FC-01 *In vivo* Control and *In vitro* Antifungal Activity of Rhamnolipid B, a Glycolipid Antibiotic, against *Phytophthora capsici* and *Colletotrichum orbiculare*. Beom Seok Kim[1], Jung Yeop Lee[2], and Byung Kook Hwang[2]. [1]Institute for Structural Biology & Drug Discovery, Virginia Commonwealth University, Virginia Biotechnology Research Park 800 East Leigh Street, Suite 212, PO Box 980133 Richmond, Virginia 23298-0133, [2]Korea University, Anam Dong 5 ga 1, Seoul, Korea 136-701.

The glycolipid antibiotic rhamnolipid B isolated from *Pseudomonas aeruginosa* strain B5 was evaluated for *in vitro* antifungal activity and *in vivo* control against phytophthora blight and anthracnose under glasshouse conditions. Rhamnolipid B showed antifungal activity against *Cercospora kikuchii, Cladosporium cucumerinum, Colletotrichum orbiculare, Cylindrocarpon destructans, Magnaporthe grisea* and *Phytophthora capsici*. Microscopic observation revealed that the high level of antifungal activity (10 μg ml^{-1}) against *P. capsici* is mainly due to the lytic effect on zoospores. Zoospore lysis began in the presence of 10 μg ml^{-1} of rhamnolipid B and most of the zoospores were collapsed at 25 μg ml^{-1}. Rhamnolipid B showed inhibitory activity against the germination of zoospores and hyphal growth of *P. capsici* at concentration of 50 μg ml^{-1}. Spore germination of the anthracnose plant pathogen *C. orbiculare* was also inhibited in the presence of 50 μg ml^{-1} of rhamnolipid B, although hyphal growth was not affected at this concentration. In the glasshouse, the efficacy of rhamnolipid B against phytophthora blight was similar to that of metalaxyl on pepper plants when treated just before inoculation with *P. capsici*. Treatment with each of the two fungicides at 500 μg ml^{-1} completely protected pepper plants from phytophthora blight. Rhamnolipid B also suppressed the development of *C. orbiculare* infection on leaves of cucumber plants.

FC-02 Effects of bacterial antagonists for the control of fungal storage diseases and the extension of storage periods for hot pepper(*Capsicum annum* L.). Youn Su Lee, and C. S. Jeong. Div. of Applied Plant Sciences, College of Agriculture and Life Sciences, Kangwon National University, Chuncheon, Korea 200-092

Effects of bacterial antagonists for the control of storage diseases and the extension of storage periods for hot pepper(*Capsicum annum* L.) were tested with pre-inoculation of antagonists and inoculation of storage disease pathongens at an interval of one, two, three and five days at 24℃. Seven(LS98-1, LS98-2, LS98-3, LS98-8, LS98-10, LS98-12, LS98-13) antagonistic bacteria and six(G1, G3, G4, G5, G6, and G7) fungal storage disease pathogens were used. As a result, LS98-1 was effective against G1, G4, and G6 at one day of interval inoculation with diminishing effects at different inoculation intervals. LS9-83 and LS98-8 was effective against G3 and G1, respectively. Overall, there were no patterns in the antagonism in the tests within three days of interval inoculations. However, at five days of interval inoculations, LS98-8, LS98-10, LS98-12, and LS98-13 showed high level of antagonism against G3, G4, G5, G6, and G7, G1, G3, G6, and G7, G5, G6, and G7, and G1, G4, G5, G7, respectively.

FC-03 Chemical Protection of Strawberry Anthracnose. Seung-Han Kim, Seong-Yong Choi, Yang-Sook Leem, Jae-Tak Yoon. Kyongbuk Agricultural Technology Administration.

Wilting and death by anthracnose(*Colletotrichum sp.*) have been often occurred in strawberry plant(mostly, Yeo-Hong cultivar.) just after planting to plastic house. To develop protection method of anthracnose, some chemicals was tested in Lab. and applied to strawberry plants in plastic house. *Colletotrichum sp.* was isolated from wilted strawberry collected in Kyungju, Goryung and Chungdo area in kyongbuk province and was cultured on PDA added Tricyclazole, Cabendazim, Tolfos, Gyophanate and Iprodion Wp(g/liter) to investigate chemical resistance. *Colletotrichum sp.* did not grow on PDA added Tricyclazole but somewhat grew on other media. Two kinds of treatments were used to develop the effective protection methods of anthracnose by chemicals. The one treatment was sprayed or irrigated the Tolfos, Benomyl, Propineb and Tricyclazole WP(g/liter) on strawberry plants in Kyongju and Goryung area for 2 years from 1997 to 1998 but there were no protecting effect on strawberry anthracnose in all treatments. Another treatment was dipped the strawberry roots for 30 min. in Tricyclazole, Azoxystrobin and Mancozeb WP(g/liter) just before planting in plastic house to protect anthracnose for two years from 1998 to 1999. The incidence of anthracnose was 29.5% in Azoxystrobin dipping treatment and were around 50% in control and other treatments

