

Evaluation of weed control methods on maize production in Afgoi District, Somalia

Mohamed Haji Mayow¹, Hassan Nuur Ismaan^{*1}, Yusuf Hasan¹,
HusniAbdirahim Muse¹, A. Abiikar¹, Omar Hajji Hussein Akila¹, Hassan
Mirkey¹ and Mohamed Khadar Abdi¹

¹*Somali Agricultural Research and Technology Centre (SARTEC)*

Corresponding Author: Hassan Nuur Ismaan

Abstract: A field experiment was conducted at the experimental farm of Agricultural Training and Education Centre (ATEC) in Gu' season, 2019 (April-June), Afgoi, Somalia. The seeds of the single maize variety (Somtux variety) were used in this experiment. Seeds were sown on 28 April with spacing of 75x30cm. The experiment was laid out in a randomized completely block design (RCBD) with four replications. Weed control methods viz. Post emergence herbicide (NICO SULFURON @ 2 L ha⁻¹), one hand weeding, two hand weeding, three hand weeding, four hand weeding and no weeding (Control) were allocated to plots randomly and the gross plot size was 7x6.4m. Three sample plants were randomly selected from each plot and marked with the tag for recording plant characters. Data on Plant stand per meter square plant height, the number of cobs plant⁻¹, 100- seed weight, grain yield; straw yield, biological yield, and harvest index were recorded at harvest. The data were analyzed with the help of a computer using MSTAT-C program (Gomez and Gomez, 1984). The treatment means were compared using Duncan's multiple range test (DMRT) (Duncan, 1955). The result showed that that four hand weeding and post emergence of NICO SULFURON @ 2 L ha⁻¹ approved the highest grain yield (5092.53 and 5029.57 kg ha⁻¹) respectively and it was found to be the most effective weed control methods as compared to the other treatments.

Key words: maize, weeds, hand weeding, herbicide and weed control

Date of Submission: 13-01-2020

Date of Acceptance: 29-01-2020

I. Introduction

Maize is one of the most significant cereal crops in the world agricultural economy both as food for man and feed for animals. It is a wonderful crop. Its yield potential is very high and there is no other cereals can be compared with maize crop which has so massive potentiality and this is the reason named '**King of cereals**'. Maize occupies third position in the cereals production after rice and wheat, although in productivity it exceeds all cereals. Maize is one of the most important cereal crops in Somalia and it is staple food for Somalia. It is grown in rainy seasons mainly Gu' (Spring) season but it can grow in all the seasons if irrigation water is available. It plays vital role in boosting economy and living standard of Somali small scale farmers by consuming the maize as food and animal feed and every household consumes once a day or every other day. But in Somalia, there many challenges hindering maize production including insect pests, diseases and weeds. In respect with the on farm problems, weed ranks the third challenge facing maize in Somalia. Critical period for crop weed competition of maize crop are considered the first 30-60 days after sowing as (Dasset al., 2012).

Weeds compete for water and nutrient in soil and also light and space so they do not allow growing crop plants. At early stage of development if maize plant do not get nutrient and water from the soil then plant remains dwarf and subsequently stunted growth thus become less enable to absorb nutrients from soil. Weed control is important to the success of maize production because weeds can reduce yield up to 86% (Bijan-zadeh and Ghadiri, 2006).

Weed control methods in maize caused in 77 to 96.7% higher yield than weed check (Khan et al., 1998). There are many weed control methods such as cultural, biological, mechanical and chemical methods. Chemical weed control along with hand weeding significantly increased the grain yield of maize. As there are disadvantages of every weed control method there integrated weed management is a good option for sustainable agriculture (Khan et al., 2002). Keeping this challenge in view, this experiment was undertaken to study the "effect of different weed management control methods on growth and yield of maize (*Zea mays* L.)"

