

Weed management through Integrated practices enhanced aerobic rice yield and reduced herbicide residue in soil

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INTRODUCTION & AIM

- » Rice is the only crop that can grow well under wider hydrological conditions, varying from flooded fields to upland dry conditions. The cut in water usage in aerobic rice production ranges from 37 per cent to 50.8 per cent, in contrast to puddled transplanted method (Yang *et al.*, 2019)
- » However, the seedlings of rice under conventional method of establishment have size differential with weeds that emerge sooner or later the transplantation, that reduces weed interference with the crop (Baghel *et al.*, 2020), which was not true with aerobic rice, where crop and weeds emerge together and for the fate weeds have comparative advantage. The extent of loss in yields due to improper weed management ranges between 62.2 to 91.7 per cent (Sunil, 2018).
- » Conventional weed management practices were proven to be effective in many cases, along with incurring high costs and time consuming. Sole herbicide usage for weed management leads to higher chemical load on the ecosystem distressing the soil ecology. Integrated weed management practices that combine different methods may help in effective control and might even have effects on one another. To address this issue, the present study on integrated weed management practices in aerobic rice was conducted at Tamil Nadu Agricultural University, Coimbatore during *Kharif* 2022.
- » Present study is an attempt to study the effect of integrated weed management practices on weed flora and weed control efficiency and their influence on herbicide residues in soil.

METHOD

Treatments	Dose	Time of application (DAS)
T ₁ PE Pendimethalin 30 EC fb two hand weeding	1.0 kg/ha	3 fb 25 fb 45
T ₂ PE Pyrazosulfuron ethyl 10 WP fb two hand weeding	30 g/ha	3 fb 25 fb 45
T ₃ PE Pyrazosulfuron ethyl 10 WP fb two mechanical weeding	30 g/ha	3 fb 25 fb 45
T ₄ EPoE Bispyribac sodium 10 SC fb one hand weeding	40 g/ha	12 fb 45
T ₅ EPoE Bispyribac sodium 10 SC fb one mechanical weeding	40 g/ha	12 fb 45
T ₆ PE Pyrazosulfuron ethyl 10 WP fb EPoE Bispyribac sodium 10 SC fb one mechanical weeding	30 g/ha fb 40 g/ha	3 fb 12 fb 45
T ₇ Two Hand weeding	-	25 fb 45
T ₈ Two Mechanical weeding	-	25 fb 45
T ₉ Control (Weedy check)	-	Full crop period

PE- Pre emergent; EPoE – Early post emergent; fb – followed by; DAS – Days after sowing;

Table 01: Treatment details

- Weed density in each plot was recorded by placing a quadrat (0.25 m²) from four places at random and expressed as no./m² at 30, 60 and 90 DAS to study their temporal variations. Weeds found within the four quadrats in each plot were pulled out, sun-dried and oven-dried at 65±5 °C for 72 hours or till a constant weight was reached and weighed and the values were expressed in g/m².
- Yield parameters like productive tillers (no./m²) and Grain yield (kg/ha) were assessed at harvest stage of the crop.
- For analysing the herbicide residues, the soil samples were collected from main field treatment plots at an interval of 0 (2 hours after application), 1, 7, 15, 30, 45, 60, 75 and 90 days after herbicide spray. The soil samples were collected at five randomly selected places in the net plot area and were stored in a deep freezer (-20 °C).
- Herbicide residue analysis was carried out using High performance liquid chromatography.

