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Mulch-based weed control strategies for enhanced sweet corn productivity

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Abstract
A field experiment was conducted at the AHS, Lara Green of the Vignan's foundation for Science, Technology and Research during summer 2025. The aim is to evaluate the effect of different mulching materials on soil moisture conservation, weed suppression, and yield performance of a sweet corn (Sugar 75) variety. Seven treatments were tested: T_1 – Paddy straw mulch (10 t/ha), T_2 – Rice husk mulch (10 t/ha), T_3 – Sawdust mulch (10 t/ha), T_4 – Black polythene mulch, T_5 – Dry leaves (10 t/ha), T_6 – Live mulch, and T_7 – Control (no mulch). The treatments were laid out in randomized block design (RBD) and replicated thrice. Parameters measured were weed density (No/m^2), weed dry weight (g/m^2), and grain yield. Results revealed that black polythene mulch (T_4) and dry leaves mulch (T_5) significantly outperformed other treatments in maintaining soil moisture, suppressing weeds, and improving yield.

Keywords: Sweetcorn, mulching, weed density and weed dry weight

1. Introduction

Sweet corn (*Zea mays* L. *saccharata*) has come to light as a valuable economic crop not only for its economic potential but also for its role in sustainable food systems due to its high consumer demand and adaptability (Sidahmed and Nagy, 2025) [8]. As global agricultural systems face increasing pressure from climate change, resource scarcity, and nutritional challenges, and weed resurgence, a strategic synthesis of research is essential to guide future innovation. Due to shifting dietary tastes, urbanization, and growing health consciousness, there has been a steady growth in the demand for sweet corn worldwide over the past 20 years, which has prompted increasing study into breeding, agronomy, and sustainability (Revilla *et al*. 2021) [6].

Weeds lower crop quality and productivity while serving as alternative hosts. For weed management, the first one to eight weeks following maize emergence are crucial. According to studies, weed infestation affects crop phenology and production qualities and results in significant yield losses of up to 60–81% in other places and 48% (Timsina *et al*. 2024) [10] in the Nepalese highlands. Various weed management approaches—cultural, physical, biological, and chemical—are used, but physical methods are labor-intensive, costly, and increasingly uneconomical due to rising labor requirements. Chemical weed management is faster and more efficient; nevertheless, chronic use of the same herbicide might lead to alterations in weed flora and herbicide resistance.

Due to its nature of improving soil health, conserve moisture, suppress weeds, and regulate soil temperature, Mulching gained a raised attention as a sustainable management technique (Patil *et al*. 2019) [4] in vegetable production systems, particularly under changing climatic conditions and limited irrigation resources.

Organic mulches such as paddy straw, rice husk, sawdust, and dry leaves improve soil structure and fertility over time (Rathore and Sharma, 2020) [5], while inorganic mulches like black polythene provide superior weed control and moisture retention. Live mulches, on the other hand, serve as soil cover crops that reduce erosion (Liu and Li, 2025) [3] but may compete with the main crop for resources. This study aimed to assess the effect of different organic and inorganic mulching materials on soil moisture retention, weed population, and yield performance of a vegetable crop under field conditions.

2. Materials and Methods

2.1 Experimental Site

The experiment was conducted at the AHS Lara Green, Vignan's Foundation for Science, Technology and Research, during the 2024- *Late rabi* season. The soil of the experimental site was sandy loam with moderate fertility and a pH of 6.8.

2.2 Experimental Design

The experiment was laid out in a Randomized Block Design (RBD) with seven treatments and three replications.

Treatments

- **T_1:** Paddy straw mulch (10 t/ha)
- **T_2:** Rice husk mulch (10 t/ha)
- **T_3:** Sawdust mulch (10 t/ha)
- **T_4:** Black polythene mulch
- **T_5:** Dry leaves mulch (10 t/ha)
- **T_6:** Live mulch (cowpea as cover crop)
- **T_7:** Control (no mulch)

2.3 Crop Details

The test crop was Sweetcorn (Sugar 75). Standard agronomic practices were followed for crop establishment and management with a spacing of 60×20cm.