FC-04 Characteristics and Chemical Control of grape anthracnose. Seung-Han Kim, Seong-Yong Choi, Yang-Sook Leem, Jae-Tak Yoon, Boo-sull Choi Kyongbuk Agricultural Technology Administration

Anthracnose is one of the most severe disease in grape, especially Campbell cultivar. So, this experiment was carried out to develop protection method of grape anthracnose. Grape anthracnose was surveyed for 4 years(1997-2000) at Kimchon, Youngchon and Kyungsan area in kyongbuk province and the results are as follows; The most abundantly occurred area was Youngcheon. In diseased rate among cultivar., Campbell Early was the most sensitive to *Glomerella cingulata* but Sheridan and MBA cultivar was resistant to it and it was observed at early Aug at first. In the analysis of correlation coefficient between weather of surveyed region and diseases rate of grape anthracnose showed that positive correlation ($r = 0.83$) with rainny days of July and negative correlation($r = -0.68$) with temperature of June. To search the main infection period to *Glomerella cingulata,* 5 clusters of "Campbell Early" grape was harvested 3 **times on** middle Jul, late Jul. and early Aug. and incubated for 5 days in humidified chamber at ambient condition. Fruits were harvested at early Aug. showed anthracnose symptom but were havested at middle Jul. and late Jul. did not show the symptom. To control this disease, Thalonyl+Mythan Wp was sprayed 3 to 4 times from middle or late July to 10 days interval, protection value was the most high at 4 times application from middle and late Jul.

FC-05 Biological contol of *Phytopthora capsici* using antifungal substance from *Bcillus circulans PL-1.* Hee Jun Kwon , Joon Tak Lee . Department of Agricultural Biology , College of Agriculture Kyungpook National university , Tague, 702-701 , Korea

To select strong antagonistic bacterium for biological control agent of Phytophthora blight and some plant pathogenic fungi, the antifungal strain PL-1 was selected among 100 strains isolated from red pepper field soil or weed roots. The strain was identified as a species of *Bacillus circulans* or closely related strain with 84.7% similarity by using the API50CHB kit, MIDI. Also the physiological and morpholgical charicteristics by scanning electron microscopy were examined. In several biochemical and *in vitro* antibiotic tests antifungal substance of *Bacillus curculans* PL-1 had heat stability. When the mycelium of *Phytophthora capcisi* were incubated in filterates of PL-1, morphology of mycelium with many branching and swelling was observed. Finally, mycelium of dry weight was lower than control treatment(e.g contol treatment was Potato Dextrose broth with pH 4.90). To examine the effect of biological control in pot, after the pepper seeds were soaked in filterates PL-1 during 3 hour, they were incubated to germinate at 28℃ for 5 days. Then they were transplanted on the 10% infected soil, disease infected rate was observed every other days. After 31 days infected rate of pepper seedling was showed lower by 50.3% than untreated control plot(e.g not soaked pepper seeds).

FC-06 Selection of fungicides for control of apple bitter rot based on the ecology of the disease. Sun Hee Jang, Mee Young Kwon, Min Jung Kim, Jae Youl Uhm. Departmant of Agricultural Biology Graduate School, Kyungpook National University Taegu 702-701, Korea

The primary infection of bitter rot of apple usually occurs by the conidia produced on the mycelia which are overwintered on the apple stems or by those produced on the inoculum plants. From the ecology of the disease the chemical control measures might be considered in 3 ways : killing of the mycelia colonized on the stem, inhibition of sporulation on the mycelia overwintered on the stems and inhibition of spore germination on the fruit surface. An experiment to select the fungicides which has one or several of these mode of action among the 8 fungicides was conducted. Fluazinam showed an excellent inhibitory efficacy against mycelial growth, almost no growth was observed from the mycelia treated with the standard dosage of the chemicals for 2 hours. Azoxystrobin and Fluazinam inhibited sporulation effectively, as determined by treatment of the mycelia grown on the autoclaved locust twigs with the chemicals of standard dosage. All of the fungicides tested in this experiment inhibited spore germination, among them Dithianon and Mancozeb showed irreversible effect on the spore germination by the exposure of 2 hours.

