

BLACK WATTLE is a tall-growing and thornless evergreen tree with deep green, bipinnate leaves, which have golden tips when young. Small glands occur along the main stem of the leaves, both at and between the junctions of the pinnae pairs (i). Trees bear sprays of creamy-yellow, globular and fragrant flowerheads (ii) in spring. These are followed by bunches of green seed pods (iii) that turn brown as they ripen, and split open to release small black seeds during summer. Black wattle was first introduced into South Africa from Australia in the mid 1800s. In the following years it was planted extensively to satisfy demands from a burgeoning forestry industry, and for production of tannin from the bark, as well as for pulp used in the production of high quality paper. It remains a valuable tree crop with large areas under commercial plantations. However, black wattle has become invasive in almost every province in South Africa. It is registered as a category 2 declared invader in South Africa, and may only be grown for commercial reasons under strict conditions. In all other situations black wattle must be controlled or eradicated.



THE PROBLEM

This is one of several Australian *Acacia* species that has become invasive in South Africa where it has invaded grasslands and forest gaps extensively, as well as river courses (iv), in all provinces except the Northern Cape. Black wattle is a very fast growing tree, which reaches reproductive maturity within a few years. The thousands of seeds produced annually by each plant have hard, water-impermeable seed coats, and seeds can accumulate in the soil at high densities where they remain viable for up to 80 years. Germination of seed is stimulated by fire, which often results in dense thickets of black wattle emerging in burned areas. Black wattle is drought resistant and it is able to fix atmospheric nitrogen and enrich poor soil. Consequently, it is able to outcompete, and eventually displace, indigenous vegetation. In addition, dense stands that grow along rivers dramatically reduce water volume and impede flows.

THE SOLUTION

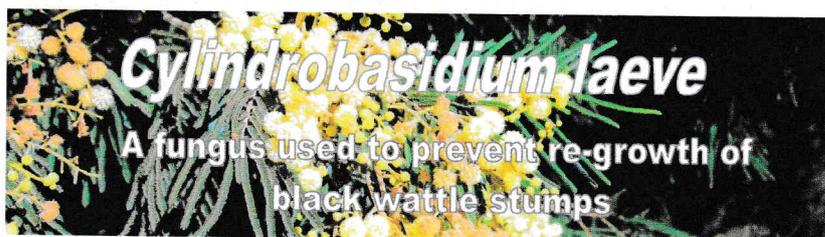
Registered herbicides are available to control black wattle but, together with mechanical control, are costly and labour intensive. The only sustainable solution is a well planned approach integrating biological control to reduce seed production, mechanical and chemical control, and rehabilitation of cleared areas. Owing to the fact that black wattle is of commercial importance, only seed-feeding insects have been released to control it. These insects are the seed-feeding weevil *Melanterius maculatus* and the flower-galling fly *Dasi-neura rubiformis*. In addition, a locally occurring wood-rot fungus *Cylindrobasidium laeve* has been developed as a cut-stump inoculant. It can be used to prevent coppicing of felled trees instead of herbicides, particularly in ecologically sensitive areas.



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The black wattle (i) stump fungus, *Cylindrobasidium laeve* (Pers.) Chamuris, is used as an inoculant on stumps of freshly felled black wattle (*Acacia meamsii*) to prevent coppice re-growth of these stumps (ii). It can also be used for the same purpose on green (*Acacia decurrens*) and golden wattle (*Acacia pycnantha*). However, it cannot be used on Australian blackwood (*Acacia melanoxylon*), nor on silver wattle (*Acacia dealbata*).

DESCRIPTION

The black wattle stump fungus does not cause disease because it is not a pathogen, but a wood-rotting saprophytic fungus, which feeds by breaking down dead wood. Although it may also invade the still-living tissue of fallen trees as a primary coloniser of the wood, it has no impact on actively growing trees. This fungus does not produce any large fruiting bodies, but may sometimes be seen as a white layer covering the wood below the bark of inoculated stumps. However, it generally remains unseen as microscopic growth in the wood. The fungus was originally isolated from dead black wattle stumps near George, Western Cape, and is indigenous to South Africa. Testing demonstrated that this fungus does not invade pruned fruit trees and, therefore, it can be used safely in orchards and other agricultural situations, and is also suitable for use against environmental invasions.

DAMAGE TO PLANTS

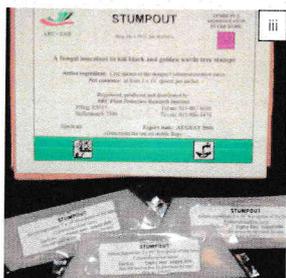
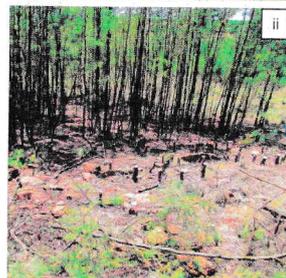
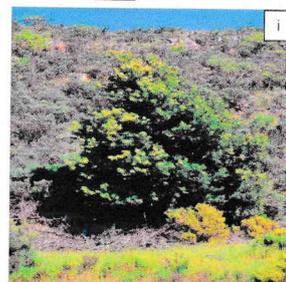
The fungus was developed as a user- and environmentally-friendly treatment on cut stumps of black wattle, as well as on golden and green wattle. It prevents the establishment of vigorous coppice growth of these wattles. However, as with chemical treatment of cut stumps of felled wattles, the trees need to be felled correctly, and the application of the stump fungus must be managed correctly for effective control.

