

Studies on Biological, Serological and Molecular Characteristics of Isolates of Cucumber Mosaic Cucumovirus (CMV) causing shoe-string and mild mosaic of Tomato plants in Iran.

Y. FAZLALI, A. AHOONMANESH, M. HAJIMORAD and A.R. KARIMI

College of Agriculture, Tarbiat Modarres Univ.; College of Agriculture, Isfhan University of Technology and Plant Pests & Diseases Research Institute

ABSTRACT

On the basis of the type and the severity of symptoms produced on *Datura stramonium* and *Lycopersicon esculentum* by 35 isolates of cucumber mosaic cucumovirus (CMV), two isolates, designated CMV-LN and CMV-LI, producing severe shoe-string symptoms, and mild mosaic, respectively, were selected and characterized. Electron microscopic studies on the partially purified preparations of the two isolates failed to reveal any difference in their particle morphology.

The isolates were serologically distinct when tested, by agar gel double diffusion, against an antiserum to serotype I of CMV, the native (unfixed) particles of CMV-LI formed spur in this test against the CMV-LN.

The two isolates were indistinguishable when tested against an antiserum to a CMV-S, the serotype II of CMV.

The coat protein of the two isolates also differed in size, when compared by SDS-Polyacrylamide gel electrophoresis, the protein subunits of CMV-LI and CMV-LN were estimated to be 23200 and 25000 daltons, respectively.

The electrophoretic mobilities of genomic RNAs of CMV-LI and CMV-LN were similar on agarose gel. No Satellite RNAs were detected in either isolates.

The differences in coat protein size, and in biological and serological properties among the two isolates are most likely due to nucleotide sequence dissimilarities in the genomic RNAs.

References

- BEACHY, R. N., LOESCH-FRIES, S. & TUMER, N. E. (1990). Coat protein mediated resistance against virus infection. *Annual Review of Phytopathology* 28, 451-474.
- DEVERGNE, J. C. & CARDIN, L. (1973). Contribution a l'étude du virus de la mosaïque du concombre (CMV). IV. Essai de classification de plusieurs isolats sur la base de leur structure antigenique. *Ann. Phytopathol.* 5, 409-430.
- DODDS, J. A. (1982). Cross protection and interference between electrophoretically distinct strains of cucumber mosaic virus in tomato. *Virology* 118, 235-240.
- EDWARDS, M. C. & GONSALVES, D. 1983. Grouping of seven biologically defined isolates of cucumber mosaic virus by peptide mapping. *Phytopathology*, 73, 1117-1120.
- FAZLALIY; A. AHOONMANESH; M. R. HAJIMORED A. KARIMI; 1994. Possible presencc of satellite RNA in the Iraning isolated of cucumber mosaic cucumovirus, *Phytopathe* Vol, 64. No. 112. P. 8-16, (In Farsi, summery english).
- FRANKI, R. I. B., MOSSOP, D. and HATTA, T. (1979). Cucumber mosaic virus. Description of Plant Viruses. No. 213. C. M. I. /AAB
- FRANCKI, R. I. B. & HATTA, T. (1980). Cucumber mosaic virus variation and problems of identification. *Acta Horticultural* 110, 167-174.
- GIBBS, A. J. and HARRISON, B. D. (1970). Descriptions of Plant Viruses No. 1. C. M. I. / AAB
- KAPER, J. M. and WATERWORTH, H. E. (1981). Cucumoviruses. In *Handbook of Plant Virus Infections and Comparative Diagnosis* (by: Kurstak, E., ed.). Elsevier/North-Holand Biomedical Press. Amsterdam.
- LAEMMELI, U. K. (1970). Cleavage of structural proteins during the assembly of the head of bacteriophage. *Nature* 227, 680-685.
- OWENS, J. and PALUKAITIS, P. (1988). Characterization of cucumber mosaic virus. I. Molecular heterogeneity of RNA-3 in 8 CMV strains. *Virology* 166, 495-502.
- PALUKAITIS, P., ROOSSINCK, M. J., DITZGEN, R. G. and FRANCKI, R. I. B. 1992. Cucumber mosaic virus. *Advances in Virus Research* 41, 281-348.
- PEDEN, K. W. C. and SYMONS, R. H. 1973. Cucumber mosaic virus contains a functionally divided genome. *Virology* 53, 487-492.

- PIAZZOLLA, P., DIAZ-RUIZ, J. R. & KAPER, J. M. 1979. Nucleic acid homologies of Eitheen Cucumber mosaic virus isolates determined by competition hybridization. *J. g. Virology* 45, 361-369.
- QUEMADA, H., KEARNEY, C., GONSALVES, D. & SLIGHTOM, J. L. 1989. Nucleotide sequences of the coat protein genes and flanking regions of Cucumber Mosaic Virus strains C and WL RNA-3. *J. G. Virology* 70, 1065-1073.
- SHINTAKU, M. 1991. Coat protein gene sequences of two cucumber mosaic virus strains reveal a single amino acid change correlating with chlorosis induction. *J. G. Virology* 72, 2587-2589.
- VAN REGENMORTEL, M. H. V. 1982. Serology and Immunochemistry of plant viruses. Academic press.
- YIE, Y.; ZHAO, F.; ZHAO, S. Z.; LIN, Y. Z. & TIEN. 1992. High resistance to cucumber mosaic virus conferred by satellite RNA and coat protein in Transgenic Commercial Tobacco Cultivar G-140-*Mol. pla. Micr. Interactions* 5, 460-465.
- ZITTER, T. A. & GONSALVES, D. 1991. Differentiation of pseudorecombinants of two cucumber mosaic virus strains by biological properties and aphid transmission *phytopathology* 81, 139-143.

Address of the authors: Eng. Y. FAZLALI, College of Agriculture, Tarbiat Modarres University, Tehran; Dr. A. AHOONMANESH, College of Agriculture, Isfahan University of Technology; Dr. M. R. HAGIMORAD & Eng. A. KARIMI, Plant Pests & Diseases Research Institute, P. O. Box 1454, 19395 Tehran.