FC-07 Degree of Incidences, Resistance of cultivars and Chemical control of White rust on Chrysanthemum. Jae Dok Choi[1], Han Mo Koo[1], Sung Dok Lee[2], Department of Plant Resources, College of Industrial Science, Kongju National University[1]. Chung-nam Korea 340-800. Yesan Chrysanthemum Experiment Station[2]. Chung-nam Korea 340-800

Incidences of white rust on chrysanthemum were progressed highly virulence at may in the greenhouse. Virulence of 56 cultivars were evaluated for their levels of resistance to *Puccinia. horiana* in the greenhouse. 16 cultivars did not produce any lesion. Others 40 cultivars were susceptible. The systemic fungicides , such as Hexaconazole, were effective of control for white rust.

FC-08 Biological control of gray mold rot of tomato with *Bacillus licheniformis* N1. Ji Hee Son, Jae Pil Lee, Su Hee Lee, Chyl Seung Kim, Jae Sung Nam, Sun Jae Jung, Byung Ju Moon. College of Natural Resource and Life Science, Dong-A University, 840 Hadan dong, Pusan, Korea 604-714.

Even though *Bacillus licheniformis* N1 previously showed succeseful biocontrol effect for *Botrytis cinerea* LVF12 on perilla, bacterial suspention alone just moderately controled gray mold rot on the tomato. To enhance biocontrol effect of *B. licheniformis* N1 for gray mold rot on the tomato, several formulations in the form of wettable powder were generated and their effect on gray mold rot on tomato was investigated. Specially, our formulation C and E significantly suppressed gray mold rot on the tomato. Their biocontrol values were 88.3% and 90.5% in the greenhouse condition respectively. These results showed that our formulation C and E have as effective fungicide activity as iprodion W. P. used commonly for controling gray mold rot on the tomato. In addition treatment of formulation C and E significantly increased quantity and weight of fruit than untreated control.

FC-09 Effectiveness of Kresoxim-methyl and Iminoctadine Fungicides in Postharvest Diseases Control of Citrus. Jae-Wook Hyun, Seong-Chan Lee, Yang-Bin, Ihm, Sang-Wook Ko and Kwang-Sik Kim. Citrus Experiment Station, Jeju Agricultural Experiment Station, Rural Development Administration, Jeju-Do, Korea 699-800.

The efficacies of the kresoxim-methyl and iminoctadine tris (albesilate) for the protection of citrus postharvest diseases were assayed. *In vitro* tests, percent inhibition of kresoxim-methyl at 0.05 μg a.i. /ml and iminoctadine at 0.03 μg a.i. /ml against the hyphal growth of *Penicillium digitatum* and *P. italicum* were 44.8 % and 59.6 % with values ranging from 23.6 % to 68.8 % and 28.8 % to 87.5 % , respectively. Kresoxim-methyl and iminoctadine were markedly effective to control the postharvest decay by spray at 7 days prior to harvest. When the fruits were sprayed at 7 days prior to harvest and subsequently stored for 3 months, the percentage of diseased fruit was 8.4 $\pm$ 2.7 % in kresoxim-methyl at 155 μg a.i. /ml, and 12.8 $\pm$ 3.5 % and 13.7 $\pm$ 1.8 % in iminoctadine at 600 μg a.i. /ml and 300 μg a.i. /ml, respectively. On the other hand, the percentage of diseased fruit was relatively high, 22.9 $\pm$ 10.2 % and 29.0 $\pm$ 8.9 % in thiophanate-methyl at 700 μg a.i. /ml and non-treatment, respectively. The mostly penicillium-diseased fruits from treatment with kresoxim-methyl and iminoctadine were caused by *Penicillium* sp. except *P. digitatum* and *P. italicum*. The *Penicillium* sp. was resistant to thiophanate-methyl, kresoxim-methyl, and iminoctadine but the pathogenicity was relatively low. Residue analysis of pesticide on harvested and stored fruits for 3 months which had been sprayed with kresoxim-methyl of 155 μg a.i. /ml and iminoctadine of 600 μg a.i. /ml at 7 days prior to harvest demonstrated that kresoxim-methyl and iminoctadine at less than 0.33 and 0.13 ppm was recovered from the flesh and peel of fruit, respectively.

