

Persistent dsRNA plant viruses and viral diseases of ornamental crops: importance, identification, and occurrence

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Because of the importance of virus identification in developing control strategies my research program focuses on plant virus identification and characterization. My laboratory and collaborators have identified, characterized, and developed detection tools for several newly recognized viruses. Some of these viruses cause diseases in economically important crops (acute viruses) but others do not appear to cause diseases (persistent viruses). We are continuing this endeavor with emphasis in viruses of common bean (*Phaseolus vulgaris*), pepper (*Capsicum annuum*), and ornamental crops.

Persistent dsRNA Viruses. Based on the type of relationship with the host, plant viruses can be grouped as acute or persistent. Acute viruses are well studied, cause symptoms, and plant diseases. In contrast to acute viruses, persistent viruses do not appear to affect the phenotype of the plant host. Persistent plant viruses include dsRNA virus members of the families *Endornaviridae*, *Chrysoviridae*, *Partitiviridae*, and *Totiviridae*. They have been reported to infect many economically important crops such as avocado, alfalfa, barley, beets, cherry, common bean, fava bean, melon, pepper, rice, and tomato, among others. The molecular and biological properties of these viruses indicate a close relationship with fungal viruses. The genus *Endornavirus* contains persistent viruses that infect plants without causing visible symptoms and little is known about the effect they have on their plant hosts. We hypothesize that endornaviruses are in a mutualistic relationship with the host and provide tolerance to biotic or abiotic agents. Nevertheless, it is also possible that these viruses could interact synergistically with acute viruses or other pathogens and cause harmful effects. Therefore, the addition or elimination of endornaviruses from crop cultivars to increase crop productivity may be an outcome of this investigation.

Viral Diseases of Ornamental Crops. Most viruses that infect plants cause diseases that are detrimental to the plant, however, there are some instances in which infections by mild viral strains of a virus have been used to protect the plant against severe strains of the same virus. There are other viruses that can cause desirable effects in ornamental plants and infected plants have been selected or in some cases these viruses have been used, by ornamental horticulturists to enhance the aesthetics of the plants. In most cases, this translates in an increase of their commercial value. There are several examples of ornamental plants being more marketable when infected by a particular virus than virus-free. Although, the interaction between these viruses and their ornamental host described here do not appear to harm

the host plant; the utilization of plant viruses to enhance the aesthetics of ornamental plants can lead to potential problems. Some of these viruses are pathogenic to other crops or have the potential to be pathogenic through mutations or recombination. Moreover, if transmitted these viruses can not only cause disease but could interact with other plant viruses as well as with indigenous plant species. Since there are many viruses that are endemic in clonally propagated ornamental plants, some of them symptomless, additional viral infections may result in synergistic effects resulting in severe diseases. Plants with a virus infection can also be more susceptible other pathogens than are healthy plants. Due to the potential problem that some these viruses can cause to agriculture, there is a need to implement regulatory procedures for some of these viruses to minimize their dissemination.

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