Journal of Environment and Earth Science
ISSN 2224-3216 (Paper) ISSN 2225-0948 (Online)
Vol.5, No.2, 2015

Screening of Selected Herbicides for Weed Control in Maize Zea Mays L

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Abstract
An experiment was conducted at Imo State University Teaching and Research farm between April and July 2008 to study the efficacy of selected herbicides in controlling weeds in maize (Zea mays L.).The experiment consisted of recommended rates of primextra (T1), Ultrazine (T2) fusillade forte (T3) a weedfree plot (T4) and weedy check (T5) treatments, giving a total of five treatments. The experiment was laid our in a completely randomized design (CRD) in three replicates. Primextra and ultrazine herbicide treatments significantly reduced the mean weed population and increased the vegetative and yield attributes of maize than that of the unweeded plot treatment.
Keywords: Herbicides, Weed control, Maize

Introduction

Maize (Zea Mays) is a major food crop in Nigeria and the world in general. It is widely cultivated in almost all the ecological zones of Nigeria (Smith et al, 1994). It is widely cultivated throughout the world and a greater weight of maize is produced each year than any other grain (www.wikipedia.org/wiki/maize).

According to estimation, 75% of the total production of maize is used as food by the farming community and the remaining finds its way in starch manufacturing industry, poultry feed and grain sales (Mohammed, 1979). As one of the staple food crops, the yield of maize is very crucial for the survival of millions of Nigerian citizen (Nwokomma, 2003). However maize yield is widely affected by weed competition El Koomy 2005 reported that the reduction in maize due to weeds is as a result of the effects of inter plant, competition for light, water, nutrition and other potential yield limiting factors. Weed provides competition for space, nutrients, water and light, although how seriously they will affect a plant depends on a number of factors (www.wikipedia.org).

Weeds tend to strive at the expense of the more refined edible or ornamental crops. Weeds expose the more refined edible or ornamental crops. Weeds expose the maize plant to insecticidal infection, compete with it for vital nutrient and drastically reduce the yield of the crop. Maize grown in the presence of weeds would have a less developed root system than when grown without weed and maize is most sensitive to weed competition during its early growth period (Smith *et al.,* 2004). Maximum weed competitions in maize occurs within a period of 2 – 6 weed after sowing (Eddowes and Harper, 1962). This suggest the importance of maintaining the field weed free during the critical period of weed competition.

Weed control is a problem particularly for those farmers who have large holdings because of acute shortage of labour and frequent rain during the early growth period of maize, Hand weeding or mechanical weeding operations are usually left all together. In such a situation, herbicide offer the most effective and economical method of weed control and increased crop yield.

Herbicide have shown a promise in weed management in maize. Different herbicides exist for controlling weed in maize, but their efficacies vary depending on the reaction of the test plant and the nature of the weed to which it is prone. Selective herbicides kill certain targets while leaving the desire crop relatively unharmed. Some of the herbicides act by interfering with the growth of the weed and are often based on plant hormones, several reports address the importance of herbicides in maize. Miller and Libby (1999), concluded that corn yield respond positively when weeds were controlled by herbicides. Becker and Stanforth (1981) obtained higher yield in maize with weed cites as compared to cultural weed control. Jehangeri *et al,* (1984), reported that application of selective herbicides provide 65 – 90% weed control and gave 100 – 150% more maize yield than weedy check.

In view of the importance of the problem, this experiment was specifically aimed at the following objectives.

To investigate the efficacy of these selected herbicides in controlling weeds in maize.
To determine the effect of these selected pre-emergence herbicides on the growth and yield attributes of maize.
To establish the effect of these selected pre-emergence herbicides on that is, the number and types of weed species

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1.1 Materials and Methods

The experiment was conducted at the teaching and research farm of the faculty of Agriculture and Veterinary Medicine, Imo State University Owerri.

1.1.1 The experiment consisted of three herbicides treatments, primextra T1, ultrazine (T2) and Fusilade forte (T3), a weed free plot treatment (T4) and an unweeded plot treatment (T5). The three herbicides, primextra, ultrazine and fusillade forte were obtained from commercial shops in Owerri.

