potyviruses and cucumber mosaic cucumovirus did not break the resistance to CFMMV. The mechanism of resistance of line I44 appears to be RNA-mediated, however the means is apparently different from the gene silencing phenomenon. Homozygote line I44 cucumber as rootstock demonstrated for the first time protection of a non-transformed scion from soil inoculation with a soil borne pathogen, CFMMV.

4-51. Involvement of RNA2 for systemic infection of *Cucumber mosaic virus* isolated from lily on zucchini squash

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A lily strain of *Cucumber mosaic virus* (LK-CMV) was not able to systemically infect zucchini squash (*Cucurbita pepo*), while Fny strain of CMV (Fny-CMV) caused systemic mosaic and stunting symptom at 4 days post-inoculation on the same host species. The pathogenicity of LK-CMV in zucchini squash was investigated by reassortments of genomic RNAs of LK-CMV and Fny-CMV for infection, as well as by pseudorecombinants generated from biologically active transcripts of cDNA clones of LK-CMV and Fny-CMV, respectively. The assessments of pathogenicity for LK-CMV indicated that RNA2 of LK-CMV was responsible for systemic infection in zucchini squash. In the protoplast of zucchini squash, the RNA accumulations of all constructed pseudorecombinants were indistinguishable and LK-CMV replication was slightly lower than that of Fny-CMV, suggesting that the inability of LK-CMV to infect squash plants was responsible for the poor efficiency of virus movement, rather than the reduction of replication function.

4-52. Survey and identification of virus diseases on paprika in Jeonnam province

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Occurrences of virus diseases on paprika (*Capsicum annuum* var. grossum) were surveyed in Joennam province from 1999 to 2003 and the collected samples showing virus-like symptoms were tested using ELISA. Virus diseases appeared 4.5%, 17.5%, and 4.9% in 2000, 2002, and 2003, respectively. As the results of investigation of the seasonal incidence with the growing stages of plant, virus was not occurred at seedling stage and was slightly from the planting time to the first harvesting time, but was dramatically increased at the second harvesting time. Virus diseases were more severe on the vinyl house than on the green house. *Pepper mild mottle virus* (PMMoV) was severely occurred in 2000 but not after that year. Comparing the virus species, *Pepper mottle virus* (PepMoV) was 35.9%, *Broad bean wilt virus* (BBWV) was 14.1%, and *Cucumber mosaic virus*

(CMV) was 10.9% in 2002, and 76.0%, 11.1%, and 2.4% in 2003, respectively.

4-53. Multiplex Reverse Transcription Polymerase Chain Reaction Assay for Simultaneous Detection of Five Cucurbit-infecting Viruses.

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A single-step multiplex reverse transcription polymerase chain reaction (RT-PCR) assay was developed for the simultaneous detection of five cucurbit-infecting viruses: cucumber mosaic virus (CMV), watermelon mosaic virus 2 (WMV2), zucchini yellow mosaic virus (ZYMV), cucumber green mottle mosaic virus (CGMMV), and kyuri green mottle mosaic virus (KGMMV). The multiplex RT-PCR provides a simple and rapid method for detecting various viruses in cucurbit plants, which will help diagnose many cucurbit plants at a time.

4-54. Characterization of *Carnation mottle carmovirus*(CarMV) Isolated from *Lilium spp.* in Korea

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Carnation mottle carmovirus(CarMV) was isolated from *Lilium spp.* in Korea. This isolate, CarMV, was done bioassay, which plants were *Dianthus caryophyllus, Gomphrena globosa, Chenopodium amaranticolor, Dianthus chinensis.* CarMV was propagated on the leaves of *Chenopodium amaranticolor* with the crude-sap inoculation method and purified by Mossops method(1976). We produced antiserum against CarMV and analyzed the antiserum specificity with ELISA, Gel diffusion method, and Rapid Immunofilter Paper Assay (RIPA). From these results of the assay, RIPA method was simple and rapid for CarMV detection. We have established successfully the CarMV detection system. CarMV coat protein gene was amplified by RT-PCR with specific primers and sequencing analysis was done.

4-55. A simple method for detection of CMV viral RNAs and satellite RNAs in Korean pepper.

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To analyze the genome of *Cucumber mosaic virus*(CMV) in pepper, we developed a new extraction method for double-stranded RNA(dsRNA). To isolate the dsRNA, 0.1g of pepper leaves homogenized with 1ml of 5×EXB extraction buffer[0.5M glycin, 0.5M NaCl, 5mM EDTA(pH9.0/NaOH), 10% Sodium N-lauryl salcosinate(NLS), 10% Sodium dodecylsulfate(SDS)] and