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Cluster Front Line Demonstration an effective tool for spreading the advance technology of Sesame among the farmers

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Abstract

The world's largest exporter of sesame seeds was India, and Japan the largest importer (FAO-STAT, 2013). World total cultivation area under sesame was 9,398,770 ha, producing 4.76 million tons (FAO, 2013), which has risen from 1.12 million tons in the early 1961s (FAO STAT, 2015). Major sesame-producing countries in 2007 were India, China, Burma (Myanmar), Sudan, Ethiopia, Uganda, and Nigeria, while in 2001 the largest producers of sesame were China and India followed by Burma (4.2 million tons) and Sudan (3 million tons). Asia and Africa grow 70% and 26% of world sesame, respectively (Hansen, 2011). The studies revealed that maximum numbers of farmers fall in category of low level (43.75) knowledge; while very few were with high knowledge level 20.75 per cent. The both year average yields under recommended practice (CFLD) were obtained 6.99 q/ha as compared to farmers' practice 4.57 q/ha, which was 52.95 % higher. The two years average data of CFLD Sesame on technology index II was higher (34.87%) than the farmers' practice. The average yield of district increased in second year (0.87 to 0.96 q /ha). The two years average gross return (Rs 48540) and net return (Rs 29690) in CFLD demo were found higher than the farmers practice gross return (Rs 30560) and net return (Rs 16560). The average net returns 79.29% higher than that of farmers' practice. The B: C ratio exhibited the same trend as in gross and net return which was found 2.10 – 3.07 in CFLD demo and 1.97 – 2.41 in farmers' practice and the impact of CFLD on Sesame in the district increased in cultivated area, from 8515 to 8932 ha,

Keywords: Sesame, Production, Productivity and Area

Introduction

India is the fourth leading oilseeds producing country in the world, next only to the USA, China, and Brazil, harvesting about 29 million tonnes of oilseeds per annum, grown in an area of nearly 27 million ha with an annual average yield of 1058 kg/ha. Oilseeds sector have an annual turnover of about ' 80000 corers, which subjugate a vital position in the agrarian economy of the country. Oilseeds are significant following only to food grains in terms of area and production. India accounted for 19% of oilseeds area, and 2.7% of oilseeds production in the world, (FAOSTAT, 2013).

At the national level, the domestic achievements in oilseeds production are unparallel when we observe that six times increase in oilseeds production during the period of 1950–2011 was achieved under predominantly rain fed (72%) agro-ecological conditions, which is even higher than the production increase in total food grains during the corresponding period (Hegde, 2012).

Presently, about 27 million ha area is under oilseeds, producing nearly 29 Mt oilseeds; with the average yield of 1095 kg/ha. The estimated share of different states in total oilseeds area and production has shown that Madhya Pradesh, Maharashtra, Gujarat, and Rajasthan contributed about 70% of the total area and 75% of total oilseeds production during TE 2012. Thus, these four states were considered as the major oilseeds producing states though other states like Andhra Pradesh, Karnataka, Tamil Nadu and Uttar

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Pradesh, etc. are also important in the production of various oilseeds in the country.

Sesame seed have both nutritional and medicinal value because they are rich in fat, protein, Carbohydrate, fibbers and essential minerals. They are used in sweets such as sesame bars and halva (desert) and in brakery products or milled to get high-grade edible oil (Bedigian, 2004). Seed are chemically composed of 44-57% oil, 18-25% protein, 13-14% carbohydrate (Borchani *et.al*. 2010).

Average global sesame yield in 2010 was 3.84 million metric tons grown on an area of 7.8 million hectares. The largest producer of sesame seeds in 2013 was Burma. The world's largest exporter of sesame seeds was India, and Japan the largest importer (FAO-STAT, 2013). World total cultivation area under sesame was 9,398,770 ha, producing 4.76 million tons (FAO, 2013), which has risen from 1.12 million tons in the early 1961s (FAO STAT, 2015). Major sesame-producing countries in 2007 were India, China, Burma (Myanmar), Sudan, Ethiopia, Uganda, and Nigeria, while in 2001 the largest producers of sesame were China and India followed by Burma (4.2 million tons) and Sudan (3 million tons). Asia and Africa grow 70% and 26% of world sesame, respectively (Hansen, 2011).

The cultivable land used worldwide for sesame production has generally remained constant over the years, but in a number of countries the crop has become marginalized due to higher remuneration from other crops and labour shortages pushing sesame to less fertile areas. These huge yield gaps among different sesame growers are due to knowledge gaps, poor crop management techniques, and lack of advanced technologies.

