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Effect of ecofriendly weed management practices on growth parameters and yield of organic tomato

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Abstract
A two-year field study (2022–2023 and 2023–2024) evaluated ecofriendly weed management practices in organic tomato against a chemical control standard. Nine treatments, including mulching, stale seedbed preparation, intercropping, and tamarind leaf extract application, were tested alongside metribuzin 70% WP @ 0.525 kg a.i ha^{-1} PE *fb* hand weeding and an unweeded control. Plant height was not significantly affected, although rice straw mulch (T_4), live mulch with *dhaincha* (T_1), and intercropping (T_6) consistently produced taller plants. The number of primary branches was significantly highest with poly mulch + intra-row HW (T_3) in both years, followed by rice straw mulch (T_4). Yield was greater under chemical control (23.43–24.43 t ha^{-1}), but poly mulch (T_3, 18.07–21.34 t ha^{-1}) and rice straw mulch (T_4, 16.57–19.04 t ha^{-1}) were the most productive organic treatments. The unweeded control recorded the lowest yields (2.17–2.48 t ha^{-1}). Results demonstrate that poly and straw mulch offer viable, high-performing alternatives to chemical weed control in organic tomato.

Keywords: Weed management, growth parameters, organic farming

Introduction
Tomato is one of the most important vegetable crops in the World. In India, tomato is cultivated in an area of about 8.73 lakh hectares with the production of 212.4 lakh tonnes.
Demand for organically grown vegetables is increasing in urban areas. Organic vegetable producers rank weeds as one of the most troublesome, time consuming and costly production problems. Hence, there is a need to develop effective non chemical weed management strategies for organic vegetables especially tomato.
Organic farming is practiced in 187 countries, with atleast 3.1 million farmers operating 72.3 million hectares of farmland organically (Willer *et al.*, 2021) [6]. India had 1.4 million organic food producers during 2020, which was more than the combined number of organic food producers in the world's other nine largest countries. Organic farming is typically seen to be more sustainable than conventional farming, yet it comes with its own set of problems and opportunities.

Materials and Methods
A field experiment entitled "Assessment of ecofriendly weed management practices in organic tomato" was conducted during *kharif*, season of 2022-2023 and 2023-2024 at AICRP on weed management block, college farm, PJTAU, Rajendranagar, Hyderabad. The experiment was laid out in a randomised block design with three replications. The soil of the experimental site was sandy loam in texture with a pH of 7.6, organic carbon 0.76%, bulk density; 1.5 g/m^3, available nitrogen 255 kg/ha, avaialable phosphorus 18.1 kg/ha and available potassium 615 kg/ha. The treatments comprised of "T_1-Live mulch with *dhiancha* and incorporation at 30 DAT, T_2- Stale seed bed *fb* HW at 20 & 40 DAT, T_3- Polymulch+intrarow hand weeding (HW) at 30 DAT, T_4-Rice straw mulch 5 t/ha *fb* intrarow HW at 30 DAT, T_5- Hoeing twice at 20&40 DAT, T_6-Intercrop (Fenugreek) green leaf vegetable *fb* HW at 40 DAT, T_7- Tamarind leaf aqueous extract @10% at 3 and 30 DAT followed by hand weeding at 40 DAT, T_8-Unweeded control, T_9-Chemical weed control-Metribuzin 70% WP @ 0.525 kg a.i./ha *fb* HW at 40 DAT (outside the layout).

Plant height (cm)
Data on plant height was recorded with meter scale at at 30 and 60 DAT, was expressed in cm.

Number of primary branches per plant
Visually, the numbers of branches per plant were counted from main stem at physiological maturity.

Yield per hectare (t ha^{-1})
The obtained yield of individual treatment was used to compute per hectare and expressed in tonnes. The total weight of matured fruits harvested from each picking in the respective treatments was recorded until the final harvest. The total yield of fruits per hectare under different treatments was computed.

Statistical analysis
The data collected from the experiment were analyzed statistically by analysis of variance method for randomised block design (Gomez and Gomez, 1984) [4]. Whenever the treatment differences were found significant (F test), critical differences were worked out at five per cent probability level. Treatment differences that were non-significant were denoted by NS. If the difference between two treatments was more than critical difference, the value was indicated for comparison by treatment means.

