



## Pests and diseases fact sheet

### 1) Introduction

As with all living organisms, pests and diseases can occur on veteran trees. The effect on the tree can differ substantially, ranging from a loss of aesthetic interest to a rapid death. Many factors influence the occurrence, the severity and the impact of pests and diseases. This fact sheet does not aim at listing all those factors, but wants to draw the outlines of how pests and diseases arise and how to evaluate and potentially manage them.

### 2) Trees are part of an ecosystem

In order to survive, all living organisms depend on abiotic factors (air, soil, water, light, heat, ...) and in most cases also on other living organisms. An easy way of representing such relationships is a so called food chain, e.g. *plant* > *aphid* > *ant* > *woodpecker* > *hawk*. In reality, the relationships are not as linear, but multidirectional, leading to a food web rather a food chain. Also the nature of the relationship between organisms can differ. An ecosystem is the whole of abiotic and biotic factors interacting. It is important to acknowledge that each organism has a niche, a role to play in that ecosystem. Also organisms that we consider pests and diseases. Often their role is to act as 'process accelerators', killing declining or dysfunctional trees.

Considering the way organisms gain their main food supply, we can distinguish between the following categories:

- **Saprophytes** live off dead or dysfunctional organic matter. An example in tree ecosystems are the micro-organisms that decompose leaf litter.
- **Symbionts** live together with the tree to mutual benefit. Mycorrhizal fungi are examples of such symbionts and are very important for a tree's health. The VETcert videos starring Lynne Boddy explain this relationship and its importance in detail.
- **Commensals** make use of the tree without positive or negative effect for the tree itself. Examples are lichens growing on the bark or nesting birds.
- **Parasites** live off the living, functional tissues of the tree, causing disadvantage to the tree. This can be substantial or neglectable. Pests and pathogens are part of this group of organisms.

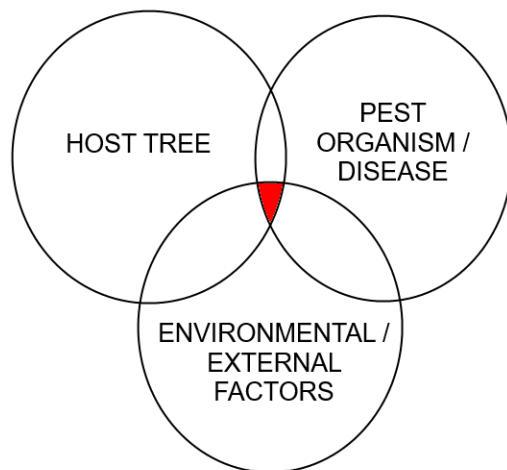
Many organisms (also red listed species) use trees as their host plant, feeding on the living parts of the tree. Strictly speaking they are parasites, but as long as they don't cause substantial problems for the tree's survival, we don't consider them a pest. In this respect, the 'damage threshold' concept is very important in pest and disease management. In commercial settings, economic thresholds are used, but in veteran tree management the long term survival and good health of the tree is what is at stake. One should take action if an organism threatens the long term survival of a veteran tree.



It is important to consider that the borders between the categories mentioned above are not rock solid. So called necrotrophic parasites kill living tissue, but continue living saprophytically after they have killed their hosts. Symbionts of course need their host to stay alive, as they need living tissue to interact with. Surprisingly the same is true for biotrophic parasites: if their host dies, the parasite dies too. Also some mycorrhizal fungi have the capacity to decompose dead organic matter, whilst others can exhibit parasitic traits when their companion tree weakens.

### 3) Triggers for pests and diseases

Pest and disease organisms are often present in ecosystems in low numbers. The mere presence of these organisms, even in the proximity of a sensitive host tree, does not necessarily cause a problem. The determining factor in an outbreak are mostly environmental or external factors, such as drought, heat, competition, physical damage, nutrient imbalance or any other form of stress. These can be acting alone or in combination. Also biotic stress factors can impact on the resilience of veteran trees, e.g. defoliating insects or foliar diseases (which in turn are favoured by suitable environmental conditions and abiotic stress).



The key message is not to look at pests and diseases as the actions of a specific pathogen acting in splendid isolation, but as a complex interplay of biotic and abiotic stress factors, impacting on the resilience of veteran trees. Rather than only trying to exterminate the pest and disease organisms, veteran tree managers might have a lot more impact on the environmental stress factors.

### 4) Alien pests and diseases

Much of the 'problematic' pests and diseases that threaten our veteran trees, are alien pests and diseases: organisms that are not part of the natural ecosystem of our tree species. They often disrupt the balance in the ecosystem and that's why they are so successful: the checks and balances in natural ecosystem cannot function, as the ecosystem is not prepared to deal with them.

An example of such an alien pest that poses a problem with our veteran trees is oak mildew. Research shows that it originates from a mildew on mango and coffee plants: it is a subtropical plant pathogen species that switched hosts.

An interesting field guide on alien invasive species (not all tree related) can be found at:  
[https://www.researchgate.net/publication/336013492\\_A\\_field\\_guide\\_to\\_invasive\\_alien\\_species\\_in\\_European\\_forests](https://www.researchgate.net/publication/336013492_A_field_guide_to_invasive_alien_species_in_European_forests)

## **5) Managing pests and diseases**

The main focus when managing pests and diseases is to aim for the primary cause of the problem. Very often this is not the pure presence of the pathogen organism (unless for alien pests and diseases), but the environmental factors (drought, soil degradation, climate change, root damage, ...)

Not all of those environmental factors can be managed by a local veteran tree manager (e.g. climate change). In that case, management should be aimed at supporting veteran tree health and resilience. The more resilient a tree is, the better it can cope with pests and diseases.

## **6) Resilience in ecosystems**

A natural ecosystem has a large biodiversity and a broad genetic variety. The complexity of such an ecosystem leads to great robustness and resilience. In many cases, pests and diseases only lead to temporary imbalance, before the ecosystem restores balance. Alien pest and disease species can lead to greater disruption, but the ecosystem's greatest asset to tackle it is its complexity.

An impoverished ecosystem (e.g. much urban ecosystems) generally have low diversity and a small genetic base. On top of that, there are many abiotic stress factors, mainly associated to soil quality (soil compaction, disruption of natural cycling, nitrogen overload, ...). In such ecosystems an imbalance caused by pests and disease can have a major impact, especially when looking at alien pests and disease species.