Biological control of *Pythium ultimum* and *Fusarium solani* by indigenous strains *Bacillus subtilis*

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Abstract

Introduction: Different *Bacillus subtilis* products of secondary metabolits include iturin lipopeptids, that may control plant disease effectively. The aim of this study was to investigate the antifungal activity of Indigenous strains *Bacillus subtilis* against plant pathogenic fungi *Pythium ultimum* and *Fusarium solani*.

Materials and methods: Seven soil samples were collected and *B. subtilis* were isolated from each soil sample. The isolates were screened by antifungal activity. Best strains were identified by 16srDNA sequence. The culture conditions were optimized for the best production of antifungal metabolites. The bacterial metabolites were then obtained from 4 days grown isolates, purified and were confirmed iturin existence by chromatography method. The iturin A (Sigma) was used as standards.

Results: Totaly, 91 strains were isolated from soil samples, 23 spp were confirmed as *B. subtilis* by morphological and biochemical features. In subsequent experiments, two strains 48 and 83 showed the greatest activity against the *Pythium ultimum* and *Fusarium solani* respectively. 16srDNA sequence analyses for selected isolates confirmed 100% similarity to *B. subtilis*. Then nutrient broth with carbon and nitrogen sources glucose, yeast extract, neutral pH and 30°c incubation temperature were optimized for best production. The HPLC results showed the best productivity of iturin A for two isolates *B. subtilis* by comparing peaks and retention times between iturin A (Sigma) and native strains.

Discussion and conclusion: Iranian native strains also have the ability to produce antifungal metabolites. Therefore, this strain can be a good candidate for biological control of plant pathogenic fungi and an alternative for chemical fungicides.

Key words: Biological control, *Bacillus subtilis*, Iturin, *Pythium ultimum*, *Fusarium solani*

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