The Andhra Agric. J 72 (2): 121-124, 2025
doi :10.61657/aaj.2025.185

Influence of organic weed management practices on growth and yield of transplated finger millet *(Eleusine coracana L.)*

A Rajesh, M M V Srinivasa Rao, U Triveni and Ch Sitarama Lakshmi
Department of Agronomy, Acharya N G Ranga Agricultural University,
Agricultural College, Bapatla-522101, Andhra Pradesh, India

ABSTRACT

A Field experiment entitled "Organic weed management in transplanted finger millet (*Eleusine coracana* L.)" was conducted during *rabi*, 2024 - 25 at Agricultural Research Station, Vizianagaram, Andhra Pradesh, India. Among all the organic weed management practices, significantly higher dry matter production, grain yield and straw yield were recorded with hand weeding at 20 & 40 DAT, which was statistically on par with Corn gluten meal mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT, Paddy husk mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT, Saw dust mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT and Cono weeding at 20 DAT + H.W at 40 DAT. The present study concluded that among the various organic weed management practices tested, hand weeding at 20 and 40 DAT proved to be the most effective in enhancing the growth and yield of transplanted finger millet. Treatments that involved organic mulches, cono weeding combined with hand weeding at 40 DAT were also recorded significantly higher growth and yield parameters and showed superior performance when compared to their sole mulch treatments.

Keywords: *Corn gluten meal, Finger Millet, Mulch, Paddy husk and Organic weed management*

Finger Millet (*Eleusine coracana* L.) is an important food crop in the semi-arid tropics, particularly in India and East Africa. It is rich in proteins, minerals, phosphorus, iron, calcium, vital amino acids and vitamins than many other cereals, the grain is frequently referred to as "nutritious millet." According to Devi *et al*. (2014), finger millet has about 65-75% carbs, 8% protein, 15-20% dietary fibre and 2.5-3.5% minerals. Being a C_4 crop, it uses water effectively and can survive under drought conditions. It is widely cultivated across several major states, namely Karnataka, Uttarakhand, Tamil Nadu, Andhra Pradesh, Odisha, Jharkhand and Maharashtra. In India, finger millet grown in 12.02 lakh hectares, with production of 15.63 lakh tonnes and productivity of 1300 kg ha^{-1}. Andhra Pradesh produces 1222 kg ha^{-1} of productivity from the cultivation of 0.33 lakh tonnes of finger millet on 0.27 lakh hectares (Department of Agriculture and Farmers Welfare, 2023-24).

Modern agriculture, which emphasizes production, mostly relies on synthetic inputs such as herbicides to manage weeds. In finger millet, ethoxysulfuron and 2,4-D sodium salt are commonly used as post-emergence herbicides to control weeds, while alachlor and pendimethalin are applied as pre-emergence treatments. However, the indiscriminate use of herbicides for weed control can destroy biodiversity, pollute the environment and lead to the development of herbicide-resistant weed species.

Mulching is an effective non-chemical weed management technique. It protects the soil surface from sunlight, which can prevent weed seeds from germinating. Mulch also inhibits weed growth by acting as a physical barrier. In organic farming systems, mulching can be done using organic materials such as Paddy straw, paddy husk, sawdust, corn gluten meal and maize shank powder. Depending on the quantity required to suppress weed emergence, the cost of purchased mulches may be affordable. An additional benefit of organic mulches is that they contribute organic matter to the soil and are naturally biodegradable.

MATERIAL AND METHODS

A field experiment was conducted during the 2024-25 *rabi* season in Field No. 24 at the Agricultural Research Station, Vizianagaram, located at 18°072 N latitude, 83°262 E longitude and 58.2 meters above sea level, in the North Coastal Agroclimatic Zone of Andhra Pradesh, India. The soil

was red sandy loam in texture, neutral in soil reaction, low in organic carbon and available nitrogen and medium in available phosphorus and potassium. The experiment was laid out in randomized block design with twelve weed management practices and three replications. Treatments consisted of T_1 (Weedy check), T_2 (Hand weeding at 20 & 40 DAT) (Weed free check), T_3 (Cono weeding at 20 DAT + H.W at 40 DAT), T_4 (Paddy husk mulching @ 500 kg ha^{-1} at 2-3 DAT, T_5 (Paddy husk mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT), T_6 (Saw dust mulching @ 500 kg ha^{-1} at 2-3 DAT), T_7 (Saw dust mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT), T_8 (Maize shank powder mulching @ 500 kg ha^{-1} at 2-3 DAT), T_9 (Maize shank powder mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT), T_{10} (Corn gluten meal mulching @ 500 kg ha^{-1} at 2-3 DAT), T_{11} (Corn gluten meal mulching @ 500 kgha^{-1} + H.W at 40 DAT), T_{12} (Spraying of 25% Eucalyptus leaf extract at 15 & 40 DAT).

