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RESEARCH PAPER

Profitability of Tomato as Influenced by IWM in Shivalik Foothills of Jammu

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ABSTRACT

A field experiment was conducted during spring-summer season of 2024 at the Research Farm, Division of Agronomy, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, to study the profitability of tomato as influenced by integrated weed management in shivalik foothills of Jammu. The experiment was conducted in randomized complete block design and replicated thrice. The experiment comprised of nine treatments, *viz.*, T_1 (Pendimethalin 1 kg a.i./ha (PE), T_2 (Pendimethalin 1 kg a.i./ha (PE) + one HW at 30 DAT), T_3 (Oxyfluorfen 0.25 kg a.i./ha (PPI), T_4 (Oxyfluorfen 0.25 kg a.i./ha (PPI) + one HW at 30 DAT), T_5 (Black polythene mulch), T_6 (White polythene mulch), T_7 (Two hand weeding at 30 & 45 DAT), T_8 (Weed Free), T_9 (Weedy check). Experiment results revealed that weed management treatments significantly enhanced fruit yield and economic returns. Black polythene mulch recorded significantly higher yield of 298.62 q/ha, while Pendimethalin 1 kg a.i./ha (PE) + one HW at 30 DAT recorded the highest benefit–cost ratio of 2.81. Thus, based on one year study it can be concluded that T_5 (Black polythene mulch) was found to be effective for improving fruit yield of tomato. However, T_2 (Pendimethalin 1 kg a.i./ha (PE) + one hand weeding at 30 DAT) was found to be economically viable option for tomato growers of Jammu region.

HIGHLIGHTS

- Sustainable crop production requires effective integrated management practices.
- Integrated approaches enhance crop productivity and resource-use efficiency.
- Improved management strategies increase farm profitability and system sustainability.

Keywords: Tomato, Integrated weed management, Yield, Profitability, Mulching, Herbicides

Tomato (*Solanum lycopersicum*) is one of the most important and widely cultivated vegetable crop globally (Oliveira *et al*. 2023). Originally native to the regions of Peru and Mexico, it was introduced in India by Portuguese. In India, tomato contributes substantially to both domestic consumption and the processing industry, while in the Shivalik foothills of Jammu, it forms an important source of income for small and marginal farmers. However, tomato productivity is severely constrained by weeds, which compete with the crop for nutrients, light, and moisture, leading to yield losses and increased cost of cultivation. Globally, tomato yield losses

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due to unchecked weed growth are estimated to range between 36% and 80% (Samant and Prusty, 2014). Integrated weed management (IWM), which combines cultural, mechanical, chemical, and biological control methods, has emerged as an effective and environmentally sustainable approach for weed suppression. While studies have shown that IWM can improve tomato growth and yield, information on its impact on profitability under the specific agro-climatic conditions of the Shivalik foothills is limited. Therefore, the present study was undertaken to evaluate the effect of different IWM practices on the profitability of tomato, considering both yield and economic returns, with the aim of identifying the most effective and economically viable weed management strategy for tomato growers in the region.

MATERIALS AND METHODS

A field experiment was conducted during the spring–summer season of 2024 at the Research Farm, Division of Agronomy, SKUAST-J, situated in the Shivalik foothills. The soil of the experimental field was sandy clay loam in texture, slightly alkaline in reaction, medium in available potassium, low in organic carbon, available phosphorus, and available nitrogen. The experiment was conducted in randomized complete block design and replicated thrice. The experiment comprised of nine treatments, *viz.*, T_1 (Pendimethalin 1 kg a.i./ha (PE), T_2 (Pendimethalin 1 kg a.i./ha (PE) + one HW at 30 DAT), T_3 (Oxyfluorfen 0.25 kg a.i./ha (PPI), T_4 (Oxyfluorfen 0.25 kg a.i./ha (PPI) + one HW at 30 DAT), T_5 (Black polythene mulch), T_6 (White polythene mulch), T_7 (Two hand weeding at 30 & 45 DAT), T_8 (Weed Free), T_9 (Weedy check). The herbicide doses mentioned in the treatments are on an active ingredient (a.i.) basis. Pendimethalin 30% EC and oxyfluorfen 23.5% EC were used as commercial herbicide formulations. Black and white polythene mulches of 25-micron thickness were used. The four weeks old seedlings of tomato cultivar 'Pusa Ruby' was transplanted at a spacing of 60 cm × 45 cm. Tomato crop was fertilized with recommended dose of 120 kg N/ha: 60 kg, P_2O_5/ha: 60 kg, K_2O/ha through inorganic sources. The inorganic sources of nitrogen, phosphorus and potassium were urea, diammonium phosphate and muriate of potash, respectively. The full quantity of phosphorus and potassium were applied along with one-third of nitrogen at the time of transplanting. The remaining two-thirds of nitrogen was top-dressed in two equal splits, one at 30 DAT and the other at 60 DAT. Fruit yield was estimated at harvest and expressed in quintals per hectare (q/ha). Relative economics was analyzed by calculating: -

