RICE (Oryza sativa ‘Cocodrie’)

Sheath blight; Rhizoctonia solani

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Field evaluation of Bacillus PGPR strains and fungicides for control of sheath blight in rice, 2011.

An experiment was established in a field of League-type soil (3% sand, 32% silt, and 64% clay) at the Texas A&M University System’s Agrilife Research and Extension Center, Beaumont, TX. The experiment consisted of nine treatments (see table). Bacillus subtilis subsp. subtilis strains 99-101, EXTN-1, and MBI-600 are plant growth-promoting rhizobacteria (PGPR) that have demonstrated to have growth promoting effects on rice and other crops. Strain MBI-600 is an effective ingredient in the biofungicide Integral. These treatments were arranged in a randomized complete block design with four replications. Plots consisted of seven 18-ft rows, and spaced 7 in. between rows. Seeds of rice were treated with the Bacillus strains individually at 108 cfu/ml prior to planting. Rice was drill seeded at 80 lb/A on 29 Apr. Plots received 57 lb N/A of urea fertilizer (46-0-0, N-P-K) at post emergence on 9 May, 57 lb N/A of urea prior to permanent flood on 1 Jun, and an additional application of 57 lb N/A of urea at panicle differentiation on Jun 24. For weed control, plots were applied with herbicides of Ordram 8E (2 lb a.i./A), Facet 75DF (0.25 lb a.i./A), Basagran (0.75 lb a.i./A), Stam 80EDF (2 lb a.i./A) and Penetrator Plus (1 pt/A) on 25 Jun. Permanent flood was established on 1 Jun and plots were irrigated as locally recommended. All plots were inoculated with the sheath blight pathogen by manually broadcasting 400 ml/plot of rice grain and rice hull mixture (1:2 vol/vol) containing R. solani on 6 Jul. On 20 Jul, plots were sprayed with the Bacillus strains (108 cfu/ml) and/or Quadris (azoxystrobin) (4.5 or 9.0 fl oz/A) or Validamycin (13.7 fl oz/A) using a CO2 pressurized sprayer equipped with a boom of three TeeJet 8002 nozzles spaced 16 in. apart and delivered at 32 gal/A. The Bacillus strains were grown in Nutrient’s broth medium on a shaker (120 rpm) at room temperature for 2 to 3 days. On 19 Aug, severity of sheath blight was rated on a scale of 0 to 9, where 0 represents no symptoms, and 9 represents most severe. Plots were harvested on 26 Aug using a plot combine, and grain yield adjusted to 12% grain moisture.

**Treatment, rate (32 gallon H2O/A)** | **Sheath blight Severity (0-9)** | **Yield (lb/A)**
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Untreated control | 8.8 a | 4398 d
**Bacillus Strain 99-101, 1 x 10^8 cfu/ml** | 7.1 b | 4850 cd
**Bacillus Strain EXTN-1, 1 x 10^8 cfu/ml** | 6.8 b | 4820 cd
**Bacillus Strain MBI-600, 1 x 10^8 cfu/ml** | 7.0 b | 4556 d
**Bacillus Strain MBI-600, 1 x 10^8 cfu/ml plus Quadris 4.5 fl oz/A** | 4.5 d | 5222 bc
**Bacillus Strain MBI-600, 1 x 10^8 cfu/ml plus Quadris 9 fl oz/A** | 3.4 e | 5684 ab
**Quadris 4.5 fl oz/A** | 5.5 c | 5348 abc
**Quadris 9 fl oz/A** | 3.5 e | 5721 ab
**Validamycin 13.7 fl oz/A** | 3.8 de | 5911 a

*Means in column followed by the same letter are not significantly different (P = 0.05) according to Fisher’s protected LSD test.*

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