Finger millet variety Vegavathi (VR 929) was raised with recommended package of practices except for the weed management practices. 21 days old finger millet seedlings were transplanted on 7th December, 2024 and recommended dose of fertilizers was 60-40-30 kg N, P_2O_5 and K_2O ha^{-1}. Full dose of phosphorous and potassium were applied as basal and nitrogen was applied in two equal splits viz., at basal, at tillering stage. Weed management practices were imposed as per the treatments. The different organic mulches were applied at 2-3 DAT between row to row and plant to plant of finger millet. Cono weeder also operated between the crop rows and required quantity of filtered concentrated. Eucalyptus leaf extract was sprayed at 15 and 40 DAT. Data on different parameters were recorded and statistically analyzed following the analysis of variance for RBD as given by Panse and Sukhatme (1985). Weed index was calculated by employing formula given by Gill and Kumar (1969).

$$WI = \frac{X-Y}{X} \times 100$$

Where,

WI = Weed index

X = Grain yield from weed free plot

Y = Grain yield from plots for which WI is to be calculated

RESULTS AND DISCUSSION

Weed flora

The weed flora associated with finger millet belonged to seven taxonomic families, of which the predominant weed species were *Echinochloa crusgalli*, *Dactyloctenium aegyptium*, *Cynodon dactylon, Digitaria sanguinalis, Cyperus rotundus*, *Digera arvensis, Eclipta prostrata*, *Commelina benghalensis*, *Phyllanthus niruri, Amaranthus viridis* and *Cleome viscosa etc.*,

Effect of organic weed management practices on finger millet

The results revealed that different organic weed management practices significantly improved the dry matter accumulation, earhead length, number of fingers Earhead^{-1}, numbers grains finger^{-1}, Test weight (g) and Grain yield over weedy check (Table 1).

Drymatter production

Drymatter production of maize at harvest was significantly influenced by various organic weed management practices (Table 1). Dry matter production was significantly higher with in T_2 (10813 kg ha^{-1}) which was statistically on par with T_{11} (10522 kg ha^{-1}), T_5 (10160 kg ha^{-1}), T_7 (9975 kg ha^{-1}) and T_3 (9808 kg ha^{-1}). Higher plant dry matter accumulation might be due to the pre-emergence herbicidal activity of corn gluten meal, which effectively suppressed early weed emergence. The later flush of weeds was further managed by hand weeding at 40 DAS, ensuring reduced competition throughout the crop's early growth stages. Additionally, corn gluten meal contains approximately 10% nitrogen, which might have enhanced nutrient availability and supported vigorous vegetative growth. Mulching also likely contributed by conserving soil moisture, improving nutrient uptake and minimizing weed competition. These combined effects might have promoted better canopy development, improved photosynthetic efficiency and sustained metabolic activity, ultimately resulting in greater dry matter accumulation. Similar findings were also reported by Chethan *et al*. (2023), Stanzen *et al*. (2017). Significantly lower dry matter production was registered with T_1 (weedy check) due to heavy weed infestation lead to shorter plant height with less foliage and dry matter production.

Yield

Earhead length, number of fingers Earhead^{-1}, numbers grains finger^{-1}, Test weight (g) and Grain yield of finger millet differed significantly due to organic weed management practices (Table 1).

Higher yield attributes *viz*., earhead length, number of fingers Earhead^{-1}, numbers grains finger^{-1}, Test weight (g) and Grain yield of finger millet were registered with in T_2 (Hand weeding at 20 and 40 DAT) which was statistically on par with T_{11} (Corn

Table 1. Growth, yield and weed index of transplanted finger millet as influenced by various organic weed management practices

