*Plant Archives* Vol. 26, Supplement 1, 2026 pp. 2200-2206 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2026.v26.supplement-1.295

# COMPARATIVE EVALUATION OF PRE AND EARLY POST-EMERGENCE HERBICIDES IN SUMMER PEARL MILLET

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(Date of Receiving : 12-10-2025; Date of Acceptance : 28-12-2025)

**ABSTRACT**

A field experiment was conducted at Agronomy Instructional Farm, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar during summer 2024 to assess the comparative evaluation of pre and early post-emergence herbicides in summer pearl millet using Randomized Block Design with three replications and eleven treatments. Among different treatments, weed free recorded significantly higher grain and straw yield (4948 and 8954 kg/ha, respectively). Next to weed free, significantly higher grain and straw yields were observed in IC *fb* HW at 20 and 30 DAS (4724 and 8719 kg/ha, respectively) and was found at par with application of atrazine 250 g/ha + pendimethalin 250 g/ha (PE) tank mix (4490 and 8548 kg/ha, respectively) and atrazine 500 g/ha PE (4458 and 8349 kg/ha, respectively) as compared to weedy check (2651 and 5600 kg/ha, respectively) due to higher number of effective tillers and better control of weeds at 20 DAS, 45 DAS and at harvest with lower weed index values. The maximum net return of was accrued under treatment IC *fb* HW at 20 and 30 DAS, which was followed by weed free, atrazine 250g/ha + pendimethalin 250g/ha (tank mix) PE and atrazine 500 g/ha (PE). Whereas, highest benefit cost ratio was recorded under application of atrazine 250g/ha + pendimethalin 250g/ha (tank mix) PE followed by atrazine 500 g/ha (PE).

***Keywords* :** Pre-emergence, Weed density, Weed index, Pearl millet, Atrazine.

## Introduction

Pearl millet [*Pennisetum glaucum* (L.)] is an important millet crop and grown for both food and fodder purpose. Pearl millet popularly known as bajra belongs to the family poaceae. Botanically Pearl millet is known as *Pennisetum glaucum* (L.) (2n=14). ‘West Africa’ is center of origin. Pearl millet is an indispensable arid and semi - arid crop of India (Ramesh *et al*., 2006). It grows on poor sandy soils as wall its drought escaping character has made it a popular crop of drought prone areas. The average nutrient composition of the edible portion of the seed is 67% carbohydrates, 12.4% moisture, 11.6% protein, 3.5% fat, 1.5 to 3.0% fiber and 2.7% minerals (Sharma and Burark, 2015). It is also rich in vitamins A and B, thiamin, riboflavin and imparts substantial energy to the body digestibility. Apart from grain, the straw for animal feed is an important secondary product for resource poor farmers (Arshewar *et al*., 2018). This crop can be grown in areas where other cereal crops such as wheat or maize, would not survive and it is well tailored to production systems characterized by low rainfall, low soil fertility and high temperature (Gupta *et al*., 2013).

In India, Pearl millet is the fourth most widely cultivated food crop after rice, wheat and maize. It also occupies an important place in the daily diet of many classes of people in India. During 2023-24, Pearl millet was grown in 7.38 million ha with productivity of 1453 kg/ha, while a production estimate of 10.72 million tones (Anonymous, 2023-24[a]). In Gujarat, area of summer Pearl millet is 3.16 lakh hectares, production is 9.56 lakh tonnes with productivity of 3026 kg/ha (Anonymous, 2023-24[b]). The major Pearl millet growing states in India are Rajasthan, Maharashtra, Gujarat, Haryana, Uttar Pradesh and Karnataka, where, it is grown both in kharif and summer seasons. The major Pearl millet growing district of Gujarat is Banaskantha, Junagadh, Jamnagar, Rajkot, Mehsana, Kheda, Amreli and Kutch.

