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PRESENTATION OF RESULTS



INTRODUCTION.

- Conventional maize production in the region relies heavily on inorganic fertilizers, particularly nitrogen–phosphorus–potassium (NPK) blends. While these fertilizers can enhance crop yields, their effectiveness is often constrained by high costs, poor nutrient use efficiency, and negative environmental impacts such as soil degradation and nutrient losses. As a result, there is growing interest in alternative and complementary soil fertility management strategies that are cost-effective, environmentally sustainable, and capable of improving nutrient uptake under smallholder conditions.



- ▶ Bio fertilizers have emerged as a promising option for sustainable crop production. These inputs contain beneficial microorganisms that enhance nutrient availability through mechanisms such as biological nitrogen fixation, phosphorus solubilization, and stimulation of root growth and microbial activity in the rhizosphere. Unlike inorganic fertilizers, bio fertilizers do not supply nutrients directly in large quantities but instead improve the plant's ability to access and utilize nutrients already present in the soil. Consequently, their effectiveness is often closely linked to appropriate application rates, soil conditions, and crop management practices.



- ▶ Rhizolizer Duo is a commercially available bio fertilizer formulated to enhance maize growth and yield through improved nutrient mobilization and root development. The manufacturer recommends a standard application rate of 0.5 oz, while higher rates (e.g. 1.0 oz) was adapted to evaluate if higher doses could increase yield response. However, evidence suggests that bio fertilizers may exhibit non-linear dose response relationships, whereby application beyond the recommended rate does not necessarily lead to additional yield benefits and may reduce overall efficiency. Empirical data comparing recommended and higher application rates of bio fertilizers under field conditions remain limited, particularly across multiple locations.



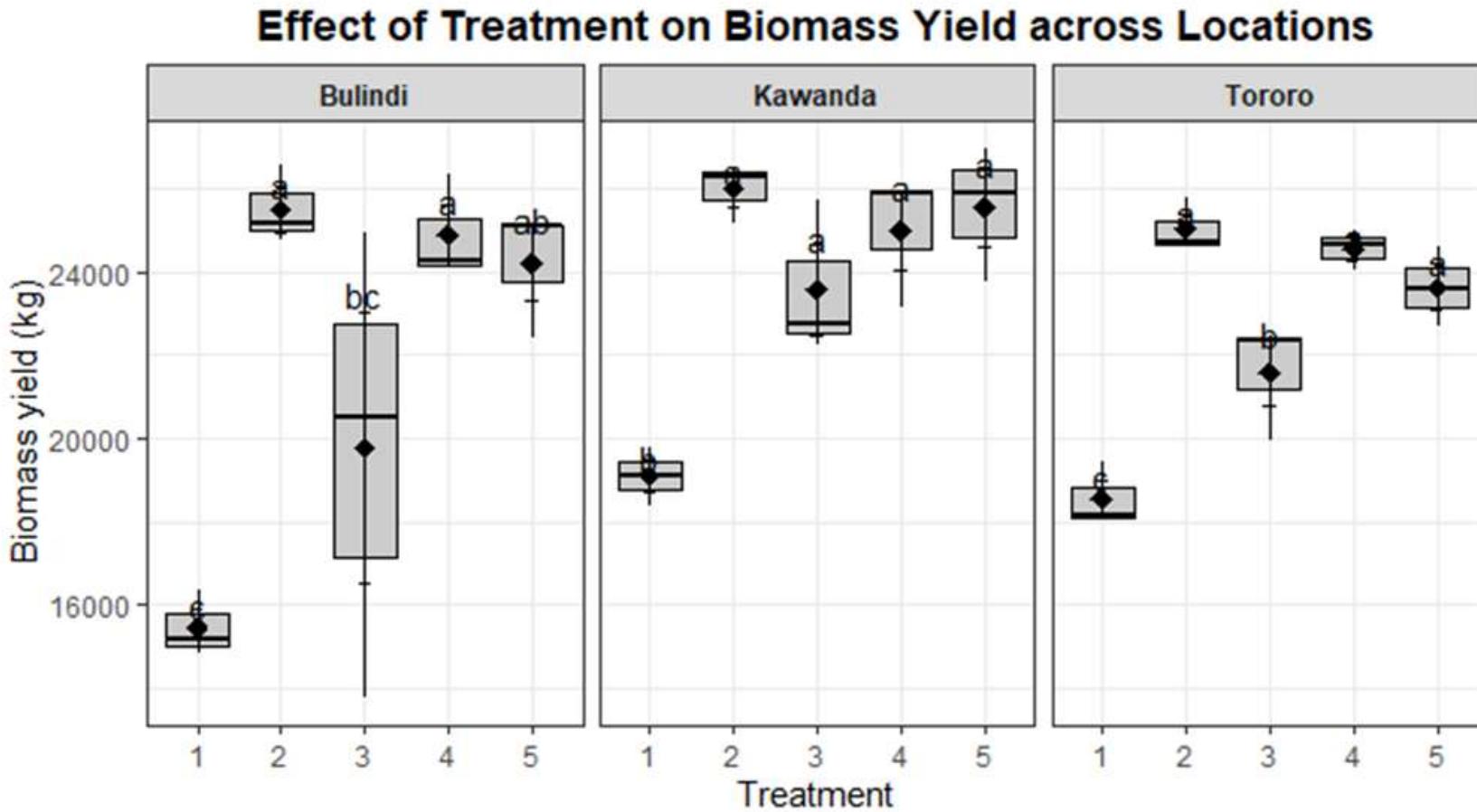
- ▶ Given the strong influence of environmental factors on crop response to nutrient inputs, multi-location evaluation is critical. Agro-ecological differences in soil properties, rainfall patterns, and native microbial communities can substantially affect the performance of fertilizers and bio fertilizers. Therefore, assessing treatment responses across different sites provides a more robust basis for recommending management practices to farmers.



