RESTORING THE CANOPY HEALTH OF DECLINING NATIVE TREES

Paul A. Barber

The rapid decline in health of native trees across the south-west of WA over recent years is causing great concern. Over the past two years we have had many enquiries from landholders about the cause(s) of decline of their trees, and whether there is anything they can do to alleviate this decline. The loss of old, significant trees can be devastating for the landholder, not to mention for the associated flora and fauna reliant upon these iconic and dominant canopy species.

Most of our enquiries concern marri, tuart, jarrah, WA peppermint, flooded gum and banksia. If people see jarrah or banksia declining or dying they often assume *Phytophthora* to be the cause, or if they notice marri declining, they assume it is the marri canker. It is always very dangerous to assume though, as mis-diagnosis is very common indeed and we have observed many examples where sudden death of jarrah or banksia has not been due to *Phytophthora*. The role of the forest pathologist is to consider all the factors that may predispose, incite or contribute to a decline in health of a specimen, and there can be many factors to consider. A change in climate or increasing age can predispose trees to decline, factors such as pathogens, pests, drought or a frost event may incite the decline, and over time, other contributing factors like canker fungi and pests can increase the severity of this decline to a stage where the tree can no longer naturally recover and will eventually die.

The decline in health of trees may not be noticeable by landholders until they have been impacted by these contributing factors, as the landholder sees the tree every day and may not be sensitive to these subtle changes. The actual predisposing or inciting factors can therefore be easily missed or forgotten. This is often the case when there has been a trigger event such as a hail-storm, frost or construction damage. The prevention of the initial inciting factor is usually the best form of management, but if this is not possible, then there are other options that can be tried.

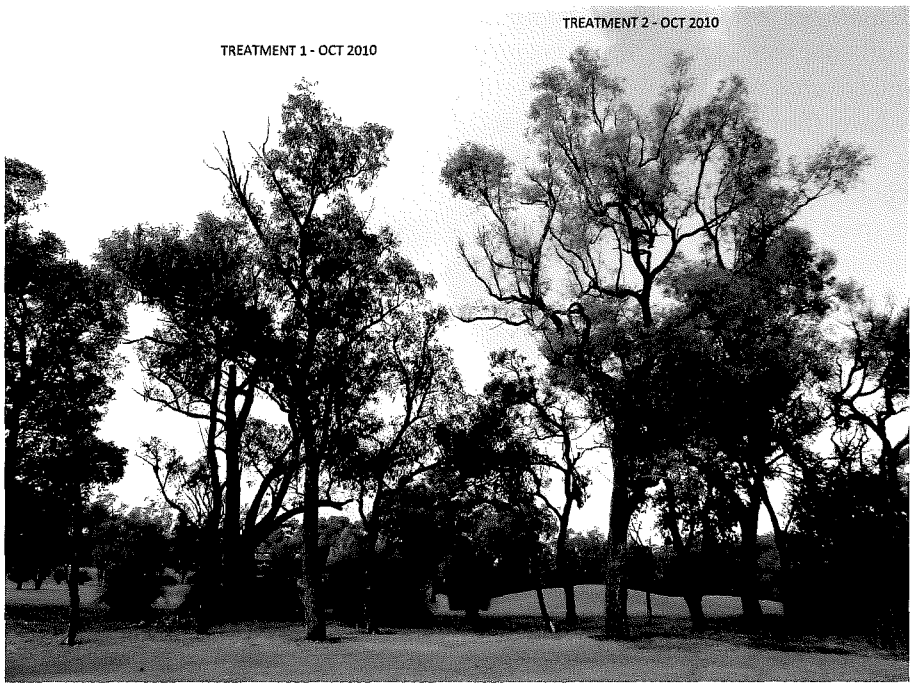

Figure 1: threatment of declining jarrah trees with two different treatments, the tree on the left responding by an improvement in leaf colour and density six months following treatment, when compared to the tree on the right that did not respond to treatment
Photo: Paul Barber

Our recent surveys of many declining trees throughout the Perth metropolitan region has revealed a diverse number of *Phytophthora* species, some of these new to science and yet to be described. We know very little about their potential to cause disease, their biology, or how to manage them. We do suspect however, based on the environment and hosts to which they are associated, and the collection of these species within some nurseries, that the movement of infected seedlings into sites may be one mode of introduction. We also know that trees that have recently died as a result of infection by pathogens such as *Phytophthora* or *Armillaria* (Australian Honey Fungus) have been removed and mulched, and this mulch has been spread throughout the environment. If green mulch is not composted properly, then it can become a source of disease spread.