IMPACT ON BLACK WATTLE

After felling black wattle trees, the stumps either have to be treated with a registered herbicide or the stump fungus, to prevent the stumps from resprouting and forming multi-stemmed trees. Spores of the fungus are supplied in mineral oil (iii), which are mixed in cooking oil and applied to freshly cut stumps. These are obtained from ARC-PPRI Stellenbosch, see below for contact details. The fungus can be applied at any time of the year, throughout South Africa. Treated stumps should not produce any coppice growth, but even if this is initiated, the stump will still die within 9 months of treatment (iv). Generally, trees should be felled as close to the ground as possible, since the closer to ground they are felled, the faster the stumps will die, and the more successful the treatment will be. The ideal height for felling is no higher than ankle height, approximately 10 cm above ground level.

ORDERING INFORMATION:

Orders for the stump fungus must be placed at least a month in advance, and directed to Ms Gwen Samuels. E-mail: SamuelsG@arc.agric.za Tel: (021) 887 4690 Fax: (021) 886 6479. Production of the fungus takes about 25 days.



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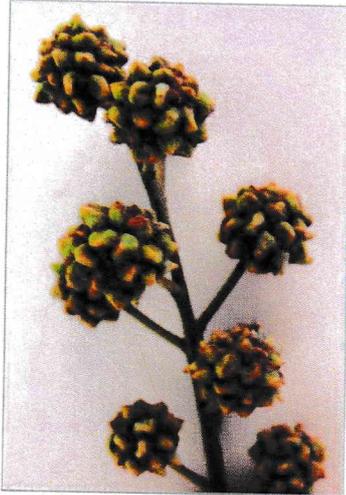


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BIOLOGICAL CONTROL OF BLACK WATTLE



Adult Midge - pic. courtesy of J. Hoffmann



Galls - pic. courtesy of C. Kleinjan

The Flowering Gall Midge

(*Dasineura rubiformis*) – an introduced natural enemy of Black Wattle (*Acacia mearnsii*)

DESCRIPTION

Adult midges are tiny (2mm) and brown/black in colour. They are mostly evident in spring when they can be seen flying around (in the vicinity of the host plants) or ovipositing on the flowers.

LIFE CYCLE

Females oviposit (lay their eggs) into the open flowers during spring. Once hatched, the larvae feed on the ovaries resulting in the formation of gall tissue. Each larva develops within a single chamber in the gall and goes through three larval stages to maturity. A single gall may contain up to five larval chambers. Since most of the flowers in the flower head are utilised during oviposition, characteristic clusters (of up to 35 individual galls) result, each of which resembles the young fruit of a blackberry.

By the end of May/early June, the galls (and larvae within them) are fully developed, and the larvae exit the gall through a small opening and drop to the ground. Here they pupate in silken cocoons in the leaf litter or at shallow depths. The emergence of the adult midges occurs several months later and coincides with the flowering season of black wattle.

IMPACT ON BLACK WATTLE

Oviposition by the midges and subsequent gall development prevents the formation of pods, and at sites where the midges are well established and abundant, pod production has virtually ceased.

Galling by the midge has no impact on vegetative growth of black wattle, so the general appearance of the trees is not affected. However, as with other similar biological control measures, any reduction in seed production, should ultimately reduce the aggressiveness and rate of spread of the plants.

COLLECTING AND RE-DISTRIBUTION

All release data must be sent to Fiona Impson ARC – Plant Protection Research Institute, Private Bag X5017, Stellenbosch, 7599 (impsonf@arc.agric.za)

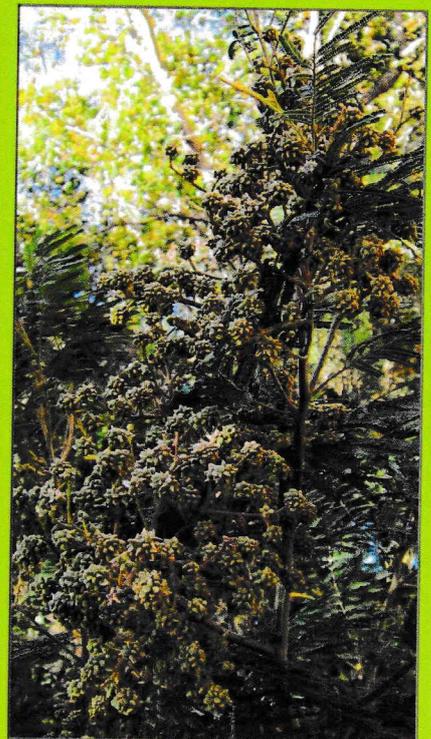
Mature galls are best collected from trees where the midge is well established during June. Galls can be cut from the branches into containers (cardboard boxes or bags) and then deposited in protected areas against the trunk of black wattle trees at the release site. Each batch of galls released should amount to approximately a carrier bag full. To ensure successful establishment, galls should be released within 72 hours of collection. At this stage the galls are fully mature and the larvae within them are ready to emerge and drop to the soil where they will pupate in cocoons. Adults will then emerge from the cocoons during spring. When choosing a release site ensure the following:

- The trees have reached reproductive age, i.e they are able to flower
- Be free from any clearing operations for between 5 – 10 years to allow for the midges to establish
- Be protected from fire and disturbance as far as possible
- The release trees are not alongside dirt roads

The following data must be collected during the release:

- Condition of the galls upon release
- GPS co-ordinates
- Contact details of land owner
- Brief description of how to get to the site

Gall damage to flowering trees
- pic. courtesy of C. Kleinjan



For additional information please contact:
FIONA IMPSON - impsonf@arc.agric.za - 021 887 4690