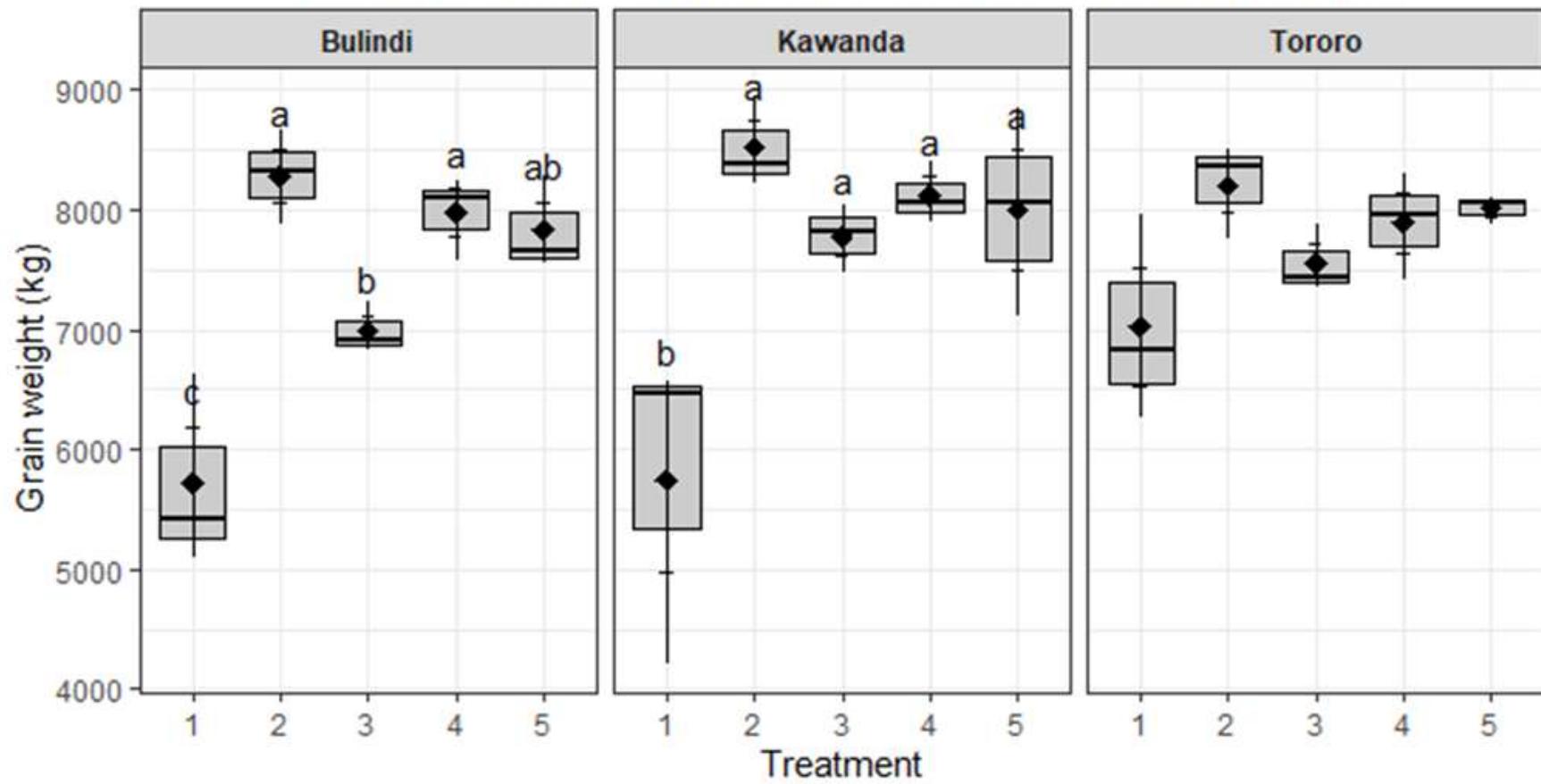
Objectives

- ▶ Compare the effects of a bio fertilizer (Rhizolizer Duo applied at recommended and higher rates), bio fertilizer (Vermipro), and an inorganic fertilizer (NPK maize blend) on maize growth and yield components.
- ▶ Determine the influence of these treatments on key yield traits, including biomass yield, grain weight, and 1000-seed weight.
- ▶ Assess the consistency of treatment responses across different locations.
- ▶ Evaluate whether the recommended application rate of Rhizolizer Duo (0.5 oz) provides superior or comparable benefits relative to a higher application rate (1.0 oz).