Pearl millet faces severe weed competition resulting in heavy reduction in grain production. On an average, 55% yield reduction in Pearl millet due to weed infestation was observed by Banga *et al.* (2000). Das and Yaduraju (1995) have reported 72% or more yield loss in Pearl millet due to initial slow growth. It picks up growth, starts tillering and increase in height after 25-30 DAS and becomes more competitive against weeds. Weeds emerge along with the crop during rainy season which cause serious competition with the crop plants during initial slow growth period resulting in seed yield loss up to 40% or more (Sharma and Jain, 2003).

Weed competition was observed maximum during the initial growth stage of Pearl millet crop, because in early stage the growth of Pearl millet is very slow. Therefore, weed control in Pearl millet during the early growth period of crop is more important. If weed infestation is minimize during critical period of crop weed competition the yield can be equivalent to that of weed free condition. Therefore, it is an essential to manage the weeds by any means during crop weed competition period to obtain potential yield of Pearl millet (Chaudhary *et al.*, 2016).

Under scarcity of human labour, use of herbicide is the best option to reduce the weed infestation during early stages of crop growth. The use of chemical along with manual weeding is best option for effective weed management (Girase *et al.*, 2017). Considering these facts and views, an experiment was conducted to identify effective weed control approach in Pearl millet.

## Materials and Methods

A experiment was carried out at Agronomy Instructional Farm, Department of Agronomy, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Banaskantha (385506) (North Gujarat Agro-climatic region (AES IV) of Gujarat) at a 24o 19' North latitude and 72o 19' East longitude with an elevation of 154.52 meters above the mean sea level. The experiment was laid out in Randomized Block Design with eleven treatments and three replications. The experimental field was cultivated by tractor drawn cultivator, the stubbles of the previous crop were collected and removed from the field and finally land was prepared by harrowing and planking. The Pearl millet variety GHB 1129 was sown at a distance of 45 cm between the rows on 1st March, 2024 with a seed rate of 3.75 kg/ha. The gross plot size and net plot size of the experiment were 5.0×4.5 $m^2$ and 3.6×2.7 $m^2$, respectively. The crop was fertilized with application of well decomposed FYM @ 5 t /ha before sowing and 120:60:00 kg N: P2O5: K /ha at sowing. Full dose of phosphorus and 50% nitrogen ware applied as basal dose in form of DAP and urea, while remain 50% nitrogen was applied in one split at 30 DAS in form of urea. The first irrigation was applied immediately after sowing to ensure good and even seed germination. Second light irrigation was given five days after first irrigation for quick germination and establishment of seedling. Remaining six irrigations were given according requirement of crop. Thinning was carried out at nine days after sowing keeping 10cm distance between two plants to maintain equal plant population in all the plots.

The weather data indicated that maximum temperature ranged between 27.6 ℃ to 44.1 ℃, while minimum temperature ranged from 12.3 ℃ to 26.9 ℃ during the period of experimentation in the year of 2024. The mean relative humidity recorded at morning and evening ranged from 68.4 to 77.6 and 34.5 to 50.2 percent, respectively. The bright sunshine hours ranged from 6.5 to 11.2 hours/day during crop period. The overall weather data indicated that the weather conditions were normal and favourable for the satisfactory growth and development of the Pearl millet crop during the summer season of 2024. The experimental field had an even topography with a gentle slope having good drainage. The experimental plot was loamy sand in texture, low in organic carbon and available nitrogen, medium in available phosphorus and high in available potassium status. EC was very low showing that the soil was free from salinity hazard. The crop was harvested at physiological maturity. Previously randomly selected and tagged five plants from each net plot were harvested separately for recording post-harvest biometric observations and their produce were added to the respective net plot yield later on. The spaying of different herbicides was done by using knapsack sprayer with flat fan nozzle having 15 litre capacity. All the pre and early post-emergence herbicides were applied at one DAS and 30 DAS respectively with a spray volume of 500 l/ha. The required quantity of trade formulation of each herbicide for gross plots was calculated using the standard formula. During the crop season weeding was carried out by manual labour as per treatments. In weedy upto harvest plot neither herbicide application nor hand weeding or inter culturing was carried out. In other plots hand weeding was done as per treatment to reduce crop weed competition.