FC-10 Fungitoxic Activity of Phomalactone Isolated from *Nigrospora sphaerica* on Plant Pathogenic Fungi. Jin-Cheol Kim, Gyung Ja Choi, Joong-Hyeop Park, Heung Tae Kim, Kyoung Soo Jang and Kwang Yun Cho. Screening Division, Korea Research Institute of Chemical Technology, P.O. Box 107, Yusong-Gu, Taejon 305-600, Korea.

Phomalactone, 5,6-dihydro-5-hydroxy-6-propenyl-2*H*-pyr-2-one produced by *Nigrospora sphaerica,* inhibited specifically the fungal growth of *Phytophthora infestans* among various plant pathogenic fungi with a minimum inhibitory concentration value of 2.5 μg/ml. Little variation was observed in inhibitory activity of the lactone compound to mycelial growth of 13 strains of *P. infestans;* its MIC values were 2.4 μg/ml for 12 strains except one strain, for which its MIC value was 7.4 μg/ml. On the other hand, its inhibitory activities against sporangium and zoospore germination of *P. infestans* were similar to those of *P. capsici.* It almost completely inhibited both sporangium and zoospore germination of the two fungi at doses higher than 20 μg/ml. Phomalactone controlled effectively the development of tomato late blight caused by *P infestans.* It was also active against *P. capsici* and *Pseudoperonospora cubensis in vivo.* Studies are in progress to synthesize the compound and its derivatives.

FC-11 Characterization and Antifungal Activities of Griseofulvin, Dechlorogriseofulvin, and Chaetoviridins Isolated from Endophytic Fungi. Joong-Hyeop Park, Jin-Cheol Kim, Gyung Ja Choi, Heung Tae Kim, Yong Ho Choi, Jeong-Gyu Kim[1], and Kwang Yun Cho. Screening Division, Korea Research Institute of Chemical Technology, P.O. Box 107, Yusong-Gu, Taejon 305-600, Korea. [1]Department of Agricultural Chemistry, Korea University, Seoul 136-701, Korea.

A total of 187 endophytic fungi isolated from 11 plant species including *Pinus densiflora, Abies holophylia, Echinochloa crusgalli,* etc. were assayed for *in-vivo* antifungal activities after culturing in potato dextrose broth and rice solid media. Twenty (11.7%) of the 187 liquid cultures showed disease-controlling activities more than 90% against at least one of the 6 plant diseases tested. F0010 isolate exhibited the most potent antifungal activity; it controlled rice blast, rice sheath blight, tomato gray mold, wheat leaf rust, and barley powdery mildew with control values more than 90%. *Chaetomium globosum* F0142 isolate almost completely controlled the development of tomato late blight and wheat leaf rust. Out of 187 solid cultures, 10 (5.3%) controlled at least one plant disease more than 90% and F0111 isolate showed disease-controlling activities more than 79% against 5 plant diseases except rice sheath blight. Five antifungal substances were purified from liquid cultures of two fungal isolates F0010 and *C. globosum* F0142 and their chemical structures were determined by instrumental analyses such as mass spectrometry and NMR spectroscopy. Two substances from F0010 isolate were identified as griseofulvin and dechlorogriseofulvin, and three substances from *C. globosum* F0142 as chaetoviridins A, B, and C. Griseofulvin effectively controlled the development of rice blast, rice sheath blight, wheat leaf rust, and barley powdery mildew. Chaetoviridin A showed relatively potent controlling activities against rice blast, tomato late blight, and wheat leaf rust.

FC-12 Ecology of Soil-borne Disease Incidence on Vegetables in Hydroponic Culture. Ki-woong Nam, Yong-Chull Jeun, Sung-Suk Yang and Choong-Hoe Kim. Plant Pathology Division, National Institute of Agricultural Science and Technology, Suwon, 441-707, Korea.

