

## Effects of Biofertilizer rate and time of application on growth, yield and Quality of Rice (*Oryza sativa* L.)

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### Objectives

The study was conducted to investigate effects of application of biofertilizer alone and in combination with chemical NPK fertilizer on growth, yield and quality of rice.

### Materials and Methods

→ Treatments included:

- Recommended NPK fertilizer rate, RF=N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O (11-5.5-4.8 kg 10a<sup>-1</sup>)
- Half of the recommended NPK fertilizer rate, HRF = N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O (5.5-2.75-2.8 kg 10a<sup>-1</sup>)
- HRF combined with biofertilizer 250 kg 10a<sup>-1</sup> (0DBT)
- HRF combined with biofertilizer 250 kg 10a<sup>-1</sup> (5DBT)
- HRF combined with biofertilizer 250 kg 10a<sup>-1</sup> (10DBT)
- Biofertilizer 500 kg 10a<sup>-1</sup> (0DBT)
- Biofertilizer 500 kg 10a<sup>-1</sup> (5DBT)
- Biofertilizer 500 kg 10a<sup>-1</sup> (10DBT)

Type of biofertilizer used: Food residue incorporated with a mixture of beneficial microorganisms

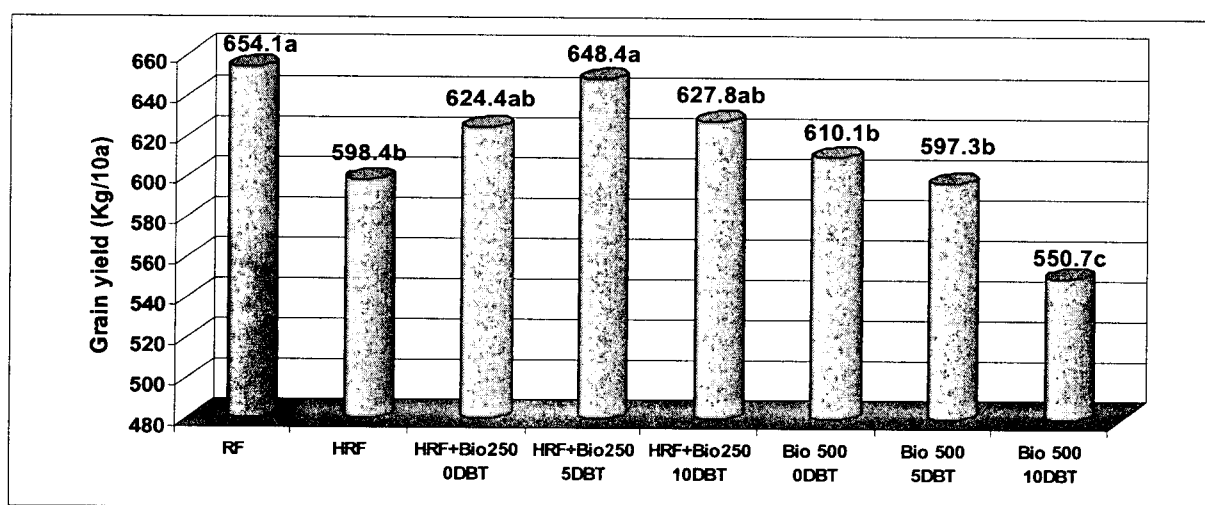
### Summary of results

Application of half recommended NPK fertilizer plus Bio 250, 5DBT ensured early establishment of rice seedlings resulting in improved growth and grain yield. Grain yield of half recommended NPK fertilizer plus Bio 250 kg10a<sup>-1</sup>, 5 DBT (648.4 kg10a<sup>-1</sup>) was statistically similar to the highest obtained in the recommended NPK fertilizer (654.1 kg10a<sup>-1</sup>). The highest percentage of head rice (96.4) and lowest percentage of broken grains (2.1) were observed in Bio 500 kg10a<sup>-1</sup>, 10 DBT whilst the lowest percentages of damaged (0.6), and cracked (5.7), were observed in Bio 500 kg10a<sup>-1</sup>, 5 DBT. All the biofertilizer treatments improved protein content and significantly reduced amylose and phytic acid contents over treatments with chemical NPK fertilizer alone. The results indicated great efficiency in utilization of biofertilizer in integrated plant nutrient management system in rationalizing the consumption of chemical NPK fertilizers to increase both yield and quality of rice simultaneously and also minimize chemical pollution of the environment.

**Table 1. Effects of biofertilizer rates and time of application on rice plant height, tiller number and Chlorophyll content at maximum tillering stage and heading stage.**

Treatment (kg10a <sup>-1</sup> )	Application time	Maximum Tillering Stage			Heading Stage		
		Plant Height (cm)	Tiller Number (No.)	Chlorophyll Content (SPAD)	Plant Height (cm)	Tiller Number (No.)	Chlorophyll Content (SPAD)
RF	Recommended	69.6a*	19.3ab	32.0a	91.7a	17.3a	32.9a
HRF	Recommended	64.4c	17.3abc	28.0b	90.3a	14.1c	32.2a
HRF+Bio 250	0 DBT	65.2c	16.6c	30.6a	91.8a	16.0abc	33.2a
HRF+Bio 250	5 DBT	69.2ab	19.4ab	32.5a	91.5a	16.9ab	32.7a
HRF+Bio 250	10 DBT	69.5a	19.5a	31.8a	90.9a	16.8ab	32.6a
Bio 500	0 DBT	65.6bc	17.2bc	31.6a	90.7a	16.2abc	33.5a
Bio 500	5 DBT	66.4abc	16.3c	30.7a	88.3a	15.0bc	33.3a
Bio 500	10 DBT	65.abc	17.3abc	30.8a	88.8a	15.8abc	33.1a

\* The same letters in each column are not significantly different at 5% level by DMRT



**Fig 1. Effects of biofertilizer rates and time of application on rice grain yield.** RF: Recommended NPK fertilizer; HRF: Half recommended of the NPK fertilizer; Bio: Biofertilizer. DBT: Days before transplanting rice seedlings.

**Table 2. Effects of biofertilizer rates and time of application on protein and amylose contents, toyo (palatability) and alkali digestion values of rice.**

Treatment (kg10a <sup>-1</sup> )	Application time	Protein content (%)	Amylose content (%)	Toyo meter	Alkali Digestion value (KOH 1~7)
RF	Recommended	6.3c*	18.0a	85.1a	4.8ab
HRF	Recommended	6.5b	17.8ab	86.8a	5.3a
HRF + Bio 250	0 DBT	6.6ab	17.5abc	82.3b	4.7ab
HRF + Bio 250	5 DBT	6.6ab	17.5abc	81.7b	5.0ab
HRF + Bio 250	10 DBT	6.6ab	17.5abc	82.2b	4.9ab
Bio 500	0 DBT	6.6ab	17.5abc	82.6b	4.8ab
Bio 500	5 DBT	6.6ab	17.4bc	81.7b	4.7ab
Bio 500	10 DBT	6.7a	17.2c	81.7b	4.3b

\*The same letters in each column are not significantly different at 5% level by DMRT