The species wise number of weeds 0.25 $m^{-2}$ from each plot was recorded from two spots at 20, 45 DAS and at harvest by using 50 × 50 cm quadrate at random locations and was averaged over two spots. Further, the data was multiplied with four to convert the data into no. $m^{-2}$. Since the weed count data does not follow normal distribution, the weed count data were analyzed after subjecting to$\sqrt{x+0.5}$ transformation. All the growth and yield observation of Pearl millet were measured using standard procedures. The statistical analysis of the data collected for different parameters were carried out following the standard procedures.

## Results and Discussion

### Effect on weed density

Density of weed was significantly influenced by different weed management practices Pearl millet at 20, 45 DAS and at harvest (Table 1). Among the various treatments tried, weed-free showed an almost negligible presence of broad leaves weeds, grasses and sedges per m² at 20, 45 DAS and at harvest by effectively maintaining a weed free condition throughout the crop growth period. The lower weed density observed in the weed-free treatment is attributed to consistent and effective weed control measures implemented throughout the crop growth period. As a result, the weed density remained negligible in the weed free plots. Similar findings recorded by Kumar *et al.* (2022) and Samota *et al.* (2022).

Next to weed free treatment, atrazine 250 g/ha + pendimethalin 250 g/ha (PE) (tank mix) recorded significantly lower density of broad leaves, sedges, grasses and total weeds (3.41, 4.04, 2.23 and 5.69/$m^2$, respectively) at 20 DAS and remained at par with treatment atrazine 500 g/ha (PE), pendimethalin 500 g/ha (PE), tembotrione 42 g/ha (PE) and pendimethalin 250 g/ha (PPI). Whereas, all other post emergence herbicides, interculturing *fb* hand weeding and weedy check treatments have recorded significantly higher density of broad leaves, grasses, sedges and total weeds. A tank mix application of atrazine and pendimethalin leads to lower weed density primarily because of the complementary herbicidal actions of these two chemicals. Atrazine inhibits photosynthesis, while pendimethalin disrupts cell division and microtubule. This combination provides broad-spectrum weed control targeting different weed species and growth stages effectively. The present findings were in accordance with Mandi *et al.* (2019).

At 45 DAS significantly lower density of broad leaves, sedges, grasses and total weeds (3.80, 5.27, 2.53 and 6.91/$m^2$, respectively) were observed in IC *fb* HW at 20 and 30 DAS, which was found at statistically par with post emergence application of atrazine 500 g/ha, tembotrione 84 g/ha and tembotrione 42 g/ha + atrazine 250 g/ha (tank mix). The lower weed density could mainly be ascribed to the fact that IC *fb* HW at 20 and 30 DAS inhibited the germination and emergence of weeds during initial and later growth stages, and thus kept the field weed free for a longer duration. The faster growth of crops resulting from improved soil looseness and better root zone aeration due to hoeing could be another reason for the reduced weed density. Among post-emergence herbicide treatments reduced weed count attributed to the broad-spectrum action of atrazine, which disrupts electron transfer during photosynthesis, combined with the effect of tembotrione, which inhibits the enzyme 4-hydroxyphenylpyruvate dioxygenase (HPPD) leading to enhanced weed control.The similar result was found by Thanmai *et al.* (2018) and Munny *et al.* (2023).

At harvest highest number of broad leaves,sedges, grasses and total weeds (5.99, 7.69, 3.89, and 10.45/$m^2$) were observed under weedy check. Whereas, significantly lower number of broad leaves, grasses, sedges and total weeds (3.02, 4.10, 2.12 and 5.43/$m^2$, respectively) were recorded with interculturing *fb* hand weeding at 20 and 30 DAS, which was statistically at par with application of atrazine 250 g/ha + pendimethalin 250 g/ha PE (tank mix), atrazine 500 g/ha (PE) and tembotrione 84 g/ha (EPoE). The similar outcome was recorded by Mukherjee, D. (2025) in wheat.