- **Cost of Cultivation (₹/ha):** The cost of cultivation was computed separately for each treatment on a per-hectare basis by accounting for labour, inputs, and all field operations at prevailing market rates.
- **Gross Return (₹/ha)**

  Yield was converted into gross returns in rupees based on prevailing market price i.e. ₹ 20/kg
- **Net Return (₹/ha)**

  Net return of tomato crop was calculated by deducting the cost of cultivation from the gross returns.
- **Benefit: Cost ratio**

  The benefit cost ratio was calculated as follows:

$$\text{Benefit: cost ratio} = \frac{\text{Net Return} \quad ₹/\text{ha}}{\text{Cost of cultivation} \quad ₹/\text{ha}}$$

Statistical Analysis

The data was subjected to analysis of variance (ANOVA) outlined by Cochran and Cox (1963), to assess the effects of the treatments and significant differences among treatments were determined using the critical difference (CD) at the 5% level.

RESULTS AND DISCUSSION

Fruit yield

Integrated weed management practices had a significant influence on tomato yield depicted in Table 1 and Fig. 1 under different treatments. Among the treatments, black polythene mulch recorded significantly higher fruit yield of 298.62 q/ha, which was statistically at par treatment T_6 (White polythene mulch), T_8 (Weed Free), T_7 (Two hand weeding at 30 & 45 DAT) and T_2 (Pendimethalin 1 kg a.i./ha (PE) + one HW at 30 DAT), indicating that effective weed suppression directly enhances productivity. Whereas, the lowest fruit yield was observed with treatment T_9 (Weedy check) to the

Table 1: Effect of integrated weed management practices on fruit yield and relative economics of tomato

Sl. No.	Treatment	Fruit yield (q/ha)	Cost of cultivation (₹/ha)	Gross Returns (₹/ha)	Net returns (₹/ha)	B:C ratio
T_1	Pendimethalin 1 kg a.i./ha (PE)	227.22	126981	454439	327458	2.58
T_2	Pendimethalin 1 kg a.i./ha (PE) + one HW at 30 DAT	249.20	130881	498407	367526	2.81
T_3	Oxyfluorfen 0.25 kg a.i./ha (PPI)	220.19	127581	440372	312791	2.45
T_4	Oxyfluorfen 0.25 kg a.i./ha (PPI) + one HW at 30 DAT	247.79	131481	495587	364106	2.77
T_5	Black polythene mulch	298.62	173181	597237	424056	2.45
T_6	White polythene mulch	294.14	183181	588287	405106	2.21
T_7	Two hand weeding at 30 & 45 DAT	253.43	135306	506856	371550	2.75
T_8	Weed Free	276.92	174306	553848	379542	2.18
T_9	Weedy check	141.52	123931	283042	159111	1.28
	SEm (±)	16.57				
	CD (5%)	49.69				