2.4 Observations Recorded

- **Weed density (number/m²)**

Data on weed density were collected 25 days after sowing (DAS). Each time quadrate having size 0.5 × 0.5 m^2 was placed randomly three times in each treatment. The weeds inside the quadrate were counted and identified to calculate the weed density. Average was determined and then subsequently converted into m^2

- **Weed dry weight (g/m²)**

Weeds within each quadrate were removed, they were shade dried for 3 weeks. Average dry weight was computed and then were converted into m^2

- **Total yield (t/ha)**

Five tagged plants have been harvested, and the grain yield has been calculated using all the yield parameters of maize. This yield has been converted into q/ha using the formula provided below (Ullah *et al*. 2008) [11].

$$\frac{Grain\ yield\ (kg) \times 10000}{Area\ (m2)}$$

2.5 Statistical Analysis

Data were analyzed using ANOVA, and treatment means were compared using the LSD (Least Significant Difference) test at a 5% level of significance.

3. Results

3.1 Weed Suppression

Weed density was significantly lowest under T_4 (black polythene) 14.67 and 17.33 on par with T_5 (dry leaves) 20.00 and 28.66. Organic mulches reduced weed growth moderately, while live mulch (T_6) 55.67 and 71. 33nd control (T_7) 66.00 and 98.33 in 30DAS and 60DAS showed higher weed infestation respectively.

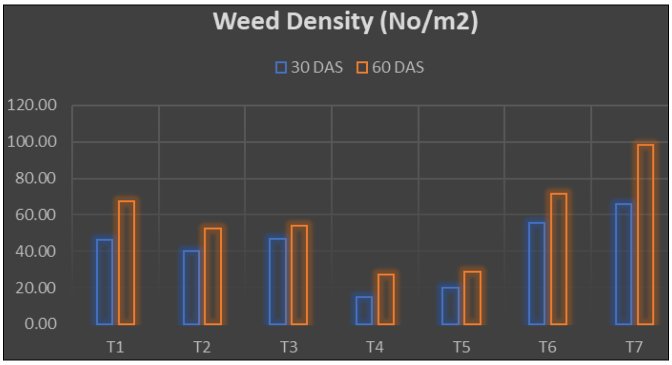


Fig 1: Weed density (No/m^2) in 30 and 60 DAS

Weed dry weight (g/m^2) also shown a significant difference among the treatments on which T_4 (black polythene) 35.78 and 114, followed by T_5 (dry leaves) 44.3 and 135. Organic mulches reduced weed growth moderately, while live mulch (T_6) 107.200 and 472.67 and control (T_7) 227.600 and 572.64 in 30 and 60 DAS showed higher weed dry weight respectively.

Table 1: Effect of dry weight at 30 and 60 DAS in different mulching treatments

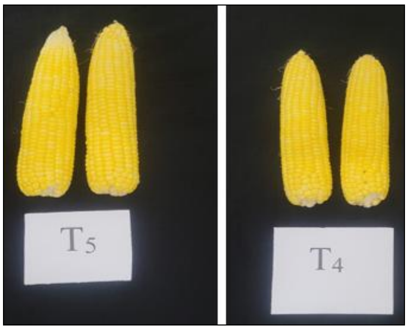
Treatment	Weed dry weight (g/m²)-	
	30 DAS	60DAS
T_1 – Paddy straw (10t/ha)	68.33	321.78
T_2 – Rice husk (10t/ha)	82.00	229.67
T_3 – Sawdust (10t/ha)	93.33	238.00
T_4 – Black polythene	35.78	114.00
T_5 – Dry leaves (10t/ha)	44.30	135.00
T_6 – Live mulch	107.200	472.67
T_7 – Control	227.60	572.64
SEd	8.11	35.00
CD 5%	17.69	76.27

3.2 Yield Parameters

Number of fruits per plant, and total yield were significantly influenced by mulch type. Maximum yield (44.33 t/ha) was obtained in T_4 (black polythene mulch), on par with T_5 (dry leaves mulch @ 10t/ha) (44.00 q/ha). Control plots produced the lowest yield (26.33 /ha).