Different weed management practices varied the weed index of Pearl millet at harvest. Among all the weed control treatments, the lower WI (4.53 %) was recorded with IC *fb* HW at 20 and 30 DAS which was followed by atrazine 250 g/ha + pendimethalin 250 g/ha PE (tank mix) (9.26%), atrazine 500 g/ha PE (9.90%) and Tembotrione 84 g/ha EPoE (20.45%). These findings were in close vicinity with those reported by Das *et al.* (2013), Girase *et al.* (2017) and Bhuva and Detroja (2018).

### Effect on plant population and growth

The plant population recorded at 20 DAS and at harvest of Pearl millet was found non-significant by weed management are furnished in Table 2. The plant population recorded at 20 DAS and at harvest of Pearl millet was found non-significant by weed management. The findings also showed that the application of herbicides, both before and after crop emergence, had no negative impact on the germination and establishment of the Pearl millet crop throughout the study period. Significantly higher number of total tillers/plant (5.67) was observed with weed free in which hand weeding up to 60 DAS was carried out, which was remained at par with IC *fb* HW at 20 and 30 DAS (5.53), tank mix application of atrazine 250 g/ha + pendimethalin 250 g/ha PE (5.40), and atrazine 500 g/ha PE (5.13). While significantly lower number of total tillers/plant was observed under weedy check (3.53). These findings corroborate with the findings of Kumar *et al*. (2022), Shekhawat *et al*. (2022) and Inaniya *et al*. (2024).

**Effect on yield attributes and yield**

All weed management practices caused significant improvement in effective tillers, grain and straw yield compared to weedy check. Among different treatments, weed free recorded significantly higher number of effective tillers/plant (5.37), it was remained at par with IC *fb* HW at 20 and 30 DAS (5.13) tank mix application of atrazine 250 g/ha + pendimethalin 250 g/ha PE (4.87) and atrazine 500 g/ha PE (4.73). Whereas, lower effective tillers/plant (3.13) was recorded with weedy check. The present findings were also supported by Girase *et al*. (2017), Kumar *et al*. (2022) and Mundphane *et al* (2023). Significantly higher grain and straw yield (4948 and 8954 kg/ha, respectively) was recorded under the treatment weed free, but in case of different integrated weed management treatment IC *fb* HW at 20 and 30 DAS recorded significantly higher grain and straw yield (4724, 8719 kg/ha, respectively), which was at par with pre-emergence application of atrazine 250 g/ha + pendimethalin 250 g/ha (4490 and 8548 kg/ha, respectively), and pre-emergence applcation of atrazine 500 g/ha (4458 and 8349 kg/ha, respectively ). Whereas, significantly lower grain and straw yield were observed under weedy check (2651, 5600 kg/ha, respectively). The increased yields observed under weed free and IC *fb* HW at 20 and 30 DAS could be attributed to more effective weed control, which likely promoted better absorption of nutrients and water by crop. This in turn supported optimal plant development including greater plant height, a higher number of effective tillers per plant and increased earhead weight per plant. Additionally, it may have boosted photosynthetic efficiency and the distribution of assimilates leading to enhanced yield components. These improvements in growth and yield characteristics were clearly reflected in the seed and straw yields achieved with these treatments. Similar observations were made by Girase *et al*. (2017), Bhuva and Detroja (2018) and Samota *et al*. (2022).

**Effect on phytotoxicity**

Result showed that herbicides have not caused any phytotoxicity symptoms on Pearl millet.

**Effect on economics**

Among all weed management practices, highest net return of Rs. 1,16,912/ha was accrued under treatment IC *fb* HW at 20 and 30 DAS, which was followed by weed free (Rs. 1,16,317/ha), atrazine 250 g/ha + pendimethalin 250 g/ha PE tank mix (Rs. 1,14,008/ha) and atrazine 500 g/ha PE (Rs. 1,11,994/ha). Whereas, highest benefit cost ratio of 3.06 was recorded under atrazine 250 g/ha + pendimethalin 250 g/ha PE (tank mix) followed by atrazine 500 g/ha PE (3.03). The higher cost of cultivation of weed free treatment mainly due to highest labour cost incurred for weeding operations recorded benefit cost ratio of 2.75. Lowest, net returns and benefit cost ratio of (Rs. 50,328/ha and 1.93, respectively) were observed under weedy check. Similar finding was also observed by Inaniya *et al*. (2024).

