

D-56 Application of Induce Systemic Resistance on rice plants by a Plant Growth-Promoting Rhizobacteria, *Bacillus valismortis* EXTN-1. Kyungseok Park and Ming-Shu Chung, Sang-Yeb Lee and Eun-Young Kim. Biological Control Lab. Plant Pathology Division, Department of Agricultural Biology, National Institute of Agricultural Science and Technology Suwon 441-707 Korea

Soil drenching or seed priming of *Bacillus valismortis* strain EXTN-1 stimulated seed germination and growth of rice plants. Furthermore, treatment of *B. valismortis* strain EXTN-1 showed a broad disease-controlling spectrum to the plant diseases caused by viral, bacterial and fungal plant pathogens such as cucumber mosaic virus, tobacco mosaic virus potato virus Y and *Pseudomonas syringae* pv. *lacrymans*, *Ralstonia solanacearum*, *Colletotrichum orbiculare*, *Magnaporthe grishia*, and *Fusarium oxysporum* in various plants as well as rice plants. In seedbed nursery of rice plant, soil drenching after seed soaking with endospore suspension of EXTN-1(10^6 cfu/ml) showed best disease protection against *Magnaporthe grishia* and growth promotion in nursery soil. In the field test, EXTN-1 treatment showed plant growth promotion and increasing yield of rice as well as induced systemic resistance. In conclusion, *B. valismortis* strain EXTN-1 can be used for growth promotion and activation of plant defense on rice plant against multiple diseases in practical

D-57 Selection of bio-control agents against Sclerotinia rot on leafy vegetables in organic farming. Ji-Young Hwang¹, Jee-Sun Han¹, Kyoung-Yul Ryu¹, Yeoung-Seuk Bae², and Hyeong-Jin Jee¹. ¹Organic Farming Technology Division, National Institute of Agricultural Science and Technology and ²Ginseng and Medicinal Crops Division, National Institute of Crop Science, RDA, Suwon, 441-707

Korea Sclerotinia rot caused by *Sclerotinia sclerotiorum* on leafy vegetables is one of the most destructive soil-borne diseases in the organic farming, especially under a greenhouse cultivation. In this study, bio-control potentials of various microbial agents were evaluated. Among the biocontrol agents selected from previous studies, Trichoderma isolates, TSR-4 and TSR-6 showed the highest bio-control activities against the disease on lettuce, head lettuce, chicory, and whorled mallow in vivo and vitro. Among the bacterial agents, Pseudomonas strains, B634-2 and B724 also effectively suppressed the disease development on the leafy vegetables in a magenta box and in a green house pot test. However, biocontrol activities of the agents varied according to the vegetables. TSR-6 showed 66% control value in head lettuce in vivo and 96% in chicory in vitro. In lettuce, the disease was not significantly controlled by

Trichoderma isolates, while Pseudomonas strains, B605, B634-2 and B724 effectively suppressed the disease showing 68% to 93% control value. Biospectrum and optimal delivery system of the promising biocontrol agents are being studied to pave safe production of organic leafy vegetables.

D-58 Antifungal Activity of Two Essential Oils against *Botrytis cinerea*. Chang-Hoon Kim, Mi-Jo Kwon, Hyo-Hyun Kim, Jae-Sung Park. Affiliated Research Institute Bicosys Co., Ltd.

Essential oils isolated from two plants viz. *Origanum vulgare L.* and *Thymus vulgaris L.* have been tested against fungi viz. *Botrytis cinerea*. Two essential oils of origanum and thyme showed high antifungal activity against *B. cinerea*. Two essential oils showed antifungal activity with minimum inhibitory concentration(MIC), ranging from 50 to 200ppm. The inhibition of *B. cinerea* was 100% for both oils at 200ppm, whereas the effects of the mixed origanum and thyme showed additive and low synergistic effect. The growth inhibition percentages of essential oils were measured as morphological abnormalities for *B. cinerea* involving lysis, distortion and swelling in hyphae, and also the screening was carried out using plant oil concentration for the determination of antifungal effects on the spore germination of *B. cinerea*.

D-59 Biological Control of Lettuce *Sclerotinia* rot against *Sclerotinia sclerotiorum* by two strains of *Bacillus subtilis*. Sang-Yeob Lee¹, Wan-Gyu Kim², Weon Hang Yeon², Kyung-Seok Park¹, Jong-Young Park¹ and Na Hyun Ryu¹ ¹Plant Pathology Division, National Institute of Agricultural Science and Technology, Suwon 441-707, Korea. ²Applied Microbiology Division, National Institute of Agricultural Science and Technology, Suwon 441-707, Korea

Two strains of rhizobacteria, M27 and RM43 obtained from rhizosphere of lettuce plants showed antifungal activity against *sclerotinia* rot of lettuce caused by *Sclerotinia sclerotiorum*. Both isolates of M27 and RM43 were identified as *Bacillus subtilis* that based on fatty acid analysis of cell component by MIDI Shorlock and rDNA patterns respectively. Percentage of *Sclerotinia* rot on lettuce plants by two strains of M27 and RM43 were 14.0 and 26.0 respectively, compared to 42.0% for the control when applied soil drenched on lettuce plants in greenhouse test. On the other hand, two strains of M27 and RM43 were soil drenched on lettuce plants showed 34.0% and 36% respectively against *Sclerotinia* minor, compared to 98.0% for the control. In future studies, Antifungal substance has to be identified and further researches on mechanisms of antibiosis by the two strains are required.