

# NatureWatch

## Brisbane Ranges Dieback Monitoring Project



### Volunteer pre-reading materials

Prepared by Ian Smith  
(work placement student)

This NatureWatch project commemorates Dr Gretna Weste, a plant pathologist who carried out more than 30 years of work looking at the impacts and lifecycle of *Phytophthora cinnamomi* in the Brisbane Ranges and other national parks in Victoria.

Using Dr Weste's original monitoring sites and monitoring methods NatureWatch volunteers will continue to gain further information on *Phytophthora cinnamomi*.

Below is information on *Phytophthora cinnamomi*. Overleaf is information on Gretna's life and how she came to be involved in looking at *Phytophthora cinnamomi* as well as her work in the Brisbane Ranges National Park.

## What are *Phytophthora cinnamomi* and Dieback?

Dieback is often caused by *Phytophthora cinnamomi* (fy-toff-thor-a sin-ah-mo-my), which is an introduced plant pathogen (disease) that infects the roots of plants, dissolving and feeding off them until it eventually kills the plant. Although *Phytophthora cinnamomi* was previously commonly known as Cinnamon Fungus, it is actually a water mould and not a fungi.



Once  
healthy  
Plants are  
infected...

...the plants soon  
show signs of  
stress...



...before dying  
completely.



Photo courtesy Anne Miehs

## NatureWatch – *Phytophthora cinnamomi*

### **Why is it a problem?**

*Phytophthora cinnamomi* spreads easily and can kill 50-75% of native Australian plants (Weste 2003). When plants are killed by this disease the structure of the natural environment is disrupted, particularly when one of the susceptible plants is the dominant species, as is the case with Grass Trees. This results not only in a loss of native plants in the area but also a loss of habitat and food for animal life, in particular small mammals.

### **How does it spread?**

*Phytophthora cinnamomi* spreads in two ways. The first method is the release of its swimming spores. These spores travel through groundwater, downhill until they find suitable hosts, generally the roots of plants where they can then survive and reproduce further.

The second way in which *Phytophthora cinnamomi* spreads is through human activities. When soil from an infected area is relocated to a non-infected area, it risks starting a new outbreak. Activities such as bushwalking, four-wheel driving, movement of camping gear, and construction can potentially move infected soil between different areas. This can risk spreading infection. As many paths and roads are built along the tops of hills, the spread of the pathogen is exacerbated as it can be moved to a new location and then flow down both sides of the hill (Peters 2007; DCNR 1994).

### **How can it be prevented?**

Although *Phytophthora cinnamomi* cannot be removed from an area once it has been introduced, it can be contained through several methods:

- **Cleaning of equipment and boots:** The most effective method of preventing its spread is by cleaning all equipment of soil when entering a non-contaminated area.
- **Wash stations:** Wash stations can be installed on paths entering and leaving infected areas. These stations normally involve a cleaning device such as a boot scrubber and a disinfectant mix of methylated spirits and water, which destroys the spores of *Phytophthora cinnamomi*.
- **Potassium phosphate:** (a chemical spray) can be used to make plants more resilient to *Phytophthora cinnamomi* (Box 2007).

## References

Department of Conservation and Natural Resources, 1994, *Phytophthora root rot... the plant killer*, brochure

Desmond Peters, 2007, Environmental planner, Parks Victoria

Peter Box, 2007, Parks Victoria

Weste, G, 2003 “The dieback cycle in Victorian forests: a 30-year study of changes caused by *Phytophthora cinnamomi* in Victorian open forests, woodlands and heathlands”, *Australasian Plant Pathology*, vol. 32, 2, pp. 247-256

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## Gretna Weste

Gretna Weste (1917-2006) was a reader, lecturer and researcher at the University of Melbourne. Also a field naturalist and plant pathologist she carried out much research into the plant pathogen *Phytophthora cinnamomi*.

### Education

Gretna graduated from the University of Melbourne with a Bachelor of Science, majoring in botany in 1938, winning a Howitt Natural History scholarship among other shared awards. Gretna undertook research for a Master of Science on the structure of Australian hardwoods in 1939, gaining first class honours as well as an exhibition in 1939 (Allen 2000).



Gretna Parkin



Gretna Parkin at the Forests Commission of Victoria.

