

The great mushroom debate

Can a pile of 300-year-old fungus be called a national monument, asks Joan Hettema

Beneath the soil of Cape Town's historic Company Gardens opposite Parliament is a mushroom-forming fungus that came to this country with the first white settlers more than 300 years ago.

Scientific research has linked the honey mushrooms that pop up each year around May to the cause of a disease that strikes down oaks and other woody plants in the gardens. Gardeners, who have dubbed the fungus "Van Riebeeck's curse", would like to see it eradicated.

But some scientists are calling for the fungus to be given the status of a national monument, considering it has been there so long.

"There is no question the fungus was introduced into Cape Town more than 300 years ago by early Dutch settlers," says Professor Mike Wingfield, director of the University of Pretoria's Forestry and Agricultural Biotechnology Institute (Fabi). "I know of no other fungus national monument. Why shouldn't South Africa be a first?"

Proof of the origins of the fungus emerged when the Cape Town City Council called in a team of tree doctors to find out what was killing the historic oak trees that line Government Avenue, alongside the gardens.

After close examination of the trees and their bark, the culprit emerged – *Armillaria mellea*, a fungus well known to cause root rot on trees in the northern hemisphere. Genetic fingerprinting showed the Cape Town fungus is closely related to strains found in Europe.

The team of scientists from Fabi that has been studying the fungus for the past five years feel strongly that it should be a national monument

They say the only way to get rid of it would be to remove all the soil from the Company Gardens and dump it in the sea. Every other item at the historic site would have to be removed and sterilised.

"Rather than taking such a drastic step – one that is not likely to occur – why not make the best of this unique opportunity?" asks Wingfield. "Making it a monument will not only help people recall our past, but could also warn them about the dangers of moving plants around the world."

The *Guinness Book of Records* lists species of *Armillaria* as the biggest and oldest living organisms on earth. The scientists say the Cape Town clone of *Armillaria mellea* must have been a stowaway on the ships of the Dutch East India Company that brought the first settlers to the Cape in 1652.

"We know they brought out fruit trees, particularly Citrus plants," explains Martin Coetzee, a PhD student who has done most of the genetic analysis of the fungus. "We assume these were brought in pots, and it will have been a small bit of infected root in one of those pots that started the rot."

The settlers could never have guessed that bringing trees to South Africa, which were planted in the Company Gardens to feed Dutch sailors travelling to the East, would leave such a legacy.

"We believe the fungus began to grow from a single point – it is a clone much like a variety of strawberry. Given that the size of the infection is about 170m in radius, we can tell that the fungus is between 108 and 575 years old," says Coetzee.

"Using a growth rate of 0,5m a year, we estimate that the clone is 375 years old, which fits almost precisely with the arrival of the early Cape Dutch settlers."

Scientist Martin Coetzee (left) with a bumper crop of *Armillaria mellea* mushrooms found in Cape Town's Company Gardens. Photo: Mike Wingfield





The scientists used DNA sequencing and other molecular fingerprinting tools on samples of the fungus. They discovered an underground network of lace-like mycelium – the web of life that supports the fungus – that now extends throughout the soil of the gardens.

Looking back to the start of the gardens, the fungus would have begun to grow and it would have gradually killed off woody plants. These would have been replaced, and the successors too would have become infected and would have gradually died off.

After the fruit and vegetable gardens were abandoned and the area was assigned as recreational space, trees such as oaks were planted. These have also been killed by the fungus over time.

Wingfield says it is important to remember the fungus does not kill trees rapidly. It needs to generate “energy” through growing on dead wood. With sufficient energy, it will then kill trees.

This has been a gradual process and trees have been dying continuously in the garden for the last 300 years or so. They are continuing to die – and it is not only the trees but other woody plants such as hydrangeas that are dying.

Every year or two, an outcrop of mushrooms appears at the base of dying trees and shrubs. They appear in clumps when the first rains begin to fall, but so far have not been detected elsewhere in the city.

The scientists say Cape Town gardeners need not fear that the fungus will creep up on them after all these years. “The concrete jungle surrounding the gardens has halted its spread. It certainly is not going to leave,” says Wingfield. ■

Left: Armillaria mellea mushrooms at the base of a diseased oak tree in the Company Gardens in Cape Town. The shape and form of these is typical of that of the fungus in Europe.

Below: Armillaria mellea mushrooms at the base of a diseased hydrangea bush in the Company Gardens. The fungus appears to be able to destroy any woody plant in the gardens. Photos: Mike Wingfield



