Organic Stimulation of Plant Growth: Inoculation of Bacterial Endophytes from Leersia oryzoides

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Leersia oryzoides, a wild relative of rice (Oryza sativa), may carry potential seed-borne bacterial endophytes which could be used to enhance growth of rice. It was hypothesized that seed-associated bacteria from L. oryzoides would be compatible with rice and promote seedling growth, development, and survival. Bacteria were isolated from seed of L. oryzoides and checked compatibility with rice as well as Bermuda grass seeds for seedling growth promotion. Growth promoting bacteria were evaluated for IAA production, phosphate solubilization and antifungal activities. Overall, ten bacteria were found to be growth promoting in rice seedlings with effects including restoration of root gravitropic response, increased root and shoot growth, and stimulation of root hair formation. All bacteria were identified by 16S rDNA sequencing. Six bacteria were found to become intracellular in root parenchyma and root hairs in rice and in Bermuda grass seedlings. Six bacteria were able to produce IAA in LB broth with highest (47.06 ± 1.99 µg ml-1) by Pantoea hericii. Nine isolates solubilized phosphate and inhibited at least one soil borne fungal pathogen. Seed bacteria of L. oryzoides are compatible with rice. Many of these bacteria become intracellular, induce root gravitropic response, increase root and shoot growth, and stimulate root hair formation in both rice and Bermuda grass seedlings. Presence of bacteria protects seedlings from soil pathogens during seedling establishment. This research suggests that bioprospecting microbes on near relatives of rice and other crop plants may be a viable strategy to obtain microbes to improve cultivation of crops.

Awards Won:
First Award of $3,000