RESEARCH NOTE

Effect of Time of Weeding and Levels of N and P_2O_5 Fertilizers on the Grain Yield of Maize

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Maize is among the world's three most important cereal crops. The importance of weed competition in maize depends on the crop growth stage, the amount of weed present, the level of water, nutrient stress and the weed species. The first few weeks are critical for controlling weed in maize. Even small weeds during the first week after emergence can reduce the grain yield substantially (Aldrich et al 1986). It was considered that yield loss due to weeds is 7% in Europe and 16% in Africa (Broadbent 1978). A diagnosis survey of the farming system in Kasipul, Oyugis division of Rachuonyo district (Kenya) revealed a significant gap between potential and actual maize yields in farmers' fields (CMRT 1995). This was attributed to biological and socio-economic constrains particularly weed crop completion and yield losses.

The main objectives of the study were a) to determine the effect of timing of the first weeding on grain yield of maize and b) to determine the effect of fertilizer application and timing of the first weeding on weed growth and grain yield of maize.

Yield loss due to weeds, insect pests and poor storage facilities was as high as 60% in Kenya (CMRT 1995). It is accepted that 10% loss of agricultural crops can be attributed to the competitive effect of weeds. It was reported that there was a marked responses of Nitrogen and Phosphorous to the grain yields of maize particularly when they were applied together (Bennet et al 1979).

The experiment was conducted during March-July, 2000 at long rain cropping season on sandy loam soils at three farmers' field sites of Oyugis (Kasipul) Division of Rachuonyo District of Kenya. Improved maize variety H 513 was planted by hand at a row spacing of 75 cm and plant to plant distance was 60 cm. Two plants per hill were maintained after thinning. The trial was laid out in Randomized Complete Block Design with three replications. First weeding was done on five different dates: 14 days after maize seedling emergence (DAE), 28 DAE, 42 DAE, 56 DAE and 70 DAE in two levels of fertilizers (0:0 and 60:60 $N:P_2O_5$ kg ha^{-1}).

First weeding after 14 DAE and 28 DAE showed significant difference on weed biomass ($P < 0.01$), plant stand count at harvest ($P < 0.01$), plant height ($P < 0.05$), crop biomass ($P < 0.01$), number of ear per hectare ($P < 0.01$) and grain yield ($P < 0.01$). First weeding on 14 DAE produced the highest plant stand (32/7.2 m^{-2}), plant height (190 cm), crop biomass (8.1 t ha^{-1}), the number of ears (38888 ha^{-1}) and grain yield (4.3 t ha^{-1}). Weeding time after (70 DAE) produced the highest weed biomass (517 gm 0.25 m^{-2}) (Table 1) but grain yield of maize was the lowest (1.1 t ha^{-1}) when weeding was done after 56 days. Weeding at later stages of crop growth was found to suppress the crop biomass and grain yield of maize significantly.

There was significant difference with and without application of chemical fertilizers ($N:P_2O_5$) on plant height ($P < 0.05$), crop biomass ($P < 0.05$), number of ear per hectare ($P < 0.5$) and grain yield ($P < 0.01$), while it did not show significant result on weed biomass and plant stand. Application of nitrogen and phosphorus combined gave the highest yield (3.3 t ha^{-1}) (Table 2).

Table 1. Effect of weeding time, weed biomass, plant stand, plant height, crop biomass, numbers of ears and grain yield of maize in 2000

Weeding time (DAE)	Weed biomass, g 0.25 m^{-2}	Plant stand, n 7.2 m^{-2}	Plant height, cm	Crop biomass, t ha^{-1}	No of ears ha^{-1}	Grain yield, t ha^{-1}
14	292	32	190	8.1	38888	4.3 a
28	250	26	179	6.1	36111	3.8 ab
42	175	21	158	4.0	19444	2.1 bc
56	483	27	146	2.8	27083	1.1c
70	517	24	141	3.1	25000	1.3c
LSD (0.05)	56.5	4.0	18.4	1.3	5.94	0.9

DAE, Days after emergence.

Table 2. Effect of Nitrogen and Phosphorous on weed biomass, maize plant stand, maize plant height, crop biomass, number of ears and grain yield of maize in 2000

N:P_2O_5, kg ha^{-1}	Weed biomass, g 0.25 m^{-2}	Plant stand, n 7.2 m^{-2}	Plant height, cm	Crop biomass, t ha^{-1}	Number of ears ha^{-1}	Grain yield, t ha^{-1}
0:0	353.3	27	150.2	3.6	27778	1.8
60:60	333.3	25	175.8	6.0	31944	3.3
LSD (0.05)	-	-	18.2	0.25	2400	0.16

It is concluded that the most appropriate time for the first weeding was 14 or 28 DAE. The application of nitrogen and phosphorus @ 60:60 kg ha^{-1} gave the highest yield. However, the environment and soil types in Nepal may not be similar to that of Kenya. Thus, similar trials need to be conducted with more treatments in Nepal so that recommendation regarding the first weeding time and levels of fertilizers could be given for improvement in maize productivity.

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