Impact of Frontline Demonstration Technologies on Sesame Crop Yield in Bhind District (M.P.)

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ABSTRACT

Sesame which is commonly known as 'Til'. It is one of the earliest domesticated plants of India. The seeds of the plants yield valuable edible oil due to presence of potent antioxidant, so sesame seeds are known as the seeds of immortality. Two distinct type of seed are recognized, the white and black one. The study was conducted in the Bhind district of Madhya Pradesh with the objective of impact of frontline demonstration technologies on Sesame crop yield. Sixty four demonstrations on improved varieties of Sesame - JTS-8 and TKG-22 covering 25.8 ha. area has been conducted during 2010-11 to 2014-15. The demonstrated technologies have shown average increased yield (22.77%) over farmers' practice in the district .The average yield of demonstrated technologies was 6.50 q/ ha., while it was 5.33 q/ ha in farmers practice. The highest yield 11.0 q / ha. has been recorded in the year of 2012-13, while, it was 7.50 q/ha. in farmers' practice in the year of 2013-14. A average yield gap 1.16 q / ha. has been recorded in demonstrated technologies and farmers' practice. The average yield gap was highest (2.0q/ha) during 2014-15 and it was lowest in (0.50 q/ha) 2014-15. The average cost of cultivation was incurred Rs. 17300 / ha. in demonstrated technologies , while, it was Rs. 15724 / ha in farmers practice .The average additional cost / ha was Rs. 1576/ in front line demonstration as compared to farmers' practice. The average net return was Rs.37206/- in demonstrated technologies while, it was Rs. 29537 in case of farmers practice. The average additional net return was Rs. 7669/ ha in demonstrated technologies as compared to farmers practice. The average B:C ratio were 2.96 and 2.66 in front line demonstrated technology and farmers practice, respectively.

Key words: *Sesame; Frontline demonstration; Farmers practice;*

Sesame or Gingelly(*Sesamum indicum L.*) belong to the family of pedaliaceae and is one of the most ancient crops and oilseeds known and used by mankind. It is also known as benniseed, gingelly , simsim, ajonjoli, sesame and till. Sesame was cultivated and domesticated on the Indian subcontinent during harrapan and Anatolian eras . This is evidenced by the presence of archeological remnants of the of the crop dating back to 5500 BC in the Harappa valley in the Indian subcontinent . Sesame is reported to be originated in South Africa and was introduced to India by migrants prior to the Indus valley civilization.

In India Sesame crop cultivated all the parts except northern and north eastern region. It is grown in different three seasons in different parts of the country. Majority of sesame is grown as a kharif crop under rain fed conditions in central and southern part of the country including Madhya Pradesh, Utter Pradesh, Andhra Pradesh, Rajasthan, Gujarat ,Maharashtra, Orissa, Karnataka and Tamil Nadu. A small amount of sesame is cultivated as a summer crop under irrigated condition. Sesame crop is grown in an area of 7.54 million ha. with a production of 3.34 million tones in world with a productivity of 443 kg / ha. India is the largest producer of Sesame in the world. It is also ranks first in the world in terms of sesame growing area (24%) with about 1.8 million hectare with a total production of 0.75 million tones and productivity of 422 kg / ha (*FAI, 2012*). The potential yield of sesame cultivars still is much higher than the actual yield performed at farmers field. This

low yield might be due to damage occurs by pests and diseases, insufficient weed control or no control, lack of mechanization (not cultivated by farmers due to seed shattering when not sufficient and unrealized genetic potential. Potential yield are as high as 2000 kg/ha**.** Seed yield per unit area increases with increases plants population density from 80,000 to 1,60,000 plants per ha.and beyond this density is becomes counter productive. Also increased number of seed per capsule, number of capsule per plant, and dry matter production increased when the intra –row spacing increased from 30 to 90 cm. Keeping this in view, frontline demonstrations on Sesame have been conducted to demonstrate the production potential and economic benefits of latest improved technologies at farmer's field.

