Effect of SRI GOLD BIO NPK and PICK UP GA on Grain Yield of Maize (*Zea mays* L.)

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Abstract

A field experiment was conducted at the Zambia Agriculture Research Institute (ZARI), Kabwe Research Station during the 2024/2025 cropping season to evaluate the efficacy of two microbial-based biofertilizers: SRI GOLD BIO NPK (granulated) and PICK UP GA (soluble powder), both produced by Contec Global UK.

Nine fertility treatments were tested, including sole applications, combinations, and integration with conventional fertilizers, using maize variety ZMS 631.

Results demonstrated that SRI GOLD BIO NPK significantly enhanced maize yield as a sole application (2859 kg/ha) compared to the control (1833 kg/ha). PICK UP GA applied alone showed limited improvement (2137 kg/ha). The combination of both products yielded 2583 kg/ha, a 41% increase over the control but statistically insignificant. Integration with conventional urea (200 kg/ha) markedly improved yields (5158 and 4513 kg/ha for SRI GOLD BIO NPK and PICK UP GA, respectively), although still below the full conventional fertilization regime (6452 kg/ha). When half-rates of conventional fertilizer were combined with biofertilizers, yields remained considerably higher than the control (4183 and 3205 kg/ha). The study highlights that integrating microbial biofertilizers with inorganic inputs can reduce chemical fertilizer dependence while sustaining yields in maize production systems.

Keywords: Maize, SRI GOLD BIO NPK, PICK UP GA, biofertilizer, urea, sustainable agriculture, yield.

Introduction

The sustainability of intensive maize production in Sub-Saharan Africa faces increasing pressure due to soil fertility depletion and high dependency on chemical fertilizers. Biofertilizers, which contain beneficial microorganisms such as *Azospirillum*, *Acinetobacter* sp., *Bacillus megaterium*, and *Bacillus cereus*, offer promising alternatives to reduce chemical fertilizer reliance while improving nutrient availability and soil health (Vessey, 2003; Hungria and Mendes, 2015).

SRI GOLD BIO NPK (granulated) and PICK UP GA (soluble powder), both developed by Contec Global, are broad-spectrum microbial formulations intended to promote crop productivity. Their roles include nitrogen fixation, phosphorus solubilization, and plant growth promotion. However, limited information is available on their efficacy under Zambian maize production systems. This study was therefore conducted to evaluate their effect, both as standalone applications and in integration with chemical fertilizers, on maize yields at Kabwe Research Station.

Hypotheses

1. Complementary application of SRI GOLD BIO NPK and PICK UP GA improves maize yield relative to unfertilized control.
2. Sole application of either product increases maize yield compared to control.
3. Integration of biofertilizers with full-rate urea improves maize yield.
4. Biofertilizer integration with reduced chemical fertilizer regimes sustains yields comparable to full conventional fertilization.

Materials and Methods

Site Description

The trial was conducted at ZARI Kabwe Research Station during the 2024/2025 cropping season. The soil was acidic (pH 5.1–5.5), with organic carbon 0.9–1.1%, available phosphorus 0.6–1.2 mg/kg, and cation exchange capacity (CEC) 5.1–5.5 cmol(+)/kg.

Experimental Design

A randomized complete block design (RCBD) with nine treatments and four replications was used. Plot size was 5 × 10 m, with maize variety ZMS 631 planted at 90 cm × 25 cm spacing.

Table 1. Treatments applied in maize trial

Treatment No.	Description
1	No fertilizer (control)
2	Conventional: D compound (200 kg/ha basal) + urea (200 kg/ha top dressing)
3	Full rate SRI GOLD BIO NPK only
4	Full rate PICK UP GA only
5	SRI GOLD BIO NPK + urea (200 kg/ha)
6	PICK UP GA + urea (200 kg/ha)
7	SRI GOLD BIO NPK + half conventional (100 kg/ha each of D compound and urea)
8	PICK UP GA + half conventional (100 kg/ha each of D compound and urea)
9	SRI GOLD BIO NPK + PICK UP GA (producer recommendation)

Data Collection

Grain yield was harvested from a 22 m² net plot area and extrapolated to per hectare basis. Data were subjected to ANOVA using R software (version 4.2.3). Treatment means were compared using least significant difference (LSD) at $p < 0.05$.

