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DIAGNOSIS OF CHILLI PEPPER VIRUS IN MEXICO

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We understand the diagnosis as relative information to the manifestation of a certain syndrome, in this case, in chilli pepper plants. Then, in this work we will refer to concerning information to etiología, epidemiology and to pathogenicity elements. At beginning of the 70´s in the XX century, the former actions about diagnosis in Mexico, were guided exclusively to detection of different virus. These detection was carried out using differential plants and determination of physical and biological proprieties. Since middle of 80´s, they begin to carry out this activity using immunologic methods. This way, at the ends of the 80s, an interdisciplinary effort, determined the presence of cucumber mosaic virus (CMV), tobacco mosaic virus (TMV) and tobacco each virus (TEV) at least in the Bajío, Northwest and Northeast of the country; sometimes involved in significant problems. By the middle of the 80s a new illness is presented in cultivation; "rizado amarillo". None of the virus previously reported for chilli pepper produced the illness. Until principles of the 90´s we could, with molecular tools, to detect Pepper huasteco virus (PHV) and Texas pepper virus (TPV) (in some articles PepGMV) involved. The former was not previously reported and the second one had been reported recently in Texas. In this time, with the handling of tools of molecular biology, we begin in Mexico deepen and extend the possibility in the diagnosis. This way, for example, the complete sequence of the genomas of the PHV and TPV, allowed us to establish phylogenetics relationships with the well-known geminivirus. Also we could using probes or primers to get a precise identification of the virus, included inside the same plant. On the other hand the actions diagnosis became nationals and in that way recently we have been able to establish some interesting aspects as those that are mentioned next:

- TMV, TEV and CMV have a wider distribution than the geminivirus. The RNA virus were detected in 74% of the production units of chilli peppers. Although not necessarily impacting on the horticultural cultivations.
- High percentage of the presence of RNA virus has been determined in weed.
- TMV is the most recurrent in the country, but TPV is more recurrent in pepper plants. TMV was not detected in the pepper cultivations but in the surrounding weed.
- Pepper, after the pumpkin, is the vegetable where there is bigger virus incidence.
- The PHV has a bigger incidence in the cultivations of the Gulf of Mexico.
- In the pepper cultivation they are, all the possible combinations of mixture of the virus CMV, TMV, TEV, PHV and TPV in a natural way.
- The PHV is the virus more disperse in the chilli peppers cultivations in Mexico.

Concerning the understanding of the patogenicidad they have been able to establish some elements like those that are mentioned next:

- Replication of the geminivirus doesn't seem a restrictive factor in asymptomatics or immune plants. Some preliminary data suggest that the restrictive can be the movement.
- Amount of virión in geminivirus infections do not correlate with the percentage of infection.
- Although the severity is high in 4-8 leaves stage pepper plants, the infectividad is bigger in plants in antesis.
- Geminivirus PHV and TPV have a protein of the movement (BR1) that share among them bigger identity that with any other virus.
- In the mixture of PHV and TPV the PHV is able to supplement the function of the movement of TPV, but not vice versa.
- The coat protein of the PHV is also involved in the virus movement.

LITERATURA CITADA

Acosta R. L. y Quintero S. M. 1988. Avances en la transmisión de una enfermedad viral transmisible por mosquita blanca en chile y tomate en la planicie Huasteca. XV Congreso Nacional de Fitopatología. Xalapa, Ver. México.

Garzón, T. J. A., Rivera, B. F. R., Herrera, E. L., Delgadillo, S. F., Pozo, C. O. 1989. Estudio preliminar sobre el "rizado amarillo" del chile (*Capsicum annuum* L.), en el sur de Tamaulipas. Un geminivirus. SMF. XII Congreso Nacional de la Sociedad Mexicana de Fitopatología. Edo. de Méx. Pág.16

Garzón-Tiznado, J. A., Torres Pacheco, I., Ascencio Ibáñez, J., Herrera-Estrella, L. and Rivera Bustamante, R. F. 1993. Inoculation of peppers with infection clones of anew geminivirus by a biolistic procedure. Phytopatology 83: 514-521.

María Guadalupe Vera Aguado. 2000. Detección de virus en jitomate *(Lycopersicon Licoersicum),* chile *(Capsicum annuum)* y maleza, en los diferentes ambientes de cultivo en México. Instituto Tecnológico de Celaya.

Rodríguez, M. R. 1971. Estudio preliminar sobre el sobre el mosaico del chile en la región del Bajío. Tesis de Maestría. C.P. Chapingo Méx.

Stenger, D. C., Duffus, J, E., and Villaon B. 1991. Biological and genomics properties of a geminivirus isolated from pepper. Phytopatology. 80:704-709.

Torres Pacheco Irineo. 1997. Gemnivirus involucrados en el "rizado amarillo" del chile: interacciones entre PHV Y TPV. Tesis de Doctorado. CINVESTAV- Unidad Irapuato. Departamento de Ingeniería Genética.

Torres-Pacheco, I., Garzón-Tiznado, J. A., Brown J. K., Becerra-Flora, A. and Rivera -Bustamante, R. 1996. Detection and Distribution of geminiviruses in Mexico and the southern United States. Phytopatology 86:1186-1192.

Torres-Pacheco, I., Garzón-Tiznado, J. A., Herrera-Estrella, L. and Rivera-Bustamante, R. 1993. Complete nucleotide sequence of pepper huasteco virus : analysis and comparison with bipartite geminiviruses. Journal of General Virology 74 :2225-2231.

Vera Aguado, M. G., Díaz Plaza R., González Chavira, M. M., Garzón Tiznado, J. A., Guevara González R. G. y Torres Pacheco, I. 1999. Detection of virus in tomato (Lycopersicon Lycopersicum) pepper (Capsicum annuum) and weed in different environments in Mexico. Advances. Horticultura Mexicana Vol. No. 1 Pág. 132.

Godínez-Hernández, Y., Anaya-López, J. L., Díaz-Plaza, R., González-Chavira, M. and I. Torres-Pacheco. 2001. Characterization of resistance to pepper huasteco geminivirus in chilli peppers (Capsicum chinense) from Yucatan, Mexico. HortScience 36 (1):139.42.

Nadia Alejandra López-Martínez, Irineo Torres-Pacheco, Ramón Gerardo Guevara-González y Mario Martín González-Chavira. 2002. Efecto de la carga viral, etapa fonológica y temperatura de incubación en la expresión del síndrome ocasionado por el PHV en chile. XXIX Congreso Nacional de la Sociedad Mexicana de Fitopatología. Monterrey N. L. México

Anaya-López, J. L., Torres-Pacheco, I, González-Chavira, M., Pons Hernández J. L., Guevara González R. G. Muñoz-Sánchez, C. I .Guevara-Olvera L., Rivera Bustamante, R. F. and Hernández-Verdugo, S. 2002. Resistance to geminivirus mixed infections in Mexican wild peppers. HortSciencie. Accepted.