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Research Article

Influence of Early Post Emergent Herbicide Mixtures on Weed Control and Gain Yield of Maize (*Zea mays* L.)

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Abstract

A field experiment was conducted during *kharif* (rainy season) 2014 at Dharwad to evaluate the efficacy of early post-emergent herbicides and herbicide mixtures on weed management in maize. Results indicated that herbicide mixtures viz., topramezone 12.5 g/ha + atrazine 625 g/ha and topramezone 12.5 g/ha + 2,4-D 500 g/ha significantly reduced the total weed density (8.67 and 11.67/0.5m^2, respectively) and weed dry weight (5.59 and 6.60g/0.5m^2, respectively) which were on par with recommended practice at 30 DAS. Significantly higher dry matter production (10.26 g/plant) and weed control index (75.99%) was recorded in topramezone 12.5 g/ha +atrazine 625g/ha at 30 DAS. Grain yield was also significantly higher with this treatment (6791 kg/ha) which was on par with application of topramezone 12.5 g/ha + 2,4-D 500 g/ha (6609 kg/ha), recommended practice (6882 kg/ha) and weed free (7103 kg/ha). Similar trend was followed in respect of net returns also (Rs. 97259/ha and Rs. 91740/ha, respectively).

Keywords: Maize; Early Post Emergent Herbicides; Herbicide Mixtures; Grain Yield Dehydrogenase Activity

Introduction

Maize is one of the most important food crops in India and is increasingly gaining an important position in crop husbandry because of its higher yield potential and short crop duration. In India, maize is grown in an area of 8.78 m ha with a production of 21.76 m t. The average productivity of maize in India is 2478 kg ha^{-1} as against the world average of 4860 kg ha^{-1} [1]. It contributes a lot to the economy of the country, as it is a rich source of food and feed and also provides raw materials for the industry. In recent years, corn oil is becoming popular among the people due to its non-cholesterol character. In addition, its products like corn starch, corn flakes, gluten germ cake, lactic acid, alcohol and acetone are either directly consumed as a food or used by various industries like paper, textile and fermentation etc. About two-third of the total world production of maize is used for livestock feed or for commercial starch and oil production [2].

Now-a-days, the labour force is diminishing in agriculture. Management of weeds in cropped field has become a real challenge to the farmers. The production and productivity of maize is reduced due to competition offered by weeds for growth resources *viz.*, nutrients, moisture, sunlight and space during entire vegetative growth and early reproductive stages. The extent of reduction in grain yield of maize has been reported to be in the range from 33 to 50 per cent depending on the type of weed species in standing crop and duration of crop-weed competition. Manual weeding is a common practice, but it is labour intensive, costly and often not done at proper stage. Mostly farmers adopt manual weeding only after sufficient weed growth. It is essential to remove the early flush of weeds at right time. For this, the pre-emergent herbicides can be used for by keeping the maize fields weed free in the first 30-35 days of crop growth. But farmers are unable to apply pre-emergent herbicides at time of sowing, since they give priority on completion of sowing. Moreover, there is acute shortage of labour even for sowing operation. Hence, there is need to use early post emergent herbicides, which can be conveniently applied after 15 to 20 days of sowing, that too when the pressure of completing the sowing is over. Hence, a field trial was conducted to evaluate early post emergent herbicides or herbicide mixtures in maize under assured rainfall conditions.

Material and Methods

A field experiment was carried out during *kharif* season (rainy season) of 2014 at Main Agricultural Research Station (MARS), College of Agriculture, Dharwad, UAS, Dharwad. The soil was black clayey (vertisols) in texture with medium available nitrogen, phosphorus and potassium with pH 7.4. The experiment was laid out in randomized complete block design with three replications involving 8 treatments. The treatment details are given in Table 1. The early post emergent herbicides and herbicide mixtures were applied at 20 DAS. In the treatment involving recommended weed management practice, pre-emergent application of atrazine 1.25kg/ha at sowing + one intercultivation at 30 DAS + one hand weeding at 45 DAS was done. The seeds of "900-M Gold" were dibbled manually at spacing of 60 cm x 20 cm at 25 kg seeds per ha. Full dose of potassium, phosphorus and half dose of the nitrogen through diammonium phosphate, muriate of potash and urea were applied at the time of sowing and remaining quantity of nitrogen was applied at knee-height stage. Observations on weed density and weed dry weight were recorded in 0.5 m^2 area at 30 DAS. The weed control index was calculated by using the formula given by Mani., *et al.* [3] and the five randomly selected plants were used to record the dry matter production at 30 DAS. The plants were cut at ground level, made into piece, oven dried at 70^0C and the dry weight was recorded in g $plant^{-1}$. The yield data was recorded and net returns were worked out based on price prevailed during December, 2014.

Results and Discussion

The data indicated that the total weed density was significantly lower with weed free (5.33/0.5 m^2), which was on par with topramezone 12.5 g/ha + atrazine 625 g /ha (8.67/0.5 m^2) at 30 DAS. It was significantly lower with topramezone 12.5 g/ha alone (21.67/0.5 m^2), atrazine 1.25 kg/ha alone (24.00/0.5 m^2) and 2, 4-D 1 kg/ha alone (29.67/0.5 m^2) (Table 1). This is in conformity with the findings of Nadiger., *et al.* [4] and Ishrat., *et al* [5]. Weed dry weight was significantly lower with treatments receiving herbicide *viz.,* topramezone 12.5 g/ha + atrazine 625 g/ha (5.59 g/0.5 m^2) and topramezone 12.5 g/ha + 2, 4-D Na salt 500 g/ha (6.60 g/0.5 m^2) which were on par with recommended weed management practice (5.51g 0.5 m^{-2}). However, topramezone alone 25 g/ha (8.14 g/0.5 m^2), atrazine alone 1.25 kg/ha (9.09g/0.5 m^2) and 2,4-D alone 1.0 kg/ha (16.62 g/0.5 m^2) recorded significantly higher weed dry weight compared to tank mixtures. Significantly higher weed dry weight was recorded in weedy check (23.95 g/0.5 m^2). In the herbicide mixtures, there was broad spectrum weed control providing congenial conditions for crop growth.

