RESEARCH LABORATORY TECHNICAL REPORT

BARTLETT TREE EXPERTS
SCIENTIFIC TREE CARE SINCE 1907

Honey fungus

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Identification, Biology & Management

This is a group of related fungi (*Armillaria* & *Desarmillaria* species) which attack the roots and stems of many different trees and shrubs, as well as herbaceous plants, worldwide. As well as attacking live plants, they can survive on buried dead wood for years. Plants which are stressed, of susceptible species, and/or on sites with lots of the fungus present, are most at risk. Management practices reduce the amount of fungus and risk of further spread to nearby plants. While the disease cannot be cured and poses a structural risk due to root decay, larger trees with smaller infections may survive for many years, especially if managed.

Identification

Symptoms of honey fungus root rot are varied, and early signs are often missed or attributed to environmental issues. Typically, they are found too late for action on an individual plant basis.

Plants may die after a period of increasingly ill health or show a general deterioration in crown condition indicating root or root collar problems. Other trees exhibit no outward symptoms but die rapidly in adverse weather or simply blow over due to decayed roots. A series of plant deaths near one another, often over years, is also typical.

A key symptom is a fan-like, whitish mat of fungal tissue (mycelium) found under the root and stem bark of infected trees (Fig. 1). The bark may peel and/or bleed. The fungal tissues often smell like button mushrooms. Wood rotted by honey fungus contains fans or similar white growth and is spongy, stringy, and wet.

The root collar is a key area for attack and its infection is followed by obvious symptoms and ultimately death. Root collar burial provides the fungus with a shortcut to this area, while also increasing host stress.

Figure 1: Honey fungus 'fan' found under bark.

Rhizomorphs, which resemble black bootlaces or roots, may also be present but are often hard to identify. They can be fragile or tough and elastic. The outer layer is dark, often flaky, and centre is white or cream coloured.

The mushrooms (Fig. 2) typically appear in autumn but may be found from July onwards. They typically grow in dense clumps from

infected wood (trunks, roots, stumps) which will exhibit the previously described symptoms. The mushrooms vary visually between and within species of the fungus.

Figure 2: Typical honey fungus mushrooms.

Colouration is typically golden/honey yellow to brown, although grey specimens are recorded. The cap often darkens approaching the centre. In many species the cap is covered with fine scales. The spores are white and may dust the caps. The stem typically has a ring around it just below the cap. This is thick in two of the more aggressive species (*A. mellea* and *A. ostoyae*). In *A. gallica*, an opportunistic attacker, it collapses leaving a scar. In *Desarmillaria tabescens* the ring is absent.

Biology & Management

Factors that increase tree susceptibility are the amount of infected material, host plant genetic susceptibility, stress and site suitability, root collar burial, and aggression of the honey fungus species present.

Honey fungus is managed in trees that do not pose a health and safety risk by addressing the above factors. It is widespread in nature, where it helps to 'recycle' weak plants and therefore cannot be entirely excluded or controlled. Available treatments are preventative, reducing the risk of further infections, although they may be of some benefit to infected trees.

Despite being practically impossible to achieve 100%, removal of as much infected material as possible is key. Stumps and large roots should be dug or ground out and removed, especially those infected. Uninfected woody material is a potential food source for the fungus. An 'air-spade' can be used to remove larger roots and disrupt remaining infected material. For severe infections this can be done on a repeated basis. Disruption exposes the fungus to drying and natural biocontrols such as *Trichoderma* and mycorrhizae. Defer any new planting for as long as possible following sanitation to allow this process. Stumps, historic plant deaths, and the mushrooms, can help map where infected material is likely to be and guide sanitation efforts.

Ensure all root collars are exposed. This is often most easily achieved at planting. For buried trees, root collar excavation re-exposes the area and allows assessment of the extent of infection. If carried out with an 'air-spade', any infected material in the area is also disrupted.

Reducing plant stress is the other key focus. There is a strong genetic component to honey fungus host resistance and currently we best understand this at the genus level (we are currently working with the RHS to improve knowledge in this area). However, even resistant plants can be infected if stressed enough or in the presence of very large amounts of the fungus.

General plant health care practices, such as soil management, prescription fertilisation, phosphite fertilisation, mulching, and watering, when necessary, help to reduce stress and increase resilience. Any new planting material should be selected based on a combination of its environmental tolerances for the specific site and its resistance to honey fungus in comparison to the local historic incidence of the disease.

Established in 1994, The R. A. Bartlett Tree Research Laboratory is the research wing of Bartlett Tree Experts in the UK. Scientists here develop guidelines for all of the Company's services. The Lab also houses a state-of-the-art plant diagnostic clinic and provides vital technical support to Bartlett arborists and field staff for the benefit of our clients.