

FLORA

DECLINE IN WA PEPPERMINTS

Cherie Kemp



Recently deceased WA Peppermints in Busselton. (Photo: C. Kemp)

For the past six years, quite a few Land For Wildlifers and other property owners in the south-west region between Bunbury and Margaret River have been reporting a decline in WA Peppermint trees (*Agonis flexuosa*). Since these are primary habitat for Western Ringtail Possums (*Pseudocheirus occidentalis*), this is of major concern, so in 2005 a group of DEC staff (including the LFWO) undertook a field investigation.

The findings then were that at most sites a chlorosis (yellowing) of the leaves occurred, and some trees were showing signs of recovery but some were not. It was hypothesised that insects and potential run off from farms and vineyards were possibly involved, although not likely to be cause of the chlorosis. A contributing factor was likely to be poor nutrients in the soil. Samples were taken, locations were recorded and a database was set up for ongoing monitoring to occur. Alas, the monitoring is showing that the problem is getting worse, not better.

the cause of the chlorosis was more likely to be a form of fungal attack, rather than just a nutrient deficiency. He suggested that nutrient plugs be used to give the trees some additional nutrients. There is another plug that is being used for Marri canker. Drill a hole in your tree trunk and just pop the plug in.

The Busselton Shire and the Geographe Catchment Group decided to purchase some equipment to assist landholders to treat and monitor their Peppermint trees in decline. There have been areas treated and monitored over the past few years throughout Busselton, although the town, many gardens, the Tuart forest and outlying areas are being affected and the spread is becoming very obvious. There are signs of decline along the new Forrest Highway from Perth all the way to Busselton.

In Busselton town, it has also been recognised that an overstocking

Recently, workshops were held in the region, at which Prof. Giles Hardy of Murdoch University asked local landholders to bring in samples of their dying and poor health peppermint trees, because he believed that

of Western Ringtail Possums is contributing to poor health in peppermint trees, as many trees are dying off or being intentionally harshly pruned or cleared. This leaves less food source for the possums and so they are overgrazing the remaining trees. These signs are very obvious as leaves look as though they have been cut in half. With these trees, it is best to give them some rest time from the possums by placing collars around the base of the trees so that certain trees can rest while others are grazed.

It will be an issue into the future that is likely to continue, unless we in the south-west attempt to plant more peppermint trees! The Shire of Busselton is currently encouraging this, with the assistance of the DEC Busselton Nature Conservation staff, Geographe Catchment Group, and Geographe Catchment Nursery.

Please contact me (see p. 2) if you have any areas of peppermint trees that are in decline either on your property, or in your local area. I do have a list of management recommendations for maintaining their health that can be sent on request.

A healthy peppermint woodland. (Photo: C. Kemp)



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MARRI DECLINE: POSSIBLE CAUSES AND IMPLICATIONS

Cielito Marbus

The majority of phone calls we receive at the WA Centre of Excellence for Climate Change, Woodland and Forest Health are from concerned community members telling us about the sorry state of Marri (*Corymbia calophylla*) trees on their block, and it's something that we have noticed for quite some time as well.

We have fair reason to be concerned. Marri is a keystone species. It has a wide geographic range and is associated with *Eucalyptus wandoo* (Wandoo), *E. marginata* (Jarrah), *E. diversicolor* (Karri) and *E. gomphocephala* (Tuart) woodlands and forests. It is a host to numerous invertebrate and vertebrate fauna (including the iconic black cockatoo species) and plays numerous roles towards ecosystem health and services. Therefore, it is critical we work towards understanding and managing the processes involved in Marri decline.

As well as being stressed by environmental factors such as



Marri stem canker caused by the fungal pathogen *Quambalaria coyrecup*. (Photo: G. Hardy)

drought and frost, Marri are suffering severe decline and death from a stem canker disease. This canker syndrome has been known since 1939, and by the 1970s it was considered widespread and since the 1990s its incidence has been high across the south-west. In 1996, Dr Trudy Paap showed that this disease was caused by the fungal pathogen *Quambalaria coyrecup*, which is considered native to Western Australia*. The pathogen also caused significant and widespread cankers in the iconic Red-flowering Gum (*Corymbia ficifolia*). So the question is – ‘why is the incidence and severity of cankers increasing?’ Also, during the course of her field studies, she observed a leaf and shoot blight to be causing dieback of young shoots and stems, which was identified as *Q. pitereka*. This leaf and shoot pathogen has been known since the 1950s to cause a disease referred to as Quambalaria Shoot Blight (QSB) in eucalypt plantations of New South Wales and Queensland and is accepted as being endemic to that region, whilst it has been introduced to WA. So unlike the canker pathogen, Marri has not evolved with QSB.

