Field performance of Sesame varieties under rainfed ecosystem in southern Tamil Nadu

ABSTRACT

In Pudukottai district, sesame is cultivated in 3,000 ha and farmers are predominantly growing very old sesame variety TMV 3. This variety is more susceptible to pest and diseases which leads to increased cultivation cost towards plant protection measures as well as reduced yield and income. To overcome this problem, Krishi Vigyan Kendra, Tamil Nadu Agricultural University, Pudukkottai conducted On Farm Testing (OFT) in sesame varieties for promoting the high yielding varieties. Fifteen farmers were selected in different locations of Thiruvarankulam block, Pudukkottai district in Tamil Nadu. Critical inputs of seeds of sesame varieties like TMV 7 and G.Til 10 were distributed to the farmers. The plant physiological and yield parameters*viz.,* plant height (cm), No. of branches, No. of capsules/ branch, capsule length (cm), seeds per capsule, Yield (q/ha) and BC ratio were recorded. The results revealed that, Among the sesame varieties tested, TMV 7 was recorded the maximum plant height (125 cm), number of branches (6.6), number of capsules per plant (43.5), capsules length (3.3 cm), No of seeds per capsule (57) which resulting in the highest yield of 7.8 q/ha followed by sesame G.Til 10 which recorded more plant height (120 cm), number of branches (6.0), number of capsules per plant (38.2) capsules length (3.1 cm), No of seeds per capsule (51) and yield of 7.3 q/ha compared to farmers variety cultivating variety TMV 3 which registered the lowest plant physiological parameters and yield (6.4 q/ha). The maximum B:C ratio was recorded in sesame variety TMV 7 (3.12) followed by G.Til 10 (2.92) over the variety TMV 3 (2.84). From this trial, it was concluded that, farmers are satisfied with the sesame TMV 7 variety for cultivation due to its low pest and disease incidence, higher yield and BC ratio.

Key Words: On Farm Test, Sesame, TMV 7,G.Til 10, Plant growth, Yield, BC Ratio.

INTRODUCTION

Sesame (*Sesamum indicum* L.) is the oldest indigenous oilseed crop, with longest history of cultivation in India. Sesamum is having the highest oil content (46- 64%) and dietary energy (6355 kcal/ kg). Its oil unlike other fats is highly stable and does not develop rancidity leading to loss of flavor and vitamins. India ranks first in the world with 16.73 Lakh ha area and 6.5 Lakh tonnes production. It is mainly cultivated in the states of Gujarat, Madhya Pradesh, Rajastan, Uttar Pradesh, Orissa, Maharashtra, Tamil Nadu, Andhra Pradesh, and West Bengal. The average yield of sesame in India is low(391 kg/ha) as compared with other countries in the world. The low productivity in sesamum is due to rain fed cultivation in marginal and sub marginal lands under poor management and unavailability of high yielding varieties. However, improved varieties and agronomical management techniquescapable of increasing the productivity levels of sesame are developed for different agro ecological situations in the country. Sesame is highly sensitive to seasonal variation in terms of day length and temperature. Therefore, varieties recommended for commercial cultivation are location and season specific. Farmers generally prefer particular varieties in different regions or states for their popularity on the basis of the desirable traits *viz*., seed colour, resistance to biotic and abiotic stresses and higher market prices. An improved varieties and scientific cultivation technologies are capable for increasing the productivity level of sesamum (Yadav et al, 2020). Against this background, with the objective of obtaining higher yield and income from sesame cultivation, On Farm Testing were conducted during summer season in the year 2020 in Thiruvarnkulam block of Pudukkottai district with high yielding varieties and improved production technologies.

MATERIALS AND METHODS

The present on farm study was conducted in the rainfed eco system in five villages of Pudukkottai district duringsummer 2020. Totally fifteen farmers' field were randomly selected and sowing was taken up using two high yielding improved varieties of sesame namely TMV 7 and G.Til 10 in five replications with one check variety TMV 3 which is already grown by the farmers. Critical inputs *viz.,* seeds of sesame varieties TMV 7 and G.Til 10 were distributed to the farmers for OFT trial. All the recommended package of practices were followed during the cropping period. The details of varieties and cultural practices were given in Table1&2. The recommended weed control and plant protection measures were applied according to requirement of the crop. Observations were recorded on plant height, number of branches, number of capsules per plant, test weight (1000 seeds weight), and yield. Cost of cultivation, net income and benefit cost ratio of the demonstrations were worked out and compared with that of the farmers practices to assess the benefits of the intervention.

According to Samui *et al* (2000) the technology gap, extension gap and technology index were estimated

Technology gap = Potential yield – yield obtained with improved practices

Extension gap = Improved practices yield – Farmers yield

Technology Index = Technology gap/ Potential yield X 100.

Table 1. Characteristics of sesame varieties selected for On Farm Trial.

Name of the variety	Characters of the variety
TMV 7	It is a hybrid derivative of Si 250 x ES 22. It is a high yielding sesame variety with brown colour seed. Duration: 85- 90 days. Yield: 737 kg/ha under rainfed condition. Oil content: 51.0 % It is tolerant to root rot disease. Yield: 737 kg/ha under rainfed condition
G.Til 10	It is a selection from TNAU 17 Days to 50% flowering: 46 Duration: 92-95, Seed coat colour: Black 1000 seed weight: 3.04 g Oil content: 45.2% Tolerant to phytophthora blight Potential yield: 950 kg/ha

Table 2. Details of Agronomic management practices in Pudukkottai district under OFT programme

Sl. No.	Cultural operation	Existing practice	Improved cultivation practice
1.	Variety	TMV 7	TMV 7 and G.Til 10
2.	Seed rate	5-8 kg/ha	5 kg/ha.
3.	Seed quality	Ungraded seed	Graded seed
4.	Seed treatment	No seed treatment	Seed treatment *Trichoderma*@ 4g/kg.