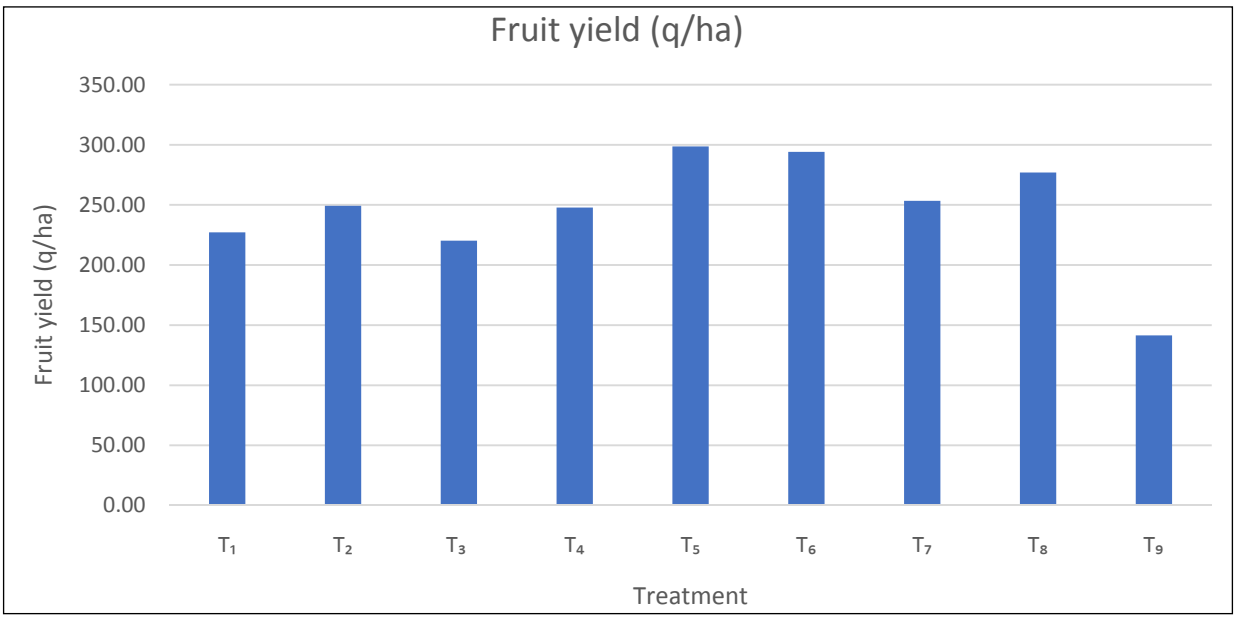

Fig. 1: Fruit yield (q/ha) of tomato as influenced by integrated weed management

corresponding value of 141.52 q/ha. These results corroborated with the findings of Li *et al.* 2019.

Relative economics

Relative economics depicted in Table 1 revealed that the cost of cultivation was slightly higher in treatments involving mulching or herbicide applications; however, these costs were offset by higher returns from increased fruit yield. The maximum net return of ₹ 424056/ha was recorded under black polythene mulch, whereas the highest benefit–cost ratio of 2.81 was achieved with pendimethalin 1 kg a.i./ha (PE) + one HW at 30 DAT, making it the most economically viable option. Black polythene mulch, while giving the highest yield, had a slightly lower B:C ratio due to higher input costs, yet it proved highly effective in improving overall productivity. These results are in line with the findings of Kumar *et al.* (2021).

CONCLUSION

Based on one year study, it can be concluded that T_5 (Black polythene mulch) was found to be effective improving fruit yield of tomato. However, T_2 (Pendimethalin 1 kg a.i./ha (PE) + one hand weeding at 30 DAT) was found to be economically viable option for tomato growers of Jammu region.

REFERENCES

Cochran, W.G. and Cox, G.M. 1963. *Experimental Designs*. Asia Publishing House, Bombay, India.

Kumar, S., Sharma, R. and Yadav, P. 2021. Black polyethylene mulch improves tomato yield by optimizing soil moisture and temperature. *Scientia Horticulturae*, **278**: 109843.

Li, X., Zhang, Y. and Wang, L. 2019. Impact of weed density on crop productivity: Insights into tomato farming systems. *Agricultural Water Management*, **223**: 105689.

Oliveira, T.R., Serafim, A.D., Breland, B., Miller, A., Beneton, K., Singh, V., Segbefia, W., Argenta, J.C., Broderick, S.R. and Tseng, T.M. 2023. An integrated weed management approach in tomato using soil steaming, mulching, and winter cover crops. *Frontiers in Agronomy*, **5**: 1075726.

Samant, T.K. and Prusty, M. 2014. Effect of weed management on yield, economics, and nutrient uptake in tomato (*Solanum lycopersicum* Mill.). *Advance Research Journal of Crop Improvement*, **5**: 144–148.