Results and Discussion
Plant height (cm)
The results of the study which is mentioned in Table.1 clearly indicated that plant height at 30, 60 days after transplanting (DAT) and at harvest was not significantly influenced by the weed management practices during both 2022–2023 and 2023–2024. At 30 DAT in 2022–2023, the highest plant height (67.00 cm) was recorded with intercropping green leaf vegetable followed by hand weeding at 40 DAT (T_6), closely followed by live mulch with *dhaincha* incorporation at 30 DAT (T_1, 65.67 cm). In 2023–2024, a similar trend was noticed, with T_6 (67.07 cm) and T_1 (67.00 cm) producing the tallest plants at this stage. By 60 DAT, rice straw mulch followed by intra-row hand weeding at 30 DAT (T_4) produced the maximum plant height (116.00 cm in 2022–2023 and 115.67 cm in 2023–2024), marginally surpassing other eco-friendly options such as T_6 and T_2. At harvest, plant height across treatments were nearly comparable, ranging from 107.13 cm under poly mulch + intra-row HW at 30 DAT (T_3) to 116.47 cm under T_4. Overall, among the eco-friendly practices, rice straw mulch (T_4), *dhaincha* live mulch (T_1), and intercropping with green leaf vegetable (T_6) consistently maintained taller plants throughout the crop growth period, suggesting better early-season weed suppression and favourable microclimatic conditions, despite the absence of statistically significant differences. Similar results were found with Kumar *et al.* (2021) and Kavitha *et al.* (2021) [5] in tomato crop.

No of primary branches/plant
The number of primary branches per plant was significantly affected by the weed management practices during both 2022–2023 and 2023–2024 which is given in Table 2. In 2022–2023, the highest number of branches (14.7) was observed with poly mulch + intra-row hand weeding at 30 DAT (T_3), which was significantly superior to all other treatments. This was followed by stale seedbed followed by hand weeding at 20 & 40 DAT (T_2, 12.3), rice straw mulch + intra-row HW at 30 DAT (T_4, 12.0), and the chemical weed control with metribuzin 70% WP @ 0.525 kg a.i ha^{-1} PE followed by HW at 40 DAT (T_9, 11.7). The unweeded control (T_8) recorded the minimum number of branches (7.1), indicating severe suppression of branching due to weed competition. In 2023–2024, a similar trend was observed, with T_3 producing the highest number of branches (14.9), significantly exceeding all treatments. Rice straw mulch (T_4, 13.8) and live mulch with dhaincha (T_1, 12.0) were the next best eco-friendly options, followed closely by chemical weed control (T_9, 10.0) and stale seedbed with HW (T_2, 10.2). Eco-friendly mulch-based treatments (T_3 and T_4) consistently outperformed the chemical weed control (T_9) in both years, highlighting their ability to promote greater vegetative growth through enhanced weed suppression, soil moisture conservation, and improved crop vigor. Treatments involving intercropping (T_6) and tamarind leaf aqueous extract (T_7) produced intermediate branch numbers, whereas the unweeded control (T_8) remained the poorest performer in both seasons. Similar results were found with Kumar *et al.* (2021), Kavitha *et al.* (2021) [5] and Bakht *et al.* (2014) [2] in tomato crop.

Yield (t/ha)
The results of the study which are given in table 2. clearly indicated that ecofriendly weed management practices had a significant influence on the yield of organic tomato during both the 2022–2023 and 2023–2024 growing seasons. Among all treatments, the highest yield was recorded with chemical weed control using metribuzin 70% WP @ 0.525 kg a.i ha^{-1} PE followed by hand weeding at 40 DAT (T_9), which produced 23.43 t/ha and 24.43 t/ha, respectively. However, among the organic-compatible approaches, poly mulch combined with intra-row hand weeding (T_3) resulted in the highest yields of 21.34 t/ha in 2022–2023 and 18.07 t/ha in 2023–2024, followed closely by rice straw mulch at 5 t/ha followed by intra-row hand weeding (T_4), which yielded 19.04 t/ha and 16.57 t/ha, respectively. The stale seedbed followed by hand weeding at 20 and 40 DAT (T_2) also showed promising results with yields of 15.28 t/ha and 13.33 t/ha, indicating its effectiveness as a sustainable weed management strategy. Lower yields were observed in treatments involving live mulch with dhaincha (T_1), intercropping with leafy vegetables (T_6), and tamarind leaf extract application (T_7), while the unweeded control (T_8) exhibited the lowest yields at 2.17 t/ha and 2.48 t/ha, emphasizing the negative impact of weed competition. The results underline the effectiveness of organic mulching techniques, particularly poly and straw mulch, as ecofriendly alternatives to chemical weed control in organic tomato production. Kavitha *et al.* (2023) [5] also reported that in tomato, significantly higher plant height, no. of branches and higher fruit yield per plant and fruit yield a was recorded with hand weeding twice at 15 and 30 DAT followed application of black polythene mulch and mechanical weeding at 15 and 30 DAT followed by the treatments with organic mulches. In another study mulching resulted in a significant increase in total yield. i.e, 27.9%, 25.6%, and 11.6% respectively in PM (pine needle mulch), RM (rice straw mulch) and WM (wheat straw mulch) as compared to NM (no mulch) (Goel *et al*., 2020) [3].