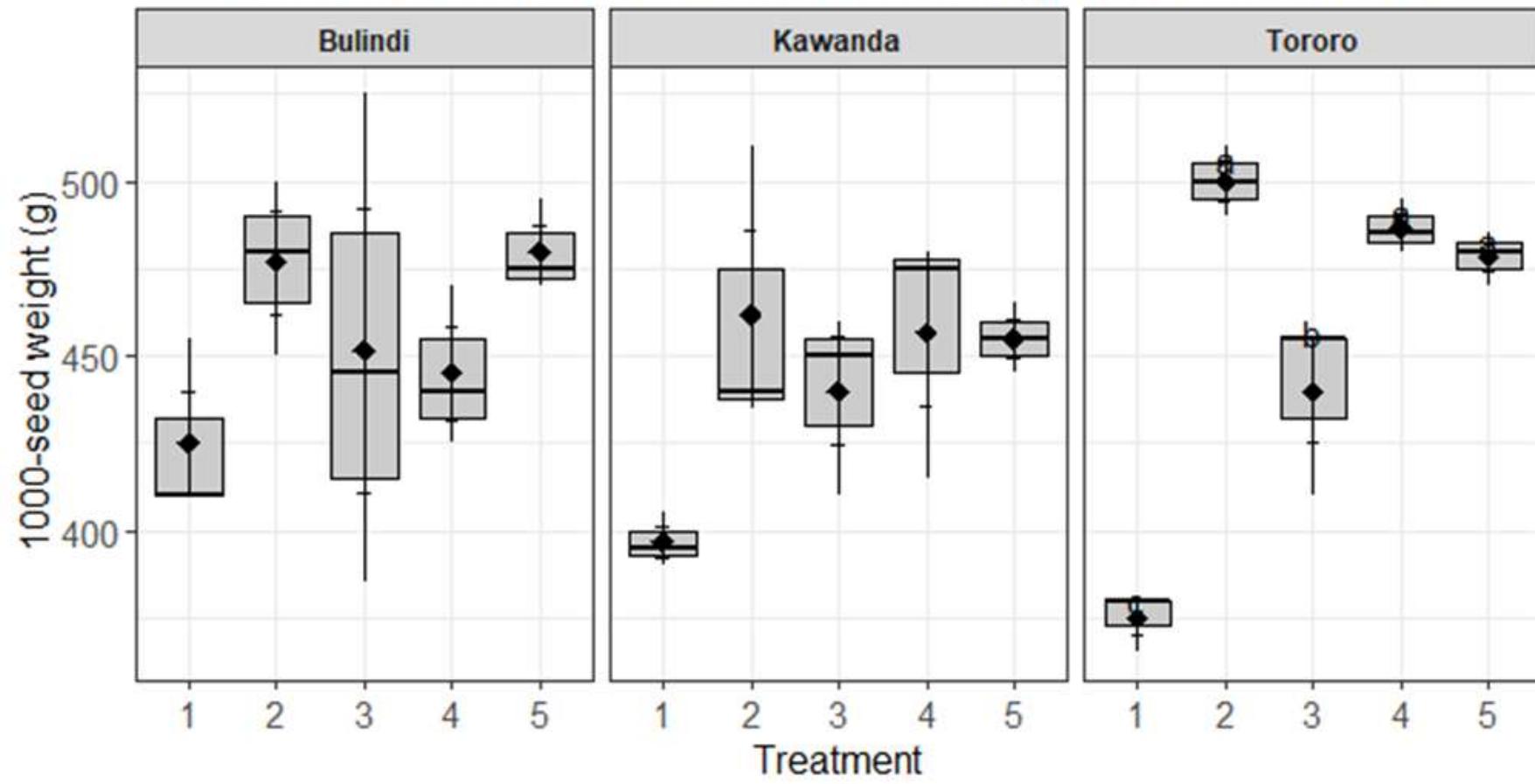
RESULTS



Effect of Treatment on Grain Yield across Locations



Effect of Treatment on 1000-Seed Weight across Locations





DISCUSSION- KAWANDA

- ▶ At Kawanda, treatment effects were statistically significant ($p < 0.05$) for grain weight, biomass yield, and 1000-seed weight. Grain weight ranged from 5,750 to 8,520 kg, with Rhizolizer Duo 0.5 (Treatment 2) producing the highest grain yield, followed by NPK Maize Blend and Rhizolizer Duo 1.0, while the control recorded the lowest grain yield.
- ▶ Biomass yield also differed significantly among treatments ($p < 0.05$), ranging from 19,085 to 26,010 kg, and followed a similar pattern, with Rhizolizer Duo 0.5 achieving the greatest biomass accumulation.