## Conclusion

On the basis of the results obtained from the present investigation, it can be concluded that for securing higher yield, net profit and effective weed control, Pearl millet should be kept weed free up to 60 DAS through hand weeding or IC *fb* HW at 20 and 30 DAS or application of tank mix atrazine 250 g/ha + pendimethalin 250g/ha (PE) or atrazine 500 g/ha (PE) is advisable.

**Table 1:** Effect of different treatments on periodical weed density in Pearl millet

| Treatments | (no./m$^2$) at 20 DAS | | | | (no./m$^2$) at 45 DAS | | | | (no./m$^2$) at harvest | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BLW | Grasses | Sedges | Total | BLW | Grasses | Sedges | Total | BLW | Grasses | Sedges | Total |
| $T_1$ | 4.04 (16.00) | 4.51 (20.00) | 2.39 (5.33) | 6.47 (41.3) | 6.86 (46.67) | 7.89 (62.00) | 3.48 (11.67) | 10.97 (120.33) | 3.98 (15.33) | 5.06 (25.33) | 2.88 (8.00) | 7.00 (48.67) |
| $T_2$ | 4.22 (18.67) | 4.54 (20.67) | 2.64 (6.67) | 6.68 (46.0) | 7.00 (48.67) | 7.98 (63.33) | 3.70 (13.33) | 11.21 (125.33) | 5.05 (25.33) | 6.66 (44.00) | 3.24 (10.00) | 8.92 (79.33) |
| $T_3$ | 3.69 (13.33) | 4.13 (16.67) | 2.26 (4.67) | 5.91 (34.7) | 6.14 (37.33) | 7.78 (61.33) | 3.42 (11.33) | 10.48 (110.00) | 3.12 (9.67) | 4.43 (20.00) | 2.26 (4.67) | 5.82 (34.33) |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $T_4$ | 7.27 (53.33) | 6.86 (46.67) | 2.88 (8.00) | 10.36 (108.0) | 4.02 (15.67) | 5.53 (30.67) | 2.58 (6.33) | 7.26 (52.67) | 4.45 (19.33) | 6.04 (36.00) | 3.12 (9.33) | 8.07 (64.67) |
| $T_5$ | 3.41 (11.33) | 4.04 (16.00) | 2.23 (4.67) | 5.69 (32.0) | 4.45 (19.33) | 5.94 (35.33) | 2.92 (8.00) | 7.93 (62.67) | 3.08 (9.00) | 4.37 (18.67) | 2.16 (4.33) | 5.70 (32.00) |
| $T_6$ | 3.97 (15.33) | 4.36 (18.67) | 2.39 (5.33) | 6.31 (39.3) | 6.10 (36.67) | 7.64 (58.67) | 3.30 (10.67) | 10.31 (106.00) | 4.11 (16.67) | 5.81 (33.33) | 3.02 (8.67) | 7.69 (58.67) |
| $T_7$ | 7.86 (61.33) | 7.47 (55.33) | 3.13 (9.33) | 11.25 (126.00) | 4.22 (17.33) | 5.57 (31.33) | 2.73 (7.00) | 7.46 (55.67) | 3.11 (9.33) | 4.68 (22.00) | 2.34 (5.00) | 6.06 (36.33) |
| $T_8$ | 7.77 (60.00) | 7.01 (48.67) | 3.00 (8.67) | 10.86 (117.3) | 3.94 (16.00) | 5.56 (31.00) | 2.65 (6.67) | 7.29 (53.67) | 3.85 (14.33) | 5.00 (24.67) | 2.78 (7.33) | 6.84 (46.33) |
| $T_9$ | 8.03 (64.00) | 7.83 (61.33) | 3.72 (13.33) | 11.78 (138.7) | 3.80 (14.00) | 5.27 (27.33) | 2.53 (6.00) | 6.91 (47.33) | 3.02 (8.67) | 4.10 (16.33) | 2.12 (4.00) | 5.43 (29.00) |
| $T_{10}$ | 7.96 (63.33) | 7.62 (58.00) | 3.44 (11.33) | 11.53 (132.7) | 8.39 (70.67) | 9.29 (86.00) | 4.44 (19.33) | 13.27 (176.00) | 5.99 (35.33) | 7.69 (58.67) | 3.89 (14.67) | 10.45 (108.67) |
| $T_{11}$ | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) | 0.71 (0.00) |
| S.Em. ± | 0.37 | 0.33 | 0.20 | 0.39 | 0.34 | 0.43 | 0.23 | 0.40 | 0.24 | 0.30 | 0.19 | 0.28 |
| C.D. at 5% | 1.10 | 0.97 | 0.59 | 1.16 | 1.00 | 1.28 | 0.68 | 1.18 | 0.70 | 0.89 | 0.55 | 0.83 |
| C.V.% | 12.07 | 10.64 | 13.20 | 8.53 | 11.67 | 11.98 | 13.61 | 8.10 | 11.23 | 10.48 | 12.54 | 7.36 |

