A decade of biological control of *Acacia saligna* in South Africa, using the gall rust fungus, *Uromycladium tepperianum*


**Summary**

*Acacia saligna*, introduced into South Africa from south-western Australia in the 1800s, was until recently regarded as the most important invasive weed in the Cape Floristic Region. Host specificity testing established that the *A. saligna* genotype of the Australian gall rust *Uromycladium tepperianum* was suitably specific for use as a biological control agent in South Africa, and permission for release was approved in 1987. The pathogen was established at 200 sites throughout the range of the weed between 1987 and 1989. This paper describes the effect of the rust on *A. saligna* populations and changes in the population levels of the pathogen from 1991 to 2001 at eight of the release sites. Disease severity was low in 1991 but increased rapidly thereafter at most sites. By 1993, almost 100% of the trees were infected at most sites. By 2001, tree densities were reduced by 83–95% compared to 1991. Most of the old trees were killed, and regenerating seedlings infected. Numbers of living trees in smaller size classes declined more rapidly than in larger size classes, but trees of all ages eventually died. After initial increases, seed numbers tended to stabilize although fires reduced the seed numbers considerably at certain sites. In many areas, dead *A. saligna* trees are being replaced by fynbos, other weeds and grasses. The recently introduced seed-destroying agent *Melanterius compactus* will enhance the control of this weed. In biological control terms, the vegetative parts of *A. saligna* are considered to be under complete control.

**Keywords:** *Acacia saligna*, classical biological control, gall rust, South Africa, *Uromycladium tepperianum*.

**Introduction**

*Acacia saligna* (Labill.) H.L. Wendl. (Port Jackson willow), a small willow-like evergreen shrub or tree was introduced into South Africa from south-western Australia in the mid 1800s to stabilize sand dunes in coastal areas. This tree has become a serious environmental weed, invading fynbos, woodlands, coastal dunes, roadsides and watercourses. MacDonald & Jarman (1984) regarded *A. saligna* as the most troublesome invasive alien weed in the Cape Floristic Region of South Africa. According to the March 2001 amendment to “The Conservation of Agricultural Resources Act” (Act No. 43 of 1983), *A. saligna* is classified as a declared invader (category 2). Category 2 plants may not occur on any land or inland water surface other than a demarcated area or a biological control reserve.

The gall-forming rust, *Uromycladium tepperianum* (Sacc.) McAlp. is highly destructive to *A. saligna* in south-western Australia. This rust was selected as a potential biological control agent and extensively tested for host specificity (Morris 1987). Once it was established that the *A. saligna* genotype of *U. tepperianum* was suitably specific for use as a biological control agent in South Africa (Morris 1987), permission for release was approved and the first release took place in 1987 (Morris 1991). By 1997, the pathogen had become established at nearly 200 sites where it had been released, and wind had...
dispersed the fungus throughout the range of the weed (Morris 1997).

**Materials and methods**

The effect of the pathogen on *A. saligna* populations and changes in the population levels of the pathogen were measured annually from 1991 to 2001 at eight of the sites inoculated during 1988 and 1989. The method used is described by Morris (1997).

**Results and discussion**

Disease severity, shown by the mean numbers of galls per tree, was relatively low in 1991 but increased rapidly thereafter at most sites. By 2001, tree densities were reduced by 83–95% compared to 1991. Regenerating seedlings were included in these counts. Most of the old trees were killed and many of the remaining trees are new seedlings, which are now also infected. The number of living trees in the smaller size classes declined more rapidly than in the larger size classes, but trees of all ages eventually died. In 2001, the mean percentage trees infected per site ranged from 16.8 to 100%, with a mean of 81.35%. The mean number of galls per infected tree in the largest tree size increased from 21.05 in 1991 to 169.34 in 2001. The number of seeds recovered from soil samples varied greatly depending on the history of the site. During the period 1991–1995, mean seed numbers per site increased from 37,497 to 47,386 seeds/m². Thereafter, soil seed numbers tended to decrease. The mean seed number in 2001 was 25,554 seeds/m². At certain sites the occurrence of fires was seen to reduce seed numbers considerably.

This long-term study has shown that the gall rust has had a major impact on *A. saligna* populations in South Africa during the past decade. In biological control terms, the vegetative part of the weed has been brought under complete control (Morris 1999). Although seeds are still being produced, the numbers are now considerably reduced and new emerging seedlings rapidly become infected. It is envisaged that the recent release of the seed-feeding weevil, *Melanterius compactus*, on *A. saligna* in South Africa will further enhance the biological control of this alien invasive plant. In many areas, fynbos and native grasses are replacing dead *A. saligna* trees and the challenge now is to ensure that these areas are not simply recolonized by other invasive plants.

**References**