RESULTS & DISCUSSION

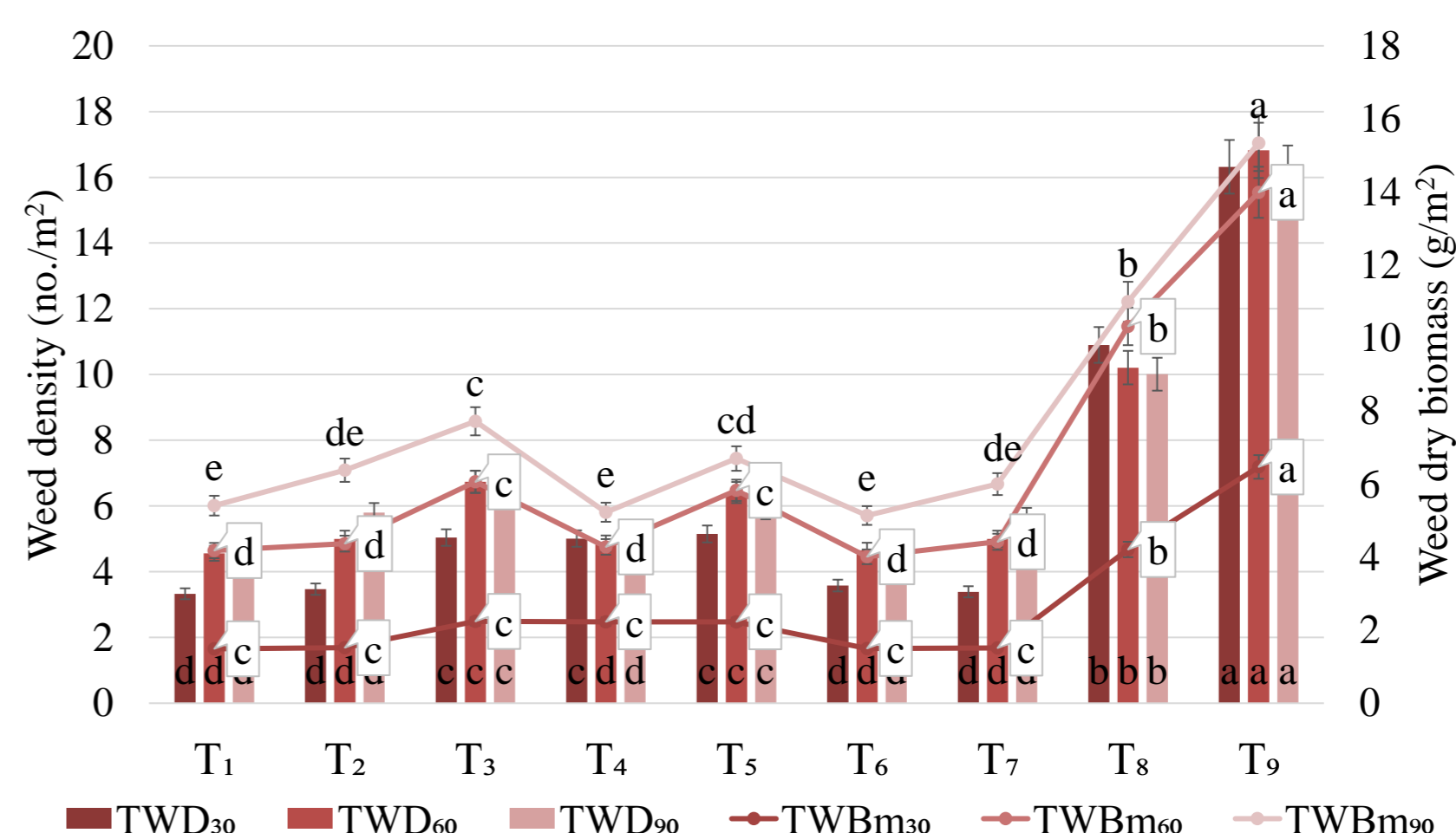


Fig. 01 Temporal variations in weed menace under different IWM practices

