Induction of Systemic Resistance by *Pseudomonas fluorescens* Pf1 against *Xanthomonas oryzae* pv. *oryzae* in Rice Leaves

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When lower leaves of rice plants were inoculated with powder formulation of a saprophytic strain of *Pseudomonas fluorescens*, Pf1, upper leaves, in addition to the inoculated lower leaves, showed resistance to the rice bacterial blight pathogen *Xanthomonas oryzae* pv. *oryzae*. When the leaves were challenge-inoculated with *X. oryzae* pv. *oryzae* 4 days after *P. fluorescens* application on lower leaves, the disease intensity in upper leaves decreased from 6.7 to 1.1. When rice seeds were treated with the formulation of *P. fluorescens* Pf1 and sown, 30-day-old seedlings showed resistance to *X. oryzae* pv. *oryzae* and the disease intensity decreased from 6.8 to 1.2. The induced resistance was transient; leaves sprayed with *P. fluorescens* Pf1 at 30 days after treatment and leaves of 60-day-old seedlings from *P. fluorescens*-treated seeds did not show resistance to the pathogen. In field trials, seed treatment followed by foliar application of the powder formulation of *P. fluorescens* Pf1 effectively controlled rice bacterial blight and increased the yield. In the induced resistant leaves a sharp increase in lignification and activities of peroxidase, phenylalanine ammonia-lyase and 4-coumarate: CoA ligase was observed when the leaves were challenge-inoculated with *X. oryzae* pv. *oryzae*. An approximately threefold increase in lignin content, peroxidase activity and phenylalanine ammonia-lyase activity and a fivefold increase in 4-coumarate: CoA ligase activity were observed 5 days after challenge inoculation with *X. oryzae* pv. *oryzae* in rice leaves pretreated with *P. fluorescens* for 5 days. A similar increase in defense-related activities was not observed in susceptible interactions or in *P. fluorescens*-treated plants at later stages of interactions when no resistance to the pathogen was observed.
KEY WORDS: Bacterial leaf blight; *Xanthomonas oryzae* pv. *oryzae*; fluorescent pseudomonads; *Pseudomonas fluorescens* Pf1; induced resistance; *Oryza sativa*.

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