

cucumber or tomato were selected for biocontrol agents against gray mold of cucumber and tomato by in vivo cucumber seedling assay. Each suspension of the selected epiphytic bacteria were sprayed three times at seven-day interval from early stage of cucumber in a field. Incidence of gray mold on cucumber fruits treated with isolates CC178, PTC25, HC39 and KY165 was 15.3%, 18.2%, 23.6%, and 10.4%, respectively, whereas that of control was 38.0% after 7 days of final spray. On the other hand, treatment with the selected isolates, CC178, PTC25, HC39, and KY165 on tomato showed 2.2%, 1.3%, 2.9%, and 3.5% in the incidence of gray mold on leaves, whereas that of control was 9.3%. All selected isolates had strong antagonistic activity against *Botrytis cinerea* on dual culture plate assay.

#### **2-38. Growth of *Phaseolus mungo* under chromium stress - influence of chromate reducing bacteria**

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The plant growth promoting rhizobacteria (PGPR), *Pseudomonas* sp. (A3) and *Bacillus* sp. (AT33) were isolated from the rhizosphere of *Amaranthus blitum* collected from soil contaminated with chromium. Both bacterial strains quantitatively reduced hexavalent chromium to trivalent chromium. *Pseudomonas* sp. brought greater conversion of Cr<sup>6+</sup> in the medium (100%) as compared to *Bacillus* sp.(62%). *Phaseolus mungo* seeds inoculated with *Pseudomonas* sp. or *Bacillus* sp. were grown under different concentration of chromium. The monitored parameters included elongation of shoot and root, fresh weight, dry weight and concentration of chromium in the shoot and root systems. As compared to non inoculated seedlings those inoculated with A3 and AT33 exhibited better growth.

#### **2-39. Plant growth promoting rhizobacteria that decrease chromium toxicity in *Brassica juncea***

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The aim of the present study was to assess the importance of siderophore producing rhizobacteria on the growth of *Brassica juncea* under chromium stress. *Pseudomonas* sp. (A4) produced an iron chelating substance siderophores in iron deficient medium. Under chromium stress condition *Pseudomonas* sp. (A4) markedly increased the root and shoot length and also biomass of *Brassica juncea* as compared to *Pseudomonas* sp. (A3). This plant growth promotion has been related to the microbial production of siderophores.

#### **2-40. Evaluation of induced systemic resistance agent, *Bacillus subtilis* strain BAC02-4 against *Magnaporthe grisea* in rice in field**

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*Bacillus subtilis* strain BAC02-4 was tested for its ability induced systemic resistance(ISR) in rice against *Magnaporthe grisea*. We extend these studies to investigate the biological induction of systemic resistance in rice following treatment with the inducer isolate BAC02-4 and naturally infested with *Pyricularia oryzae*. We also determine levels of ISR activity during the period between disease development and the onset of systemic resistance. Comparison of lesion number according to applied concentration of BAC02-4 to 'Nagdongbyeo' when naturally infested with the conidia of *P. grisea*. Results from the blast nursery trial using the 'Nagdongbyeo' showed very low rice blast severity with the inducer concentration of 10<sup>8</sup> cfu level. Considering the low level of treatment and untreated control were observed to have developed typical susceptible lesion type. Highest protection against the rice blast pathogen when applied three times with 5 days interval as root drench at 5 to 6 leaf stage before pathogen challenge. But higher dose of bacterial inducer produced a little stunted plants with less number lesions and delayed disease development. Diseased leaf area of treated with suspension of the isolate which gave about 80% of control efficacy at 20 days later comparable to that in noninfested, inducer-free soil.

**2-41. Biological control efficacy on Sclerotinia rot(*Sclerotinia sclerotiorum*) by the use of antifungal agent some *Bacillus* sp.**

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The effect of biological control agent *Bacillus* sp. (BAC03-3-1, BAC03-3-2, BAC02-4) on pre- and postemergence Sclerotinia rot of perilla (*Perilla frutescens* var. *japonica*) caused by *Sclerotinia sclerotiorum* was determined from greenhouse field trials. The ability of this antagonist to reduce germination of sclerotia of *S. sclerotiorum* was also evaluated. In the greenhouse, suspension of BAC03-3-1 application as root drench of perilla, which provided as little as 10<sup>7</sup> cells/ml per gram of soil, significantly increased plant stand in pathogen-infested soil over that in the untreated control. All three isolates reduced the germination of sclerotia of *S. sclerotiorum* in loamy sand soils in the greenhouse. In loamy sand amended with rice bran the sclerotial germination was inversely correlated ( $r = -0.79$ ) with perilla stand in the greenhouse. However, a higher rate of bacterial suspension with rice bran(1g dwt./100g soil) than that applied with bacterial suspensions only was necessary to achieve a comparable reduction in sclerotial germination. In field study, all three isolates added to soil to provide 10<sup>7</sup> cells/ml per gram significantly prevented Sclerotinia rot (73-85%) after 35 days of growth. The isolate BAC02-4, BAC03-3-1 and BAC03-3-2 gave final