Pacific Pests, Pathogens & Weeds - Fact Sheets

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Sweetpotato leaf curl (376)

Photo 1. *Sweet potato leaf curl virus* on variety Beauregard.

Photo 2. *Sweet potato leaf curl vir*us on the indicator plant, *Ipomea setosa.*

Common Name

Sweetpotato leaf curl

Scientific Name

Sweetpotato leaf curl is caused by a virus of the same name. The virus belongs to the begomovirus group, which are transmitted by whiteflies. The abbreviation is SPLCV. The begomoviruses that infect plants in the sweetpotato (Convolvulaceae) family are sometimes called 'sweepoviruses'. Different strains are known.

Distribution

Worldwide. Asia, Africa, North, South and Central America, the Caribbean, Europe, Oceania. Begomoviruses have been recorded in sweetpotato from Australia, Papua New Guinea, and Solomon Islands. It is not known if these are the same strains or different ones.

Hosts

Sweetpotato, and annual and perennial morning glory species [e.g., the Brazilian morning glory *(Ipomoea setosa)*, palm leaf morning glory *(Ipomoea wrightii)*, and ivy leaf morning glory *(Ipomoea hederacea)* in the US; and the blue morning glory *(Ipomoea indica*) in Spain and Portugal]. *Nicotiana benthamiana* has been shown to be a host when infected experimentally.

Symptoms & Life Cycle

Symptoms are variable: young sweet potato plants show upward curling of leaves, yellowing and vein swelling (Photo 1). Later, the symptoms may disappear, and the plants appear healthy. As symptoms last only a short time, it is difficult to detect SPLCV in the field, especially if there is no upward curling of the leaves, its most characteristic sign.

Spread of SPLCV occurs in three ways. First, by whiteflies, e.g., *Bemisia tabaci*. The virus is picked up as the insects feed on plant sap of disease plants and, after a short delay, they infect healthy plants. Secondly, in cuttings used for planting. Thirdly, in storage roots sent to markets: buyers often take the roots and grow sprouts from them for planting. Also, there is evidence from Korea that SPLCV is seedborne.

Survival of the virus between crops or cropping seasons occurs in vines left in the field after harvest, in storage roots discarded in the field or intentionally kept as a source of planting material. SPLCV also survives in wild morning glory species in the US, but there is no evidence it does so in Pacific island countries.

Impact

SPLCV has been reported to cause a loss of yield of 26% in the US (variety Beauregard), even though there were no symptoms. Loss of storage root yields is likely to be even higher if SPLCV occurs in combination with other viruses, e.g., *Sweetpotato feathery mottle virus*, and *Sweetpotato chlorotic stunt virus.* This interaction between the viruses may be responsible for the yield decline seen in Solomon Islands and Papua New Guinea, and may also favour spread of SPLCV by whiteflies because it increases the concentration of the virus in plant sap.

Detection & inspection

Look for upward curling of leaves; however, plants do not always show symptoms, or they recover, producing plants that look healthy. The best way of detecting the virus is to graft shoots of sweet potato onto *Ipomoea setosa*, the indicator plant for sweet potato viruses (Photo 2).

This is done for two reasons: i) *Ipomoea setosa* is sensitive to sweetpotato viruses and is more likely to show symptoms than sweet potato, and ii) the sap of *Ipomoea setosa* is easier to test as it is without the milky latex of sweet potato. If viruses are present, new leaves appear between 10 and 20 days that are inward curling, pale yellow, and stunted. The sap from these leaves is then tested for the viruses of interest by ELISA and/or PCR.

Management

NATURAL ENEMIES

Natural predators include lacewing larvae (**see Fact Sheet No. 270**), big-eyed bugs (*Geocoris* spp.) (**see Fact Sheet no. 370**), ladybird beetles (**see Fact Sheet No. 83**), the larvae of syrphid (hoverflies) flies (**see Fact Sheet No. 84**), and predatory mites. All these attack the immature stages of whiteflies. There are parasitoids, too, tiny wasps that are natural biological controls of whitefly populations. Species of *Encarsia* and *Eretmocerus* are those most successful, and some are commercially available for use in greenhouses. *Eretmocerus* attack both the sweet potato and silverleaf B *(Bemisia argentifolii)* biotypes, and are effective at higher temperatures.

CULTURAL CONTROL

Virus-tested planting material

The most useful cultural control measure is to use virus-tested planting material. This is the method of control used for this and many other virus diseases affecting sweet potato, in Australia, China, South Africa and the US; it is also a method under investigation in Papua New Guinea. Plants are tested for virus and, if infected, given heat treatment before removing the meristem and growing it into a healthy plant in tissue culture. The plant is then re-tested and, if free from virus, multiplied and cuttings are released to growers. (Note, these methods remove all known viruses and also sweetpotato little leaf phytoplasma disease (**see Fact Sheet no. 55**).

Before planting:

- Use healthy planting material, produced through a healthy 'seed' scheme.
- Remove wild *Ipomoea* species and other weeds from around sweet potato plantings, in case they are hosts of SPLCV.
- If possible, plant new crops away from older ones that might be a source of whiteflies and viruses. The recommendation from Africa is that the plots should be at least 15 m apart because whiteflies only move short distances from their host plants. Spread from outside a new plot is rare.

During growth:

- If severe symptoms occur - upwards cupping and yellowing of leaves - remove the plant and burn, bury or compost it; this is very important, especially if symptoms appear early in the crop.

After harvest:

- Remove old, harvested, vines and burn, bury or compost them.
- Do not allow discarded storage roots to sprout. Collect and feed to livestock, or bury them.

CHEMICAL CONTROL

This is not a method that can be recommended to control whiteflies that spread this virus as it is unlikely to be economic. If chemicals are needed there are many choices available (**see Fact Sheet no. 284**). In Australia imidacloprid is registered. However, broadspectrum

insecticides such as pyrethroids (e.g., deltamethim, lambda cyhalothrin, bifenthrin), neonicotinoids (e.g., imidacloprid) and organophosphates (e.g., chlorpyriphos) should be avoided, as repeated use promotes the development of resistant populations of whiteflies, and will also destroy natural enemies. Resistance to insecticides is a particularly serious problem in the control of the silverleaf B and Q biotypes, which have become resistant to a wide range of insecticides.

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