

Fungi and Tree Structure.

Bob Watson, retired Head of School of Forestry and Woodland Management, National School of Forestry, talked to the Malvern Local Group meeting on 02 November 2023.

Bob introduced his talk by giving a thought-provoking view of the forest as a single living organism with surprising levels of interdependence between its trees and even forms of communication between them. He showed that even the largest trees are not deeply rooted and do not draw water from the soil by a tap root but rather by the lateral spread of their roots, often spreading further than the width of their canopies, but which often do not go deeper than about 1.8 metres. Fungi play an important role in the integrated life of the forest. Although fungi are thought of as being destructive of trees, as in the case of Dutch elm disease, many interact with trees to both organism's benefit. Fungi seen growing on dead trees may have played no part in the death of the tree, but instead merely took advantage of the dead wood. Many fungi help the trees and plants absorb water and nutrients from the soil, well beyond the reach of their roots and root hairs.

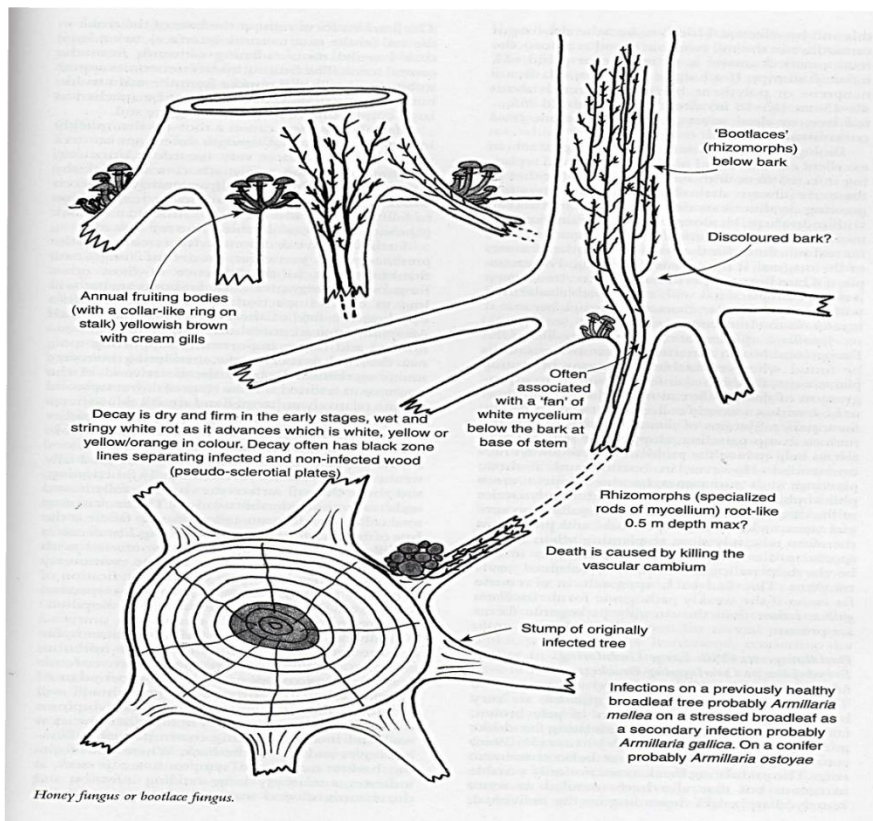


Horse Hoof fungus: living in harmony with the tree. Bob Watson



Armillaria mellea – Honey fungus. Bob Watson

However, the attention of the many gardeners in the audience was grabbed by Bob's illustration of honey fungus as one of those fungi that is the enemy of trees!



The effect of Honey Fungus. Bob Watson

When most of us think of fungus, we imagine mushrooms sprouting out of the ground. Those mushrooms are in fact the “fruit” of the fungus, while most of the fungal organism lives in the soil, interwoven with tree roots in a vast network of mycelium. Mycelia are incredibly tiny “threads” of the greater fungal organism that wrap around or bore into tree roots. Taken together, mycelium composes what’s called a “mycorrhizal highway,” which connects individual plants together to transfer water, nitrogen, carbon and other minerals. Mushrooms are the fruit of the mycorrhizal fungus and connect trees through tiny threads of mycelium. Through their mycelia, fungi can partner with the roots of trees and other plants creating a cross-kingdom web through mycorrhizal (meaning ‘fungus-root’) highways. From photosynthesis, trees and other plants produce sugars and fats, which the fungi can get from roots via their mycelia. Under certain conditions, plants may also be able to use mycorrhizal highways as a way of sharing messages with their plant neighbours. Plants infected with disease send signals to their healthy neighbours, which in response produce defensive enzymes to help protect them from infection.

In healthy forests, each tree is connected to others via this network, enabling trees to share water and nutrients. For survival, the sapling relies on nutrients and sugar from older, taller trees sent through the mycorrhizal highway. Recent research has shown that these older trees act as highly connected hubs, known as Mother Trees, nurturing seedlings by sharing their excess carbon and nitrogen through the mycorrhizal highway with their seedlings and those of similar trees, increasing the seedlings’ chances of survival. When felling trees commercially, it has been proven that allowing the Mother Trees to stand improves new tree development. Gardeners, too, can benefit by buying packets of mycorrhiza to feed plants.



Brown Cubic Rot – the shell of the tree continues to produce leaves and fruits. Bob Watson

The audience were thoroughly entertained and much impressed by Bob's wide knowledge!