



Abutilon Mosaic

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Abutilon mosaic is an interesting and spectacular viral disease of certain *Abutilon* species, most notably *Abutilon striatum*. This mosaic is an example of a so-called “beneficial plant disease,” owing to the desirable effects of the unusual and beautiful mosaic patterns found on affected leaves. The disease has negligible effects on plant growth, vigor, and flowering.

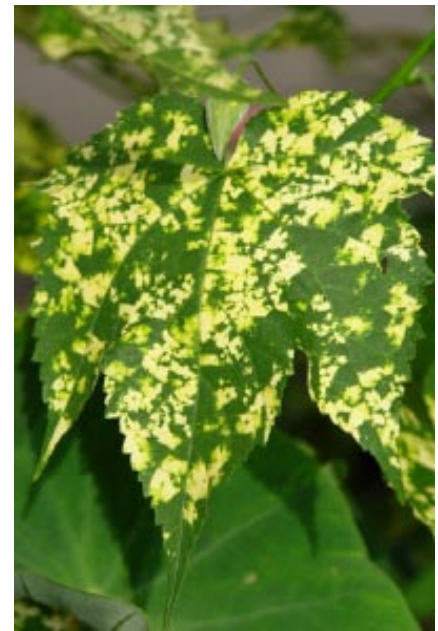
Abutilon striatum is a shrub in the mallow family (Malvaceae) known as flowering maple, parlor maple, or Indian mallow and sometimes sold as an ornamental plant with the cultivar names ‘Thompsonii’ or ‘Gold Dust’. Hawai‘i is home to endemic *Abutilon* species (*eremitopetalum*, *menziesii*, and *sandwicense*) and in-

digenous species (*Abutilon incanum*), but the mosaic symptoms are observed only in the introduced perennial *Abutilon pictum*, known as lantern ‘ilima. (Photos of some native *Abutilon* species in Hawai‘i can be seen at www.botany.hawaii.edu/FACULTY/CARR/abutilon.htm).

Host

Abutilon striatum is a robust, evergreen, upright shrub with three- to five-lobed, serrated, rich green, heavily yellow-mottled leaves and yellow-orange flowers with crimson veins. It is native to Brazil and naturalized in South and Central America.

Typical symptoms of abutilon mosaic on *Abutilon striatum*: heavily bright whitish to yellow-mottled leaves; a yellow mosaic resembling variegation. The yellow patches are sharply delimited by leaf veins, giving them an angular appearance. Symptoms may vary seasonally depending on light intensity. The plants were found for sale at a farmers’ market in Hilo, Hawai‘i, in 2007. Photos: S. Nelson.



Pathogen

Abutilon mosaic bigeminivirus (Acronym = AbMV) is a virus probably distributed worldwide (in ornamental plants). Taxonomy: bigeminivirus: *Geminiviridae*. Strains: abutilon mosaic A = West Indies virus; abutilon mosaic B = Brazil virus; abutilon mosaic Hawaii virus. As of 2007, AbMV is the only known geminivirus to occur in Hawai'i.

Disease symptoms

On *Abutilon striatum*, the leaves are heavily mottled with a bright whitish to yellow mosaic resembling variegation. The yellow patches are sharply delimited by leaf veins, lending them an angular appearance. Symptoms may vary seasonally depending on light intensity.

Virus transmission and vector

AbMV is transmitted by an insect vector, a whitefly, *Bemisia tabaci* (Aleyrodidae). The virus

- is transmitted in a persistent* manner
- is retained when the vector molts
- does not multiply in the vector
- is transmitted by mechanical inoculation and by grafting
- is not transmitted congenitally to the progeny of the vector
- is not transmitted by contact between plants, by seed, or by pollen.

*In persistent transmission of plant viruses, acquisition or transmission of the virus by the vector increases with increased feeding time. There is usually a latent period of 12 hours or more before the vector can transmit the virus. The vector remains infective for a long period of time, perhaps its whole life, but although the virus is not lost as the vector matures, efficiency of its transmission declines with the age of the vector.

More information about this vector in Hawai'i is available at http://www.extento.hawaii.edu/Kbase/Crop/Type/b_tabaci.htm.

A grower and marketer of *Abutilon* species on the island of Hawai'i reports that mosaic symptoms appear in other healthy *Abutilon* spp. after grafting their scions onto AbMV-infected rootstocks of *Abutilon striatum*.

Natural host range of AbMV and symptoms

(1) *Abutilon* spp., *Sida* spp., *Hibiscus* spp., *Gossypium hirsutum* (yellow mosaic)

(2) *Malva* sp., *Phaseolus vulgaris* (mosaic)

(3) *Abutilon pictum* (foliar crinkling, mottling, and mild mosaic).

Susceptible host plants are listed at <http://image.fs.uidaho.edu/vide/descri002.htm>.

Disease management

This disease is not normally managed or controlled. However, symptoms may vary with light intensity and may be ameliorated in subdued light. Some reports indicate that where symptomatic leaves are persistently removed, completely green, asymptomatic leaves may be produced.

Significance

Infected plants have ornamental value and enthusiasts regard them as desirable for their interesting foliage and bell-like flowers that come in shades of white, yellow, salmon, and red. The disease does not seem to significantly affect plant growth (it is not regarded as a debilitating plant disease on *Abutilon striatum* with regard to vigor and flowering). In fact, this is a case of a plant disease in which infected plants are more desirable than uninfected plants. In Hawai'i, some growers sell the plants a "variegated *Abutilon*" or by the variety name 'Gold Dust.'

In lantern 'ilima (*Abutilon pictum*), infected plants show foliar crinkling, mottling and mild chlorotic areas on leaves rather than the classic, striking yellow-mosaic symptom. Almost all lantern 'ilima samples tested in Hawai'i are infected by AbMV. However, the Hawai'i AbMV strain from lantern 'ilima was found to not be vector-transmissible by *Bemisia tabaci*. Regarding endemic or native *Abutilon* species in Hawai'i, the author is not aware of mosaic symptoms associated with AbMV occurring naturally, although these species are likely to be susceptible to mechanical transmission of the virus.

History

The flowering maples that were first introduced to Europe had solid green leaves. (Note that *Abutilon striatum* is not a true maple, genus *Acer*, a genus of trees and shrubs; the leaves of *Abutilon striatum* only resemble the shape of maple leaves.) In 1868, one seedling in a shipment of *Abutilon* imported into England from the West Indies had leaves with bright yellow mottling. The symptomatic plant was propagated vegetatively thereafter. The virus was first reported in *Malva parviflora* in Germany.

Leaf of lantern 'ilima (*Abutilon pictum*) infected with abutilon mosaic virus. Photo: J. Hu



References

- The flowering maple and its virus. http://faculty.ucc.edu/biology-ombrello/POW/flowering_maple.htm.
- Plant viruses online. <http://image.fs.uidaho.edu/vide/de-scr002.htm>.
- ICTVdB descriptions. www.ncbi.nlm.nih.gov/ICTVdb/ICTVdB/00.029.0.03.002.htm.
- The American Horticultural Society encyclopedia of plants and flowers. 2002. DK Publishing, Inc., New York.
- Wu, Z.C., J.S. Hu, J.E. Polston, D.E. Ullman, and E. Hiebert. 1996. Complete nucleotide sequence of a nonvector-transmissible strain of Abutilon mosaic geminivirus in Hawaii. *Phytopathology* 86:608–613.
- John Hu, personal communication.

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