The yield increase is due both to development and use of improved varieties and improved agronomy practices and crop protection. The potential yield of sesame still is much higher than actual yield, as still much damage occurs by pests and diseases, insufficient weed control, to high levels of mono-cropping, lack of mechanisation (amongst others causing seed shattering when not enough labour is available during harvest) and unrealised genetic potential. Potential yields are probably as high as 2000 kg/ha (Mkamilo and Bedigian, 2007).

The major constraints responsible for lower yield are inappropriate production technologies *viz*; broadcast method of sowing, none use of fertilizer and untimely weed management (45 DAS), (Khaleque and Begum, 1991). The yield of sesame can be increased by 21 to 53% 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 to demonstrate the production potential and economic benefits of latest improved technologies on farmer's fields.

Methodology

Farmers' operational area of Krishi Vigyan Kendra, Shahjahanpur was selected as per guide line of Cluster Front Line Demonstration to KVK by ICAR-ATARI, Kanpur Zone –III. Accordingly CFLDs under Sesame (Til) crop laid out in villages; namely Barapur, Nahirola, Udara, Sunderpur, Kursanda, Shukla Mai, Dahar, Samidhana, Basulia, Devaria, Ubariya, Mahudurg, Dingurpur, Benipur, Daudpur, Dingurpur, Ladhuali, Gurgawan, Naya gawan and Bhundi. The knowledge level of the farmers in these villages was also evaluated by random sample of 20 farmers each village. Thereby sample included 400 numbers of farmers in the study. The farmers were asked to reply questions about the improved agro techniques including the high yielding varieties of Sesame (Til). The score so obtained under various questions were summed up. On the basis of the total score obtained, respondents were categorized on to three classes' *i.e.* low, medium and high level of knowledge.

The soil samples were taken and analyses before sowing of CFLDs demonstration. The soils of CFLDs field were found sandy loam to clay loams having 0.4 to 0.6 per cent available organic carbon, 250 to 300 kg/ha nitrogen, 31 to 53 kg/ha available P_2O_5 and 60 to 120 kg/ha available potassium with pH range from 7.5 to 8.1. CFLDs on Sesame (Til) were cultivated during Kharif season and sown first fortnight of July. Sesame (Til) crop was sown in line and fertilize with a common dose of N: P: K: S @ 60:40:40:25 kg/ha. 1/2 dose of Nitrogen, Full dose of Phosphorus, Potash and Sulphur applied at sowing time. 1/2 dose Nitrogen after first irrigation or after showering near about 15 to 25 DAS at the time earthing-up/thinning. Seed treatment done by using carbendazim @ 2 g/kg seed 2 to 3 days before sowing. Soil treatments of CFLDs Demonstration fields were taken by using trichoderma @ 5 kg/ha and plant protection measures adopted during crop.

The participating farmers were provided with all advance technical know how about advanced cultivation of Sesame crop. KVK scientist also visited regularly to the demonstrations fields and continuously guides the farmers. The varieties (Shekhar and RT

43) were also utilized for collection of feedback information for more improvements in technology transfer programme. Field days and group meeting were also organised at demonstration sites to provide the opportunities for other farmers to witness the benefits of demonstrated technologies. The data on Sesame productivity (q/ha) were collected from the demonstration and control plots (Farmers Practice) for further analysis. The critical inputs were duly supplied to the farmers by KVK. Data were collected from the field of CFLDs farmers and analysed to compare the yield of farmers' field and CFLDs field. The Technology gap, extension gap and technology index I and technology index II were estimated by formulae provided by Samui *et.al.* 2000.

Techno1ogy gap = Potential yield – demonstration yield

Extension gap = demonstration yield – farmers practice yield (control)

$$\text{Technology index - I(\%)} = \frac{\text{Potential yield} - \text{Demo yield}}{\text{Potential yield}} \times 100$$

$$\text{Technology index - II(\%)} = \frac{\text{Demo yield} - \text{Check yield}}{\text{Demo yield}} \times 100$$

Data on District production, productivity and area were taken from agriculture department. Data were interpreted on two years average basis.

Results and discussion

1. Knowledge level of advanced agronomic practices of Sesame (Til)

To know the need of the technological intervention the knowledge level of the farmers in 20 villages were estimated from 400 farmers 20 farmers each village. Over all maximum numbers of farmers fall in category of low level (43.75) knowledge, while very few were with high knowledge level 20.75 per cent (Table 1). Thus need was felt to introduce latest varieties and nutrient management in CFLDs programme in the twenty villages. CFLDs are good extension tool to demonstrate the impact of new agro technique to the farmers.

