Researching Soils, Crops and Water In Zambia

Zambia Agriculture Research Institute

TRIAL CONCEPT NOTE

EFFICACY EVALUATION OF SUMAGROW FOR ENHANCED PRODUCTIVITY OF MAIZE AND COMMON BEAN IN ZAMBIA.

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INTRODUCTION

The world's population is projected to reach 9.7 billion by 2050, putting immense pressure on the global food system (United Nations, 2019). In order to meet this demand, agricultural productivity must increase, while addressing environmental concerns and promoting sustainable practices.

Fertilizers play a crucial role in modern agriculture, enabling farmers to increase crop yields and improve food security (FAO, 2017). However, the excessive use of chemical fertilizers has led to environmental degradation, soil pollution and water contamination (Liu et al., 2019).The over-use of chemical fertilizers has also contributed to soil nutrient depletion, reduced soil fertilizer and decreased crop resilience (Pimentel et al,2010).

In recent years, bio-fertilizers have gained significant attention as sustainable alternative to chemical fertilizers (Bhardwaj et al., 2014). Bio-fertilizers are living microorganisms that promote plant growth, improve soil health and increase crop yields (Vessey, 2003). They offer several benefits, including; Environmental sustainability, Soil health improvement, increased crop yields and Cost-effectiveness in that Bio-fertilizers can reduce farmers' reliance on expensive chemical fertilizers.

SUMAGROW is a novel bio-fertilizer that has been developed to promote sustainable agriculture and improve crop productivity. This bio-fertilizer contains a unique blend of microorganisms that have been carefully selected for their ability to fix atmospheric, solubilize phosphorus and produce plant growth-promoting substances thus stimulating plant growth and development (Glick, 2013).

Maize plays a crucial role in the lives of the Zambian population, serving as a staple food and providing a valuable source of income (Chapoto et al., 2016). The crop is grown in diverse agro-ecological regions throughout the country. Despite the importance of maize and the concerted efforts through FISP by government in the maize sector in Zambia, the country continues to battle with low and variable maize productivity (Oscillating around 2 tons per hectare as affected as compared to the worldwide average of 5.5 tons) (Republic of Zambia – Central Statistical Office, 2016; Chamberlin et al., 2014). Poor soil fertility is one of the major concern in various regions coupled with climate change effects. Climate change has resulted in

changes in weather patterns, irregular rainfall or extreme droughts resulting in unpredictable variations in maize yields and Legumes (Chamberlin et al., 2014)

OVERALL OBJECTIVE

To assess the efficacy of using *SUMAGROW* on Maize and Common Bean production in Zambia.

SPECIFIC OBJECTIVES

1. To evaluate the efficacy of SUMAGROW in improving crop yields and quality.
2. To assess the impact of SUMAGROW on soil health and microbial populations
3. To compare the performance of SUMAGROW with conventional fertilizers.

MATERIALS AND METHODS

A detailed assessment of effects of using SUMAGROW on yield and yield components of Maize and Common Bean.

Design and treatment structure

A Randomized Complete Block Design (RCBD) with four (4) treatments and three (3) replications will be used to evaluate the effect of applying the bio-fertilizer on the yield of each test crop .Two sites namely; Mt Makulu Research Centre and Nanga Research Centre will be used. The combination of treatments is described below.

1. Control
2. Sumagrow only
3. 25% Sumagrow+ 25% Inorganic fertilizer
4. 50% Sumagrow + 50% Inorganic fertilizer

Measurements

1. Plant height
2. Chlorophyll
3. Fresh biomass
4. Girth
5. Root length

6. Root structure
7. Soil moisture
8. Number of flowers(Beans)

Soil samples will be collected and analyzed for physical, chemical and biological properties. Data on crop yields, quality and soil health will be collected and analyzed.

FIELD STUDY LAYOUT

REP 1	T1	T2	T3	T4
REP 2	T1	T4	T2	T3
REP 3	T3	T1	T4	T2
REP 4	T2	T3	T1	T4

Key

T1: Control
T2: Sumagrow only
T3: 25% Sumagrow+ 25% Inorganic fertilizer
T4: 50% Sumagrow + 50% Inorganic fertilizer

DATA ANALYSIS

The effect of the treatments will be assessed by Analysis of Variance (ANOVA). For the variables where significant treatment effects are found, a comparison of means will be conducted using the Duncan's Multiple Range test with a significance level of $p \leq 0.05$

EXPECTED OUTCOMES

1. Improved crop yields and quality with the use of SUMAGROW
2. Enhanced soil health and microbial populations
3. Cost-effective and environmentally friendly alternatives to conventional fertilizers.

CONCLUSION

The efficacy evaluation of SUMAGROW will provide valuable insights into its potential to enhance crop productivity and improve soil health. The results of this study will contribute to the development of sustainable agricultural practices and promote the use of environmentally friendly bio-fertilizers.