Pacific Pests, Pathogens and Weeds - Online edition

Sweetpotato chlorotic stunt (375)

Common Name

Sweetpotato chlorotic stunt virus.

Scientific Name

Sweetpotato chlorotic stunt is caused by a virus of the same name. Previously, the virus was known as sweet potato chlorotic dwarf disease. The abbreviation is SPCSV. Different strains of SPCSV are reported. The virus particles are long flexuous rods.

Distribution

Asia, Africa, North, South and Central America, Europe, Oceania. It has been recorded from Solomon Islands.

Hosts

Sweetpotato; there are no reports that the virus has been found in other plant species or in weeds.

Photo 1. Reddening of older leaves on sweet potato caused by *Sweet potato chlorotic stunt virus*.

Symptoms & Life Cycle

Symptoms are variable in sweetpotato depending on variety and also location. There may be a mild yellowing or reddening (Photo 1) of older leaves and stunting, as the name suggests, but often infected plants do not show signs of infection.

However, when SPCSV occurs with other sweetpotato viruses the effect on plants can cause *Sweetpotato virus disease*. Leaves become yellow, thin, deformed, and plants rarely set roots, or root production is very low. This interaction has been reported with *Sweetpotato feathery mottle virus* (**see Fact Sheet no. 258**), *Sweetpotato virus G* (**see Fact Sheet no. 374**) and *Sweetpotato cavemovirus*.

Spread of SPCSV occurs in three ways. First, by whiteflies, e.g., *Bemisia tabaci*. The virus is picked up as the insects feed on plant sap of diseased plants and, after a short delay, they can 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. It is unlikely that the virus 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. SPCSV has been detected in wild *Ipomoea* hosts, but less frequently than e.g., *Sweetpotato feathery mottle virus* or *Sweetpotato leaf curl virus*.

Impact

SPCSV causes little impact when on its own in sweetpotato. However, in Africa, Asia and Central America, yield losses of 50-90% occur when SPCSV occurs with other viruses in susceptible plants. The presence of SPCSV allows the other viruses to reach concentrations in sweetpotato that are much greater than when they occur alone. For instance, with *Sweetpotato feathery mottle virus* this may be up to 600 times greater.

Detection & inspection

Symptoms are rarely seen when SPCSV occurs alone in sweetpotato, and even where symptoms do occur they are not unlike those caused by other virus infections.

Similarly, when SPCSV occurs with other viruses it is not possible to tell which viruses are present. The best way of detecting of finding out is to graft shoots of sweet potato onto *Ipomoea setosa*, the indicator plant for sweetpotato viruses.

This is done for two reasons: (i) *Ipomoea setosa* is sensitive to sweet potato 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 of whiteflies 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 sweetpotato and silverleaf B (*Bemisia agentifolii*) 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 SPCSV.
- 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 - yellowing and narrowing of leaves and stunting - 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.

RESISTANT VARIETIES

There are no known varieties resistant to SPCSV, but there are varieties resistant to *Sweetpotato virus disease* in Africa.

CHEMICAL CONTROL

This is not a method that can be recommended for the control of whiteflies that spread this virus as it is unlikely to be economic. However, if chemicals are needed there are many choices available (**see Fact Sheet no. 284**). Broadspectrum insecticides such as pyrethroids (e.g., deltamethrin, 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.

When using a pesticide, always wear protective clothing and follow the instructions on the product label, such as dosage, timing of application, and pre-harvest interval. **Recommendations will vary with the crop and system of cultivation. Expert advice on the most appropriate pesticide to use should always be sought from local agricultural authorities.**

AUTHORS Sandra Dennien & Grahame Jackson

Information from CABI Sweet potato chlorotic stunt virus (2018) Crop Protection Compendium (https://www.cabi.org/cpc/datasheet/18605); and Clark CA, *et al.* (2012) Sweet potato viruses: 15 years of progress on understanding and managing complex diseases. Plant Disease 96(2):168-185. (http://apsjournals.apsnet.org/doi/pdfplus/10.1094/PDIS-07-11-0550); and from Dennien *et al.* (2013) Growing healthy sweetpotato: best practices for producing planting material. ACIAR Monograph no. 153. Australian Centre for International Agricultural Research: Canberra. 176 pp. Photo 1 Segundo Fuentes. International Potato Center, Peru. (https://www.aspg.com.au/wp-content/uploads/2015/02/Sweetpotato-virus-detection-review-2018.pdf).

Produced with support from the Australian Centre for International Agricultural Research under projects (i) HORT/2016/185: *Responding to emerging pest and disease threats to horticulture in the Pacific islands*, implemented by the University of Queensland and the Secretariat of the Pacific Community, and (ii) PC2011/053: *Supporting commercial sweetpotato production and marketing in the PNG Highlands*, implemented by the Central Queensland University and the Queensland Department of Agriculture and Fisheries.