ABSTRACT

Ph.D Thesis

BIOLOGICAL CONTROL of STRAWBERRY ROOT DISEASES by RHIZOBACTERIA in AYDIN PROVINCE

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The study aims to use bacteria-mediated biological control against to soil-born diseases of strawberry (Rhizoctonia solani and Phytophthora cactorum) in Sultanhisar town of Aydin province of Turkey. A total of 362 bacterial isolates were obtained from the rhizosphere of healthy strawberry, cauliflower, red cabbage, broccoli, cabbage, radish, wild radish, broad bean, barnyard grass and shepherd's purse plants. The 24 isolates out of 101 producing zone of inhibition against at least one (or both) fungal pathogen in dual culture tests were selected by in-vitro antifunal activity and preliminary tests, and identified by using Fatty Acid Methyl Ester (FAME) analysis. The isolates were tested in-vivo against both fungal pathogens, and they were also screened for their ability to produce enzymes, secondary metabolites and growth promotion in strawberry seedlings. None of the isolates produced chitinase, cellulase and pectinase, while three, thirteen and twenty of 24 isolates showed phosphatase, protease and inorganic phosphorus solubilization activity, respectively. Of 24 isolates tested, 19 produced HCN, 18 produced siderophore, 11 produced biosurfactant, 16 had phlD gene for 2-4, DAPG production and two produced indole acetic acid (62.4 and 1.9 µg/ml). Among the rhizobacterial isolates tested in potted-plant (cv Camarosa) trials; 3ss9, 6l10, 7ec11, mbe controlled R. solani (57%) while 3ss9 and 6l10 reduced the severity of P. cactorum root rot by %50. All these isolates effective in-vivo were found to be positive for protease, HCN, bio-surfactant, 2-4,DAPG, siderophore production and phosphorus solubilization. In only 2006-2007 growing season of the three-year field trials conducted in a commercial strawberry (cv Camarosa) fields, the promising results were obtained from bacterial treatments (3ss9, 6l10, ka, HRO-C48) applied as a soil drench before planting and 7 months later. The number of dead plants after harvest was significantly less in Pseudomonas fluorescens biotype F isolates 3ss9 and ka treated plots than untreated control. However, marketable strawberry yield was least in untreated control plots (3928 kg/da), although yield differences were not statistically significant in all treatments (ka 4282 kg/da, 3ss9 4170 kg/da, HRO-C48 4103 kg/da, 6l10 4029 kg/da).

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Key Words:

Rhizoctonia, Phytophthora, biological control, rhizobacteria, Pseudomonas