During 3 or 5 years cultivation of ginseng, yield losses can reach as high as 30-60% due to numerous diseases in Korea. Among 106 *Bacillus* strains isolated from various plant internal roots, we selected three promising biocontrol agents by screening against root rot caused by *Cylindrocarpon destructans* in a greenhouse. Preinoculation of selected isolates to seed or one-year-old root resulted in stimulation of shoot and/or root growth of seedlings, and control of root rot in infested soils with *Cylindrocarpon destructans* (P=0.05). Furthermore, drenching of selected isolates on seedling-growing pots reduced the incidence of Phytophthora blight when the seedlings were challenged with zoospores of *Phytophthora cactorum* (P=0.05). However, isolates B1141 and B1142 did not show any antifungal activity against various soilborne pathogens while B1146 did in vitro. Our results provide an insight that rhizobacteria can induce resistance against various plant diseases on ginseng even if any resistant breeds have been unknown on ginseng yet.

2-36. Postharvest biological control of garlic blue mold rot caused by *Pantoea agglomereans* and its mode of action

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To screen for potential biocontrol agents against postharvest disease of garlics caused by *Penicillium hirsutum*, a total of 933 isolates (432 fungi and 501 bacteria) were isolated from the rhizoshere or rhizoplane of garlics. Among them, *Pantoea agglomerans* isolate 59-4 (Pa 59-4) was selected for a potential biocontrol agent by in vivo wounded garlic bulb assay. When the spore suspension (10^5 spores/㎖) of *Penicillium hirsutum* was co-inoculated with spore or cell suspension of each fungal or bacterial isolate on wounded garlics, the isolate highly suppressed disease development. Soaking garlic bulbs in the suspension of Pa 59-4 significantly reduced garlic decay from *P. hirsutum*. However, Pa 59-4 did not inhibit the mycelial growth of *P. hirsutum* in dual-culture with *P. hirsutum* on Tryptic soy agar. In order to elucidate mode of action of Pa 59-4 nutrient competition between Pa 59-4 and *P. hirsutum* was investigated using tissue culture plates with cylinder inserts containing defusing membrane reported by Janisiewicz et al. The results showed that Pa 59-4 effectively suppressed spore germination and mycelial growth of blue mold in the low concentration (0.5%) of garlic juice, but did not suppress those of blue mold in the higher concentration (5%) of garlic juice. This result suggests that the mechanism in biocontrol of garlic blue mold by Pa 59-4 may involve in nutrient competition with *P. hirsutum* on garlic bulbs.

2-37 Biocontrol of gray mold of cucumber and tomato by epihpytic bacteria in field condition

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Bacterial isolates, CC178, PTC25, HC39 and KY165 originally obtained from the leaves of

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. broughter greater conversion of Cr6+ 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