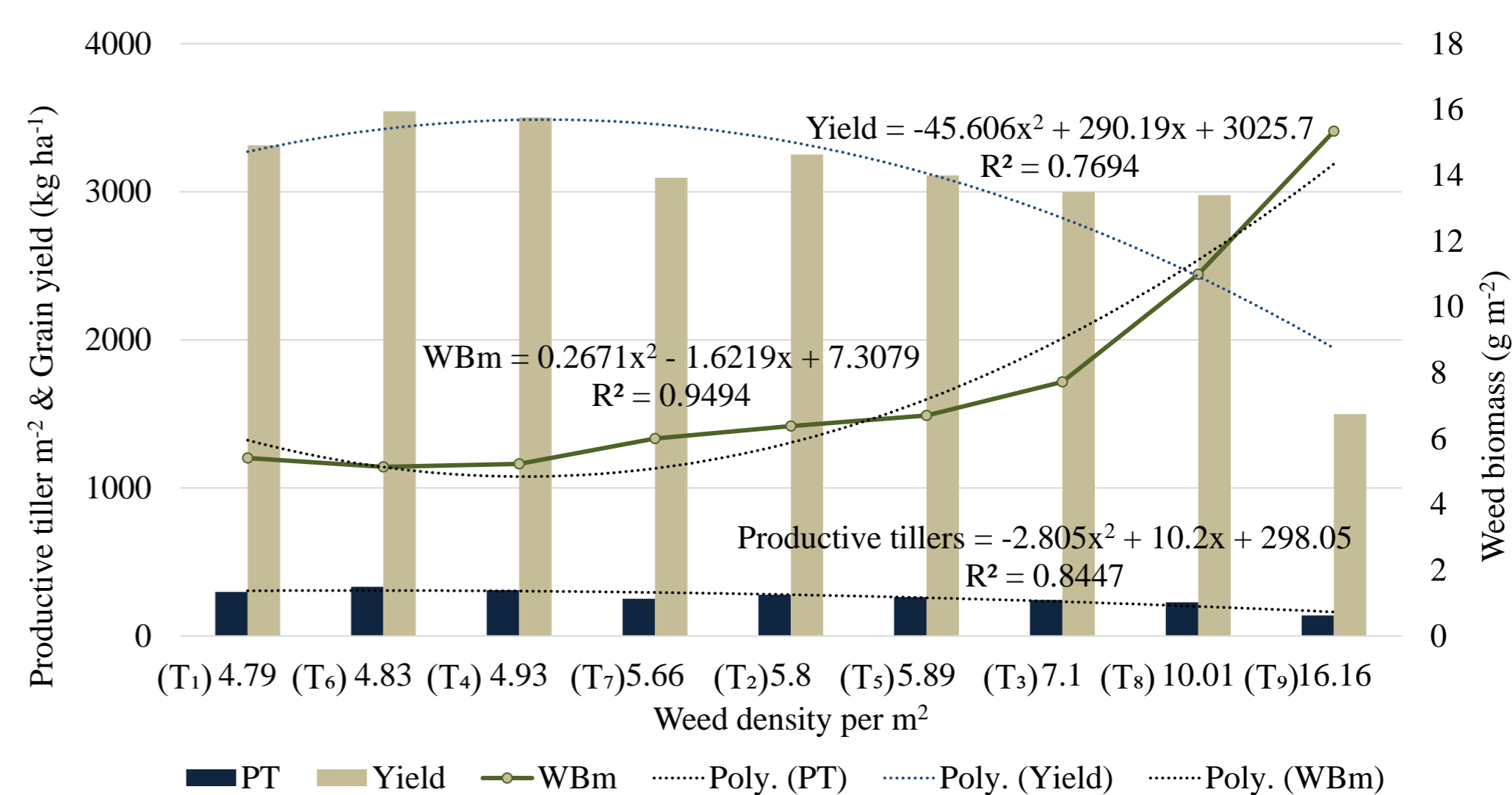


Fig. 02 Variations in weed biomass, productive tillers and yield under different IWM practices against weed density at 90 DAS