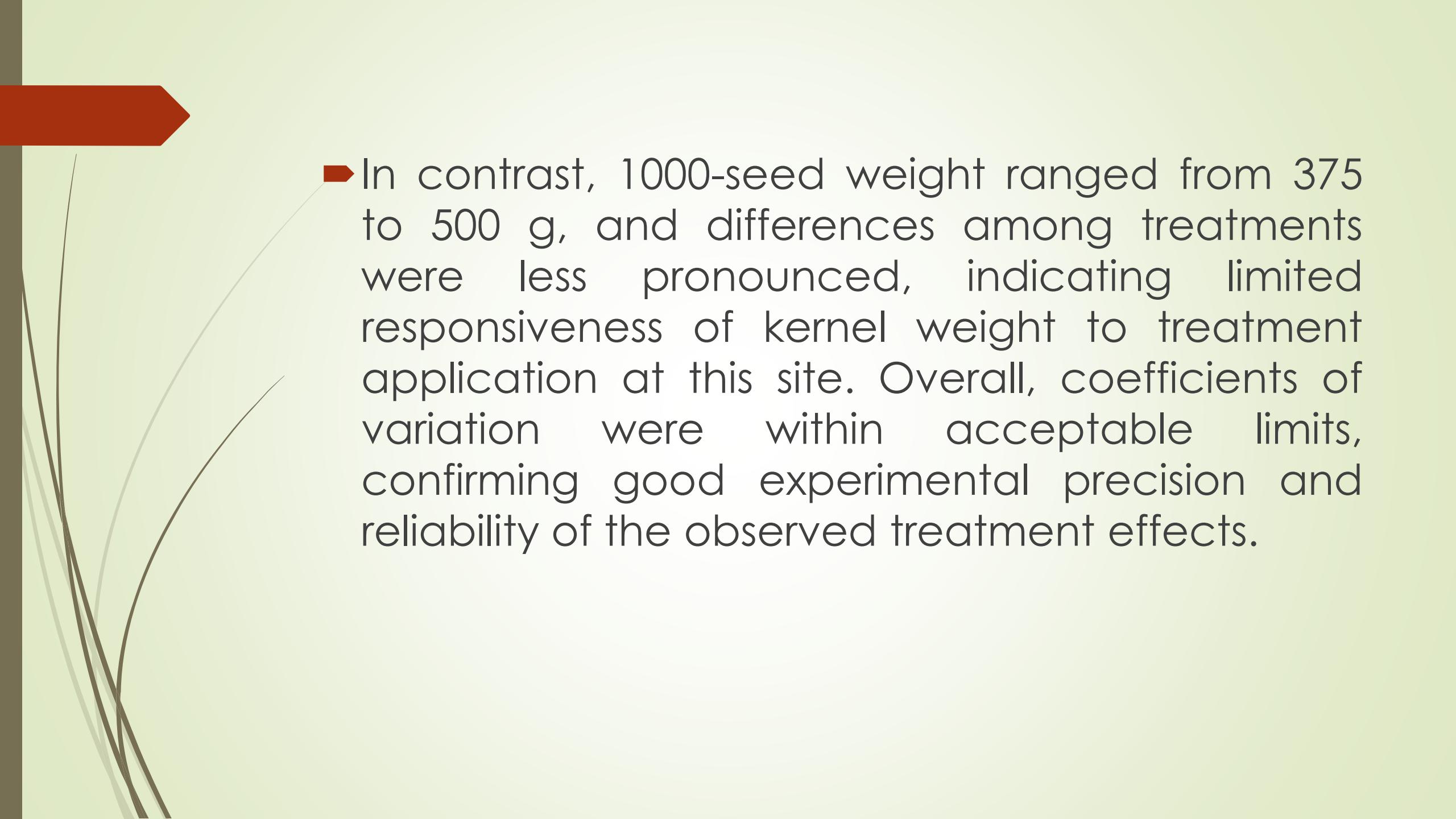


► In addition, 1000-seed weight ranged from 397 to 462 g and was significantly higher under Rhizolizer Duo 0.5, indicating enhanced kernel development at the recommended application rate. Coefficients of variation were within acceptable limits, confirming good experimental precision. Mean separation using LSD ($p = 0.05$) clearly distinguished superior treatments for yield-related traits.



DISCUSSION-TORORO

- ▶ At Tororo, treatment effects were statistically significant ($p < 0.05$) for grain weight and biomass yield, whereas 1000-seed weight showed weaker treatment responses. Grain weight ranged from 7,023 to 8,209 kg, with Rhizolizer Duo 0.5 (Treatment 2) producing the highest grain yield, followed by Rhizolizer Duo 1.0 and NPK Maize Blend, while the control recorded the lowest grain yield.
- ▶ Biomass yield also differed significantly among treatments ($p < 0.05$), ranging from 18,557 to 25,038 kg, and followed a similar trend, with Rhizolizer Duo 0.5 achieving the greatest biomass accumulation.



► In contrast, 1000-seed weight ranged from 375 to 500 g, and differences among treatments were less pronounced, indicating limited responsiveness of kernel weight to treatment application at this site. Overall, coefficients of variation were within acceptable limits, confirming good experimental precision and reliability of the observed treatment effects.



DISCUSSION-BULINDI