I decided to conduct my Honours studies on *Q. pitereka* to determine: (a) to what extent the pathogen is present over the Marri growth range; (b) how severe are the symptoms and where are the worst symptoms; (c) what are the symptoms; and (d) does infection lead to reductions in the number of flowers and fruit available for beekeeping activities and native bird food sources?

The leaf and flower bud disease has become widespread over the last five years, although it was first sighted in WA in the early 1990s.



Quambalaria Shoot Blight (QSB) caused by *Quambalaria pitereka* on new Marri growth. (Photo: C. Marbus)



QSB on Marri buds make them look as though they have been dipped in icing sugar. (Photo: G. Hardy)

I suspect that the disease is very much dependent on a particular set of weather conditions, requiring temperatures in the mid-20s together with an extended period of high humidity for the pathogen to develop infection on immature foliage or flower buds. This is a research area that needs some immediate attention before we can make any conclusions. While I observed the disease to be present across the Marri growth range, the symptoms were mostly mild. The exceptions to this were Margaret River and Albany, where I observed a number of severe cases.

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Marri decline

What we do know is that in WA the disease affects both *C. calophylla* and *C. ficifolia* and causes damage not only on leaves but also the flowering structures at all stages of development, the flower buds, flowers and fruit. Even the smallest infection on a flower bud is capable of reducing or extinguishing its ability to develop into a fruit and set seed. QSB of flower buds causes deformities and unsuccessful operculum opening, with extreme cases leading to early termination and drop of flower buds and flowers. *Q. pitereka* is capable of severely stunting tree growth. It causes distortion and twisting of young shoots, which repeatedly destroys growing tips resulting in bushier crowns and reduced apical dominance. In severe cases infection can also result in death of the tree.

It is likely that insects such as the honey bee or meat ants can vector the pathogen. Insects have also been found inside deformed fruit and it is not clear whether the fungus or insect caused the deformation, or both. We are still unsure whether the pathogen can infect directly or whether it requires wounding from insects or other means. More work is required to determine how the fungus is spread, how it infects plant tissues, how severe its impact is, what environmental conditions are required for optimum disease symptoms and spread, how much variation occurs in the pathogen itself and, importantly, are there any resistant Marri individuals out there?

Interruption of the Marri flowering cycle by quambalaria infection has the potential to affect fecundity, native bird food sources, and industry. It is interesting that the pathogen is able to infect flowers, fruit and seed, particularly as *Q. pitereka* is not known to cause disease in the flowering structures of its eastern Australian host tree species.

Many people are aware of the contribution that Marri trees make



Deformation of Marri fruit is linked to infection by *Quambalaria* species. (Photo: C. Marbus)

to our native ecosystems. Native fauna use the hollows of old growth trees for nesting and the fruit and seeds are important food sources for many native birds, particularly black cockatoos. Interestingly, when Marri fruit is unavailable the birds have a tendency to feed on and cause damage to orchard fruits such as apples and pears, and incidences of high damage are connected to areas where Marri is declining or not flowering. Baudin's Cockatoo has been listed as a declared pest in WA, and management is difficult because the bird is also on the endangered species list. The lack of Marri trees or their fruit has been accepted as the main reason for fruit damage by birds, and thus it would appear that the interests of local orchardists, not just conservationists,



A severe case of QSB infection causing termination of an entire flowering branch from a Marri tree in Margaret River. (Photo: C. Marbus)

would be supported by preserving local stands of Marri and reducing the threats to Marri.

Marri have historically been a reliable source of pollen, flowering prolifically and regularly, and contributing significantly to the state's honey production. Australian honey has a 'clean and green' image and a global reputation for high quality and is able to command a significantly higher price than honey from other countries. Apart from honey products, there are estimated billions in un-tapped value in beekeeping, particularly in pollination services and in medical products.

In summary, Marri is an iconic Western Australian tree species, and based on our observations and reports from the wider community there is now a real urgency to establish a concerted effort and understanding of the Marri decline syndrome. We do have a good understanding of what is causing cankers and leaf and shoot blights in Marri. However, we do need to improve our understanding of the biology, genetics, and pathology of *Quambalaria* species associated with Marri decline in order to develop effective control and management tools that can be utilised by forest managers, and all property owners. To this end, the State Centre of Excellence on Climate Change, Woodland and Forest Health is in the process of raising funds and in-kind support to allow it to approach the Commonwealth Government for matching funds to address this urgent problem. You can keep up to date with our progress on our Forest Blog blogonforesthealth.com or via our website www.foresthealth.com.au.

For further information on Marri decline, contact Cielito Marbus at C.Marbus@murdoch.edu.au or 9360 7414.

[* See WW 6/3, July 2002]