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


## 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,scientifically known as(*Sesamum indicum* L.) is cultivated for its high oil content.Sesame seeds contain 21.9% protein and 61.7% fat, and are rich in minerals such as Fe and Ca, vitamins and dietary fiber (Rout et al., 2018). Sesame oil contains 80% unsaturated fatty acids and a small amount of saturated fatty acids"(Ozdemir et al., 2018)."India ranks first in the world with 16.73 Lakh ha area and 6.5 Lakh tonnes production. The production of sesame yields in developing countries is much higher than in developed countries, where sesame production in Asia and Africa represented more than 93% of global production. Asia produces half of the world's production of sesame crop, followed by Africa with an average yield of about 43%. Sesame is mainly cultivated in the states of Gujarat, Madhya Pradesh, Rajastan, Uttar Pradesh, Orissa, Maharashtra, Tamil Nadu, Andhra Pradesh, and West Bengal. In india, the average yield is low(391 kg/ha) when compared with other countries. The low productivity in sesamum is due tofarmers depend on the traditional methods of sesame cultivation, such as hand planting which leads to the labour-intensive and increasing the cost of production,nonavailability of high yielding varieties, rain fed cultivation in marginal and sub marginal lands and adoption of poor management practices. However, improved varieties and production techniquescapable of increasing the productivity 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 are prefered particular varieties according to different regionson 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). Based on this background, On Farm Testing was conducted during summer season in the year 2020 in Thiruvarnkulam block of Pudukkottai district with high yielding varieties and improved production technologiesfor obtaining higher yield and income from sesame cultivation.

## MATERIALS AND METHODS

The on farmtrial 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 with high yielding improved varieties of sesame *viz.,*TMV 7 and G.Til 10in 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. The recommended crop management practices were adopted during the cropping period. The particulars of varieties and cultural practices were given in Table1&2. Based on the requirement of the crop, the recommended weed management and plant protection measures were applied. "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". [17]

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

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

| Sl. No. | Particulars | Existing cultivation 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<br>FYM: 12.5 t/ha<br>Fertilizer: 23:13:13 kg NPK/ha |
| 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 (125 cm), number of branches (6.6) per plant, number of capsules per branch (43.5) and more number of seeds per capsule (57) were recorded in variety TMV 7 followed by G.Til 10 which recorded the plant height of 120 cm, more number of branches (6.0), capsules per branch (38.2) and seeds per capsule (51). The maximum capsule length (3.3 cm) and test weight ( 3.12 g) were also observed in the TMV 7variety when compared with the farmers' cultivating variety TMV 3 which recorded the lowest plant physiological and yield parameters.

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). So, the use of old variety along with farmers' practice may be replaced with high yielding varieties and improved or advanced production technologies for getting higher productivity.According to Naik et al (2016) adoption of advanced cultivation technologies for production of sesameresulted in higher yield over the adoption of local cultivation practice.Theggali et al (2018) also found that "the use of improved varieties was very useful in replacement of local varieties for higher productivityof sesame". Similar trend of results 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) found that in greengram, cultivation of improved varieties resulted in higher productivity which facilitates replacement of local varieties.

**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 |

Cost of cultivation for sesame TMV 7 variety and local variety were calculated based on the prevailing market prices, wages and other essential input costs. The cost of production of sesame with improved variety and technologies under the demonstration was Rs. 25,000/ha when compared to farmers practice (Rs. 22500/ha). Similar trend of resultswas obtained in 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. However net returns (Rs.78,000/ha) and benefit cost ratio (3.12) were higher in the demonstration plots as compared to the farmers pracice (Rs. 64,000/ha and 2.84, respectively)”. [17] 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) demonstrated 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 results showed that the wider technology gap ranged from 1.2 to 2.2 q/ha. The observed technology gap might be due to various constraints such as soil fertility, availability of low moisture content, climatic hazards, application of local cultivation practices with low yielding variety*etc*. Hence, to reduce the yield gap, location specific recommendations for varieties, soil testing and timely sowing appears to be necessary. In this trial, arange of value of 0.9 to 1.4 q/ha of extension gap was found which showed that 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) in greengramand Kushwah*et al* (2016) in mustard. The technology index of this study showed the suitability of varieties for cultivation at farmer’s field. The technology index value ranged from 13.33 to 23.15 per cent and the lower technology values indicated that feasibility of variety for cultivation among the farmers is more. Similar trend of finding was reported by Sandhu and Dhaliwal (2016) in moong bean..

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

| **Name of Variety** | **Yield (q/ha.)** | | | **Per cent increas** | **Technology gap (q/ha)** | **Extension gap (q/ha)** | **Technology index (%)** |
|---|---|---|---|---|---|---|---|
| | **Potential yield (q/ha)** | **Improved practices** | **Farmers Practice** | | | | |

| | | | | e | | | |
|---|---|---|---|---|---|---|---|
| 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) concluded that the cultivation of high yielding sesamum varieties with improved production techniques substantially increased the yield and economic benefits of sesame cultivation in Southern districts of Tamil Nadu.

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