



## Weed management with new generation herbicides in maize

K. Swetha, M. Madhavi, G. Pratibha<sup>1</sup> and T. Ramprakash<sup>2</sup>

Department of Agronomy, College of Agriculture, PJTSAU, Hyderabad, Telangana 500 030; <sup>1</sup>CRIDA, Hyderabad, Telangana 500 059

<sup>1</sup>AICRP on Weed Management, PJTSAU, Hyderabad, Telangana 500 030, India

\*Email: swethakota55@gmail.com

Maize (*Zea mays* L.) is the world's third most important cereal crop after wheat and rice. In India, it is cultivated in an area of 6.29 M ha with a productivity of 1.64 t/ha. Rainy-season maize suffers heavy yield losses ranging from 28-100% due to weed infestation owing to congenial environment for luxurious weed growth. Atrazine recommended as pre-emergence herbicide, is not effective against grasses and sedges and there are reports of persistence of atrazine in soil resulting in residual effects. Topramezone and tembotrione are the new selective, post-emergence herbicides introduced for use in maize that inhibit Hydroxy-phenyl pyruvate dioxygenase (4-HPPD) enzyme and the biosynthesis of plastoquinone (Grossmann and 2007, Singh *et al.* 2012). Tank mixing of these herbicides with lower dose of atrazine was reported to be more effective than application of individual chemical, hence the present investigation was undertaken to study the tankmix efficacy of these herbicides.

### METHODOLOGY

Field experiment was carried out during *Kharif*, 2014 at Professor Jayashankar Telangana State Agricultural University, Hyderabad to evaluate the tank mix efficacy of new herbicides. The soil was sandy loam in texture. The experiment was conducted in randomized block design (RBD) with a plot size of 5.4 x 4m with three replications. Ten treatments consisting of atrazine *fb* intercultivation, tank mix of topramezone and tembotrione with atrazine with and without adjuvants as post-emergence (PoE), intercropping with cowpea and application of pendimethalin as pre-emergence (PE) and unweeded control. Maize hybrid, 'DHM-117' was used with recommended package of practices. The recommended fertilizer dose was 180-60-60 kg of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O/ha, respectively.

**Table 1. Weed control, yield and economics of maize as influenced by different weed control measures**

Treatment	Weed dry matter (g/m <sup>2</sup> )	WCE (%)	Grain yield (t/ha)	Net returns (x10 <sup>3</sup> Rs./ha)	B:C ratio
Atrazine (1.0 kg/ha) as PE <i>fb</i> inter-cultivation at 30 DAS	(20.34) 4.61	74.3	5.72	55.33	3.11
Topramezone (25.2 g/ha) + MSO (adjuvant) as PoE	(27.13) 5.31	64.3	4.99	43.13	2.50
Tembotrione (105 g/ha) + adjuvant as PoE	(28.26) 5.41	65.6	4.83	40.97	2.43
Topramezone + atrazine (25.2+250 g/ha) + adjuvant as PoE	(16.73) 4.21	78.9	6.43	62.60	3.17
Tembotrione + atrazine (105+250 g/ha) + adjuvant as PoE.	(18.23) 4.38	77.0	6.28	60.18	3.10
Tembotrione (105 g/ha) as PoE	(30.56) 5.61	61.4	4.52	37.02	2.30
Intercropping of maize with cowpea and PE application of pendimethalin (1.0 kg/ha).	(18.93) 4.46	76.1	4.71 (MEY)	41.17	2.55
Hand weeding at 20 and 40 DAS.	(73.32) 8.62	7.5	6.58	59.36	2.72
Intercultivation at 20 and 40 DAS	(74.56) 8.69	6.0	5.48	52.35	3.01
Unweeded control	(79.32) 8.96	–	2.02	16.67	1.68
LSD (P=0.05)	0.4		0.36	4.77	

### RESULTS

Predominant weed species observed were *Cynodon dactylon* L., *Dactyloctenium aegyptium* L., *Echinochloa spp* and *Rottboellia exaltata* L (among grasses), *Parthenium hysterophorus* L., *Commelina benghalensis* L., *Amaranthus viridis* L., *Euphorbia geniculate* L. and *Trianthema portulacastrum* L. (among the broad leaved weeds) and *Cyperus rotundus* L (sedge). Herbicidal treatments significantly influenced the density and dry matter production of weeds. Lowest weed dry matter was recorded with topramezone + atrazine at 25.2 + 250 g/ha + MSO adjuvant as PoE. Higher weed control efficiency was recorded with topramezone + atrazine at 25.2 + 250 g/ha + MSO and tembotrione + atrazine at 105 + 250 g/ha + stefesmero indicating that weeds are controlled efficiently with tank mix application of herbicides.

The highest grain and stover yield was recorded with hand weeding at 20 and 40 DAS which was at par with topramezone + atrazine at 25.2 + 250 g/ha + MSO and tembotrione + atrazine at 105 + 250 g/ha + stefesmero. The yield loss due to uncontrolled growth of weeds was 69.2%.

Herbicidal treatments resulted in considerably lower cost of cultivation compared to hand weeding. The B:C ratio was found maximum (3.17) with topramezone + atrazine at 25.2 + 250 g/ha + MSO and atrazine at 1.0 kg/ha as PE *fb* intercultivation at 30 DAS (3.11) and tembotrione + atrazine at 105 + 250 g/ha + adjuvant (3.10).

### CONCLUSION

Tank-mix application of post-emergence herbicides topramezone (22.5g/ha) or tembotrione (105 g/ha) with lower dose of atrazine at 250 g/ha can be recommended for efficient weed control and improved grain yield with high B:C ratio in *Kharif* maize.

### REFERENCES

- Singh VP, Guru SK, Kumar A, Banga A and Tripathi N. 2012. Bioefficacy of tembotrione against mixed weed complex in maize (*Zea mays* L.). *Indian Journal of Weed Science* **44**(1):1-5.
- Grossmann K and Ehrhardt T. 2007. On the mechanism of action and selectivity of the corn herbicide topramezone: a new inhibitor of 4-hydroxyphenylpyruvate dioxygenase. *Pest Management Science*