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IMPACT OF FERTILIZER AND PLANTING DENSITY ON WEEDS POPULATION IN MAIZE CROP

Zakir Ullah Jan[1,*], Shamsher Ali[1], Muhammad Adnan Khan[2], Zahid Hussain[3], Ikram Ullah[4] and Khair Ullah[4]

ABSTRACT

The experimental study was conducted to find out the influence of fertilizer and plant density on weed population in maize crop. The experiment was design in complete block design with three replications. Three levels of planting density i.e. 66000, 56000, and 46000 plants ha^{-1} and different nitrogen levels including 200, 250, and 300 kg ha^{-1} were used. In treatments, highest number of weeds (65.33 m^{-2}) was recorded in 300 kg N^{-1} while the highest fresh weight (1960 kg ha^{-1}) and dry weight (520 kg ha^{-1}) of weeds were recorded in 300 kg N ha^{-1} and also produced higher grains yield (6119 kg ha^{-1}) of maize. In planting density, the largest number of weeds (64.0 m^{-2}) was found where the planting density was 56,000 and maize grain yield was 5753 kg ha^{-1}. The plant density of 66,000 had 61.33 weeds m^{-2} and maize grain yield as 5776 kg ha^{-1}. It can be concluded from this experiment that decreasing planting density and increasing nitrogen levels significantly enhanced weeds population and growth.

Key words: Fertilizer, planting density, maize yield, number of weed.

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INTRODUCTION

Weeds growth produce different type of problems, yield reduction, quality of seed damage, soil fertility losses, soil deterioration and some of weed specie show more resistance to pesticide (Wilson, 1993). Weeds introduced to a new area as a potential food or medicinal crop, livestock feed, fiber or ornamental plant. Proso millet *(Panicum miliaceum* L.) was initially introduced in Canada in the mid-1800s for cereal production, but it modified to the

[1]Dept. of Soil and Environmental Sciences, [2]Dept. of Agronomy, AMK Campus Mardan, [4]Dept. of Soil and Environmental Sciences, The University of Agriculture Peshawar, Pakistan
[3]Dept. of Agronomy, Bacha Khan University Charsadda, Pakistan
*Corresponding author's email: zakirullahjan@aup.edu.pk

new habitat it became a competitive weed in north most ground over the last 25 years.

Some researcher studied that conservation tillage can improve the density of annual and perennial weeds but Jasinskaite et al. (2009) also find out the advantage of double-layer ploughing can help in decreasing the density of perennial weed and biomass. The problematic weed seeds dormancy increase with increasing deep ploughing (Macák *et al*., 2005). The best tools for weeds controls are crop rotation which reduce the major weed population because the weed emergence is relative with crop emergence, in crop rotation, crop change also changed emergence time. Controlling the early emergence of weed prevent the high losses of yield.

Maize crop is sensitive to weeds competition at initial stages of development and thus the maximum yield reduction occurred. Generally, the maize competition with weeds significantly reduced the grain yield (Farkas, 2006; Khan *et al.,* 2012; Ali *et al.,* 2016). Therefore, the objective of this research is to investigate the effect different level nitrogen and planting density on weeds control, to improve the grain yield.

MATERIALS AND METHODS

The experimental design was randomized complete block design with three replicates of Nitrogen (N) level used (200, 250, 300 kg nitrogen ha^{-1}). Three planting densities (PD) i.e. 66000, 56000 and 46000 plants ha^{-1} were used. Each experimental unit size was 600 x 200 cm^2. The distance between two adjacent rows was kept 70 cm. All additional agronomic and mechanical practices were done as required. The combination of treatments was T_1 = control, T_2 = N 200 kg ha^{-1} + PD 46000 ha^{-1}, T_3 = N 200 kg ha^{-1} + PD 56000 ha^{-1}, T_4 = N 200 kg ha^{-1} + PD 66000 ha^{-1}, T_5 = N 250 kg ha^{-1} + PD 46000 ha^{-1}, T_6 = N 250 kg ha^{-1} + PD 56000 ha^{-1}, T_7 = N 250 kg ha^{-1} + PD 66000 ha^{-1}, T_8 = N 300 kg ha^{-1} + PD 46000 ha^{-1}, T_9 = N 300 kg ha^{-1} + PD 56000 ha^{-1}, and T_{10} = N 300 kg ha^{-1} + PD 66000 ha^{-1}. The study was carried out by taking sample of weeds from each plot and the following parameters of weeds were studied.

The fresh weight of weeds was measured at randomly selected weed from an area of 50 cm^2 in each plot at points. For the dry weight of weeds, the samples were sun dried by keeping ten days in field to obtain constant weight. The number weeds were counted at randomly selected area (50 cm^2) at points in each plot. The collected data were statistically analyzed by ANOVA method of randomized complete block design procedure using Statistix 8.1 Package. The probability level for LSD test i.e 5 % level of significance was used to distinguish between the means.