Note: Square root transformation ($\sqrt{x+0.5}$) was applied (original values are given in the parenthesis)

**Table 2:** Effect of different treatments on periodical plant population and number of total tillers per plant of Pearl millet

| Treatments | Plant population | | Number of total tillers per plant |
|---|---|---|---|
| | At 20 DAS | At harvest | |
| $T_1$: Pendimethalin 500 g/ha (PE) | 11.33 | 9.27 | 4.60 |
| $T_2$: Pendimethalin 250 g/ha (PPI) | 10.17 | 9.53 | 4.13 |
| $T_3$: Atrazine 500 g/ha (PE) | 10.93 | 10.00 | 5.13 |
| $T_4$: Atrazine 500 g/ha (EPoE) | 11.27 | 10.13 | 4.13 |
| $T_5$: Atrazine 250 g/ha + Pendimethalin 250 g/ha (PE) (tank mix) | 11.53 | 10.33 | 5.40 |
| $T_6$: Tembotrione 42 g/ha (PE) | 11.20 | 9.43 | 4.27 |
| $T_7$: Tembotrione 84 g/ha (EPoE) | 12.13 | 10.67 | 4.80 |
| $T_8$: Tembotrione 42 g/ha + Atrazine 250 g/ha(EPoE) (tank mix) | 12.00 | 10.33 | 4.60 |
| $T_9$: IC *fb* HW at 20 and 30 DAS | 12.20 | 10.80 | 5.53 |
| $T_{10}$: Weedy check | 10.57 | 9.00 | 3.53 |
| $T_{11}$: Weed free | 11.60 | 10.73 | 5.67 |
| S.Em. ± | 0.50 | 0.43 | 0.27 |
| CD at 5 % | NS | NS | 0.79 |
| CV% | 7.65 | 7.38 | 9.82 |

**Table 3:** Phytotoxicity effect of herbicides on Pearl millet

| Treatments | Days after application of herbicides | |
|---|---|---|
| | 7 days | 15 days |
| $T_1$: Pendimethalin 500 g/ha (PE) | 0 | 0 |
| $T_2$: Pendimethalin 250 g/ha (PPI) | 0 | 0 |
| $T_3$: Atrazine 500 g/ha (PE) | 0 | 0 |
| $T_4$: Atrazine 500 g/ha (EPoE) | 0 | 0 |
| $T_5$: Atrazine 250 g/ha + Pendimethalin 250 g/ha (PE)(tank mix) | 0 | 0 |
| $T_6$: Tembotrione 42 g/ha (PE) | 0 | 0 |
| $T_7$: Tembotrione 84 g/ha (EPoE) | 0 | 0 |
| $T_8$: Tembotrione 42 g/ha + Atrazine 250 g/ha (EPoE) (tank mix) | 0 | 0 |
| $T_9$: IC *fb* HW at 20 and 30 DAS | - | - |
| $T_{10}$: Weedy check | - | - |
| $T_{11}$: Weed free | - | - |