Results and Discussion

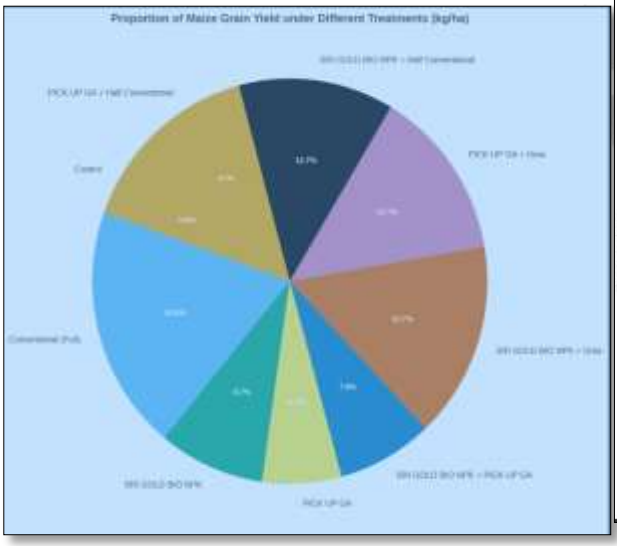
Maize Grain Yield

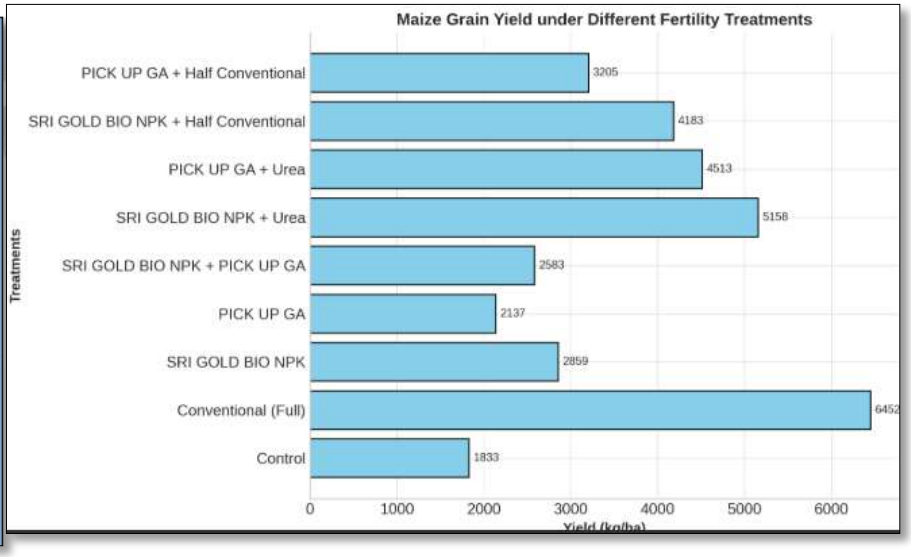
Analysis of variance revealed significant treatment effects on maize grain yield (Table 2).

Table 2. Mean maize grain yield under different fertility treatments

Treatment No.	Description	Yield (kg/ha)
1	No fertilizer	1833a
4	PICK UP GA only	2137ab
9	SRI GOLD BIO NPK + PICK UP GA	2583bc
3	SRI GOLD BIO NPK only	2859cd
8	PICK UP GA + half conventional	3205d
7	SRI GOLD BIO NPK + half conventional	4183e
6	PICK UP GA + urea	4513ef
5	SRI GOLD BIO NPK + urea	5158f
2	Conventional (D compound + urea)	6452g

Note: Means followed by the same letter are not significantly different at $p < 0.05$.





The results showed that SRI GOLD BIO NPK as a sole application significantly increased maize yield over the control, while PICK UP GA alone did not significantly differ. The combination of both products (2583 kg/ha) improved yield by 41% over control but was not statistically significant. Integration of biofertilizers with either full-rate urea or half-rate conventional fertilizer substantially

enhanced yields, indicating synergistic effects. However, yields under integrated regimes remained below those of full conventional fertilization. These findings align with previous studies demonstrating that microbial consortia can reduce fertilizer requirements while maintaining yield (Amalraj et al., 2015; Thilagar et al., 2016; Bhardwaj et al., 2014).

Similar observations were reported by Singh et al. (2011), who emphasized that efficient soil microorganisms enhance nutrient availability and crop productivity. Additionally, Adesemoye and Kloepper (2009) noted that plant growth-promoting rhizobacteria act as biofertilizers and biocontrol agents, thereby reducing the need for agrochemicals.

Conclusion

SRI GOLD BIO NPK significantly enhanced maize yield as a sole biofertilizer, whereas PICK UP GA proved more effective when integrated with inorganic fertilizers. The integration of biofertilizers with reduced chemical inputs sustained relatively high yields, suggesting their potential role in sustainable maize production systems in Zambia. Wider adoption of such integrated nutrient management approaches may contribute to soil health improvement and reduced dependence on synthetic fertilizers.

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