

# EFFECTS OF CHEMICAL AND BIO-FERTILIZERS ON THE GROWTH AND YIELD OF SELECTED RICE (*Oryza sativa* L.) CULTIVAR

By

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## ABSTRACT

Excessive and improper usage of chemical fertilizers on rice leads to adverse effects on human and environment. It has become necessary for a suitable alternative source of fertilizer to replace the chemical fertilizer or to reduce the usage of chemical fertilizers in rice production. Bio-fertilizer is one of the alternative sources which consists of beneficial microorganisms to reduce harmful effects to human and environment through reducing the usage of chemical fertilizer. An experiment was conducted in the Rice Research Station, Department of Agriculture, Sammanthurai, Sri Lanka during the 'Yala' 2017 to evaluate the possibility of replacing chemical fertilizers with bio-fertilizers. Rice cultivar 'Bg 250' was used for this study. This experiment was laid out in the Randomized Complete Block Design and consisted of five treatments and four replications.

The treatments were T<sub>1</sub> - No fertilizer (Control), T<sub>2</sub> - 100% recommended dose of chemical fertilizer (Urea-225 kg ha<sup>-1</sup>, TSP-55 kg ha<sup>-1</sup> and MOP-60 kg ha<sup>-1</sup>), T<sub>3</sub> - 50% chemical fertilizer (Urea-113 kg ha<sup>-1</sup>, TSP-28 kg ha<sup>-1</sup> and MOP-30 kg ha<sup>-1</sup>) + 50% bio-fertilizer (250 ml ha<sup>-1</sup>), T<sub>4</sub> - 50% bio-fertilizer only (250 ml ha<sup>-1</sup>), T<sub>5</sub> - 100% bio-fertilizer only (500 ml ha<sup>-1</sup>). 'Gro Bio-fertilizer<sup>®</sup>' was used as the bio-fertilizer source, which consisted of *Azotobacter chroococcum*, *Azospirillum brasilensis*, *Bacillus polymixa*, *Bacillus megaterium* and other *Bacillus* spp. in a liquid base medium.

Rice cultivar 'Bg 250' was evaluated for selected growth and yield parameters. The results revealed that there were significant ( $p < 0.05$ ) differences between treatments in the measured parameters. Combined application of 50% chemical fertilizer and 50% bio-fertilizer showed the highest plant performance such as plant height (58.2 cm), leaf area (272 cm<sup>2</sup>), plant dry weight (3.3 g), chlorophyll contents (chlorophyll a - 1.7 mgg<sup>-1</sup>, chlorophyll b - 1.4 mgg<sup>-1</sup>, total chlorophyll - 3.1 mgg<sup>-1</sup>), flag leaf length (80.1 cm), yield and yield components.

The application of 100% bio-fertilizer, combined application of chemical and bio-fertilizer and 100% chemical fertilizer showed the highest 1000 grain weight (25.2, 25 and 24.6 g) respectively. The application of bio-fertilizer has significantly ( $p < 0.05$ ) increased the yield of rice. The application of combination of 50% chemical and 50% bio-fertilizer has given the highest (2.5 t ha<sup>-1</sup>) yield. Hence, it could be stated that bio-fertilizer combined with chemical fertilizer could be used as an alternative source in the production of rice with reduced hazardous effects on the environment.

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