

***Alternanthera Mosaic Potexvirus in Scutellaria*¹**

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INTRODUCTION: Skullcap, *Scutellaria* species. L. is a member of the mint family, Labiatae. It is represented by more than 300 species of perennial herbs distributed worldwide (Bailey and Bailey 1978). Skullcap grows wild or is naturalized as ornamentals and medicinal herbs. Fuschia skullcap is a Costa Rican variety with long, trailing stems, glossy foliage and clusters of fuschia-colored flowers.



Fig. 1. Fuschia skullcap (*Scutellaria* species) infected with *Alternanthera mosaic virus*. Symptoms include foliar mottle and chlorotic to necrotic ring-spots and wavy-line patterns. (FDACA-DPI)

SYMPTOMS: Vegetative propagations of fuschia skullcap grown in a Central Florida nursery located in Manatee County showed symptoms of viral infection in the fall of 1998, including foliar mottle and chlorotic to necrotic ring-spots and wavy-line patterns (Fig. 1).

SURVEY AND DETECTION: Symptomatic leaves were collected and examined by electron microscopy. Flexuous virus-like particles, approximately 500 nm long, like those associated with potexvirus infections, were observed. Subsequent enzyme-linked immunosorbent assay (ELISA) for a potexvirus known to occur in Florida, resulted in a positive reaction to papaya mosaic virus (PapMV) antiserum. However, further tests indicated that while this virus was related to PapMV, it was not PapMV. Sequencing data showed that the virus was actually *Alternanthera mosaic virus* (Baker *et al.* 2006).

VIRUS DISTRIBUTION: In 1999, a *Potexvirus* closely related to PapMV was found in Queensland, Australia. It was isolated from *Altrernanthera pogens* (Amaranthaceae), a weed found in both the Southern U.S. and Australia. Despite its apparent relationship with PapMV using serology, sequencing showed that it was only 79.8% identical to PapMV at the nucleotide level. The authors of the paper concluded that the virus in *A. pogens* was a species of *Potexvirus* related to but different from PapMV (Gerring and Thomas 1999). The virus was tentatively named *Alternanthera mosaic virus* (AltMV).

Since then, AltMV has been found in various ornamental plants in Europe (Italy: Ciuffo and Turina 2004), the United States (Maryland and Pennsylvania: Hammond *et al.* 2005, Florida: Baker *et al.* 2006, and New York: Lockhart 2008), and in Brazil (Duarte *et al.* in review).

HOST RANGE: In Italy, AltMV was found in moss rose (*Portulaca gradiflora*). In the United States it was found in moss rose, phlox (*Phlox stolonifera*), skullcap (*Scutellaria* species), firecracker plant (*Crossandra infudibuliformis*) and in a mixed infection in angelonia (*Angelonia angustifolia*). In Brazil it was identified in *Torenia* sp, *Helichrysum* species, *Salvia splendens* and *Angelonia* species. Three of the later hosts showed no obvious symptoms (*Angelonia*, *Salvia* and *Torenia* species).

Host range studies indicate that some isolates of this virus can systemically infect tomatoes (*Lycopersicon esculentum*), faba beans (*Vicia faba*), sunflowers (*Helianthus annuus*), and Zinnias (*Zinnia elegans*). Some cultivars of watermelon (*Citrullus lanatus*), cucumbers (*Cucumis sativus*), and blackeyed peas (*Vigna unguiculata*) also became systemically infected. Many of these plants showed mild symptoms or were asymptomatic. The virus does not seem to infect papaya (*Carica papaya*).

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TRANSMISSION: Like other members of the potexvirus genus, infective virions of AltMV occur in leaf sap in high concentrations, are slightly flexuous, rod-shaped and measure about 530 nm. They are efficiently spread by pruning, cultivation, leaf to leaf contact, propagation of infected cuttings and probably by insect activities (Murant *et al.* 1988). Risk of infection increases for perennially grown plants established for long-term cultivation, vegetatively propagated plants that may have originated from infected cuttings, and frequently trimmed plants subjected to virus-infested tools or hands. Seed transmission has not been tested.

CONTROL: Infection by AltMV can be avoided by (1) propagating cuttings from healthy plants, (2) sterilizing cutting tools and pots by heating in a dry oven for one hour at 155°C (300°F) or inactivating the virus by disinfecting tools and pots and soaking them in freshly prepared 10% (1 part + 9 parts water) household bleach solution, (3) spacing plantings, and (4) controlling activities of insects and free-roving animals. If this virus or any other is suspected, verify with diagnostic testing and rogue all infected plants. Potexviruses are persistent, remaining infective in sap up to six months at room temperature (25°C = 77°F).

The fact that this virus has been found in four continents in ten years in vegetatively propagated ornamentals and that it is asymptomatic in many of them suggests that this virus may have been spread though international plant trade. It is likely it will become more widespread. Its close serological relationship with PapMV also may mean that it has been and still can be easily misdiagnosed.

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