Treatments	Weed density (No./m^2)	Weed dry weight (g/ m^2)	Weed control index (%)	Total dry matter production (g/plant)	Grain yield (Kg/ha)	Net returns (Rs./ha)
Topramezone 25 g/ha at 20 DAS (Early Post-emergence)	4.70* (21.67)	2.92* (8.14)	63.42	8.97	5707	80043
Atrazine 1.25 kg/ha at 20 DAS (Early Post-emergence)	4.95 (24.00)	3.09 (9.09)	61.13	8.89	5713	84962
2, 4-D Na salt 1.0 kg/ha at 20 DAS (Early Post-emergence)	5.47 (29.67)	4.09 (16.62)	31.93	8.22	5604	82267
Topramezone 12.5 g/ha + Atrazine 625 g/ha at 20 DAS (Early Post-emergence) (Tank mixture)	2.99 (8.67)	2.45 (5.59)	75.99	10.26	6791	97259
Topramezone 12.5 g/ha + 2, 4-D Na salt 500 g/ha at 20 DAS (Early Post-emergence) (Tank mixture)	3.48 (11.67)	2.63 (6.60)	70.11	8.87	6609	91740
Atrazine (PRE) 1.25 kg/ha + IC+ HW (RPP)	3.23 (10.00)	2.41 (5.51)	77.69	10.26	6882	99535
Weed free	2.40 (5.33)	1.96 (3.37)	85.56	12.30	7103	97584
Weedy check	8.49 (71.67)	4.92 (23.95)	0.00	7.58	4973	68462
S.Em±	0.23	0.27	5.87	1.03	278	3275
LSD (0.05)	0.70	0.83	17.80	3.13	842	9935

Table 1: Weed density, weed dry weight, Weed control index, total dry matter production grain yield and net returns as influenced by weed management practices in maize.
*Values in parentheses are original. Data transformed to square root transformation

At 30 DAS, the weed control index was significantly higher with recommended weed management practice (atrazine 1.25 kg/ha + IC + HW) with weed control index value of 77.69% closely which was on par with application of topramezone 12.5 g/ha + atrazine 625 g/ha (75.99%) and topramezone 12.5 g/ha + 2, 4-D 500 g/ha (70.11%) and these were on par with weed free (85.56%). Application of topramezone alone 25 g/ha or atrazine alone 1.25 kg/ha or 2,4-D alone 1.0 kg/ha alone recorded significantly lower weed control index (WCI) compared to tank mixtures which controlled the weeds effectively. Topramezone controlled grasses and atrazine controlled broad leaf weeds thereby giving broad spectrum weed control. Similar report was made by Madhavi., *et al* [6]. At 30 DAS, the dry matter accumulation was significantly higher with application of topramezone 12.5 g a.i/ha + atrazine 625 g/ha (10.26 g/plant) and atrazine 1.25 kg/ha + IC + HW (10.26 g/plant) which were on par with weed free check (12.30 g/plant) and recommended practice. Dry matter production was significantly lower in weedy check (7.58 g/plant).

Grain yield was significantly higher with the application of the herbicide tank-mixtures *viz.,* topramezone 12.5 g/ha + atrazine 625 g/ha and topramezone 12.5 g/ha +2,4-D 500 g/ha (6791 kg/ha and 6609 kg/ha, respectively) compared to their single applications. More interestingly, these herbicide mixtures were on par with recommended weed management practice and with weed free treatment. This was due to higher weed control index and better crop growth owing to better weed control. Weed free check (7103 kg/ha), recommended weed management practice (6882 kg/ha), topramezone 12.5 g/ha + atrazine 625 g/ha (Rs.97259/ha) recorded significantly higher net returns and they were on par with each other. This result is in conformity with the findings of Walia., *et al* [7].

Conclusion

From the foregoing, it can be concluded that topramezone 12.5 g/ha + atrazine 625 g/ha resulted in better WCI, higher grain yield and net returns.

Bibliography

1. Anonymous. "Directorate of Maize Research, Indian Council of Agricultural Research". Vision 2050. (2013): 38.
2. Khalil IA and Jan A. Cereal crops cropping technology, National Book Foundation, Islamabad. (2004): 169-201.
3. Mani VS., *et al*. "Double edged weed tillers in peas". *Indian Fmg* 26.5 (1976): 19-21.
4. Nadiger S. "Bioefficacy of pre emergence herbicide on weed management in maize (Zea mays L.)". M. Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad, Karnataka (India) (2011).
5. Ishrat DH., *et al*. "Effect of pre and post emergence herbicides on weed control in maize". *Karnataka Journal of Agricultural Sciences* 25.3 (2012) : 392-394.
6. Madhavi M., *et al*. "Topramezone (33.6% SC) + Atrazine (50% WP) tank mix efficacy on maize". *Indian Society of Weed Science* (2014): 23-24.
7. Walia US., *et al*. "Integrated control of hardy weeds in maize (Zea mays L.)". *Indian Journal of Weed Science* 39 (2007) : 17-20.

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