II. Methods and Materials

A field experiment was conducted in Gu' season, 2019 (April-June) at the experimental farm of Agricultural Training and Education Centre (ATEC), Afgoi. Afgoye is situated about 30 kilometers west of Mogadishu, the Somalia's capital city. The Shabelle River passes through the middle of the town. It is an area suitable for farming. The soil of the experimental site is clay in texture with high water holding capacity, it has good organic matter. The seeds of the single maize variety (Somtux variety) were used in this experiment. The seeds of this variety were collected from the local market of Afgoi district, Lower Shabelle, Somalia and sown in spacing of 75×30 cm with two seeds per hill. The experiment was laid out in a randomized completely block design (RCBD) with four replications. Weed control methods viz. post emergence herbicide (NICO SULFURON @ 2 L ha⁻¹), one hand weeding, two hand weeding, three hand weeding, four hand weeding and no weeding (Control) were allocated to plots randomly and the gross plot size was 7×6.4m (44.8m²). NICO SULFURON @ 2 L ha⁻¹ was used 10 days after emergence, one hand weeding were done 15 days after emergence, two hand weeding 15 and 35 days after emergence, three hand weeding 15, 35 and 55 days after emergence, four hand weeding 15, 35, 55 and 75 days after emergence and no weeding which weeds were allowed to grow up to harvesting. Fertilizers were applied at the dose of 200 DAP kg ha⁻¹ and 217kg ha⁻¹ urea. The DAP fertilizer was applied during final land preparation while Urea fertilizer was applied in two splits at 20 and 40 DAS. Appropriate irrigation, thinning, and pest and diseases control were confirmed in each plot. Three sample plants were randomly selected from each plot and marked with the tag for recording plant characters. Data on Plant stand per meter square plant height, the number of cobs plant⁻¹, 100- seed weight, grain yield; straw yield, biological yield, and harvest index were recorded at harvest. The data were analyzed with the help of a computer using MSTAT-C program (Gomez and Gomez, 1984). The treatment means were compared using Duncan's multiple range test (DMRT) (Duncan, 1955).

III. Results And Discussion

Plant stand per meter square

According to plant stand per meter square, there is significant different among treatments at 5% level (Table 1). The highest amount of plant stand per meter square was produced by three hand weeding (9.00) followed insignificantly NICO SULFURON @ 2 L ha⁻¹ treatment (8.92), two hand weeding (8.84), four hand weeding (8.58), one hand weeding (8.42) but the lowest plant stand per meter square (5.92) was found in no hand weeding. This result is in line with the findings of Rastgordani et al. (2013).

Days to 50% flowering

All treatments in respect to the days to 50% of flowering did not show significant difference and revealed that different weed management did not affect the days to 50% of flowering of maize crop (Table 1). The highest days to 50% flowering (50.50 %), was obtained from one and four hand weeding respectively which are numerically samewhreas the rest of the treatments viz. NICO SULFURON @ 2 L ha⁻¹, two hand weeding, three hand weeding, no weeding (control) showed days to 50% flowering of (49.50, 49.00, 49.00 and 50%) respectively.

Table 1: The effect of weed control methods on plant stand per m², days to 50% of flowering, plant height, first ear height and 100 seed weight

Treatments	Plant stand/M ²	Days to 50% flowering	Plant height (cm)	First ear height (cm)	100 Seed weight (g)
NICO SULFURON @ 2 L ha ⁻¹	8.92 a	49.50 a	165.50 a	104.60 a	31.50 a
One hand weeding	8.42 a	50.50 a	162.21ab	94.58 a	26.00 cd
Two hand weeding	8.84 a	49.00 a	168.80 a	105.33 a	28.50bc
Three hand weeding	9.00 a	49.00 a	165.63 a	103.44 a	30.50 ab
Four hand weeding	8.58 a	50.50 a	163.42 a	96.92 a	30.75 ab
No weeding	5.92 b	50.00 a	136.4 B	101.72 a	24.50 d
LS	**	ns	ns	ns	**
CV	7.44	3.69	11.17	7.82	6.83

Values having same letter (s) do not differ significantly by DMRT at P<5% level

LS= level of significant, CV= coefficient variation, ns = non-significant

**highly Significant (p≤ 1%)

Plant height

In accordance with plant height, there was no significant variation among treatments (Table 1). The highest plant height (168.80cm) was obtained from two weeding which statistically similar to those of NICO SULFURON @ 2 L ha⁻¹, one hand weeding, three weeding and four hand weeding however the lowest plant

height (144.58 cm) was recorded from no weeding treatment. Similar findings was reported by Behera et al. (1998)

First ear height (cm)

First ear height was not significantly influenced by the different methods of weed control (Table 1). It was observed that statistically similar first ear height from all weed control methods. However the maximum height of first ear (105.33 cm) was recorded into two hand weeding followed by irrelevantly by the rest of the treatments including the control treatment (no weeding).