5.	Method of sowing	Broadcasting	Line sowing
6.	Fertilizer application	Indiscriminate application	Integrated Nutrient Management
7.	Application of nutrient	-	TNAU MN mixture @ 7.5 kg/ha
8.	Plant protection	-	Integrated pest management

RESULTS AND DISCUSSION

The results revealed that the maximum plant height was recorded in variety TMV 7 (125 cm) followed by G.Til 10 (120 cm). The sesame varieties TMV 7 showed the maximum number of branches (6.6), maximum number of capsules per branch (43.5) and more number of seeds per capsule (57) followed by G. Til 10 which also recorded more number of branches (6.0), number of capsules per branch (38.2) and number of seeds per capsule (51). Capsule length (3.3 cm), number of seeds per capsule (57) and test weight (3.12 g) were also higher in the TMV 7 when compared with the farmers' practice variety TMV 3.

The maximum yield of 7.8 q/ha was recorded in TMV 7 which was 21.9 per cent increase over farmers' practice variety TMV 3 (6.4 q/ha) followed by G.Til 10 which recorded 14.1 % increase in yield (7.3 q/ha). Thus, the local variety or farmers' practice may be replaced with high yielding varieties because of their higher productivity. Naik et al (2016) reported that adoption of scientific technologies for production of sesamum have given very good result in comparison to local practice. Theggali et al (2018) also reported that the adoption of improved varieties of sesame crop was helpful in replacement of local varieties for higher productivity. Similar findings were reported by Kumar et al (2018) on significant yield improvement in sesamum due to introduction of new variety in cluster mode which facilitated better crop management. The similar trend of result was observed by Kathiravan and Vanitha (2017) in paddy and they reported that the replacement of old varieties and farmers' practice by high yielding varieties with improved production technology increased the productivity in rice. Cultivation of groundnut variety CO 7 with improved production technology recorded 15 per cent more number of pods per plant and 17 per cent higher pod yield (Marimuthu and Kathiravan 2019). Kathiravan et al (2023) reported that adoption of improved varieties of greengram crop was helpful in replacement of local varieties for higher productivity.

Table 3. Performance of varieties on growth parameters, yield attributes in sesame

Treatments	Plant height (cm)	No. of branches	No. of capsules	capsule length (cm)	No. of Seeds \ capsule	Test weight(g)	Yield (q/ha)
Famers practice TMV 3	110	5.3	27.8	3.1	44	2.83	6.4
TMV 7	125	6.6	43.5	3.3	57	3.12	7.8
G.Til 10	120	6.0	38.2	3.0	51	3.04	7.3
SEd	1.7	0.22	2.14	0.11	1.8	0.02	0.01
CD P< (0.05)	3.51	0.46	4.30	0.25	3.8	0.05	0.02

Economic advantages of the management of sesame TMV 7 variety over local variety were calculated based on the prevailing market prices, wages and other input costs. The cost of production of sesame under the demonstration was Rs. 25,000/ha when compared to farmers practice (Rs. 22500/ha). The result confirmed the similar findings of demonstrations on oilseed crops by Singh et al (2018). This was naturally higher when compared to the farmers practice due to the adoption of better management practices. But net returns and benefit cost ratio were higher in the demonstration plots (Rs.78,000/ha and 3.12, respectively) compared to the local check (Rs. 64,000/ha and 2.84, respectively). Rao and Ramana (2017) reported similar results in adoption of improved varieties and production techniques in sesame under rain fed conditions in Andhra Pradesh. Meena et al (2018) concluded that the small and marginal farmers associated with sesamum cultivation could substantially increase the income as well as the livelihood security by the use of new production technologies.

Table 4. Yield and Economics of sesame varieties cultivated in OFT.

Variety	Yield (q/ha)	Economics of Trials (Rs. /ha)			
		Gross cost	Gross income	Net income	B:C Ratio
Famers' practice VRI 2	6.4	22500	64000	41500	2.84
TMV 7	7.8	25000	78000	53000	3.12
G.Til 10	7.3	25000	73000	48000	2.92

The technology gap ranged between 1.2 to 2.2 q/ha. The observed technology gap was due to various constraints such as soil fertility, availability of low moisture content and climatic hazards etc. Hence, to reduce the yield gap, location specific recommendations for varieties, soil testing and timely sowing appears to be necessary. A value of 0.9 to 1.4 q/ha of extension gap was found. There is a need to decrease this wider extension gap through dissemination of latest improved cultivation practices among the farmers. These findings were similar to the findings of Jain (2016) and Kushwah*et al* (2016). The technology index showed the suitability of varieties for cultivation at farmer's field. The Lower technology values indicated that feasibility of variety among the farmers is more. The technology index ranged from 13.33 to 23.15 per cent. The finding was in accordance to finding of Sandhu and Dhaliwal (2016).

Table 5. Yield, technology gap, extension gap and technology index of sesame.

Name of Variety	Yield (q/ha.)			Per cent increase	Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
	Potential yield (q/ha)	Improved practices	Farmers Practice				
TMV 7	9.0	7.8	6.4	21.9	1.2	1.4	13.33
G.Til 10	9.5	7.3	6.4	14.1	2.2	0.9	23.15

CONCLUSION

The results of the On Farm Testing (OFT) showed that the high yielding sesamum varieties with improved production techniques substantially increased the yield and economic benefits of sesame cultivation in Southern districts of Tamil Nadu. There is a need to increase the adoption and spread of improved technologies by the extension agencies to improve the area expansion and production potential of sesame.

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