In recent, acreage of hydroponic cultivation has been rapidly increased and amounted to 648.8 ha in Korea. Hydroponic culture which is preferred by farmers to prevent soil-borne disease incidence is grouped into two systems, artificial solid medium culture and water culture. Nevertheless, soil-borne diseases have become one of the greatest limiting factor in hydroponic culture. In a survey in 1999, bacterial wilt caused by *Ralstonia solanacearum* was most severe, showing up to 18.9 % incidence on tomato in 57 diseased farms and 28.3 % on paprika in three diseased farms. *Erwinia* soft rot was found on tomato, red-chicory and kale. *Phytophthora* disease was one of the most severe diseases in pepper, tomato, cucumber, paprika and lettuce cultivation. *Pythium* disease frequently occurred on cucumber, lettuce, red-chicory and crown daisy. When each pathogen was artificially inoculated in hydroponic culture, initial symptom of bacterial wilt appeared in tomato 7 days after inoculation into nutrient solution, and 11 days on paprika. Symptom appearance of late blight on tomato was first observed 6-8 days after inoculation, and 7 days for *Pythium* root rots. However, fusarium wilt caused by either *F. oxysporum* f.sp. *lycopersici* or *F. oxysporum* f.sp. *radici-lycopersici*, soft rot caused by *Erwinia carotovora* and bacterial canker caused by *Clavibacter michiganesis* were not observed by pathogen-inoculation into nutrient solution during the experimental period. This result suggests that those pathogens may be not transmitted by the nutrient solution in hydroponic culture system.

FC-13 A Biotic Factor Affecting Growth and Biocontrol Efficacy of *Trichoderma harzianum* in Soil. Yeoung-Seuk Bae*, Guy R. Knudsen, and Louise-Marie C. Dandurand Plant Pathology Division, University of Idaho, Moscow, Idaho, 83844-2339, USA. *Current address: Plant Pathology Division, National Institute of Agricultural Science and Technology, RDA, Suwon, 441-707, Korea.

Trichoderma harzianum as a biocontrol agent against plant diseases has been shown to be susceptible to many biotic and abiotic factors in the habitats where we intend to introduce it. Interactions between a fungivorous nematode, *Aphelenchoides* sp., and the GFP-transformant *T. harzianum* isolate ThzID1-M3 were investigated for more predictable and effective biocontrol of plant diseases in natural ecosystems. ThzID1-M3 was identified in soils (heat-treated and untreated field soil) by epifluorescence microscopy. When ThzID1-M3 was added to soil as an alginate pellet formulation, addition of the nematode (10 per g) significantly reduced both hyphal radial growth and recoverable population of the fungus; this effect was greater in heat-treated soil. Addition of ThzID1-M3 to soil pre-treated with the nematode (10 per g) stimulated nematode population growth for approximately 10-20 days, whereas nematode populations decreased in the absence of added *Trichoderma.* Addition of ThzID1-M3 to untreated soil also resulted in an increase in numbers of indigenous nematodes. When sclerotia of *Sclerotinia sclerotiorum* were added to soil (10 per 200 g) with ThzID1-M3 (40 pellets per 200 g), addition of *Aphelenchoides* sp. reduced the number of sclerotia colonized by ThzID1-M3. These results suggest that fungivorous nematodes may be a significant constraint on activity of biocontrol fungi in the field.

FC-14 Differential Expression of Induced Resistance in Cucumber Plants Pre-treated with Chemical and Biological Inducers against *Colletotrichum orbiculare.* Yong-Chull Jeun, Kyung-Seok Park, and Choong-Hoe Kim. Plant Pathology Division, National Institute of Agricultural Science and Technology, Suwon, 441-707, Korea.

Systemic acquired resistance (SAR) can be triggered by pre-treatment of a biotic or an abiotic inducer to a certain parts of the plant. Similarly, pre-inoculation with plant growth promoting rhizobacteria (PGPR) can mediate resistance, which is termed as induced systemic resistance (ISR). It is known that signaling of ISR differs from that of SAR. However, the expression of ISR and SAR have not studied in details. To illustrate the expression of both types of resistance, cytological studies were carried out with the cucumber leaves expressing SAR or ISR against *Colletotrichum orbiculare.* SAR were triggered on cucumber plants by amino salicylic acid (SA) as well as by DL-3-amino butyric acid (BABA) against anthracnose. Similarly, the selected PGPR strains *Serratia marcescens* (90-166), *Pseudomonas fluorescencens* (89B61) and *Bacillus pumilus* (T4) mediated ISR to the same pathogen. The microscopical study showed that hypersensitive reaction (HR) of the host cells was frequently observed and germination rate of the spores was decreased in the leaves of the plants treated with both chemicals as well as the three PGPR strains. On the plants treated with both chemicals appressorium formation was dramatically reduced, whereas no apparent reduction of appressorium was found by the PGPR strains. Conversely, callose formation was significantly enhanced at the penetration sites of the leaves by PGPR strains, whereas both chemical inducers could not enhance callose biosyntheses in the plant cell walls. These results suggest that the resistance expression may be different by the treated inducers PGPR or chemicals, which may be caused the different values of protection rates against the anthracnose disease.