Table 1: Overall knowledge level of farmers in respect of cultivation of Sesame (N= 400)

Category of knowledge level	Score range	No. of farmers	%tage of respondents
Low	30-35	175	43.75
Medium	36-54	142	35.50
High	55-75	83	20.75

2. Yield and Technological index I & II

Implementation of improved production technology remarkably increased the yield (39.10 – 75.00 per cent) over farmers' practice during the two years of CFLD demonstrations. The both year average yields under recommended practice (CFLD) were obtained 6.99 q/ha as compared to farmers' practice 4.57 q/ha, which was 52.95 % higher (table 2). Although, yield obtained under CFLD demonstration Higher than potential yield of variety. It may be due to cumulative effect of several biotic and a biotic factors or agronomical management in micro climatic conditions that varying year to year.

Yield enhancement under recommended practice might be due to balance nutrition as per soil test value, integrated approach, involving fertilizers and bio-fertilizers which play a vital role in making availability of plant nutrient. Similar results were observed by R S Raikwar and P Srivastva (2013), Tomar *et al.* (2003), Tiwari and Saxena (2001) and Tiwari *et al.* (2003).

Table 3 showed that by adopting advance production technology under CFLD demonstrations produced lower yield than the potential yield of varieties and it reflected technology index I (-17.24-6.14) per cent. The two years average yield of CFLD demonstration technology index I was found (-) 5.55 per cent. The technology index II of CFLD Sesame was found higher (28.77-40.97) per cent over the farmers' practice. The two years average data of

Table 2: Performance of technological intervention (CFLD) on Yield (q/ha) of Sesame

Year	Yield Potential (q/ha)	Yield obtained (q/ha)						Yield increase (%)
		Check			Demo			
		Max.	Min.	Av.	Max.	Min.	Av.	
2016-17	6.00	5.20	3.30	4.25	8.40	6.30	7.47	75.00
2017-18	6.00	5.10	4.20	4.68	7.20	5.75	6.51	39.10
Average	6.00	5.15	3.75	4.57	7.80	6.03	6.99	52.95

Table 3: Performance of technological intervention (CFLD) on technology index I & II of Sesame

Name of the crop	Year	Area (ha)	Demos (No.)	Variety Check	Variety Demo	National av. yield (q/ha)	State av. yield (q/ha)	District av. yield (q/ha)	Potential yield of the demo variety (q/ha)	Technology index- I (%)	Technology Index -II (%)
Sesame	Kharif2017	10	25	Type 78	GT 03	4.45	2.15	0.87	6.00	-17.24	40.97
Sesame	kharif-18	10	25	Type 78	GT 03	4.48	2.15	0.96	6.00	6.14	28.77
Average	-	10	25	-	-	4.48	2.15	0.92	6.00	-5.55	69.74

Table 4: Economical comparison between CFLD demo and farmers' practice of Sesame

Year	Sale Price (Rs q^{-1})	Check: Gross Cost (Rs/ha)	Check: Gross return (Rs/ha)	Check: Net Return (Rs/ha)	Check: B:C ratio	Demo: Gross Cost (Rs/ha)	Demo: Gross return (Rs/ha)	Demo: Net Return (Rs/ha)	Demo: B:C ratio	Net returns increase (%)
2017	7500	13200	31875	18675	2.41	18200	56025	37825	3.07	102.5
2018	6250	14800	29245	14445	1.97	19500	41055	21555	2.10	49.22
Average	6875	14000	30560	16560	2.18	18850	48540	29690	2.56	79.29

Table 5: District Growth on Area (ha), Production (Mt) and Productivity (q/ha) of Sesame (Til)

Year	Area (ha)	Area % over the last year	Production (mt)	Production % over the last year	Productivity q/ha	Productivity % over the last year
2016	8515	-	1192	-	1.40	-
2017	8847	3.89	770	-35.40	0.87	- 37.85
2018	8932	0.96	1026	33.24	1.15	32.18

Source: *JDA Statistics, Krishi Bhawan, Lucknow*

CFLD Sesame on technology index II was higher (34.87%) than the farmers' practice. The average yield of district increased in second year (0.87 to 0.96 q / ha).