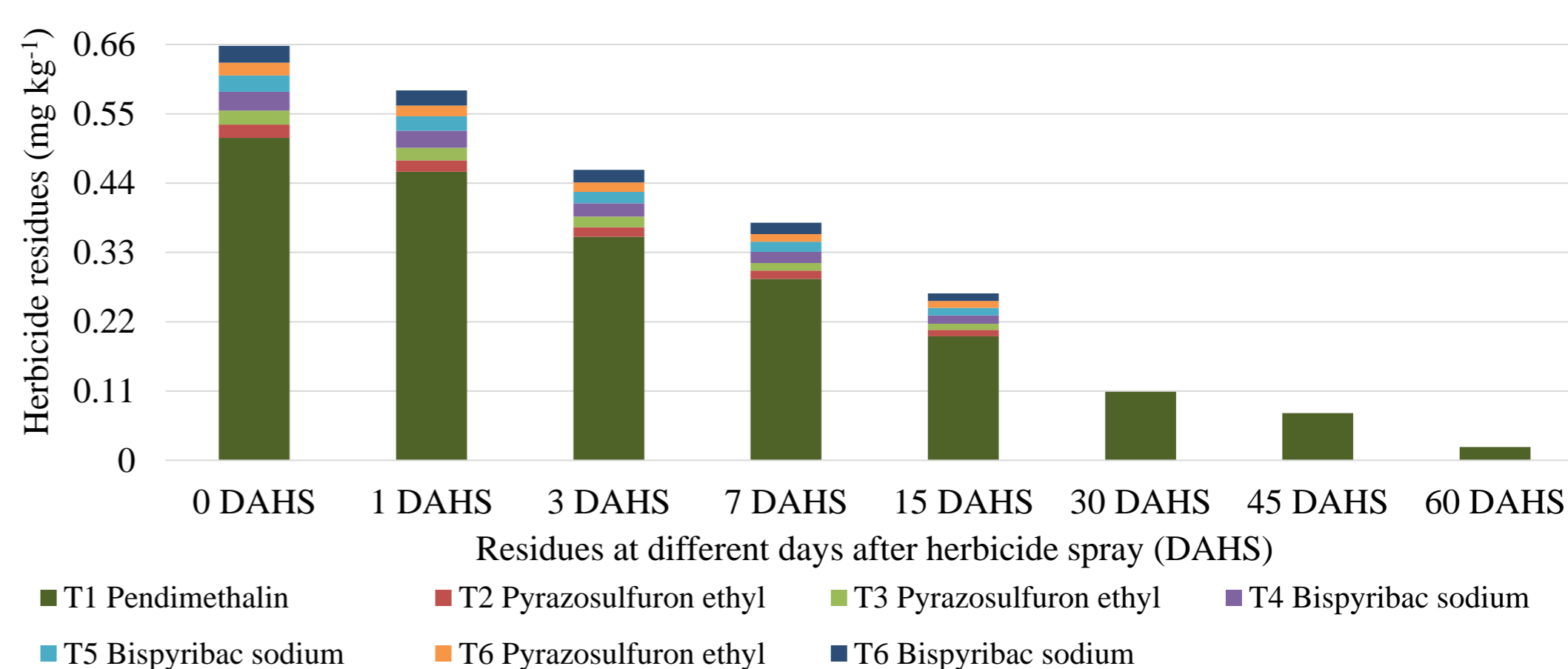


Fig. 03 Variations in herbicide residues under different IWM practices at different intervals

CONCLUSION

- ❖ Among the nine treatments, PE pyrazosulfuron ethyl (at 3 DAS) fb EPoE bispyribac sodium (at 12 DAS) fb one round of MW (at 45 DAS) led to a higher weed control efficiency (WCE) of 91.19% and grain yield of 3544 kg ha⁻¹, by controlling the weeds mainly at critical period of crop-weed competition (between 15 to 45 DAS for aerobic rice).
- ❖ The integration of HW and MW methods increased herbicide degradation in all the plots with herbicide applied, thus reducing their levels below the detectable limit in soil, at 30 DAS, except pendimethalin (0.11 mg kg⁻¹)

REFERENCES

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