RESULTS AND DISCUSSION

Weed density m^{-2}

The effect of fertilizer and PD was significant on number of weeds m^{-2}. The maximum number of weeds was 65.33 m^{-2} found where N was applied at the rate of 300 kg ha^{-1} while the lower number of weeds was 56 m^{-2} obtained under 200 kg N ha^{-1} application. With planting density, 61.33 m^{-2} weeds were observed where plant population was 66,000 plants ha^{-1}, while 64 m^{-2} weeds were obtained under 56,000 plants ha^{-1}. The rest of the plots produced more than weeds as compared to control (10). These results were similar to Abuzar *et al*. (2011) who reported that decreasing planting density increased the number of weeds.

Weeds fresh weight

The nitrogen had remarkable effect on fresh weight of weeds. The mean data of weeds fresh weight as compare to control were significantly changed and planting density were also found significant. The maximum Fresh weight obtained where the N level was 300kg ha^{-1} which was (1960 kg ha^{-1}) and lower weight was obtained from 250kg N ha^{-1} which was (1720 kg ha^{-1}). In contrast the maximum fresh weight was noted (2200 kg ha^{-1}) where the plants population were 46,000 plants ha^{-1}, while lower (1533 kg ha^{-1}) was found where plant population was 66,000 plants ha^{-1}. The minimum fresh weight was recorded in control as compare to rest. These results are supported by Wajid (2007), Sharar *et al.* (2003) who also reported that increasing the nitrogen levels increased the fresh weight of weeds.

Dry weight

The nitrogen and planting density was non-significant influence on dry weight of weeds. The rest treatment as compare to control were significant. Interaction between N and PD was also found more significant. Application of Nitrogen at @ of 300 kg ha^{-1} was maximum dry weight of weeds (520 kg ha^{-1}) whereas the lower dry weight (480 kg ha^{-1}) was achieved when N was applied at 200 kg ha^{-1}. Increasing planting density also effected dry weight of weeds and higher dry weight (520 kg ha^{-1}) was recorded when planting density was maintained at (46,000) plants ha^{-1} whereas the lower dry weight (453 kg ha^{-1}) were recorded when the density was kept (66,000) plants ha^{-1}. Control vs rest showed that dry weight was higher in rest of the plots as compared to control. These results were similar with finding of Mkhabela *et al*. (2001). They reported higher level of nitrogen enhances the dry weight of weeds. The result of planting density was supported by Efthimiadoua *et al*. (2012) and Ahmed and Khan (2002) reported improved yield with increase plant population.

Grain yield

The nitrogen and planting density had significant influence on grain yield of maize. The rest treatment as compare to control were significant. Interaction between N and PD was found more significant. Application of Nitrogen at @ of 300 kg ha^{-1} had highest grain produce (6119 kg ha^{-1}) while the lower grain produce (5,266 kg ha^{-1}) and followed by N at the @ 200 kg ha^{-1}. Increasing planting density enhanced grain produce of maize and the maximum grain produce 5,776 kg ha^{-1}. were verified where the planting density at 66,000 plants ha^{-1} while the minimum grain produce 5,644 kg ha^{-1} was noted where the planting density 46,000 plants ha^{-1}. The rest treatment as compare to control were high grain yield production. These results were similar with finding of Nadeem *et al*. (2006) who reported improved yield with increased plant population of the crop.

Table-1. Effect of fertilizer and planting density on weeds density

Nitrogen level kg hectare $^{-1}$				
Plants ha^{-1}	200 N	250 N	300 N	Mean
66,000	56	60	68	61 b
56,000	52	64	76	64 a
46,000	60	68	52	60 b
Mean	56 c	64 b	65 a	

Table-2. Effect of fertilizer and planting density on weeds fresh weight

Nitrogen level kg ha^{-1}				
PD ha^{-1}	200	250	300	Mean
66,000	1560	1360	1680	1533 c
56,000	1800	1600	1920	1773 b
46,000	2120	2200	2280	2200 a
Mean	1826 b	1720 c	1960 a	

Table-3. Effect of fertilizer and planting density on weeds dry weight.

Nitrogen level kg ha^{1}				
Plants ha^{-1}	200 N	250 N	300 N	Mean
66,000	440	440	480	453 b
56,000	520	440	560	507 a
46,000	480	560	520	520 a
Mean	480 b	480 b	520 a	

Table-4. The effect of different levels of N and PD grain yield of maize

Nitrogen level kg ha^{1}				
Plants ha 1	200 N	250 N	300 N	Mean
66000	5317	5860	6150	5776 a
56000	5306	5800	6098	5735 a
46000	5176	5648	6108	5644 b
Mean	5266 c	5769 b	6119 a	

CONCLUSION

Based on finding of the results it is concluded that the planting density significantly reduced the weeds papulation as compare to treatment application. The planting density of 66,000 plants ha^{-1} effectively reduced the weed population. Similar was the effect of Nitrogen level of 300 kg ha^{-1}. Increasing fertilizer also increased the number of weeds but increasing in planting density decreased the weeds population.

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