### Early Career

Following completion of her MSc, Gretna was employed as a Research Officer in the Forests Commission of Victoria. In 1939, bushfires opened up opportunities for Gretna, as large amounts of usable timber from trees that were killed, but not incinerated, in the bushfires were at risk of fungal disease.

Gretna isolated, identified and tested the fungi. Two years later Gretna discovered that her position was classified as “temporary typist” and that she had already reached the maximum pay. With her high level of scientific skill, inappropriate classification, low pay and marriage (married women could not be employed in the public service at the time), Gretna resigned from the Forests Commission.

The restrictions placed on women working during that time did not apply to universities. The University of Melbourne’s professor of botany arranged for a research grant, which allowed Gretna to continue her work on fungal decay in Broken Hill mining timber in 1942.

She spent the next 19 years raising three children and worked for seven years teaching biology at a secondary school.

## NatureWatch - Gretna Weste

### Later Career

In 1961 Gretna was invited to return to the botany school and accepted an appointment as Senior Demonstrator for Plant Pathology classes. It was expected she would undertake research for a PhD degree, which she happily accepted. Gretna spent the following years working on her doctoral thesis, demonstrating and lecturing. She was appointed to a lectureship in 1967. In 1969 Gretna Weste was awarded a PhD for her thesis about a wheat fungal pathogen. Also in the late 1960s Gretna began work on the “Jarrah Dieback” in Victoria. This turned out to be her first work on *Phytophthora cinnamomi*.

Much of Gretna’s work on *Phytophthora cinnamomi* was conducted in national parks and perhaps for this reason, as well as her interest in educating the public, she joined the Victorian National Parks Association in 1972, where she led bushwalks and was awarded an honorary lifetime membership in 2003.

In 1974 she was appointed senior lecturer, and then reader in 1980 before retiring in 1982. Her work on *Phytophthora cinnamomi* continued beyond this period, with several papers being published, including one in 2002. She wrote over 120 research papers and articles, as well as chapters in 10 books, which contributed significantly to the study of plant diseases. As well as conducting her own work, Gretna mentored many PhD students, up until 1997. Some of these students have gone on to continue researching *Phytophthora cinnamomi*. One such student is now Associate Professor David Cahill from Deakin University’s School of Life and Environmental Sciences, Geelong. David has been heavily involved in the development of this NatureWatch project.

Dr Gretna Weste sadly passed away on August 30, 2006, leaving a legacy of vast amounts of knowledge and research on the pathogen as well as of other plant diseases and fungi physiology.



Dr Gretna Weste addressing a bushwalking group.

### References

Allen, A, 2000 “Preservation of native forests: the contribution of an Australian woman scientist”, The Royal Australian Historical Society, vol. 86, part 1, pp. 176-196.

Gillbank, 2006 “Dr Gretna Margaret Weste AM (5 September 1917 - 30 August 2006)”, The Victorian Naturalist, vol. 124, no.3, pp. 183-187.

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## NatureWatch

# Gretna Weste's work and legacy in the Brisbane Ranges

The first evidence of *Phytophthora cinnamomi* in Victoria was seen in the Brisbane Ranges in 1969, the same year Gretna completed her Doctorate.

Following the discovery of this disease in Victoria, Gretna set up permanent sites to look at the impacts of the pathogen. At this stage Gretna was highly skilled and eager to take on the task. She also set up plots in other areas such as the Grampians-Gariwerd and Wilson's Promontory. These plots would help compare sites infected and uninfected by *Phytophthora cinnamomi*.

In total thirteen sites across Victoria had "quadrats" set up. The size of each quadrat varies from 6m<sup>2</sup> to 14m<sup>2</sup> depending on plant diversity. The Brisbane Ranges quadrats were assessed by Gretna every two years from 1970-1986 and 1992-1998. Each assessment of a quadrat involved measuring the species composition, percentage cover and the health of each plant, including Grass Trees. Her assessments were repeated in three infected areas and three disease-free areas.

### **NatureWatch Volunteers continue the legacy**

Towards the end of Gretna's research she discovered that there was some regeneration of plants occurring in sites previously infected by *Phytophthora cinnamomi*. It is currently not clear how long this regeneration will continue. The data you collect will contribute to answering this question posed by Dr Gretna Weste in one of her final papers.



Locating Gretna Weste's small wooden stakes, which had been burnt by fire, that marked the corners of the original quadrats.