- ▶ At Bulindi, treatment effects on yield traits were moderate but statistically significant for biomass yield and grain weight ($p < 0.05$), while 1000-seed weight showed limited responsiveness to treatment application.
- ▶ Grain weight ranged from 5,717 to 8,283 kg, with Rhizolizer Duo 0.5 (Treatment 2) producing the highest grain yield, followed by NPK Maize Blend and Rhizolizer Duo 1.0, whereas the control recorded the lowest value.
- ▶ Biomass yield also differed significantly among treatments ($p < 0.05$), ranging from 15,445 to 25,524 kg, and exhibited a similar pattern, with Rhizolizer Duo 0.5 achieving the highest biomass production.



► In contrast, 1000-seed weight varied narrowly from 425 to 480 g, and differences among treatments were not statistically significant ($p \geq 0.05$), indicating relatively uniform kernel weight across treatments under Bulindi conditions. Overall, coefficients of variation were within acceptable limits, confirming satisfactory experimental precision.



- ▶ The present study demonstrated that Rhizolizer Duo applied at the recommended rate (0.5 oz) consistently produced higher grain weight, biomass yield, and, in some locations, 1000-seed weight compared with the higher application rate (1.0 oz). This response highlights the importance of dose optimization when using bio fertilizers and suggests that increasing application rate beyond the recommended level does not necessarily translate into improved crop performance.





Control

Rhizolizer





Rhizolizer



NPK Maize blend

