Plant Path

U.S. Department of Agriculture **Accomplishments Report AD-421** U.S. Dept. of Agriculture, State Agricultural Experiment Stations and Other Institutions			Date (Month, Day, Year) 03/22/2012
1. Accession 0215856	Agency Identification No. 2. CSREES 3. LA.B	5. Work Unit/Project No. **LAB93932**	6. Status **Annual Report**

7. Title

Molecular Characterization of dsRNA Viruses Infecting Plants and Fungi

12. Investigator Name(s) (Last Name and Initials)

Valverde, R. A.

20. Termination Date 09/30/2013	40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011

Outputs:

The molecular characterization and the identification of three new species of dsRNA viruses, Bell pepper endornavirus (BPEV), Pepper cryptic virus 1 (PCV-1) and Pepper cryptic virus 2 (PCV-2), infecting pepper were reported. This information, together with their occurrence in pepper genotypes was published in two peer reviewed journals. Based on sequence data and phylogenetic analyses, discussions on the origin of various viral genes, the taxonomy, and the evolution of endornaviruses was presented at an international conference and published in a refereed publication. PCR primers for detection of the three pepper dsRNA viruses were developed, and the detection method validated using seed and foliar tissues. Forty-seven pepper genotypes from the United States and Japan were reported to be infected with BPEV. Seven pepper genotypes were reported to be infected with PCV- 1 and PCV-2 in single or mixed infection. The molecular characterization of dsRNA endornaviruses from melon and avocado was presented in posters at the annual meeting of the American Phytopathological Society and the Spanish National Congress of Virology, respectively.

Outcomes/Impacts:

The unique nucleotide sequence of three new dsRNA viruses from pepper was obtained and analyzed. Phylogenetic and sequence analyses performed demonstrated a close relationship with fungal dsRNA viruses. This information supported a proposal for the information to be described as a newly plant virus species. PCR detection of these viruses from seed and foliar tissues was successfully accomplished. Distinct endornavirus species were detected in avocado and melon cultivars in the United States and Spain. Research on molecular and biological characterization is underway. Data on molecular and biological properties will be useful in elucidating their role in plants and will clarify their taxonomic status.

Publications:

Lai, Y., Yi, G., Chen, C., Bhardwaj, K., Tragesser, B. J., Valverde, R. A., Zlotnick, A., Mukhopadhyay, S., Ranjith-Kumar, C. T., and Kao, C. C. 2011. Viral Double-strand RNA-binding Proteins Can Enhance Innate Immune Signaling by Toll-Like Receptor 3. PLoS ONE 6 (10): e25837. doi:10.1371/journal.pone.0025837.

Okada, R., Kiyota, E., Sabanadzovic, S., Moriyama,H., Fukuhara, T., Saha, P., Roossinck. M. J., Severin, A., and Valverde, R. A. 2011. Bell pepper endornavirus: molecular and biological properties and occurrence in the genus Capsicum. Journal of General Virology 92:2664-2673.

Roossinck, M. J., Sabanadzovic, S., Ryo Okada, R., and Valverde, R. A. 2011. The remarkable evolutionary history of endornaviruses. Journal of General Virology 92:2674-2678.

Sabanadzovic, S. and Valverde, R. A. 2011. Properties of two cryptoviruses from pepper (Capsicum annuum). Virus Genes 43:307-312.

Sabanadzovic, Valverde, R. A., and Wintermantel , W. M. 2011. Molecular characterization of an endornavirus from Cucumis spp. Phytopathology 101: S158.

Valverde, R. A., Sabanadzovic, S., Okada, R., Navas-Castillo, J., and Fukuhara, T. 2010. Cryptic viruses of Capsicum. In: Proceedings 4th Conference of the International Group on Legume and Vegetable Viruses, May 17-20, 2010, page 40, Antequera, Spain.

Villanueva, F., Sabanadzovic, S., Valverde, R. A., and Navas-Castillo, J. 2011. Evidencia de infeccion por virus con genoma

dsRNA pertenecientes a varios generos en aguacate. In: Proceedings XI Congreso Nacional de Virologia, 29 de Mayo a 1 de Junio, Granada, Espana.

Participants:

This research is being conducted with informal collaborations with a team of national and international scientists and students working on dsRNA viruses. R. A. Valverde (PI), LSU AgCenter; S. Sabanadzovic, Mississippi State University; Scientists from Tokyo University of Agriculture and Technology in Japan and Consejo Superior de Investigaciones Cientificas of Spain, USDA/ARS, Salinas, CA, and the Noble Foundation, Ardmore, OK.

Target Audiences:

Plant pathologists, plant virologists, plant breeders, research development personnel of seed companies, and graduate students.

Project Modifications:

Nothing significant to report during this reporting period.

Approved (Signature)	Title	Date