



Short Note

Evaluation of Different Herbicides in Zero Tillage Maize

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A field experiment was conducted at Agricultural Research Station, Kampasagar, Andhra Pradesh during *rabi* 2008-09 to evaluate different herbicides in zero tillage maize after *kharif* rice. The experiment was laid out in a randomized block design with nine treatments (atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹, atrazine as post emergence @ 1kg a.i.ha⁻¹, atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹, atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹+ glyphosate as pre emergence @ 0.5 kg a.i.ha⁻¹, metribuzine as pre emergence @ 0.3 kg a.i.ha⁻¹, metribuzine as post emergence @ 0.1 kg a.i.ha⁻¹, oxy flourofen as pre emergence @ 0.1 kg a.i.ha⁻¹, un weeded check and weed free check). Weed density and weed dry matter were significantly lower in application of atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹. Application of atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹ registered significantly higher yield attributes and grain yield than other herbicides. It was on par with atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ and atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹+ glyphosate as pre emergence @ 0.5 kg a.i.ha⁻¹.

Key words: Atrazine, paraquat, pre emergence, weed free, zero tillage maize

Maize crop is grown under zero tillage after rice in different parts of Andhra Pradesh. Various methods of sowing are in vogue. Irrespective of the methods, weeds are controlled by herbicides without any recommendations. Farmers are using atrazine, gramaxone or glyphosate and their combinations as pre emergence. Atrazine is recommended to maize crop at the rate of 1.25 kg a.i.ha⁻¹. Under zero tillage conditions the rejuvenation of rice tillers pose problems in the growth of maize. To control ratoon rice plants along with the other established weeds, the farmers are using paraquat 0.5 kg a.i.ha⁻¹. Different levels of these two chemicals or other combinations under zero tillage conditions need to be evaluated for suggesting exact recommendations. Hence this experiment was formulated.

Materials and Methods

The field experiment was conducted during *rabi* 2008-09 at Agricultural Research Station, Kampasagar, Andhra Pradesh, India. The soil of the experimental site was sandy clay loam with pH 7.6. The nutrient status was medium in available N (282 kg N ha⁻¹) and available phosphorous (23.0 kg P₂O₅ ha⁻¹) and high in available potassium (310 kg K₂O ha⁻¹). The experiment was carried out with nine weed control treatments (T₁- atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹, T₂ - atrazine as post emergence @ 1kg a.i.ha⁻¹, T₃ - atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹, T₄ - atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹+ glyphosate as pre emergence @ 0.5 kg a.i.ha⁻¹, T₅ - metribuzine as pre emergence @

0.3 kg a.i.ha⁻¹, T₆ - metribuzine as post emergence @ 0.1 kg a.i.ha⁻¹, T₇ - oxyflourofen as pre emergence @ 0.1 kg a.i.ha⁻¹, T₈- un weeded check and T₉ - weed free check) in a randomized block design and replicated thrice. Maize hybrid Cargill 900 was sown on 28th December 2008. The seeds were sown @ 20 kg ha⁻¹ at a spacing of 50 X 20 cm. Pre emergence herbicides were sprayed within 48 hours of sowing as per treatments. Fifteen days after sowing, post emergence herbicides were sprayed as per treatments.

The fertilizer recommendation followed was 120:60:40 kg NPK ha⁻¹. Nitrogen was applied in three equal splits at sowing, knee high stage and panicle initiation stages in the form of urea. Phosphorous as single super phosphate and potassium as muriate of potash were applied to all the treatments uniformly at the time of sowing. Pocket application was done for all fertilizers. Irrigation water was applied immediately after sowing. Eight irrigations were given in total upto maturity. Need based plant protection chemicals were sprayed to control pests and diseases. The observations on weed density and weed dry matter were recorded at silking stage. Cob length and diameter, grain number per cob, 100 grain weight and grain yield were recorded at harvest.

Results and Discussion

Weed density, weed dry matter and weed control efficiency

Weed density and weed dry matter were significantly influenced by different herbicides (Table 1). Among herbicides, application of atrazine as pre

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emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹ recorded significantly lower weed density and weed dry matter. It was comparable with atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹, atrazine as post emergence @ 1kg a.i.ha⁻¹ and atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹+ glyphosate as pre emergence @ 0.5 kg a.i.ha⁻¹. Un weeded check recorded significantly higher weed density and weed dry matter than other herbicides. Weed free check recorded higher weed control

Table 1. weed density and weed dry matter as influenced by different herbicides in zero tillage maize during rabi 2008-09 after kharif rice harvest.

