factory was periodically measured using a selective medium, corn meal agar with Pimaricin 10 mg, Rifampicin 10 mg, Ampicillin 100 mg per 1 liter in order to check the contamination of recycled water. After fitering step using 5 and 1 ml in the recycled system was applied and it was effectively controlled Pythium rot. The daily yield of sprout was stable and the occurrenceof Pythium in the recycled water was much less after filtering.
The fungal isolates were identified as *Pythium deliense* Meurs based on various mycological characteristics on corn meal agar and sucrose-asparagine bentgrass leaf culture medium. *P. deliens* oogonia were spherical, smooth, 19-23 um in diameter, and their stalk bending toward antheridia. Antheridia were straw hat-shaped, curred club-shaped, therminal or intercalary, monoclinous, occasionally diclinous, 12~15 x 8~11 um, 1(~2) per oogonium.

2-14. The visible injury and physiological responses of three varieties of hot peppers to ozone.

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A growth chamber fumigation was conducted to evaluate the ozone (O3) on the physiology of three hot pepper, *Capsicum annuum* L. cultivars, 'dabotab', 'buchon' and 'pochungchun'. Thirty-day old plants were exposed to O3 of 120 nl l-1 in the chambers for 8 h d-1 for 3 days. Foliar damage due to O3was different from the varieties, 'dabotab' was most sensitive to O3, 'pochungchun' was medium, and 'buchon' was resistant. Ozone symptom on the leaves was bifacial necorsis. Photosynthesis and stomatal conductance were decreased due to O3 treatment, but they were not much different from the variety. Decreases of net photosynthesis by O3 were 56%, 40% and 35% on 'dabotab', 'buchon' and'pochungchun', respectively. Decreases of stomatal conductance by O3 were 66%, 63%, and 50% on each varieties. Ozone closed the stomata and decrease net photosynthesis on hot peppers regardless of the variety. Light curves on the three varieties were showing similar patterns that O3 damage on net photosynthesis were started at the low levels of light with or without the visible injury. Assimilation-internal CO2 concentration curves of the three cultivars were not different due to the treatment. It means there was not significant biochemical damage inside the leaves by O3. In conclusion, ozone closed the stomata and damaged light capturing system of the pepper leaves with or without the visible damage. Although visible damage of the leaves could be a good indicator of O3 resistance, the ecophysiological change by O3 were not proportional to the amout of visible injuries

2-15. Disease Suppressive Mechanisms of Antagonistic Bacteria against *Phytophthora capsici* causing Phytophthora Blight of Pepper

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In our previous studies, we selected three antagonistic bacteria, KJ1R5, KJ2C12, and KJ9C8 against *Phytophthora capsici*, the casual agent of Phytophthora blight of pepper. For elucidating

production, root colonization, and total microbial activity were investigated. The dual culture assay was accomplished to elucidate existence of antibiotics. In this assay, any antagonistic bacteria did not inhibit growth of six important fungal plant pathogens, suggesting that these antagonists do not produce antibiotics. root surface or rhizosphere soil colonizations were examined with spontaneous rifampicin-resistant mutants equal to antagonistic ability of wild types. KJ2C12 colonized consistently rhizosphere soil while yellowish colonies of KJ1R5 and KJ9C8 well colonized root surfaces and rhizosphere soil. Total microbial activity in pots treated with the antagonistic bacteria was measured using fluorescein diacetate hydrolysis. total microbial activity of three antagonistic bacteria treatments was significantly higher than that of buffer-treated control until 4days after treatment. However, total microbial activity of treatment of three antagonistic bacteria decreased after 7 days. These results indicate that the antagonistic bacteria, KJ1R5 and KJ9C8 colonized and protected roots well against Phytophthora blight of pepper through competition of infection courts, especially competitions.

2-16. Evaluation of control methods for the best practicing conditions for the control of bacterial blossom blight of kiwifruit

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Control of bacterial blossom blight of kiwifruit (*Actinidia deliciosa*) has been mainly depended on chemical control. Recently cultural practices such as trunk girdling of kiwifruit trees and rainproof installation over kiwifruit trees also were conducted as the alternative control practices. Each of the control methods was evaluated for the best practicing conditions for the control of bacterial blossom blight of kiwifruit. Among the various combinations of spray times and spray periods, optimum spray program of antibiotics was turned out to be 3 times with intervals of 10 days from early May during the flowering season of kiwifruits. Optimum periods of trunk girdling of kiwifruit trees were from late March to late April. Trunk girdling with 20-30 ㎜ wide showed best control efficacies on bacterial blossom blight, irrespective of the heights of girdling on trunks of kiwifruit trees. Optimum period of rainproof installation over kiwifruit trees was from March till late April, irrespective of installation methods.

2-17. Cloning and mutational analysis of pyrroquinoline quinone(PQQ) genes from a phosphate - solubilizing biocontrol bacterium *Enterobacter intermedium.*

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E. intermedium 60-2G possessing a strong ability to solubilize insoluble phosphate, has