Treatments	Plant drymatter accumulation (kg ha^{-1})	No. fingers Earhead^{-1}	No. of grains finger^{-1}	Earhead length (cm)	Test weight (g)	Grain yield (kg ha-1)	Weed index (%)
T_1: Weedy check	5540.00	5.33	119.00	6.19	2.89	1483.00	53.51
T_2: Hand weeding at 20 & 40 DAT (Weed free check)	10813.00	7.00	209.00	8.04	3.15	3192.00	0.00
T_3: Cono weeding at 20 DAT + H.W at 40 DAT	9808.00	6.60	180.00	7.37	3.06	2797.00	12.36
T_4: Paddy husk mulching @ 500 kg ha^{-1} at 2-3 DAT	7073.00	6.23	136.00	6.75	2.96	1950.00	38.91
T_5: T_4 + H.W at 40 DAT	10160.00	6.70	191.00	7.82	3.09	2948.00	7.63
T_6: Saw dust mulching @ 500 kg ha^{-1} at 2-3 DAT	6844.00	6.20	130.00	6.65	2.95	1866.00	41.52
T_7: T_6 + H.W at 40 DAT	9975.00	6.67	182.00	7.77	3.08	2870.00	10.08
T_8: Maize shank powder mulching @ 500 kg ha^{-1} at 2-3 DAT	6961.00	5.83	129.00	6.60	2.92	1881.00	41.07
T_9: T_8 + H.W at 40 DAT	9031.00	6.50	170.00	7.22	3.05	2553.00	20.02
T_{10}: Corn gluten meal mulching @ 500 kg ha^{-1} at 2-3 DAT	7578.00	6.27	144.00	6.87	2.96	2105.00	34.06
T_{11}: T_{10} + H.W at 40 DAT	10522.00	6.80	194.00	7.92	3.13	3080.00	3.51
T_{12}: Spraying of 25% Eucalyptus leaf extract at 15 & 40 DAT	7520.00	6.23	168.00	7.11	3.03	2107.00	33.98
S.Em(±)	441.30	0.23	12.80	0.25	0.06	162.30	1.67
CD (P=0.05)	1294.00	0.68	37.00	0.73	NS	476.00	4.89
CV %	9.00	6.20	13.60	5.90	3.40	11.70	11.60

gluten meal mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT), T_5 (Paddy husk mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT), T_7 (Saw dust mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT) and T_3 (Cono weeding at 20 DAT + H.W at 40 DAT). This might be due to lower crop weed competition for growth resources throughout the crop growing period enabling the crop for maximum utilization of nutrients, moisture, light and space, which enhanced the vegetative and reproductive potential of the crop that might have reflected in the form of higher growth yield attributes and yield of finger millet. Similar results were also reported by Mahto *et al*. (2020), Stanzen *et al*. (2017). Yield was significantly lower with T_1 (weedy check) when compared to rest of the weed management practices.

Weed index

Among the organic weed management practices, the lowest weed index was observed in T (3.51%). This might be due to the effective suppression of weed emergence during the early crop stages by corn gluten meal, which acted as a pre-emergent inhibitor, coupled with timely hand weeding that removed later flushes. Such sustained weed control likely minimized weed biomass accumulation and allowed for more efficient utilization of resources such as nutrients, moisture and light by the crop, resulting in a significantly higher grain yield, which was on par with T_5(7.63) where reduced weed competition and improved grain yield contributed to lower weed indices. (Table 1).

CONCLUSION

The study revealed that hand weeding at 20 and 40 DAT was the most effective organic weed management practice for transplanted finger millet, resulting in the highest growth and yield. However, corn gluten meal mulching combined with hand weeding was statistically on par and recorded the lowest weed index, indicating effective weed suppression. Integrated approaches combining mulches or mechanical methods with hand weeding i.e., Paddy husk mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT, Saw dust mulching @ 500 kg ha^{-1} at 2-3 DAT + H.W at 40 DAT and Cono weeding at 20 DAT *fb* H.W at 40 DAT also performed well. Overall, integrated organic methods proved superior to sole applications and offer a sustainable alternative to chemical weed control.

LITERATURE CITED

Chethan R, Sagar G K, Rani B S and Reddy C B R 2023. Weed dynamics, growth and yield of maize as influenced by organic weed management practices. *Indian Journal of Weed Science.* 55 (3): 315-318.

Department of Agriculture and Farmers Welfare 2023-2024. https://upag.gov.in

Devi P B, Vijayabharathi R, Sathyabama S, Malleshi N G and Priyadarisini V B 2014. Health benefits of finger millet (*Eleusine coracana* L.) polyphenols and dietary fiber. *Journal of food science and technology*. 51:1021-1040.

Gill G S and Kumar V 1969. Weed index a new method for reporting weed control traits. *Indian Journal of Agronomy*. 6 (2): 96-98.

Mahto R, Kumar C and Singh R K 2020. Weed management in maize (Zea mays L.) through 4 hydroxyphenylpyruvate dioxygenase inhibitor herbicide with or without a methylated seed oil adjuvant. *Pesticide Research Journal*. 32 (1): 179- 185.

Panse V G and Sukhatme P V 1985. Statistical Methods for Agricultural Workers. Indian Council of Agricultural Research, New Delhi. 100-174.

Stanzen L, Kumar A, Puniya R, Sharma N, Sharma A, Mahajan A and Chand B R 2017. Effect of tillage and weed management practices on weed dynamics and productivity in maize (Zea mays)- wheat (Triticum aestivum) system. *International Journal of Current Microbiology and Applied Sciences*. 6 (4): 1907-1913.

Received on 25.04.2025 and Accepted on 20.05.2025