Agri JOURNAL WORLD
ONLINE ISSN: 2583-4339
www.journalworlds.com
VOLUME 2 ISSUE 8 AUGUST, 2022

POTASSIUM FOR HIGHER GRAIN YIELD AND FODDER QUALITY OF MAIZE CROP

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ABSTRACT

Potassium is an important macronutrient which plays a significant role in plant growth and development. The deficiency of potassium which appears first on older leaves results in stunting and poor growth of the maize crop and ultimately reduces the crop grain as well as fodder yield. In maize grown for grain purpose, recommended dose of potassium improve the grain yield, nutrient concentration, protein content and economic returns. In fodder maize application of a recommended dose of potassium improve the grain as well as fodder quality and economic returns. Hence, the application of potassium is a good way to improve the yield, and quality of maize crops and a good way to achieve good profit for the maize-growing farmers.

INTRODUCTION

Agriculture development always remained a ray of hope which provided food, feed and fodder for both humans and animals. Among various discoveries, nitrogen fixation, the green revolution, the conceptualization of principles of genetics, combine harvester, Archimedes' screw and refrigeration helped tremendously in achieving the green revolution around the world. Over the century, the advancement in agricultural technologies leading the way for higher production and quality produce. Agriculture moved from subsistence farming to intensive farming. After the green revolution, the decline in factor productivity was observed due to intensive agricultural practices. The imbalanced nutrient management practices lead to a decline in factor productivity. Among macronutrients, potassium is the most neglected nutrient regarding application to food and fodder crops.

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ROLE OF POTASSIUM IN THE CROP?

- Potassium regulates photosynthesis in plants by governing the opening and closing of the stomata.
- Potassium helps in the activation of various enzymes in plants which generates ATP requires to provide the energy to carry out various chemical and physiological processes in the plants.
- Potassium plays a significant role in the osmoregulation of water and other salts in plant cells and tissues.
- Potassium contributes a significant part to starch synthesis and facilitates protein synthesis in plants.

A field view of potassium applied maize crop

DEFICIENCY SYMPTOMS OF POTASSIUM IN MAIZE

Being a mobile element, deficiency, of potassium first appears on older (lower) leaves. In general potassium deficiency appears on leaves as brown scorching with curling of leaf tips as well as chlorosis between leaf veins. Purple spots may also appear on the underside of the leaf. Potassium deficiency may induce stunted plant growth, and root development and also reduce seed and fruit development. Deficient plants may be more prone to frost damage and disease, and their symptoms can often be confused with wind scorch or drought.

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SOURCES OF POTASSIUM FOR PLANTS

Potassium Chloride: It is the most common source of potassium which carries 60-62% K_2O on per kg basis for most food crops.

Potassium sulfate: It can be used to supply sulfur along with potassium to the crop. It is suitable for both food and tuber crops. Potassium sulfate carries 50% K_2O on per kg basis for most of the food crops.

Farmyard Manure: The K content of farmyard manure varies with animal type, feed ration, storage and preparatory techniques. Generally, the K content in farmyard manure varies from 0.5 to 1.0 %.

TIME AND METHODS OF POTASSIUM APPLICATION IN MAIZE

For any crop, the time and method of nutrient application are very important. Generally, potassium is applied as a basal dose in maize crops at the time of sowing either by broadcasting or band placement. In some areas, potassium is also applied as foliar spray @ 2% to correct the potassium deficiency in the standing maize crop.

EXPERIMENTAL RESEARCH FINDINGS ON POTASSIUM APPLICATION IN MAIZE

A) Grain Maize:

Kumar *et al.*, (2015) experimented on maize crops at IARI New Delhi and showed that the application of potassium results in increased maize grain yield with an increased level of potassium fertilizer doses. The application of inorganic potassic fertilizers resulted in higher zinc and iron content as well as crude protein content in the grain. The treatment applied with a recommended dose of potassium (RDK) @60 kg/ha recorded the highest B: C ratio of 1.05 Rs/ha.

Table 1. Effect of the Recommended dose of potassium on yield, quality and B:C ratio of fodder maize crop

Parameter	No K application	RDK applied @60 kg /ha
Green fodder Yield (t ha^{-1})	2.21	3.6
Stover Yield (t ha^{-1})	4.9	5.7
Crude protein content (%)	9.7	10.7
Zn Content (ppm)	21.3	26.3
Fe Content (ppm)	44.7	48.3
B:C ratio	0.62	1.05

B) Fodder Maize:

Baljeet *et al*., (2020) showed that the application of potassium results in increased green and dry fodder yield of maize. The application of inorganic potassic fertilizers resulted in higher zinc and iron content in the fodder on a dry weight basis. Application of RDK @40kg/ha also recorded higher crude protein content, total ash content and ether extract content. The treatment applied with a recommended dose of potassium (RDK) @40 kg/ha recorded the highest B: C ratio of 2.19 Rs/ha.

Table 2. Effect of the Recommended dose of potassium on yield and quality of fodder maize crop

Parameter	No K application	RDK applied @40 kg /ha
Green fodder Yield (t ha^{-1})	30.5	44.7
Dry matter Yield (t ha^{-1})	5.9	8.2
Zn Content (ppm)	16.5	22.1
Fe Content (ppm)	90.0	101.4
Crude protein content (%)	7.3	8.7
Ether extract (%)	1.64	2.0
Total Ash (%)	8.3	9.6
B:C ratio	1.26	2.19

CONCLUSION

Potassium is an important macronutrient which plays a significant role in plant growth and development. The deficiency of potassium which appears first on older leaves results in stunting and poor growth of the maize crop and ultimately reduces the crop grain as well as fodder yield. In maize grown for grain purpose, recommended dose of potassium improve the grain yield, nutrient concentration, protein content and economic returns. In fodder maize application of a recommended dose of potassium improve the grain as well as fodder quality and economic returns. Hence, the application of potassium is a good way to improve the yield, and quality of maize crops and a good way to achieve good profit for the maize-growing farmers.

SUGGESTED READINGS

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