Data presented in table 3 revealed that demonstration technology had impact over farmers' practices. It might be due to cumulative effect on average yield of district, technology index I and technology index II due to good management of CFLD and technological spread among the farmers of the district. The average yield increased in CFLD demo field due to technological intervention may happen in other similar situation. The results are in agreement with the finding as reported by Tomar *et al.* (2003)

3. Economical Assessment:

The cost of cultivation in CFLD demonstration comparatively higher (Rs 18200 - 19500) as compared to farmers' practice (Rs 13200 – 14800) because of additional input applied in CFLD demo. The two years average gross return (Rs 48540) and net return (Rs 29690) in CFLD demo were found higher than the farmers practice gross return (Rs 30560) and net return (Rs 16560). The average net returns 79.29% higher than that of farmers' practice. It showed that the adoption of demonstration technology by farmers would be higher economically and gainful proposition.

The B: C ratio exhibited the same trend as in gross and net return which was found 2.10 – 3.07 in CFLD demo and 1.97 – 2.41 in farmers' practice (table 4). Years to year ups in cost of cultivation which consequently reflect the benefit cost ratio in decreasing trends in farmers' practice and increasing trends found in demonstration. Results suggested economics viability and agronomic feasibility of technology for Sesame cultivation as reported Deshmukh *et al.* (2005) and Pathak (2005).

4. Impact of CFLD on technology dissemination in the Districts:

Data presented table 5 revealed that the impact of CFLD on Sesame in the district increased in cultivated area, from 8515 to 8932 ha, Production and productivity of sesame in district decreased 1192 mt to 770 and 1.40 to 0.87 q/ha due to un even and short rainfall and next year production and productivity increased from 770 mt to 1026 mt and 0.87 to 1.15 q/ha, respectively. Technologies dissemination on advance technology of sesame through CFLD on Sesame crop, growth area, production and productivity 3.89, (-) 35.40 and (-) 37.85 per cent in 2017, and 0.96, 33.24 & 32.18 per cent in 2018, respectively. In 2017 found higher dissemination rate due to acceptability of advance technology, variety and un-saturation of area under Sesame crop

Conclusion

Very few farmers had the knowledge of improved practice of Sesame cultivation. The farmers need to be made aware about the improved package of practices including high yielding varieties. Cluster Front Line Demonstration increased remarkable the area, but due to dependency on rain fall productivity and production of Sesame fluctuate in both years in district Shahjahanpur.

References

Bedigian, D. (2004). Introduction and early uses of Sesame in Southwest Asia. Econ Bot 58, 329-353

Borchani, C., Besbes, S., Bleker, C.H., Attia, H., (2010). Chemical Characteristics and oxidative stability of Sesame seed, Sesame paste and olive oil. J. Agric. Tech. 12, 585-596

Deshmukh, K.K.; Saraiya, A.B. and Dubey, D.P. (2005). Effect of integrated nutrient management on productivity trends, economics and soil fertility in soybean-chick cropping system. JNKVV Research Journal. 39 (**2**): 29-32

FAO STAT, (2015). Food and Agriculture Organization, FAOSTAT Database, Available at *http://faostat,fao.org/site/567/defalt*

FAOSTAT, (2013). food and Agriculture organization of the United Nation. Available from *http://faostat,fao.org/site/567/desktop defalt. Aspx?Page ID=878#ancor*.

Hegde, D.M. (2012). Carrying capacity of Indian agriculture: oilseeds, *Current Science*, **102**(6): 867- 873.

Hasen, R., (2011). Sesame profile, 19th August, 2011. Avaible at *http:// www.ogmre.org/commodoties_products/grains_oil seed/sesame_profile.*

Khaleque MA, 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.

Mkamilo GS, Bedigian D (2007). In *PROTA* (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. < http://database.prota.org/search.htm>. Accessed 30 November, 2008. (Van der Vossen, H. A. M. & Mkamilo, G. S., eds.).

Pathak, Jagannath (2017). Evaluation of yield performance of gram (Cicer arietinum) through front line demonstration. *The Journal of Rural and Agricultural Research.* 17 (**2**): 6-10

Samui, S.K.; Maitra, S.; Roy, D.K.; Mandal, A.K. and Saha, D. (2000). Evaluation on front line demonstration on groundnut.*Journal of the Indian Society Castal Agriculture Research.*18(**2**): 180-183

Tiwari, K.B. and Saxena, A. (2001). Economic analysis of FLD of oil seed in Chhindwara. *Bhartiya Krishi Anusandhan Patrika,* 16(**3&4**): 185-189

Tiwari, R.B.; Singh, Vinay and Parihar, Pushpa (2003). Role of FLD in transfer of gram production technology. *Maharastra Journal of Extension Education.* 22(**1**):19.

Tomar, L.S.; Sharma, B.P. and Joshi, K. (2003). Study on yield gap and adoption level of potato production technology in grid region. *Maharshtra Journal of Extension Education.*22 (**1**): 15-18