The management of the health of your native trees on your block therefore begins with avoiding the introduction of green mulch and infected nursery material. This can be achieved by using mulch from your own site, setting up your own composting facility for your green waste, and if introducing soil media or mulch, ensuring it has been properly composted to Australian Standards. To avoid the introduction of new plants you can collect seed from plants on your block and propagate, or strike cuttings. Alternatively, the use of tube-stock minimises the amount of soil media that may be diseased, reduces the chances of purchasing pot-bound seedlings,

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Canopy health of native trees

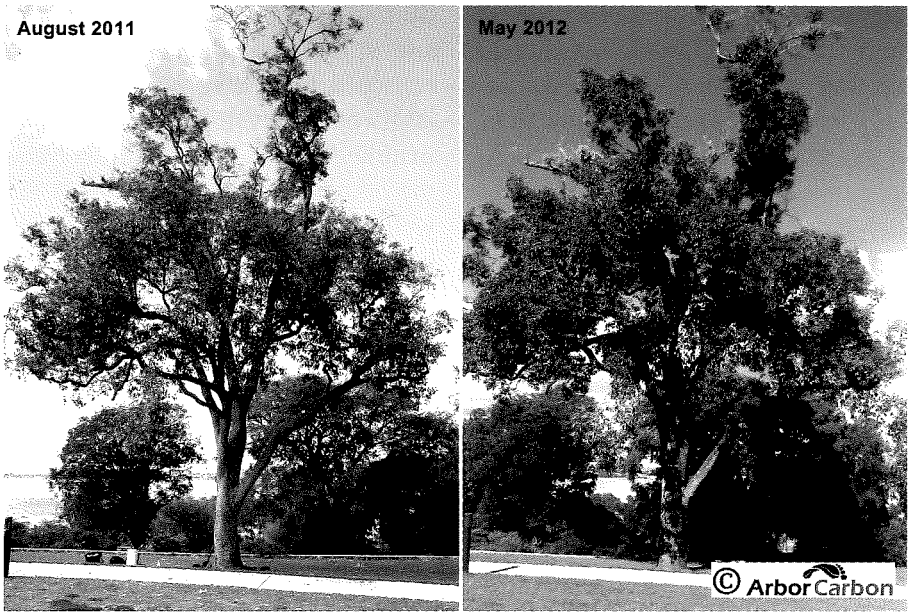

Figure 2: treatment of a declining marri tree showing an improvement in foliage colour and density after six months
Photo: Paul Barber

and is more cost-effective.

When considering the health of more mature trees, the ongoing maintenance is important. Pruning should only be carried out where required to improve the form (that is, formative pruning), or to remove limbs that pose an unnecessary risk to life or property. Unfortunately many landholders see big trees near houses or overhanging thoroughfares as an unacceptable risk, and many species are unfairly labeled as 'widowmakers'. The reality is that the chances of being seriously injured or killed by a falling limb or tree in Australia is probably no more than 1 in 10 million, much lower than other risks that we accept every day such as driving a car or crossing the road. The unnecessary pruning of trees is wounding and such wounding can greatly increase the chances of infection by pathogens or pests, leading to more pruning, expense, risk from decayed limbs, and eventual death of your trees. An expert opinion on the risk of your trees may save your trees and many thousands of dollars in future pruning and removals. Pruning of trees should also only be carried out by qualified contractors working to the Australian Standard.

There is also a misconception that it is normal for Australian native trees to have branch dieback, deadwood throughout the crown, or look a bit scrappy. People are often told by the tree loppers that their trees will benefit from a haircut. This may sound a bit silly, however, this is a very common form of management of native trees throughout the south-west of WA. Pruning of trees can induce stress, and result in the tree allocating valuable resources to respond to the pruning that could otherwise be used for defense against pests and diseases. There are alternatives, and these alternatives may not only be of far greater benefit to tree health, but much better for the environment and much more cost-effective.

Over recent years we have encountered many different disorders on native trees in a range of environments. Diagnosis in many cases has been challenging, and the application of effective treatments even more so. However, we have had many successes and we remain optimistic when it comes to the response of trees to treatment. Trees are incredibly resilient and adaptive. Lets take the decline of jarrah, for example. We know that if trees like jarrah are affected by *Phytophthora cinnamomi* they may respond well to treatment with phosphite. But what if trees are declining but the cause is not *P. cinnamomi*? As observed in figure 1, jarrah trees suffering a decline in health from factors other than *P. cinnamomi* were treated with two different treatments and this resulted in two very different outcomes.