METHODSOLOGY

The 64 frontline demonstration have been conducted in 64 different farmers locations at farmers field in the the villages of Ruhani Jagir, shyampura, Jaganpura, Churali, Gadhi, Bijpura, Raun, Bespura jaganpura, Ruhani Jagir, sunderpura, Rampura, Jamua and Gyanpura Bhind district of Madhya Pradesh. The demonstrations have been conducted in kharif season during 2010 to 2014 in rained to semi-irrigated condition on light to medium soil under Mustard/ Wheat sesame cropping system. The improved varieties i.e. TKG-8 (yield 6-8q/ha., duration 86 days , oil content 46.61%, tolerant to phyllody, phytophthora blight, tolerant to alternaria leaf spot and bacteria blight) TKG-22 (yield 6-10 q/ha. duration 76 to 81 days, oil content 53.3% and tolerant to phytophthora blight) have been included in the demonstration. The seeds have been treated with Thiram @2.5 gram/kg seed to prevent the seed born diseases and inoculation with PSb@5 gram/kg seed for increasing the availability of phosphorus to the crop. The crop was sown during onset of Monsoon (15 July to 30 July) with a seed rate of 4 kg / ha. The crop has been sown with a line spacing of 45 cm between row and 10 cm between plants in the row. Recommended dose of fertilizers (60:30:15:40 kg NPK / ha.) have been applied. Full dose of phosphorus, potassium and half dose of nitrogen have applied as basal dose. The half remaining amount of nitrogen had top dressed in two split doses at 30 DAS and 45 DAS. Weed control was done by following integrated weed management practices (pre-emergence herbicide pendimethiline @ 1 kg a.i./ha followed one hand weeding at 20-25 DAS) 40 kg S/ ha. Increased productivity from 700 to 800 kg / ha. with also a 3 per cent higher oil content (increased from approx. 47 to 50%). The crop was harvested during last week of September to first fortnight of October after the leaves turn yellow and start dropping while the capsules are still greenish yellow.

RESULTS AND DISCUSSION

The Table 1 revealed the data related to yield attributing characteristics of 3 years (2012 to 2014). Capsules per plant in demonstrated technologies were 74.2, 82.35 and 75.2 as compared to farmer's practice which were 65.40, 73.20 and 70.30 during the years 2012, 2013 and 2014, respectively. Increased number of capsule per plant in frontline demonstration technologies was 13.45, 12.50 and 6.97 per cent over farmer's practice. The average number of capsules per plant in in demonstrated technologies was 77.25 while it was in farmers practice is 69.63. Therefore, 10.97 percent more capsules were found in demonstrated technologies as compared to farmer's practices. Increased number of seeds per capsule, no. of capsules per plant and dry matter production increased when the intra row spacing increased from 30 to 90 cm. The average number of seeds per capsule was 68.19 in frontline demonstration technologies as compared to (63.17) farmer's practices. During the years 2012, 2013 and 2014 the number of seeds per capsules in frontline demonstration technologies was 68.32, 70.15 and 66.12 as compared to farmers' practice during the year's i.e. 64.20, 63.20, and 62.12. The overall average seeds were 68.19/capsule as against farmers practice i.e. 63.17. This finding also got support from (*Singh et al., 2014*), who reported that all over average seeds/capsule increased 6.38 per cent as compared to local check .The data related to test weight revealed that during the years 2012, 2013 and 2014, test weight of sesame seeds in frontline demonstration technologies were 3.15, 3.12, and 3.10 as compared to farmers practice i.e. 2.42, 2.56, and 2.43, respectively. The overall average test weight was 3.12 gram in frontline demonstration technologies while it was 2.47 in farmers practice. The increased test weight under frontline demonstrated technologies were found 30.16, 21.87, and 27.57 per cent and overall average increased test weight was 26.53 g. as compared to farmer's practice. *Raikwar and Shrivastava, 2013,*

Table 1. Yield attributing characters of sesame crop

Years	Nos. of capsules / plant.			Nos. of seeds/ capsule			Test weight (g)		
	Demo.	FP	% increased	Demo.	FP	% increased	Demo.	FP	% increased
2012	74.2	65.40	13.45	68.32	64.20	6.41	3.15	2.42	30.16
2013	82.35	73.20	12.50	70.15	63.20	10.99	3.12	2.56	21.87
2014	75.2	70.30	6.97	66.12	62.12	6.63	3.10	2.43	27.57
Average	77.25	69.63	10.97	68.19	63.17	8.01	3.12	2.47	26.53

FP- farmers practice, Demo- Demonstration

Table 2. Yield of demonstrated technologies and farmers practice of Sesame crop at farmers' fields

Years	Nos. of demo.	Area (ha)	varieties	demo. yield (q/ha.)		FP	% increased	Av. Yield gap (q/ha.)
				Max.	Av.			
2010	13	5.2	JTS-8	6.0	4.46	3.71	20.21	0.75
2011	12	5.0	JTS-8	5.10	4.20	2.80	50.00	1.4
2012	13	5.2	JTS-8	11.0	9.50	7.50	26.67	2.0
2013	13	5.2	TKG-22	8.60	8.20	7.01	16.97	1.19
2014	13	5.2	JTS-8	6.50	6.16	5.66	8.11	0.50
Average	64	25.8		7.44	6.50	5.33	22.77	1.16

Table 3. Economic analysis of demonstrated technologies and farmers practice at farmers field

Years	Cost of cultivation / ha.		Additional cost / ha.	Net return (Rs./ha.)		Additional net return Rs./ha	Effective gain	B:C ratio	
	Demo.	check	in demo	Demo.	Check	.in demo.	Rs./ha.	Demo.	Check
2010	11,500	10,000	1500	8570	6695	1875	375	1.7	1.6
2011	13.500	12,420	1080	9600	2980	6620	5540	1.71	1.23
2012	18,000	16,500	1500	77,000	58,500	18,500	17000	5.21	4.48
2013	21,500	19,200	2300	60,500	50,900	9600	7300	3.81	3.65
2014	22,000	20,500	1500	30,360	28,610	1750	250	2.38	2.34
Average	17,300	15,724	1576	37,206	29,537	7669	3033	2.96	2.66

who reported that 38.10 per cent increased, test weight as compared to local check.