Treatment	Weed density (No.m ⁻²)	Weed dry matter (g m ⁻²)	Weed control Efficiency (%)	No.of grains cob ⁻¹	Cob length (cm)	Cob diameter (cm)	100 grain weight (g)	Grain yield (kg ha ⁻¹)
T ₁ Atrazine as pre emergence @ 1.25 kg a.i.ha ⁻¹	15	27.7	92.0	500	18.0	15.9	28.0	6700
T ₂ Atrazine as post emergence @ 1kg a.i.ha ⁻¹	13	26.3	92.4	484	17.9	15.7	27.7	6000
T ₃ Atrazine as pre emergence @ 1.25 kg a.i.ha ⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha ⁻¹	3	7.7	97.7	523	18.9	16.2	30.0	7477
T ₄ Atrazine as pre emergence @ 1.25 kg a.i.ha ⁻¹ + glyphosate as pre emergence @ 0.5 kg a.i.ha ⁻¹	4	8.3	97.6	517	18.2	16.1	30.0	7000
T ₅ Metribuzine as pre emergence @ 0.3 kg a.i.ha ⁻¹	160	220.0	37.0	464	17.7	14.9	25.0	4100
T ₆ Metribuzine as post emergence @ 0.1 kg a.i.ha ⁻¹	182	224.7	35.7	440	17.9	14.5	25.0	4160
T ₇ Oxyfloufen as pre emergence @ 0.1g a.i.ha ⁻¹	185	286.7	18.0	397	17.5	13.9	24.0	990
T ₈ Un weeded check	252	349.7	0.0	360	17.1	13.0	20.0	540
T ₉ Weed free check	0	0.0	100	583	22.1	16.0	30.0	7500
S.Em ±(P=0.05)	18	20.0		23	1.3	0.3	1.6	194
C.D (P=0.05)	39	42.0		49	NS	0.7	3.4	411

dry matter with atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹. The same was reported by Rao *et al.* (2009).

Yield attributes and yield

Yield attributes were significantly influenced by herbicide application. Application of atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹ registered significantly higher grains per cob, cob diameter and 100 grain weight than other herbicides. The above yield attributes were on par with atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹, atrazine as post emergence @ 1kg a.i.ha⁻¹ and atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹+ glyphosate as pre emergence @ 0.5 kg a.i.ha⁻¹. Grains per cob was significantly higher with weed free check than herbicides.

The yield attributes were higher with weed free check and atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹ due to broad spectrum control of weeds cum reduced weed dry weight which led to more nutrient uptake, exposure to sunlight and weed free condition at the early stages of crop growth. The weed free condition at critical stages of crop might have increased grains per cob, cob diameter and 100 grain weight due to increased availability of nutrients with less competition, which ultimately resulted in higher grain yield.

efficiency (100%) (Table 1). Among the herbicides, weed control efficiency was higher with application of atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹ (97.7%) followed by atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹+ glyphosate as pre emergence @ 0.5 kg a.i.ha⁻¹ (97.6%), atrazine as post emergence @ 1kg a.i.ha⁻¹ (92.4%) and atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ (92.0%). It was mainly due to better control of weeds and reduced weed

Grain yield was significantly influenced by different herbicides (Table 2). The highest grain yield was observed with weed free check (7500 kg ha⁻¹). Among the herbicides, application of atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹ recorded significantly higher grain yield (7477 kg ha⁻¹) than other herbicides and it was on par with weed free check. Comparable grain yields were recorded with atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ (6700 kg ha⁻¹) and atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹+ glyphosate as pre emergence @ 0.5 kg a.i.ha⁻¹ (7000 kg ha⁻¹). The least grain yield was recorded with unweeded check (540 kg ha⁻¹). Similar results were reported by Rao *et al.* (2009) and ANGRAU (2008).

It can be concluded that in zero tillage maize, application of atrazine as pre emergence @ 1.25 kg a.i.ha⁻¹ + paraquat as pre emergence @ 0.75 kg a.i.ha⁻¹ successfully controlled the weeds and recorded higher grain yield.

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