FC-15 Screening of Biocontrol Agents for the Control of Crop Diseases.

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Aims of this study were to find effective and beneficial biological control agents against soil-borne and foliar diseases of economic crops. We isolated 300 strains from various sources of soil and plants. Among 300 isolates, 20 isolates were selected by dual culture method against 8 plant pathogenic fungi such as *Alternaria* sp., *Botrytis cinerea*, *Fusarium solani*, *Cylindrocarpon destructans*, *Phytophthora capsici*, *Pythium* sp., *Collectotrichum* sp. and *Rhizoctonia solani*. In pot test, *Bacillus* sp. (isolate E strain) and *Trichoderma* sp. (isolate T3 strain) among 20 isolates were the most effective for the control of damping-off disease caused by *R. solani* and *Pythium* sp. in chinese cabbage seedlings. Especially, *Trichoderma* sp. (isolate T3) showed a high parasitic activity against *Rizoctonia solani*. In treatment of *Bacillus* sp. (isolate E), the plant standing was 85% as compared with that of control. In treatment of *Trichoderma* sp. (isolate T3) treatment, the plant standing was 80% as compared with that of control. *Bacillus* sp. (isolate E) was identified as *B. subtilis*, whereas *Trichoderma* sp. (isolate T3) was identified as *T. longibrachiatum* on the basis of it's morphology and ITS region sequencing.

FC-16 Possible utilization of chitosan as a control agent of apple white rot. Min Jung Kim, Mee Young Kwon, Sun Hee Jang, Jae-Youl Uhm. Department of Agricultural Biology, College of Agriculture Kyungpook National University, Taegu 702-701, Korea

The possible control efficacies of chitosans of different molecular weight against apple white rot were examined. As the control efficacy of chitosan against apple white rot, if it may confirmed, might be derived from the inhibition of spore germination or mycelial growth, or from the induction of resistance reaction, the effect of chitosan on the spore germination and mycelial growth was examined. The inhibitory efficacy of spore germination and mycelial growth was quite different by the molecular weight of the chitosan. Chitosan of molecular weight higher than 30KD strongly inhibited spore germination but those of lower than 10KD could not, and the mycelial growth was inhibited by those of lower than 50KD. The actual control efficacy was tested on 14 years old Fuji apples by substituting the 500 ppm chitosans for fungicides two times in the early decade of June and July in a spray program at which the fungicides were to be spray at 15-day interval from petal fall to late August. The infection rate at the plot where the chemicals were normally sprayed at 15-day interval was 3.2%, and that of the untreated plot in which neither the chemical nor the chitosan was sprayed at the time of chitosan application was 9.2%. Whereas the infection rate in the plot where 300KD was sprayed was 2.2%, 3.4% in 300-500KD and 2.1% in 3KD. These results allude the availability of the chitosan as the control agent of apple white rot.

FC-17 Antifungal Activity of Crude Extracellular Polysaccharides(EPS) Extracted from *Burkhoderia cepacia* strain 923-87 on Anthracnose of Pepper Fruit and Cucumber Plants.

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Antifungal activity of crude EPS extracted from *Burkholderia cepacia*(Strain 923-87) to anthracnose disease on pepper and cucumber plants caused by *Colletotrichum gloeosporioides* and *C. orbiculare*, respectively, was investigated. Compared to the untreated control, the disease severity was dramatically decreased in the red pepper fruits treated at the concentration of 250ug/ml of the crude EPS. In addition, the development of anthracnose disease were suppressed in the cucumber seedlings treated with the crude EPS. To illustrate the protection mechanism of the crude EPS in plants, spore adhesion and germination rate of *C. gloeosporioides* were investigated in the suspension of the crude EPS in vitro. At the concentration of 50ug/ml showed 40% and 70% inhibition of adhesion and germination of spores, respectively. Using column chromatography(amberlite XAD-2) 5 fractions were isolated from the crude EPS. Some of them suppressed the spore adhesion of *C. gloeosporioides* but none could inhibit the spore germination. From these results it is suggested that the crude EPS may suppressed the disease development of anthracnose on pepper as well as cucumber plants by inhibition of adhesion and germination of fungal spores and that antifungal activity of the crude EPS may be decreased when they are separated.