Table 2: Effect of yield in different mulching treatments

Treatment	Yield (q/ha)
T_1 – Paddy straw (10t/ha)	34.66
T_2 – Rice husk (10t/ha)	37.33
T_3 – Sawdust (10t/ha)	36.33
T_4 – Black polythene	44.33
T_5 – Dry leaves (10t/ha)	44.00
T_6 – Live mulch	33.33
T_7 – Control	26.33
SEd	1.81
CD 5%	3.95



Treatmental variation

The study's findings plainly demonstrate the way several mulching materials can reduce weed development and increase crop output. Among the treatments, black polythene mulch (T_4) considerably reduced weed density (14.67 weeds/m²) and dry weight (35.78 g/m²), closely followed by dry leaves mulch @ 10t/ha (T_5), which recorded 20.00 weeds/m² and 44.30 g/m² at 30 DAS. Organic mulches such as paddy straw, rice husk, and sawdust marginally restricted weed growth, but live mulch (T_6) and control plots (T_7) indicated increased weed infestation and dry biomass. These results support earlier research that found synthetic mulches prevent weed emergence by restricting light penetration, forming a physical barrier (Senevirathne and Kaparaju, 2025) [7] and changing the temperature and moisture content of the soil (Cucu *et al*. 2025) [2].
Weed suppression directly altered growth and yield characteristics. Black polythene mulch produced the highest maize yield (44.33 q/ha), followed by dry leaf mulch (44.00 q/ha), while control plots produced the lowest yield (26.33 q/ha). This result is consistent with earlier research showing that effective weed control enhances plant growth (Singh *et al*. 2018) [9], fruit production, and overall output. The moderate efficacy of organic mulches may be ascribed to slower decomposition and partial coverage, which offers some suppression of weeds but less than black polythene. On the other hand, because live mulch competed with the primary crop for nutrients and space, it was less effective and produced a lower yield (Cougnon *et al*. 2025) [1].

4. Conclusion

The present study demonstrates that mulch type significantly affects weed suppression and maize productivity. Black polythene mulch and dry leaves mulch were the most effective treatments, significantly reducing weed density and biomass, while increasing yield. Live mulch and unmulched control plots provided the least amount of weed control, while organic mulches provided a moderate amount. These results imply that mulching—especially with black polythene or dry leaves—offers an effective, economical, and long-lasting method of controlling weeds in maize farming. By increasing crop output and lowering reliance on chemical herbicides, the use of various mulching techniques can support sustainable farming methods. Moreover, proper mulching helps save soil moisture, regulate soil temperature, and promote nutrient retention, creating favorable circumstances for crop growth. The application of organic mulches like dry leaves also provides organic matter to the soil, boosting soil health over time. Implementing such mulching procedures can lower production expenses related with manual weeding and herbicide use. Therefore, integrating mulching into maize cultivation can be an eco-friendly and economically viable approach for improving overall crop productivity.

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References

1. Cougnon M, Durand JL, Julier B, Barre P, Litrico I. Using perennial plant varieties for use as living mulch for winter cereals: a review. Agronomy for Sustainable Development. 2022;42(6):110.
2. Cucu MA, Choudhary R, Trkulja V, Garg S, Matić S. Utilizing environmentally friendly techniques for the sustainable control of plant pathogens: a review. Agronomy. 2025;15(7):1551.
3. Liu JX, Li ZY. Plastic film mulching is a key strategy for coping with cultivated land loss and driving green agricultural development in the Loess Plateau. Land Degradation & Development. 2025;36:1-15.
4. Patil DS, More SD, Jadhav P. Influence of sawdust and straw mulching on soil fertility and weed control. Agricultural Reviews. 2019;40(3):221-226.
5. Rathore S, Sharma P. Organic mulches and soil health improvement in vegetable cropping systems. Journal of Applied and Natural Science. 2020;12(4):633-639.
6. Revilla P, Anibas CM, Tracy WF. Sweet corn research around the world 2015–2020. Agronomy. 2021;11(3):534.
7. Senevirathne N, Kaparaju P. Enhancing the agronomic value of anaerobic digestate: a review of current vs. emerging technologies, challenges and future directions. Agriculture. 2025;15:1-25.
8. Sidahmed H, Vad A, Nagy J. Advances in sweet corn (*Zea mays* L. saccharata) research from 2010 to 2025: genetics, agronomy, and sustainable production. Agronomy. 2025;15(5):1260.
9. Singh R, Sharma V, Meena R. Effect of different mulches on growth and yield of tomato. Indian Journal of Horticulture. 2018;75(2):264-269.
10. Timsina D, Sah SK, Adhikari P. Weed management in maize: mulching is a next alternative to herbicide. Far Western Review. 2024;2(2):72-90.
11. Ullah W, Khan MA, Sadiq M, Rehman H, Nawaz A, Sher MA. Impact of integrated weed management on weeds and yield of maize. Pakistan Journal of Weed Science Research. 2008;14(3-4):141-151.