

Spreading Scale Insects to Control Sifton Bush (*Cassinia arcuata*) and other *Cassinia* spp.

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Sifton bush (*Cassinia arcuata*) occurs over 616,000 ha of NSW (Campbell, 1990). Another 16 *Cassinia* species are also regarded as weeds of pastures (Campbell *et al.*, 1990). All members of this genus are difficult and costly to control when cultivation, herbicides, slashing, burning or pasture improvement are used (McGowen *et al.*, 1990). The possibility of developing a low-cost method to control *Cassinia* spp. arose in 1992 after observations showed that native scale insects had killed plants throughout NSW in 1988-92 (Campbell and Wykes, 1991).

An outstanding example of the effect of the red scale *Austrotachardia* sp. on *C. arcuata* and *C. longifolia* is given in Table 1. This scale which spread by natural means and by transfer of infected cuttings (P.J. Wykes), killed mature plants and seedlings, the latter being a major problem in control (Campbell *et al.*, 1990).

SCALE INSECTS

The two scales which cause the most damage are *Austrotachardia* sp. in central NSW, and *Paratachardina* sp. in the north-western part of the state (Holtkamp and Campbell, 1992). Fully grown *Austrotachardia* females are red scales, approximately 2 to 3 mm across. They are often covered by sooty mould that blackens the scales as well as most stems on infected plants. The sooty mould grows on honeydew which is produced by the females. This sweet product also attracts ants. The scale insects are most easily found by looking for dead or sickly bushes with black stems and frantic ant activity. It is possible that in collecting honeydew, the ants protect the scales from predators.

TRANSFERENCE

Austrotachardia scales spread by orange crawlers (0.5 mm long) that emerge about December and February each year and find a new host plant by walking, being blown by wind or being carried by ants. They then insert their mouth parts and remain stationary for the one year of their life. This natural spread is slow because the distance crawlers can

Table 1: Kill of *Cassinia* spp. by the red scale *Austrotachardia* sp. on "Daydawn" the property of P.J. Wykes, Kerrs Creek NSW.

Year (Nov.)	Area killed (ha)	% Kill
1987	0	0
1988	3	1
1989	13	5
1990	172	47
1991	255	70

travel is limited. However, the spread can be greatly expanded by placing infected cuttings on healthy plants just before the crawlers emerge. Successful spread in this way within a property (eg. on "Daydawn" by Peter Wykes) and between properties (by posting cuttings of infected material to over 300 interested landholders) achieved over widespread areas in NSW.

Timing

At Orange, crawlers emerge in February and December each year. However, in hotter climates they may emerge one or two months earlier and in cooler climates later. The February generation re-emerge the following February and the December generation the following December.

There are no easily recognisable external signs to indicate when the crawlers are about to emerge, but microscopic examination of a few dissected females will indicate the development status of crawlers. If large oval bodies are present in the red liquid it is time to take cuttings; *ie.* 2 to 4 weeks before the crawlers emerge.

The only way to spread the scale insects at other times of the year is to transplant infected plants to new well watered sites and then take cuttings at the correct time.

Method of spreading scale insects

Take cuttings with scale insects from high up on infected, living plants. Plenty of ant activity indicates that high honeydew production by the scale insects and thus they should be healthy. Do not take cuttings from low down on old plants where spider webs, white chalky marks or any other impurities are evident. These indicate the presence of scale predators and should be avoided. Transfer cuttings in cold dry containers. Take cuttings about 10 cm long and strap them very closely to stems on new clean plants about 0.5 to 1 m above the ground. Make an acute angle cut at each end of the cutting and tie it onto the new plant so that the points are adjacent to the new stem. Tie the cuttings on with wire or a twist-tie so the crawlers can walk across to the new plant. After 4 weeks collect and burn the cuttings to destroy enemies. Once the scale insects are established on your property, cuttings can be taken when the crawlers are about to emerge, *ie.* about a year after the first transfer, and every year after that, to further spread the insects.

Predators and parasitoids

The major parasitoids of *Austrotachardia* sp. appear to be small wasps that emerge with or after the crawlers and lay one egg either in or under an establishing scale. Later the wasp larvae feed on female scales and adult wasps eat their way out of the scale leaving a round hole. A predator,

the larvae of a *Stathmopoda* sp. moth, attacks scales under a protective web. Despite these enemies the populations of scales and their effects expanded markedly between 1987 to 1992. Predators and parasitoids have not prevented establishment of scales transferred on cuttings to new areas. To date the only method used to control enemies has been to select cuttings with visually healthy scales.

FUTURE

By partially understanding the biology and ecology of the scale insects on sifton bush it has been possible to spread them widely in NSW. Spreading crawlers free of enemies could be achieved by treating cuttings to selectively kill predators and parasitoids or spreading the emerged crawlers alone. This may give scales 5 to 10 years without enemies in which to control *Cassinia* spp.

PASTURE IMPROVEMENT

For long-term control a strong pasture is needed to replace sifton bush and other *Cassinias*. In addition to providing forage for livestock, vigorous growing pasture can effectively control regeneration of sifton bush seedlings through interspecific competition. This can be done by promoting resident native perennial grasses by topdressing with superphosphate and subterranean clover as the *Cassinia* bushes are dying, or by sowing introduced perennial

grasses and clovers. However, to ensure establishment of phalaris and cocksfoot, herbicide application is essential to kill weeds under the dying bushes prior to sowing. Methods used to establish pastures on unploughed land are detailed in Campbell (1985).

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