was calculated depending on prevailing prices of inputs and output costs (table 4). It was found that cost of production of sesame under improved technologies varied from 14,400 to 14,823/ha as against 13,125 to 13,605/ha under farmer's practice. Cultivation of sesame under improved technologies gave higher net return which ranged from 14,295 to 40,977/ha as compared to farmer's practices which ranged from 14,429 to 24,846/ha. Similar results also have been reported by (Khan *et al*., 2009, Raikwar and Srivastava, 2013). The improved technologies *i.e.* line sowing; nutrient management, weed management and whole package also gave higher benefit cost ratio of 2.93, 3.14, 3.31 and 3.76 as compared to 1.97, 2.03, 2.14 and 2.87 under farmer's practice, respectively.

The results from the present study clearly indicate the potential of improved production technologies in yield enhancement under rainfed condition. Thus, to get maximum yield of sesame recommended package of practices for the crop should be followed. In conclusion, the frontline demonstrations conducted on sesame at the farmers' fields revealed that the adoption of improved production technologies significantly increased the yield as well as yield attributing traits of the crop and also the net returns to the farmers. The highest productivity and net returns were obtained under the frontline demonstrations laid out on whole package of practices for the crop, which emphasizes the adoption of recommended production technologies. So, there is 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 for the crop for higher returns.

References

CSA (2016) Area and production of major crops, Agricultural sample survey (vol. 1), Central Statistical Agency, Addis Abeba, Ethiopia.

Islam, F, Gill, R. A., Ali, B., Farooq, M. A., Xu, L., *et al.* (2016) Sesame: In S. K. Gupta (Ed.), Breeding oilseed crops for sustainable production: opportunities and constraints, Elsevier, Amsterdam, Netherlands.

SBN (2015) Sesame Business Network (SBN) Newsletter.

Anonymous (2011) Package of practices for crops of Punjab kharif, Punjab Agricultural University, Ludhiana, Punjab.

Bennett, M. (1993) Sesame research report 1991-92, wet season, Katherine, Northern Territory, Technical bulletin no. 215, Australian Department of Primary Industries and Fisheries, Australia.

FAO (2012) Agricultural Production Statistics, *http://faostat. fao.org/,* as accessed on 23 February 2014.

Imoloame, E. O., Gworgwor, N. A. and Joshua, S. D. (2007) Sesame (*Sesamum indicum* L.) weed infestation, yield and yield components as influenced by sowing method and seed rate in Sudan Savanna agro-ecology of Nigeria, *African Journal of Agricultural Research*, **2**: 528-533.

Khaleque, M. A. and Begum, D. (1991) Area and production of oilseed crops, 1988-90, In: Fifteen

years of oilseed research and development in Bangladesh, AST/CIDA, **28**: 190.

Khan, M. A. H., Sultana, N. A., Islam, M. N. and Hasanuzzaman, M. (2009) Yield and yield contributing of sesame as affected by different management practices, *American-Eurasian Journal of Scientific Research*, **4**: 195-197.

Mkamilo, G. S. and Bedigian, D. (2007) *Sesamum indicum* L., In: vegetable oils, Plant Resources of Tropical Africa, Van Der Vossen, H. A. M. and Mkamilo, G. S. (Eds.), PROTA Programme, Wageningen University, the Netherlands, pp: 153-158.

Olowe, V. I. O. and Busari, L. D. (2003) Growth and grain yield of two sesame (*Sesamum indicum* L.) varieties as affected by row spacing in Southern Guinea savanna of Nigeria, *Samaru Journal of Agricultural Research*, **19**: 91-101.

Raikwar, R. S, and Srivastva, P. (2013) Productivity enhancement of sesame (*Sesamum indicum* L.) through improved production technologies, *African Journal of Agricultural Research*, **8**: 6073-6078.

Singh, D., Dagar, J. and Gangwar, B. (1992) Infestation by weeds and their management in oilseed crops - a review, *Agricultural Reviews*, **13**: 163-175.

Tripathi, M. L. and Rajput, R. L. (2007) Response of sesame (*Sesamum indicum* L.) genotypes to levels of fertilizers, *Advances in Plant Sciences*, **20**: 521-522.

Upadhyay, U. (1985) Weed management in oilseed crops, In: Oilseed production constraints and opportunities, Srivastava, H., Bhaskaran, S., Vatsya, B. and Menon, K. K. G. (Eds.), Oxford and IBH Publishing Co., New Delhi, pp: 491-499.