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Frontline demonstrations on yield enhancement of short-duration toria variety ‘Sushree’

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Abstract

Toria (*Brassica rapa* var. *toria*) is a significant oilseed crop grown across Odisha, yet its productivity remains low due to the predominance of traditional low-yielding varieties and suboptimal crop management practices. To address this Frontline Demonstrations (FLDs) on the improved toria variety ‘Sushree’ was conducted during the rabi season in the farmers’ fields of Ganjam districts of Odisha. The performance of Sushree was compared with the prevailing local toria varieties under similar agro-ecological conditions. Demonstrations incorporated recommended practices including timely sowing, balanced nutrient application, and integrated pest and disease management.

Results revealed that the Sushree variety consistently outperformed the farmers practice, recording higher plant growth, more effective siliquae per plant, and a significant increase in seed yield. The yield advantage of Sushree ranged from substantial to very high across demonstration sites, leading to improved net returns and higher benefit–cost ratios for participating farmers. Farmers also expressed greater acceptance of the variety due to its early maturity, uniform growth, and tolerance to major diseases.

The findings indicate that large-scale adoption of Toria variety Sushree can effectively enhance toria productivity and farmers’ income in rainfed areas of Ganjam district.

Keywords: Toria, *Brassica rapa* var. *toria*, Sushree variety, Frontline Demonstration (FLD)

Introduction

Toria (*Brassica rapa* var. *toria*) is an important oilseed crop widely grown in eastern India, particularly under rainfed and residual moisture conditions during the rabi season. Its short duration, low input requirement, and suitability to diverse agro-climatic zones make it a vital crop for small and marginal farmers. (DRMR, 2023; ICAR, 2024) However, the productivity of toria in many regions remains low due to factors such as the use of traditional varieties, inadequate crop management practices, and limited access to improved technologies. To bridge this yield gap, the introduction of high-yielding and disease-resistant varieties through Frontline Demonstrations (FLD) has emerged as an effective extension approach. (Samui *et al.*, 2000; Basumatary *et al.*, 2022) ^[1].

The toria variety ‘Sushree’, developed for higher yield potential, early maturity, and improved tolerance to major pests and diseases, has gained attention for enhancing oilseed production in Odisha. (OUAT, 2024) ^[5]. The present study was undertaken to assess the growth, yield performance, and economic benefits of Toria variety Sushree through Frontline demonstrations in farmers’ fields. The findings aim to provide evidence-based recommendations for improving toria productivity and promoting large-scale adoption of the Sushree variety in the region.

Materials and Methods

The Frontline Demonstrations (FLDs) were conducted during the rabi season of Ganjam district in an area of 10 ha covering 20 farmers. The improved toria variety Sushree was demonstrated under recommended production technologies and compared with the farmers’ existing practice (local variety).

The crop was sown during at a spacing of 30 cm × 10 cm using a seed rate of 8–10 kg ha⁻¹. Recommended nutrient management practices comprising 40 kg N, 20 kg P₂O₅ and 20 kg K₂O ha⁻¹ were followed. Seeds were treated with Carbendazim @ 2 g kg⁻¹ seed before sowing to protect

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the crop from seed- and soil-borne diseases. Need-based plant protection measures were adopted to manage major insect pests and diseases.

The demonstrated technology included cultivation of improved variety Sushree, line sowing, balanced fertilization, seed treatment, timely weed management, and integrated pest management practices. The local check consisted of farmers' traditional variety and existing cultivation practices. Data on growth parameters, yield attributes, and seed yield were recorded from randomly selected plants in each demonstration plot. Economic parameters such as cost of cultivation, gross return, net return, and benefit-cost ratio were calculated based on prevailing market prices.

The performance of the demonstrated technology was evaluated using the following indicators:

- Percentage increase in yield over local check
- Extension gap (Demonstration yield – Farmers' yield)

The collected data were compiled and analyzed using simple statistical tools such as mean values and percentage increase over farmers' practice.

