

Biological control of sheath blight of rice with fluorescent pseudomonads

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Article Chronicle :

12.03.2012;

Revised :

22.04.2012;

Accepted :

20.05.2012

Key Words :

Pseudomonas fluorescens,
Chitinase, Sheath
blight

SUMMARY: In this experiment, a few carefully selected strains of *Pseudomonas fluorescens* particularly those from Karnataka state were evaluated for the suppression of sheath blight of rice. Thirty eight strains of fluorescent *Pseudomonads* were isolated from Karnataka state and twenty five strains were obtained from Tamil Nadu. Total of 63 bacterial strains were used in this study. Eleven strains were screened in the laboratory for their antibiosis towards 3 rice fungal pathogens namely *Rhizoctonia solani*, *Sarocladium oryzae* and *Pyricularia oryzae*. All eleven strains also were screened for chitinase production by using a rapid chitinase assay. Very few strains had broad spectrum activity against all 3 rice fungal pathogens. The ones that showed activity against all 3 fungi were strains, T 11, K3, K8, K11 and K13a (5 strains) only 9 of the 63 strains showed activity against any 2 fungal pathogens tested. Chitinase production did not always correlate with *in vitro* inhibition of fungi. Eleven of the 63 strains (17.5%) were positive for chitinase production and among the chitinase producers 7 strains did not inhibit any of the 3 fungal pathogen tested. Four other chitinase producers, strains K6, K8, K11 and T14 inhibited at least one of the 3 pathogens. The results from the present study serve to suggest that bacterial strain selection procedures used alone or in combination may be useful in locating strains with superior capabilities for suppressing sheath blight of rice and perhaps will benefit the resource poor rice farmers of the tropics. The present study revealed the probable influence of antagonism, plant growth promotion and induced systemic resistance (ISR) by the mixture of *Pseudomonas* bioformulations in enhancing the disease resistance in rice plants against sheath blight.

HOW TO CITE THIS ARTICLE : Krishnaveni, M., Sharavanan, P.S. and Noorunisa Begam, M. (2012). Biological control of sheath blight of rice with fluorescent pseudomonads. *Asian J. Environ. Sci.*, 7 (1): 67-72.

Rice or paddy (*Oryza sativa*) is the important staple food of the people in the Eastern, Southern and South Eastern part of India. India is the largest rice growing country in the world. The other important rice growing countries are China, Indonesia, Japan, Thailand, Philippines, Pakistan, Brazil, Vietnam, Cambodia, Korea and Taiwan. Over 3000 varieties are under cultivation in different parts of India.

The sheath blight of rice is incited by *Rhizoctonia solani*. Sheath blight has also been reported from Sri Lanka, China, Brazil, Surinam, Venezuela, Madagascar, Philippines, U.S.A. and it has been observed in most rice growing countries (Ou, 1985). In the Philippines it has been estimated that the damage caused by this disease may amount to 25-50 per cent of rice production. In Japan about 120,000 to 1,90,000

hectares have been reported to be infected and a loss of 24,000 to 38,000 tones of rice each year has been lost due (Mizuta, 1956). Subsequent to sheath blight subsequent years, annual crop losses of 20-25 per cent were observed in rice due to *R. solani* (Hori, 1960) in Japan. In the U.S., rice sheath blight caused an estimated losses worth 67\$ million during 1988 (Anonymous, 1988).

The sheath blight disease development in relation to the physical, environment and the chemical control of the disease has been studied by Rao *et al.* (1979). The disease can be controlled by fungicides or by growing resistant cultivars. However, there are no resistant varieties found till date. Since 1973 commercial stone fruit and rose growers in Australia have protected their crops from crown gall dipping their planting material in a suspension of bacterial cells,

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