

Black Goo - October 2000

Mail and Guardian 27/10/2000, Eldene Eysell and Elisabeth Lickindorf, DNA -testing could prevent deadly 'black goo' Stellenbosch team, has found a fast, accurate test for the fungus known as "black goo" which has been devastating the world's vineyards.

Slow to grow, the deadly fungus (*Phaeoconiella chlamydospora*) is difficult to detect in its early stages. Like cholesterol that blocks arteries in humans, the fungus attacks the woody tissue of grapevines, which reacts by producing a thick, sticky substance - the consistency and colour of Marmite - that blocks the vessels carrying water and minerals from the roots to the rest of the plant. The vines become lethargic, unproductive and off-colour. After three to seven years they die.

Says

plant pathologist Professor Pedro Crous of the University of Stellenbosch: "Walking through vineyards I realised what havoc this fungus was causing. I had to drop whatever else I was doing and investigate."

The

fungus is ruinous for vine growers in wine-producing areas from California to South Australia. Although it can take years to develop, especially in the temperate climates of France, Italy, New Zealand and South Africa, it appears to be latent in nearly all "mother vines". So farmers need to know that cuttings are healthy before planting them out into vineyards.

In

the past it would take four weeks or more before the fungus could be positively identified under a microscope. Because other fungi superficially show similar symptoms, it's vital to isolate the specific fungus quickly to halt further infection.

Crous

and his colleagues, biochemist Professor Dirk Bellstedt and postgraduate student Michelle Groenewald, have designed a groundbreaking diagnostic method in the form of DNA "fingerprinting" that can identify the fungus within 24 hours, even in young nursery vines that show no symptoms.

Using

minute samples from infected vines in South Africa and the Netherlands, they grew cultures of the fungus and extracted its DNA, which they then replicated many thousands of times using primers in a polymerase chain reaction amplification process. Because they do not allow the DNA of other fungi to multiply these primers enable the identification of black goo DNA.

Phaeoconiella chlamydospora

discovered and named by Crous in 1995 - is associated with, and may even make vines vulnerable to, other debilitating diseases like esca and apoplexy. It is potentially as cataclysmic as the root-destroying aphid, phylloxera, that wiped out most of Europe's vineyards in the 19th century.

It

is also causing dissent between vine suppliers and growers. Because the disease has been found on newly planted farms that have never had grapevines, let alone black goo, farmers are blaming nurseries for supplying infected material. Plant pathologists at the Nietvoorbij Institute of Viticulture and Oenology in Stellenbosch, for instance, found infected roots in about half of the newly planted nursery vines that they tested.

Too

little is known about the disease, its causes and how it is transmitted, however, to knowwhom to blame. "Doing research in this

field is like walking a tightrope," comments Crous, "because so much money is involved. The nurseries are adamant that the problem doesn't lie with them; the farmers are equally adamant. We still have lots to find out, but a process of screening vines, young and old, and certifying them free of infection has now become very important."

Farmers

complain that the quality of cuttings is not what it was now that the industry is growing and nurseries are under pressure to meet increasing demand for new vines. Nurseries counter by pointing out that black goo is stress-induced - it can be caused by any combination of conditions, like careless planting in holes that are too small or too shallow, lack of water or poor drainage, nutrition deficiency, compacted or poorly prepared soil.

It's

not certain what causes black goo to spread. It could be airborne, infecting vine wounds during pruning, or soilborne, attacking plants through the roots. It could be dispersed by rain and sprinklers or carried by insects. However it is spread, there is no cure.

"A

healthy plant has about 20 shoots," Crous explains. "Once a plant becomes sick it produces fewer and fewer shoots, which means fewer and fewer bunches of grapes - that is why some people call it 'slow dieback disease'. The length of time it takes for the plant to die depends on how early it becomes infected and how badly stressed it gets.

"That's

why it's so difficult to estimate the damage. You have to calculate the cost of the plants that die and also the cost of reduced production while the plants slowly sicken. The figure could run to millions of rands."

Crous

envisages a certification scheme that would, within a year or so, enable nurseries to give young vines a clean bill of health: "We scientists have done the research and provided the knowledge. Now entrepreneurs need to apply DNA screening of vines commercially"

The scientific announcement by M Groenewald, DU Bellstedt and PW Crous was published in the South African Journal of Science.