100 seeds weight

100 seed weight was greatly varied due to the different weed control methods at probability of 1% level (Table 1). The heaviest 100 seed weight (31.50g) was recorded in NICO SULFURON @ 2 L ha⁻¹ followed insignificantly by four hand weeding (30.75g) and three hand weeding (30.50g) although two hand weeding and one hand weeding showed intermediate but the lowest 100 seed weight (24.50g) was obtained from no weeding (control). This result was supported by the previous findings of Ahmad et al. (1988). These findings are also in accordance with those of El-Bially (1995) who found that 100-grain weight was better for the chemical and mechanical weed control treatments than control plots.

Number of cobs per plant

On other hand, the effect of weed management on number of cobs per plant varied significantly among treatments at 1% probability level (Table 2). The highest amount of cobs per plant (3.84) was found in four hand weeding tracked insignificantly by NICO SULFURON @ 2 L ha⁻¹ (3.42), three hand weeding (3.33) and one hand weeding (3.17) while two hand weeding produced (2.75) which is statistically similar to that of control treatment (1.84). Similar findings have been revealed by Abdullahiet al. (2016) who found that different weed control methods significantly enhanced yield and yield components of maize during the study as compared to weedy check.

Grain yield (Kg ha⁻¹)

According to Table 2 grain yields exhibited highly significant variation at 1% probability level. All weed control treatments improved maize grain yield compared to the control treatment but the highest amount of grain yield (5092.53 kg) was obtained from four hand weeding treatment followed insignificantly by NICO SULFURON @ 2 L ha⁻¹ (5029.57 kg) and three hand weeding (4229.59 kg) furthermore, one hand weeding and two hand weeding treatments yielded (3629.59 and 2718.47kg) respectively but the lowest amount of grain yield (670.00 kg) was produced by no weeding. This result ties well with previous studies of Abdullahiet al. (2016) who found that different weed control methods significantly enhanced yield and yield components of maize during the study as compared to weedy check.

Straw yield (kg ha⁻¹)

Data regarding straw yield of maize crop as influenced by different weed control method were found statistically significant difference at 1% probability level. The superior amount of straw yield (6774.00 kg ha⁻¹) was documented from NICO SULFURON @ 2 L ha⁻¹ although all the other weed control methods except control treatment showed intermediate but the lowest straw yield (2153.50 kg ha⁻¹) was found from control treatment.

Table 2: The effect of weed management on number of cobs/plant, Grain yield, straw yield, biological yield and Harvest index

Treatments	Cob number plant ⁻¹	Grain yield (kg ha ⁻¹)	Straw yield (kg ha ⁻¹)	Biological yield (kg ha ⁻¹)	Harvest index (%)
Herbicide	3.42 ab	5029.57 a	6774.00 a	11803.57 a	42.59 b
One hand weeding	3.17 ab	3629.59 b	5409.75 b	9039.34 b	39.80 b
Two hand weeding	2.75 bc	2718.47 b	5452.50 b	9170.97 b	40.54 b
Three hand weeding	3.33 ab	4229.59ab	5270.50 b	9500.08 b	43.79 ab
Four hand weeding	3.84 a	5092.53 a	5542.00 b	10634.53 ab	47.93 a
No weeding	1.84 c	670.00 c	2153.50 c	2823.86 c	23.86 c
LS	**	**	**	**	**
CV (%)	21.11	10.06	14.18	15.99	7.11

Values having same letter (s) do not differ significantly by DMRT at P<5% level

LS= level of significant, CV= coefficient variation

**Highly Significant (p≤ 1%)

Biological yield (kg ha⁻¹)

With regard to the biological yield, there was highly significant at 1% probability level among treatments (table 2). The highest amount of biological yield (11803.57kg ha⁻¹) was obtained from NICO SULFURON @ 2 L ha⁻¹ followed by four hand weeding (10634.53kg ha⁻¹) whereas the lowest biological yield (2823.86 kg ha⁻¹) was recorded from control treatment and finally the rest of the treatments showed medium biological yield. These findings are in conformity with those of Sinha et al., (2001), Dixit & Gautam (1996) and Shinde et al., (2001).

