Red leaf mottle

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Cause

Peanut clump virus (PCV), genus *Pecluvirus*.

Geographical distribution

Burkina Faso, Chad, Congo, Gabon, India, Niger, Senegal, Sudan.

Symptoms

Several types of symptoms can be observed on well-developed leaves depending on the variety (Baudin and Chatenet, 1988; Rott, 1996):
– chlorotic bands, elongated over the length of the leaf, from 1 cm wide to as wide as the blade; they can appear spotted, yellow or rust-coloured (Figure 1); the entire leaf can become dark red with age (cultivar Co1001, B70574, etc.);
– numerous wine-red spots with diffuse edges and no clearly defined shape develop on both sides of the blade in some varieties (cultivar Ragnar, etc.) (Figures 2 and 3);
– white stripes appear on the leaves of some varieties; they resemble the stripes caused by leaf scald but have wavy edges and develop on any part of the blade without being linked to the midrib (Figure 4). A few isolated leaves develop white diamond-shaped or partly diamond-shaped stripes on the surface of the leaves (cultivar B51129, B51410, B7134, etc.).

Diagnosis

The leaf dip technique can be used to observe the pathogen by electron microscopy in leaves or roots sampled from symptomatic plants (Baudin and Chatenet, 1988). The virus forms rigid rods of variable length in sugarcane leaf preparations. Particle lengths range from 200 to 250–300 nm and the diameter is approximately 20 nm (Figure 5). The virus can also be detected in leaves, stalks and roots by various serological methods (ELISA, dot-blot, tissue-blot) using an antiserum prepared with purified virus (Baudin and Chatenet, 1988; Chatenet and Saeed, 1995).

Strains of the pathogen

There is no information available regarding strain variation of PCV in sugarcane. However, two major strains were identified in groundnut: the original PCV strain that was found in Africa and a second strain that was identified in India and called Indian peanut clump virus (THOUVENEL *et al.*, 1976; REDDY *et al.*, 1983). The biological and physical properties of the two strains are identical but great variation was observed in their serological properties (REDDY *et al.*, 1985). Additionally, characterization of PCV with monoclonal antibodies showed the existence of five serotypes of the virus (HUGUENOT *et al.*, 1989).

Transmission

Red leaf mottle is a soil-borne disease. It has been proven experimentally that the disease can be transmitted through the soil, not only from sugarcane to sugarcane, but also from sugarcane to groundnut. The virus can be transmitted from groundnut to groundnut by a soil fungus, *Polymyxa graminis* (THOUVENEL and FAUQUET, 1981). The disease is also transmitted by cuttings taken from symptomatic sugarcane stalks. In groundnut, the virus can also be seed-transmitted (4–14%).

Host range

Sorghum and groundnut are the major hosts of PCV, and the pathogen is only occasionally found in sugarcane. The virus has also been identified under natural conditions in *Sorghum arundinaceum* in Burkina Faso (DOLLET *et al.*, 1976), and in wheat in India (DELFOSSE *et al.*, 1995). Virus isolates obtained from sugarcane cannot be mechanically transmitted to sugarcane nor to maize. However, symptoms such as mosaic or necrotic spots were observed after artificial inoculation of several species of *Nicotiana, Chenopodium amaranticolor* and *C. quinoa* (BAUDIN and CHATENET, 1988; RAO and SINGH, 1999).

Epidemiology

Sandy soils with a high pH (7.0 and higher) particularly favour transmission. In some fields, there are areas of infected sugarcane where the disease reappears after replanting, even if a different variety is grown.

Economic importance

Red leaf mottle caused losses in yield trials in Senegal, but in plant cane only (BAUDIN *et al.*, 1989). However, no yield losses due to red leaf mottle have been reported in commercial fields so far.

Control

No efficient method has yet been reported to eliminate the virus from infected cuttings. Soaking cuttings in water for 3 h at 50°C does not eradicate the

Figure 1. Chlorotic elongated bands on the leaf with numerous rust-coloured spots (P. Baudin).

Figure 2. Numerous wine-red leaf spots (P. Baudin).

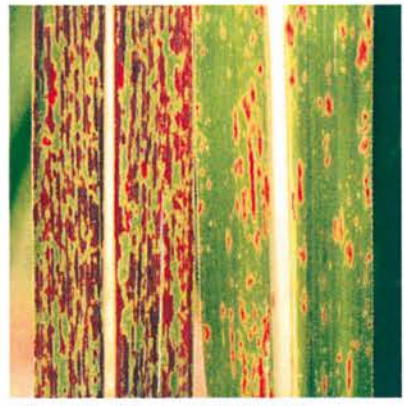

Figure 3. Wine-red leaf spots with diffuse edges on both sides of the blade (P. Rott).

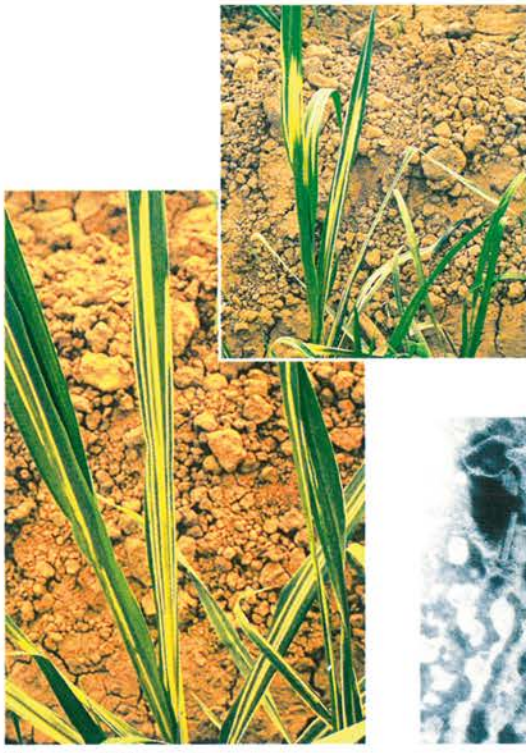

Figure 4. White stripes on the leaves (P. Baudin).

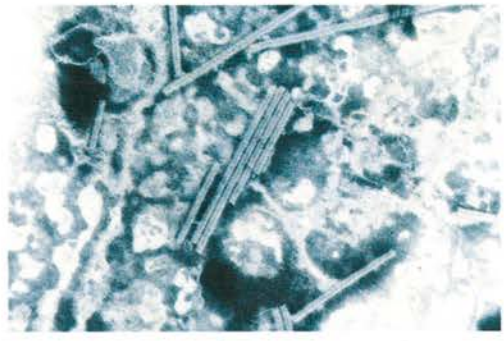

Figure 5. Virus particles (200–300 nm long) observed by transmission electron microscopy (M. Chatenet).

disease. Stools that show symptoms should be eliminated in multiplication plots. As red leaf mottle of sugarcane has been reported in only a few countries in Africa, great attention should be paid during germplasm exchange involving affected locations.

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