The experimental site was cleared using cutlass and hoe. Beds (3m by 3m (9m2) were sown at the rate of three seeds per hole at a depth of 2 – 3 cm. herbicides were applied immediately after planting using a 20L Knapsack sprayer calibrated at 220L/ha delivery rate. The weed free plot (T4) was kept totally weed free by hand weeding any emerging weed throughout the duration of the experiment. Whereas treatment five (T5) were left unweeded.

Two weeks after planting, the seedlings were thinned down to two seedlings per stand.

Fertilizer (NPK (15:15:15)) was applied 3 weeks after germination at a rate of 28g per stand. The fertilizer was applied 6 – 10cm from the base of each stand.

The experiment was laid out in a completely randomized design in three replicates arranged according to Cochran and Cox (1957).

1.1.2 DATA COLLECTION

Data was collected for the following parameters at 4 weeks, 6wks, 8wks, and 12wks. Plant height (cm), Number of leaves, days to 50% silking, Days to 50% physiological maturity, 1000 Seed weight (g)yield kg/plot

1.1.3 DATA ANALYSIS

Data collected were analysed statistically using the Analysis of variance (ANOVA) and means were compared using the Duncan Multiple Range Test at 5% level of significance (p=0.05).

1.2 Results

Table 1: Effect of pre-emergence herbicides on the vegetative and yield attributes of maize

TRT	Girth Cm	Height Cm	Leaf count	50% silking	50% maturity	Seed Wt(g)	Yield Kg/plot
T1	12.43a	160.33a	13.55a	70a	100a	36.13a	67.00a
T2	12.46a	170.33a	14.33a	70a	99a	36.16a	66.7a
T3	0.00c	0.00c	0.00c	0.00c	0.00c	0.00c	0.00c
T4	12.600a	160.67a	14.33a	68a	96a	37.00a	68.0a
T5	11.333b	147.33b	10.667b	62a	95a	15.40b	38.00b

Means with the same letter(s) are not significant p = 0.05.

Significant difference were obtained for plant girth, plant height, leaf count, seed weight and yield for herbicides treatments primextra (T1) and ultrazine (T2) when compared with the unweeded plot treatment (T5) table 1.

Primextra treatment (T1), ultrazine (T2) and weed free treatment (T4) showed no significant difference for all parameters considered table 1.

Ultrazine (T2) recorded mean plant girth value of 12.6cm while the lowest mean plant girth value of 11.33cm was obtained in unweeded plot (T5) (table 1).

The unweeded plot treatment (T5) also recorded the lowest mean plant height of 140cm and ultrazine the hightest mean plant height of 170cm which was not statistically different from that obtained for primextra (160cm) and weed free plot treatment.

There were no significant difference observed for premextra treated plot, ultrazine (T2), weed free plot (T4) and unweeded plot (T5) for days to 50% silking, and days to 50% physiological maturity, but values for primextra (70 days) ultrazine (70 days) and weed free (68 days) were higher than that obtained for unweeded polts treatment (T5).

Significant difference were obtained for obtained for grain weight and yield (kg/plot) for herbicide treated plot (T1) and (T2) weed free plot (T4) when compared with the unweeded plot (T5).

Fusillade forte treatment (T3) completely suppressed maize growth, no maize plant emerged for (T3) in all the replicates.

Mean weed population as influenced by herbicide treatment

Table 2: Mean weed population after 12 weeks

Treatment	Grasses	broadleaf	Sedges	L.S mean
T1	4.00d	10.33d	12.607cd	8.00d
T2	7.33cd	16.00c	14.33c	16.22c
T3	27.667d	27.00b	31.00ab	21.55bc
T4	0.00	0.00	0.00	0.00
T5	35.00a	32.33a	29.00ab	32.33a

Mean with the same letter are not significant.

Significant differences were observed for mean weed population and weed types as influenced by different herbicide treatment (table 2).

