



Response of Maize to Potassium Fertilizer at Hadero, Southern Ethiopia

By

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Introduction

Up to now N and P fertilizers are the only commercial fertilizers being imported and applied in Ethiopia to improve crop productivity ever since they were first introduced in late 1960s.

However, yield gains from NP fertilizer are decreasing with time despite year by year steady increase in per capita fertilizer consumption. Among others, depletion of soil potassium (K) is one of the most likely reasons for this to happen.

Apparently, emerging research evidences based on the responses of potato and wheat proved that it is indeed becoming a limiting nutrient in some soils of Ethiopian (Haile and Mamo, 2013).

But, there is little or no information are available on the response of maize to K so far in Ethiopia. Thus, it was found important to investigate the response of maize to K fertilization.

Objectives

- To evaluate the effect of K fertilizer on the yield and yield components of maize.
- To determine economic feasibility of K fertilizer application on maize.

Materials and Methods

Description of the study area

The experiment was conducted at Hadero, Southern Ethiopia located between 07° 11' 52" - 07° 11' 89" N and 37°39'49" - 37° 39' 58"E. Maize is the major cereal crop grown in the area. The experiment was done during the main cropping season of 2015.

Treatments and experimental procedure

Treatments used included non-fertilized control, K, NP and NPK fertilizers. Treatment codes and fertilizer rates used in each treatment is shown in Table 1.

Table 1. List of treatments and the corresponding rates of fertilizer nutrients applied.

Treatments	Rates (kg ha ⁻¹)	Remarks
Control	0:0:0	Non-fertilized control (local control)
K	0:0:60	25 % of K fertilizer was applied six weeks after planting of maize
NP	92:20:0	Standard control. N was split applied
NPK	92:20:60	N was split applied

The experiment was laid out in RCB design with four replications (2 replications/farmer's field). Maize variety, Shone was planted in a pot size of 3.75 X 2.5 m with intra and inter row spacing of 0.25 and 0.75 m respectively. Urea, TSP and KCl were used as a source of N, P, and K respectively.

Data collection and analysis

Data on plant height (PLHT), ear length (EL) and number of seeds per ear (NSPE), thousand seed weight (TSW), grain and straw yields were collected and subjected of ANOVA using SAS software. Means were separated using least significance difference (LSD) method at 0.05 probability level. Economic analysis of treatment effects were done following standard procedure.

Results and Discussion

Effect on yield components of maize

Potassium fertilizer produced significantly higher yield components in maize than that produced by local control treatment. It increased PLHT, EL, NSPE and TSW by 18, 14, 20.5 and 25.6 % over local control respectively (Table 2). However, the highest PLHT, EL, NSPE and TSW were obtained from treatment involving application of NP + K.

KEY MESSAGE:
THERE IS AN URGENT NEED TO INCLUDE POTASSIUM IN THE FERTILIZER PROGRAM OF ETHIOPIA TO ENHANCE CROP PRODUCTION AND PRODUCTIVITY.

Table 2. The effect of potassium applied alone and in combination with NP on the yield components of maize at Hadero.

Treatments	PLHT(cm)	EL (cm)	NSPE	TSW (g)
C	226.6c*	23.6d	353.3d	295.8c
K	267.5b	27.0c	425.6c	371.5b
NP	274.8b	28.7b	493.8b	387.8b
NPK	297.5a	30.5a	576.0a	432.5a
LSD (0.05)	9.6	1.05	34.6	22.9
CV (%)	7.5	5.0	8.7	5.0

*Means within column followed by the same letter (s) are not statistically different from each other.

Effect on grain yield of maize

Application of K fertilizer has also significantly increased grain yield of maize by 48 % over that produced by local control treatment suggesting low level soil K content in the study area for optimum production of maize (Fig. 1). However, the highest grain yield was produced by NP + K (NPK) treatment. It increased grain yield by 41 % over that produced by NP treatment. This shows the importance of balanced applications of fertilizers containing all the three nutrients for enhancing productivity of maize at Hadero. This is in line with Haile and Mamo (2013) who reported that application of K along with NP has dramatically increased yields of potato and wheat in Hagereselam and Chench locations of Southern Ethiopia. Application of K alone or in combination with NP on maize was also found to be economically feasible (data not shown here).

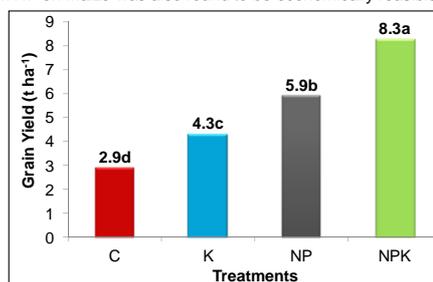


Figure 1. Effect of K fertilizer applied alone and in combination with NP on the grain yield of maize
*Bars followed by the same letter (s) are not statistically different from each other.



Plate 1: NP treated ears
Plate 2: NPK treated ears
Plate 1 and 2 compare maize ears produced by NP and NPK treatments respectively.

Conclusion

In conclusion, maize responds significantly to K fertilizer application at Hadero suggesting low level soil K content for optimum production of maize in the area. However, the highest yield was obtained when K was applied along with NP fertilizers implying that there is a need for balanced applications of all the three nutrients for enhanced and sustained production of maize. This finding should serve as an additional evidence to convince policy makers that there is a need to include K in the fertilizer program of Ethiopia.

Reference

Haile, W. and T. Mamo. 2013. The effect of potassium on the yields of potato and wheat grown on the acidic soils of Chench and Hagereselam in Southern Ethiopia. IPI, e-ifc No. 35.