



## Determination of the Optimal Spraying Application Rate for Improving the Vegetative Growth of Maize Crop Using Knapsack sprayer

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**Abstract:** The most popular and efficient way for fertilization is soil application which needs to be applied in more significant quantities. Nevertheless, foliar fertilization is more practical and cost-effective in some situations. The main diagnostic methods for crop nutrients are foliar and soil fertilization tests to improve crop growth responses. Due to insufficient fertilizer application, particularly when utilizing the usual approach as a soil fertilizer addition, soil degradation will continue and become more expensive and impacting plant growth. To evaluate the influence on the maize vegetative growth, several NPK fertilizer levels were applied using foliar spraying, soil application and their combination treatments at different dosages. Experimental design was factorial arrangement in a complete randomized block design (CRBD) with three replicates. Data analysis using Genstat software (Discovery edition3). The droplet properties such as volume median diameter, droplet deposition, uniformity, and coverage percentage are influenced by the layer of the plant canopy. In addition, the main growth characteristics of maize plants were measured. The upper layers of the plant canopy are the more in the spray deposition ( $0.529 \mu\text{l}\cdot\text{cm}^{-2}$ ), but the higher coverage percentage (33.36%) and the better deposition uniformity (5.54%) obtained in the bottom layers of the maize canopy. The findings demonstrate also a considerable increase in plant height, leaf number, leaf area, stem diameter, wet weight, dry weight, and percentage of N content in plants treated with foliar application and soil fertilization simultaneously (47.52cm, 14.98 leaf.plant<sup>-1</sup>, 8077, 6.06cm, 52.13gm, 14.31gm, and 2.71%) respectively. The findings imply that soil fertilization and foliar spraying can be used to enhance maize growth.

**Keywords:** Droplet characteristics, Foliar spraying, Soil fertilizer, *Zea mays* L.

### Introduction

Maize (*Zea mays* L.) is considered as one of the most important economic crops in the world after rice and wheat (FAO, 2023). Using chemical products as fertilizers in crop production is one of the most important factors in agricultural production

(Bourodimos *et al.*, 2019). These products are administered directly to the soil or leaves using an appropriate manner in the application process to provide vital nutrients to the plant intended at various stages of growth. The crop output is significantly