

Transcript for the Plant Virology Course, Week 4, Part 2

4.1. (00:10 00:27) Welcome to the Second Part of the course on Plant Virology Week 4 entitled “Epidemiology - transmission of plant viruses”.

Beside the aphids, the most numerous and versatile group of insect vectors, plant viruses can be transmitted also by thrips, whiteflies, mites, nematodes and by zoospores of protozoan and fungi.

4.2. (00:27 01:30) The most important virus transmitted by thrips (mainly *Frankliniella occidentalis*) is *Tomato spotted wilt virus* (TSWV). TSWV is a propagative virus and is able to replicate in both the plant and the insect. The acquisition of virus only at the first larval stage results in transmission by the imago.

4.3. (01:30 01:56) Transmission by whiteflies. Virus vectors belong to the genera *Bemisia* and *Trialeurodes*. Whitefly-borne viruses (e.g. begomoviruses) are transmitted in a persistent, circulative manner.

4.4. (01:56 02:35) Eriophyoid mites can transmit several important viruses, such as *Blackcurrant reversion virus*, *Citrus leprosis virus*, *Rose rosette virus* or *Wheat streak mosaic virus*. The retention sites are still unknown, but some of these viruses are transmitted in a semi persistent manner.

4.5. (02:35 03:17) Soil-borne nematodes acquire and transmit viruses by feeding on infected roots. The virions are attached mostly to the stylet, and the viruses do not circulate in the vector. Nepoviruses such as *Tomato ringspot virus* or *Arabidopsis mosaic virus* are transmitted by nematodes from the family *Longidoridae*, and tobamoviruses (e.g. *Tobacco rattle virus*) by nematodes from the family *Trichodoridae*.

4.6. (03:17 04:18) Transmission by fungi and protozoan.

Cucumber necrosis virus or *Tobacco necrosis virus* and other soil-borne viruses are acquired externally by zoospores of the **vector chytrid fungus *Olpidium* sp.** Virus particles are bound to the receptors on the zoospore surface.

The zoospores of plasmodiophorid vectors, such as *Polymyxa betae*, transmit *Beet necrotic yellow vein virus*, and of *Polymyxa graminis* transmit *Barley yellow mosaic virus*. Virus particles have been observed inside the zoospores. Red dots=virus particles.

4.7. (04:18 05:46) Viruses can spread by contact of a wounded plant with a healthy one. This is called “mechanical transmission through sap”. Plants can contact during strong wind, or when the infected sap adheres to the tools, the worker hands or to cloth during cultural operations. Also, such contact may occur during animal feeding on the plants. This type of virus transmission is commonly used in biological tests (an artificial plant inoculation).

Please remember! There is very strong contribution of **humans** to plant virus diseases spread, mostly by common agricultural/horticultural practices and by world-wide markets.

4.8. (05:46 06:01) Experimental transmission of viruses by dodder

4.9. (06:01 06:33) Genera of plant viruses transmitted by soil. Please, note that some of them do not have a vector.

4.10. (06:33 07:42) Plant viruses were identified in surface waters and designated by ICTV as separate plant virus species. They are called “orphan” viruses, i.e. their natural hosts are unknown. Infectious plant virus particles were detected in nutrient feeding solutions, in fog and clouds, in stable manure, in canals near sewage plant, in ditches and drainage canals, in tap water and even in ancient glacial ice. Epidemiological significance of these findings is negligible or unknown.

4.11. (07:42 07:47) Thank you for your attention