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Screening of an antagonist of *Pythium ultimum* : Purification and characterization of an antibiotic effective to the oomycetes fungi

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To find an antagonist of *Pythium ultimum*, the causal agent of damping-off, numerous actinomycete strains were screened for *in vitro* inhibiting mycelial growth of the target fungus and producing bioactive metabolites. A strain identified as *Streptomyces* sp. G60655 was isolated and used for further antagonistic efficacy. The degree of antagonism between the fungus and G60655 was affected by the medium used. Furthermore, the preinoculation of the antagonist was found to be necessary to exhibit the maximum efficacy of antagonsim against the fungus. From the culture broth, a bioactive metabolite was detected and purified by solvent extraction, silica gel chromatography and preparative HPLC. The FAB-MS spectrum of the active compound showed a molecular ion peak at m/z 1101 $(M + H)^+$, suggesting the molecular weight of 1100. The UV absorptions at 242 and 323 nm indicated the presence of aromatic functions. The structure of this compound was identified as echinomycin, a depsipeptide antibiotic by spectroscopic studies including various NMR measurements. Echinomycin was inactive against several soil born fungi, but inhibited the mycelial growth of *P. ultimum* and its related oomycetous fungi.

Key Words : *pythium ultimum*, antagonist, echinomycin