Harvest index (%)

Pertaining to harvest index, there was highly significant at 1% level (Table 2) being the maximum degree of harvest index in four hand weeding (47.93%) followed insignificantly by three hand weeding (43.79%) and this may be minimum weed intensity providing health environment for maize plant growth while the lowest degree of harvest index (23.86%) was recorded from control treatment and the rest treatments showed medium harvest index. Similar conclusions were reached by Ahmad et al. (1988).

IV. Conclusion

This study experimented by the weed control methods on maize production in Afgoye. From the results of Grain yield, it can be concluded that four hand weeding and post emergence of NICO SULFURON @ 2 liter per hectare for obtaining (5092.53 and 5029.57 kg ha⁻¹) respectively and it was found to be the most effective weed control methods as compared to the other treatments.

References

- [1]. Abdullahi, S., Ghosh, G. and Dawson, J. (2016). Effect of Different Weed Control Methods on Growth and Yield of Maize (*Zea Mays L.*) Under Rainfed Condition in Allahabad. *J. Agri. and Vet. Sci.*, 9(4): 44-47.
- [2]. Ahmad, S., M.S. Zahir, Z.A. Cheema and R.M. Iqbal, (1988). Effect of weed control practices on weed population and yield of maize. *Pakistan J. Weed Sci. Res.*, 1: 67-71
- [3]. Behera, B., G.S. Singh, P.C. Pradhan and P.C. Senapati, (1998). Weed management in runner-bean (*Phaseolus coccineus*) + maize (*Zea mays*) intercropping under rain-fed conditions. *Indian J. Agric. Sci.*, 68: 697-8.
- [4]. Bijanzadeh, E. and Ghadiri, H. (2006). Effect of separate and combined treatments of herbicides on weed control and corn yield. *Indian J. Weed Sci.*, 20: 640-645.
- [5]. Dass, S., Kumar A, Jat S.L., Parihar, C.M., Singh, A.K. and Chikkappa, G.K. (2012). Maize holds potential for diversification and livelihood security. *Indian Journal of Agronomy*; 57:32-37.
- [6]. Dixit, A. and Gautam, K.C. (1996). Effect of atrazine on growth and yield of winter maize. *Ann. Agri. Res.*, 17(2): 121-124.
- [7]. Duncan, D.B. (1955). Multiple range and multiple F tests. *Biometrics*. 11:1-42.
- [8]. El-Bially, M.E. (1995). Efficiency of atrazine with other herbicides used alone, in sequence or as tank mix in maize. *Ann. Agri. Sci.*, 40(2): 709-721.
- [9]. Gomez, K.A and Gomez, A.A. (1984). *Statistical Procedures for Agricultural Research*. 2nd edn. Singapore: John Wiley & Sons.
- [10]. Khan, M.A., K.B. Marwat, H. Gul and K. Naem. (2002). Impact of weed management on maize (*Zea mays L.*) planted at night. *Pak. J. weed Sci. Res.*, 8(1-2): 57-62.
- [11]. Khan, S.A., N. Hussain, I.A. Khan, M. Khan and M. Iqbal. (1998). Study on weed control in maize. *Sarhad J. Agri.*, 14(6): 581-586.
- [12]. Rastgordani, F., Ahmadi, A. and Sajedi, N.A. (2013). The Influence of mechanical and chemical methods on Weeds Control in Maize. *Tech J Engin & App Sci.*, 3 (S): 3858-3863.
- [13]. Shinde, S.H., A.K. Kolage and R.L. Bhilare. (2001). Effect of weed control on growth and yield of maize. *J. Maharashtra Agri. Uni.*, 26 (2): 212-213.
- [14]. Sinha, S.P., S.M. Prasad and S.J. Singh. (2001). Response of winter maize (*Zea mays*) to integrated weed management. *Indian J. Agron.*, 46(3): 485-488.

Mohamed Haji Mayow, et al. "Evaluation of weed control methods on maize production in Afgoi District." *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 13(1), 2020, pp. 09-12.