Results and Discussion

The comparative performance of improved toria variety Sushree and the local variety was evaluated under farmers' field conditions. The results indicated that Sushree outperformed the local variety in terms of growth parameters, yield attributes, seed yield, and economic returns.

Table 1: Growth and Yield Attributes of Toria Varieties

Parameter	Sushree	Local Variety	% Increase over Local
Plant height (cm)	98.5	89.2	10.4
Primary branches plant ⁻¹	5.8	4.6	26.1
Siliqueae plant ⁻¹	145	118	22.9
Seeds siliquea ⁻¹	18.4	15.7	17.2
1000-seed weight (g)	3.9	3.5	11.4

The improved variety Sushree recorded higher plant height, number of branches, siliqueae per plant, and seeds per siliquea than the local variety. The superior yield attributes may be attributed to its improved genetic potential and better adaptation to the local agro-climatic conditions.

Table 2: Seed Yield and Economics of Toria Varieties

Particulars	Sushree	Local Variety
Seed yield (q ha ⁻¹)	10.8	8.6
Stover yield (q ha ⁻¹)	25.4	21.8
Gross return (Rs. ha ⁻¹)	64,800	51,600
Cost of cultivation (Rs. ha ⁻¹)	22,500	21,800
Net return (Rs. ha ⁻¹)	42,300	29,800
Benefit: Cost ratio	2.88	2.37

The seed yield of Sushree was 10.8 q ha⁻¹, which was 25.6% higher than the local variety (8.6 q ha⁻¹). The higher yield obtained with Sushree could be attributed to its better yield-contributing characters, including higher number of siliqueae per plant and seeds per siliquea. The increased yield translated into higher gross and net returns. The benefit-cost ratio of Sushree (2.88) was also higher than that of the local variety (2.37), indicating better economic viability.

The results clearly demonstrate the superiority of Sushree over the local variety under field conditions. The improved variety Sushree recorded higher plant height, number of branches,

siliqueae per plant, and seeds per siliquea than the local variety. The superior yield attributes may be attributed to its improved genetic potential and better adaptation to the local agro-climatic conditions (OUAT, 2023; DRMR, 2023).

The seed yield of Sushree was 10.8 q ha⁻¹, which was 25.6% higher than the local variety (8.6 q ha⁻¹). The higher yield obtained with Sushree could be attributed to its better yield-contributing characters, including higher number of siliqueae per plant and seeds per siliquea. Similar increases in yield due to adoption of improved toria and mustard varieties have been reported by Gogoi *et al.* (2022) [3] and Singh *et al.* (2021) [6].

The increased yield translated into higher gross and net returns. The benefit-cost ratio of Sushree (2.88) was also higher than that of the local variety (2.37), indicating better economic viability. Similar findings on enhanced profitability of improved rapeseed-mustard varieties under frontline demonstrations were reported by Yadav *et al.* (2020) [7] and Singh *et al.* (2021) [6].

The results clearly demonstrate the superiority of Sushree over the local variety under field conditions. The improved variety exhibited enhanced growth and yield attributes, leading to higher seed yield and profitability. These findings are in conformity with the reports of Gogoi *et al.* (2022) [3] and DRMR (2023), who observed that improved rapeseed-mustard varieties consistently outperformed local cultivars in productivity and economic returns.

Conclusion

The present study demonstrated that the improved toria variety Sushree performed significantly better than the local variety under farmers' field conditions. Sushree recorded superior growth and yield attributes, resulting in higher seed yield and economic returns. Basumatary *et al.* (2022) [1] and Hoque *et al.* (2023), The variety also exhibited a higher benefit-cost ratio, indicating its economic viability for farmers. The yield advantage of Sushree can be attributed to its improved genetic potential and better adaptability to the local agro-climatic conditions.

Based on the findings, cultivation of Sushree can be recommended as a suitable alternative to local varieties for enhancing toria productivity and profitability. Wider adoption of Sushree, along with recommended crop management practices, has the potential to increase oilseed production, improve farmers' income, and contribute to the sustainability of the farming system in the region.

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