Table 1: Plant height (cm) as influenced by ecofriendly weed management practices in tomato crop of organic tomato

T. No	Treatment	Plant height (cm)					
		2022-2023			2023-2024		
		30 DAT	60 DAT	At harvest	30 DAT	60 DAT	AT harvest
T_1	Live mulch with *dhiancha* and incorporation at 30 DAT	65.67	113.53	114.27	67.00	112.67	114.27
T_2	Stale seedbed *fb* HW at 20 & 40 DAT	60.33	115.20	115.27	65.47	115.27	115.27
T_3	Poly mulch + intra row hand weeding (HW) at 30 DAT	60.87	107.00	107.13	64.40	105.47	107.13
T_4	Rice straw mulch (5 t ha^{-1}) *fb* intra row HW at 30 DAT	58.33	116.00	116.47	65.20	115.67	116.47
T_5	Hoeing twice at 20 & 40 DAT	55.73	111.73	112.20	60.33	110.93	112.20
T_6	Intercrop green leaf vegetable *fb* HW at 40 DAT	67.00	115.47	115.47	67.07	113.60	115.47
T_7	Tamarind leaf aqueous extract @ 10% at 3 and 30 DAT *fb* HW at 40 DAT	52.27	114.33	114.47	64.33	113.60	114.47
T_8	Unweeded control	55.07	114.20	114.20	64.67	112.93	114.20
T_9	Chemical weed control- metribuzin 70% WP @ 0.525 kg a.i ha^{-1} PE *fb* HW at 40 DAT	55.00	114.07	114.07	57.20	110.87	114.07
	SE(m)±	NS	NS	NS	NS	NS	NS
	C.D. (P=0.05)	NS	NS	NS	NS	NS	NS

Table 2: No of primary branches/plant and Yield (t/ha) in tomato as influenced by ecofriendly weed management practices in organic tomato

Tr. No	Treatments	No of primary branches		Yield (t/ha)	
		2022-2023	2023-2024	2022-2023	2023-2024
T_1	Live mulch with *dhiancha* and incorporation at 30 DAT	11.7	12.0	6.18	7.16
T_2	Stale seedbed *fb* HW at 20 & 40 DAT	12.3	10.2	15.28	13.33
T_3	Poly mulch + intra row hand weeding (HW) at 30 DAT	14.7	14.9	21.34	18.07
T_4	Rice straw mulch (5 t ha^{-1}) *fb* intra row HW at 30 DAT	12.0	13.8	19.04	16.57
T_5	Hoeing twice at 20 & 40 DAT	11.1	10.1	10.80	7.83
T_6	Intercrop green leaf vegetable *fb* HW at 40 DAT	9.5	10.9	7.60	5.10
T_7	Tamarind leaf aqueous extract @ 10% at 3 and 30 DAT *fb* HW at 40 DAT	8.8	10.3	6.04	8.01
T_8	Unweeded control	7.1	9.8	2.17	2.48
T_9	Chemical weed control- metribuzin 70% WP @ 0.525 kg a.i ha^{-1} PE *fb* HW at 40 DAT	11.7	10.0	23.43	24.43
	SE(m)±	0.62	0.55	0.67	0.63
	C.D. (P=0.05)	1.87	1.64	2.02	1.90

Conclusion

Chemical weed control achieved the highest tomato yields, but poly mulch + intra-row HW and rice straw mulch provided comparable performance within organic standards. Hence mulch integration can be recommended for organic tomato cultivation to balance productivity and sustainability.

References

1. Arun Kumar T, Radha Rani K, Sridevi S. Impact of different mulching material and weed management practices on weed dynamics, growth, fruit yield and economics of tomato (*Solanum lycopersicum*). J Pharmacogn Phytochem. 2021;10(1):2334-2337.
2. Bakht T, Khan IJ, Marwat KB, Hussain Z. Integration of row spacing, mulching and herbicides on weed management in tomato. Pak J Bot. 2014;46(2):543-547.
3. Goel L, Shankar V, Sharma RK. Effect of organic mulches on agronomic parameters: A case study of tomato crop (*Lycopersicon esculentum* Mill.). Int J Recycl Org Waste Agric. 2020;9:297-307.
4. Gomez KA, Gomez AA. Statistical Procedures for Agricultural Research. New York: John Wiley and Sons; 1984.
5. Kavitha MP, Uma Maheswari M, Krishna K, Balaji G, Yuavaraj R, Sachin R, *et al*. Effect of weed management treatments on growth and yield of tomato. Indian J Weed Sci. 2021;53(1):114-116.
6. Willer H, Travnicek J, Meier C, Schlatter B. The World of Organic Agriculture: Statistics and Emerging Trends 2021. Bonn: Research Institute of Organic Agriculture (FiBL) and IFOAM–Organic International; 2021. Version 20210301.