**Table 4:** Effect of different treatments on number of effective tillers, grain and straw yield of Pearl millet

| Treatments | No. of effective tillers per plant | Grain yield (kg/ha) | Straw yield (kg/ha) | Weed index (%) |
|---|---|---|---|---|
| $T_1$: Pendimethalin 500 g/ha (PE) | 4.33 | 3519 | 7408 | 28.87 |
| $T_2$: Pendimethalin 250 g/ha (PPI) | 4.00 | 3271 | 7015 | 33.90 |
| $T_3$: Atrazine 500 g/ha (PE) | 4.73 | 4458 | 8349 | 9.90 |
| $T_4$: Atrazine 500 g/ha (EPoE) | 4.00 | 3372 | 7236 | 31.85 |
| $T_5$: Atrazine 250 g/ha + Pendimethalin 250 g/ha (PE) (tank mix) | 4.87 | 4490 | 8548 | 9.26 |
| $T_6$: Tembotrione 42 g/ha (PE) | 4.07 | 3498 | 7359 | 29.30 |
| $T_7$: Tembotrione 84 g/ha (EPoE) | 4.47 | 3936 | 7525 | 20.45 |
| $T_8$: Tembotrione 42 g/ha + Atrazine 250 g/ha(EPoE) (tank mix) | 4.13 | 3766 | 7476 | 23.90 |
| $T_9$: IC *fb* HW at 20 and 30 DAS | 5.13 | 4724 | 8719 | 4.53 |
| $T_{10}$: Weedy check | 3.13 | 2651 | 5600 | 46.42 |
| $T_{11}$: Weed free | 5.37 | 4948 | 8954 | - |
| S.Em. ± | 0.28 | 257.69 | 492.68 | NA |
| CD at 5 % | 0.82 | 760 | 1453 | |
| C.V. % | 10.95 | 11.52 | 11.15 | |

**Table 5:** Effect of different weed control treatments on economics of Pearl millet

| Treatments | Gross return (Rs. /ha) | Total cost (Rs /ha) | Net realization (Rs /ha) | BCR |
|---|---|---|---|---|
| $T_1$: Pendimethalin 500 g/ha (PE) | 138442 | 55700 | 82742 | 2.49 |
| $T_2$: Pendimethalin 250 g/ha (PPI) | 129718 | 55047 | 74671 | 2.36 |
| $T_3$: Atrazine 500 g/ha (PE) | 167097 | 55103 | 111994 | 3.03 |
| $T_4$: Atrazine 500 g/ha (EPoE) | 133758 | 55103 | 78655 | 2.43 |
| $T_5$: Atrazine 250 g/ha + Pendimethalin 250 g/ha (PE) (tank mix) | 169409 | 55401 | 114008 | 3.06 |
| $T_6$: Tembotrione 42 g/ha (PE) | 137577 | 55853 | 81724 | 2.46 |
| $T_7$: Tembotrione 84 g/ha (EPoE) | 148760 | 57076 | 91684 | 2.61 |
| $T_8$: Tembotrione 42 g/ha + Atrazine 250 g/ha (EPoE) (tank mix) | 144543 | 56089 | 88454 | 2.58 |
| $T_9$: IC *fb* HW at 20 and 30 DAS | 176042 | 59130 | 116912 | 2.98 |
| $T_{10}$: Weedy check | 104448 | 54120 | 50328 | 1.93 |
| $T_{11}$: Weed free | 182962 | 66645 | 116317 | 2.75 |

## Acknowledgement

The authors sincerely acknowledge the C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar for providing all the necessary facility for conducting of this experiment.

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