Grasses, Broadleaf and sedges were reduced by primextra (T1) and ultrazine (T2) when compared with unweeded plot (T5) (table 2).

Weed population for fulillade forte treatment (T3) was significantly higher than that for primextra (T1) and ultrazine (T2).

Greater population of sedges and broadleaf than grasses were obtained for all the herbicides treatment. Grasses tended to be suppressed more than sedges and broad leaf by the herbicides when compared with the unweeded plot treatment(T5) (table 2). Treatment 2, recorded a higher weed population among the three types (grasses, broadleaf and sedges) when compared with treatment 1, though differences were not statistically significant. The unweeded plot (T5) had the highest number of grasses, broad leaf and sedges as expected.

Primextra and ultrazine herbicides treatments significantly reduced the mean weed population and increased the vegetative and yield attributes of maize than that of the unweeded plot treatment as evident by the higher mean plant height, mean plant girth number of leaves, seed weight and yield of maize. Vegetative and yield attributes of maize obtained for the weed free plot treatments were statistically the same as those for primextra and ultrazine herbicide treatments. These showed that using these herbicides will give the same result as hand weeding constantly to keep the maize plot weed free. Primextra and ultrazine were able to keep weed competition at a level that maize performance were not hampered. This is similar to report by Mohammed and Nour-ul (2004).

Maize plants in plots treated with ultrazine herbicide tended to perform better than those in the weed free plots though no significant different was recorded in any of the cases. This is in accordance with report by Auskaline (2002) who reported that the green matter yield of maize in plots treated with ultrazine tended to be higher than the weed free plot.

Ultrazine herbicide treatment had higher values for plant height, girth, leaf number, seed weight and yield for maize plant than that obtained for primaxtra herbicides but difference were not significant. That means that ultrazine herbicide is more efficient in controlling weed in maize than primextra herbicide in this study. Though no significant difference were obtained for days to 50% silking and days to 50% physiological maturity among all treatments, maize plants in ultrazine, primextra and weed free plots had higher values than those in the unweeded plot. This shows that heavy weed competition led to pre mature silking and maturity. These findings are in agreement with Nawab *et al,* (1997) who reported that number of days to silking and physiological maturity were increased in plots treated herbicides and weed free plots as compared to unweeded plot treatment.

Mean weed population were significantly reduced by ultrazine and primextra when compared to the control (unweeded plot treatment). The reduction in weed population by these chemicals (ultrazine and primaxtra) resulted in reduced competition between maize plants and weeds as such leading to improved maize performance similar to report by Subhan *et al,* 2007.

Results obtained showed that no maize emerged in plots treated with fusillade forte herbicide (T3), but grass weeds as well as sedges and broadleaf were present. The presence of grasses while maize of grass family could not germinate might be as a result of existence of weed seeds deeply rooted inside the soil at depths where the effect of these chemicals might not be felt or that some of these weed seeds had under gone the process of germination and started to emerge before the chemicals were applied. The lowest mean weed population was obtained for primaxtra herbicide treatment though no significant differences were observed with that obtained for ultrazine weed treatment. But maize plants in plots treated with ultrazine performed better than those in plots treated with primextra which can be induced according to Sahara *et al* (2005) that some levels of weed competition helps to stimulate maize plant growth.

Conclusion and Recommendation

The need to increase crop production and at low input calls for some improved technological input such as the use of herbicides to help reduce the high labor intensive production phase of manual weeding that have for a very long while helped in limiting farm size and keeping scale of production at a permanently low level. Primextra and ultrazine herbicides have been found to be able to reduce weed competition and improve maize production in this study. The performance of these herbicides ultrazine and primextra were significantly similar to manually keeping the field grass free, considering the drudgery, labour and cost involved in keeping a farm weed free manually, using the pre-emergence herbicide (Ultrazine and Primextra) which are only applied once is arguably more advantageous.

Further studies are required to be able to screen most of the commonly available herbicides to determine their effectiveness for various crops. In the context of this study, ultrazine and primextra can be considered for weed control in maize.

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