Table (2) revealed that productivity of Bhind district of Madhya Pradesh under frontline demonstration ranged between 3.2q/ha. to 11.0 q/ha.with mean seed yield 6.50 q/ha. The productivity of frontline demonstration technologies during the years from 2010 to 2014 varied from 3.5 to 6.0, 3.2 to 5.10, 9.5 to 11.0, 8 to 8.6 and and 6 to 6.5 q/ha. The average yield has been recorded during the period was 6.50 q / ha while , it was found 5.33 q/ha in farmer's practice. The additional grain yield range from o.50 to 2.0 q/ha with an average of 1.16 q/ha was found in frontline demonstration technologies. The percent increased yield were found i.e. 20.21 , 50.0, 26.67 , 16.97 and 8.11 during the years 2010, 2011, 2012, 2013 and 2014, respectively with an overall increased in yield 22.77 per cent over farmers practice. The increased in seed yield of sesame over farmers practice was 61 per cent by whole package, 23 per cent by improved varieties, 14 per cent by fertilizers management, 35 per cent by plant protection and 92 per cent intercropping (*Annual report AICRP on Sesame and Niger, 2012*).This might be cause of many factors: with high yielding varieties , higher fertilizer rates are needed and also in case of lower soil fertility. Grain yield under frontline demonstration technologies was higher as compared to farmer's practice. The reasons for this could the interplant competition for the moisture and nutrients which could be more severe in farmer's practice. Higher weed infestation under farmer's practice might be one of the major reason low grain yield because the heavy weed infestation reduced the amount of nutrient and water availability to the crop. The similar findings also given by *Singh et al.(2014)* who reported that FLDs programme had a positive impact over existing practices. *Afjal et al. (2013)*

reported on over all basis 14.80 per cent increased in yield over local check in case of front line demonstration technologies of Mustard.

The economic analysis of frontline demonstration technologies over farmer's practice was calculated depending on prevailing prices of inputs and output cost (Table 3). The cost of production of crop under frontline demonstration technologies was varied from Rs.11500 to 22000 / ha with an average of Rs.17300 / ha, while in case of farmer's practice it was varied from Rs. 10,000 to 20500/ha with an average of Rs. 15724/ha. In frontline demonstration technologies an additional cost of production per ha varied from Rs.1500 to 2300/ha with an average Rs.1576/ha over farmers practice. This additional cost of production in frontline demonstration technologies was mainly due to more cost involved in quality seed, integrated nutrient management and integrated weed management practices. Cultivation of sesame crop under frontline demonstration gave higher net return which was ranged from Rs. 7700 to 60,500 with an average Rs.37206 / ha. as compared to farmers practice which was Rs.2980 to 28610/here with an average of Rs. 29537/ha. *Singh et al. (2014)* and *kumar et al. (2014)* reported that the higher net returns as well as higher IBCR in case of frontline demonstration technologies as compared to farmers practices. An additional net return was found under frontline demonstration technologies ranged from Rs.1750 to 18500/ ha with an average Rs.7669/ha, while it was highest Rs.18500 in 2012-13 and lowest Rs.1750 in the year 2014. In case of benefit cost (B:C) ratio it was higher under demonstrated technologies 1.70, 1.71, 5.2, 3.85 and 2.38 as compared to farmer's practice i.e. 1.6, 1.23, 4.48, 3.65 and 2.35 during 2010, 2011, 2012, 2013 and 2014, respectively. The overall average benefit cost ratio was 2.96 in frontline demonstration as compared to 2.66 in farmer's practice. The results from the study clearly showed that the potential of improved production technologies in rain fed condition of study area.

CONCLUSION

The productivity enhancement under frontline demonstration over farmers practices of sesame cultivation created awareness and motivated the farmers of district to adopt improved package of practices related to sesame crop. The selection of specific technology like improve and recommended varieties , seed treatment , proper spacing , integrated nutrient management with application of sulpher, plant protection measures, application of herbicide and one hand weeding also proven effective for increasing the yield as well as net economic return as compared to farmers practices. Thus it could be said that frontline demonstrations were the most successive tools for transfer of technology for productivity enhancement of sesame.

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