Marri canker caused by the fungus *Quambalaria coyrecup* has become an epidemic throughout the south-west of WA. At present, we do not have a treatment that we can apply with confidence that will control the canker. We have, however, treated marri trees suffering from canker and other disorders and observed good recoveries in crown health (see figure 2). Tuart trees can also respond well to some treatments, as can flooded gum and WA peppermint, but the success of the treatments is dependent on the cause of the decline. Isn't it better to try to save your tree rather than slowly watch it die and then eventually remove it?

Treatments can take very different forms, from slow-release systemic implants that are absorbed via the tree's vascular system, to stem injections, foliar sprays, or soil amendments, drenches, granules or tablets. The method of application is determined by a number of factors, including the size of the tree, accessibility to the root system, site characteristics, product composition and availability, and ultimately, the factor(s) causing the decline in health.

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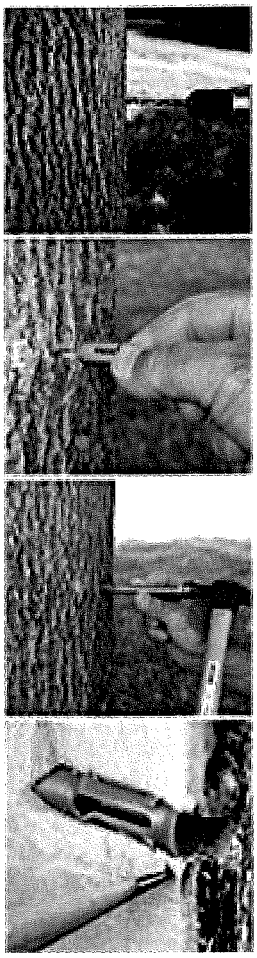
Canopy health of native trees



Method of application and depth of insertion of the systemic tree implants

Photo: Paul Barber

During the last year we have received many enquiries about systemic nutrient implants and enquiries to *LFW* have initiated the publication of this article.

The systemic nutrient implants were developed in the USA more than 40 years ago. Since that time we have conducted many trials to determine their efficacy for a range of tree health disorders. They are applied around the circumference of the tree at 10 to 15 cm spacings into the sapwood where the gelatin capsule containing the active ingredients is slowly absorbed into the vascular system of the tree. Figure 3 shows the implants inserted into the sapwood just beneath the cambium. The ingredients then stimulate the foliage within the crown and over time, these nutrients are hopefully translocated back down into the root system. We have used these implants on native and non-native trees. They are not designed to eradicate or kill pathogens or pests, but work on the principle of improving the vigour of trees and stimulating their defence and resistance to these agents. Knowledge is still being developed on the correct treatment for various disorders and the optimal time for application. As well, new products are continually being developed. As trees are living organisms and we really know very little about them, in particular their below-ground structure and function, there are no guarantees that the treatments will work. They are not a magic bullet! However, the chances of their success can be greatly enhanced through accurate diagnosis and correct application.

Dr Paul Barber is the Director of ArborCarbon Pty Ltd, an environmental and arboricultural consulting company based in Perth, and is an Adjunct Senior Lecturer at Murdoch University's Centre for Climate Change, Woodland and Forest Health. (A PDF of this article can be obtained from the author by email at p.barber@arborcarbon.com.au)

GARDENING FOR WILDLIFE WORKSHOP

Land for Wildlife's two-part/all day 'Gardening for Wildlife' workshop with Sabrina Hahn at Tortoiseshell Farm in Bridgetown in November was a great success.

The morning session with Sabrina and *LFW* Officers Sheila Howat and Heather Adamson explored how to turn your garden into a habitat haven for small birds, mammals, frogs and insects who will all work diligently to pollinate your flowers and enrich your soil. The pollinating native bees were seen during the bush walk!

The afternoon session expanded the theme into reaping the benefits of biodiversity to create a sustainable kitchen garden with the aid of native pollinators and pest controllers.

If you missed out this time (it was booked out very soon after the date was announced), Sabrina will be back at Tortoiseshell Farm in November. Details to be advised, or you can register preliminary interest with me at any time.

Sheila Howat