

CURRENT STATUS OF THE BIOLOGICAL CONTROL
PROGRAMME AGAINST GROUNDSEL BUSH
(*BACCHARIS HALIMIFOLIA*)

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Summary. The biological control programme against groundsel bush (*Baccharis halimifolia*) in Queensland commenced in 1961 with a survey of insects attacking *Baccharis* spp. in the Americas. Insects have been collected, tested and imported into Australia as a result of investigations in the United States of America from 1967 to 1969, and in Brazil from 1973 to 1976 and from 1978 to the present. Twenty insect species have been introduced into quarantine but only four have become established in the field. As control of the weed is not yet satisfactory, investigations are continuing.

INTRODUCTION

Groundsel bush is a woody shrub which is a weed in pastures, woodland, national parks and other situations on the eastern coast of Australia because of its ability to invade and displace more useful plants. It was introduced into Australia during the last century probably as an ornamental garden plant from North America (Bailey 1900). Groundsel bush evolved on the eastern coast of the U.S.A. although it now occurs in the Gulf of Mexico states of the U.S.A. across to the Pacific coast (Shetler and Skog 1978). *B. halimifolia* is the only species of *Baccharis* in Australia. Although there are other *Baccharis* species in North America, most of the 350 species in the genus are found only in South America (Barroso 1973).

Groundsel bush is controlled mainly by the use of herbicides such as 2,4-D. During 1981, the cost of this control in Queensland is estimated to be in excess of \$1 million. The biological control programme against groundsel bush was initiated in 1961 when the Department of Lands contracted the Commonwealth Institute of Biological Control to survey the natural enemies of *Baccharis* spp. in North and South America (Bennett 1963). Based on results from these surveys, investigations were commenced in the U.S.A. on insects attacking groundsel bush and subsequently extended to South America for insects attacking other *Baccharis* species. This paper reviews the current state of the biological control investigations.

INSECTS INTRODUCED FROM THE U.S.A. AND ESTABLISHED IN QUEENSLAND

Between 1967 and 1969 six species of insects were introduced from the U.S.A. and of these, the following two became established in the field.

Trirhabda baccharidis (Coleoptera; Chrysomelidae). This leaf feeding beetle defoliates plants during flowering in autumn causing a reduction in the amount of viable seed produced. It was introduced in 1969 and has only spread slowly; to increase its rate of spread, beetles are collected from areas where it is

abundant and released into new areas. Most establishment has occurred near the coast in semi-tidal or sandy areas. A total of 77 020 beetles were collected and released during the 1980/81 summer bringing the total number released since 1969 to 249 520.

Aristotelia spp. (Lepidoptera; Gelechiidae). Larvae of this moth feed on the shoot tips and web them together. It is established on groundsel bush throughout its range in Australia, but generally does not reach high enough densities to control the weed.

INSECTS INTRODUCED FROM BRAZIL AND ESTABLISHED IN QUEENSLAND

As a result of studies undertaken in Brazil between 1973 and 1976, seven species of insect were introduced of which two are known to be established and a third may have established.

Megacyllene mellyi (Coleoptera; Cerambycidae). The larvae of this beetle are stem-borers. The young larvae girdle the stem feeding on the vascular tissue and causing the upper part of the stem to die, before they burrow down into the heart-wood. They are established at Hinze Dam, Eden Island and Burpengary from small releases totalling less than 900 beetles. As plants are killed and establishment seems possible the rearing programme is being increased. Further supplies of *M. mellyi* have recently been obtained from Brazil in order to augment the size and the genetic base of the laboratory colony. Because of the relatively long life cycle of about 6 months, the rate of increase is slow. The colony now stands at over 3000 individuals which will provide an adequate base for the larger scale releases planned to commence in spring 1981.

Anacassis fuscata (Coleoptera; Chrysomelidae). The first field establishment of this foliage feeding beetle was recorded at Springbrook in the Gold Coast hinterland in December 1980. Beetles were released at this site in 1977 and an inspection in December 1980 revealed eggs, larvae, pupae and adults, although the population density is still too low to retard the growth of groundsel bush. The population will be monitored in future to determine if it is expanding.

As it is now evident that *A. fuscata* will establish in the field, the rearing programme of this species will be increased and further supplies have recently been obtained from Brazil to increase the numbers and genetic base of the laboratory colony. To date a total of 38 959 beetles have been released, mainly in the Nerang valley.

Lioplacis elliptica (Coleoptera; Chrysomelidae). It is uncertain if this nocturnal foliage feeding beetle has established in the field. Establishment is difficult to determine especially at low densities as it is not active during the day and feeding damage is the only evidence of establishment. Rearing of this insect is continuing.

INSECTS RECENTLY IMPORTED FROM BRAZIL FOR TESTING UNDER QUARANTINE

Investigations in Brazil were commenced in late 1978 for a further three year period. Of the following seven species introduced, testing has been completed on four and is continuing on three.

Rachiptera virginalis (Diptera; Tephritidae). The females of this gall forming fly laid eggs in the tips of groundsel bush but the larvae did not develop to adults. Investigations on this insect have ceased.

Lioplacis caratubae (Coleoptera; Chrysomelidae). Both adults and larvae of this beetle fed only sparingly on the foliage of groundsel bush and adults did not oviposit. It was considered that groundsel bush was an unsuitable host and study on this insect has ceased.

Uroplata spp. (Coleoptera; Chrysomelidae). The adults of this leaf mining beetle fed and oviposited on groundsel bush. However, only a few larvae developed into adults which were smaller than imported adults. It is believed that groundsel bush is an unsatisfactory host and work on this insect has ceased.

Liothrips spp. (Thysanoptera; Phloeothripidae). Adults on this thrip oviposited and fed on the tips of groundsel bush causing severe dieback. The larvae did not develop and died a few days after hatching. This is considered to be due to groundsel bush being an unsuitable host and consequently further study on this insect has ceased.

Heilipodus spp. (? *argentinus*) (Coleoptera; Curculionidae). This root boring weevil has recently been received and testing is continuing. Adults feed on the tips and have laid some eggs in the roots. Fewer eggs than expected have been laid but it is too early to know if this species will accept groundsel bush.

Aulocochlamys spp. (Coleoptera; Chrysomelidae). Both adults and larvae of this beetle have fed on the leaves of groundsel bush and adults have laid eggs. Host specificity testing of this species has now commenced.

Tischeria spp. (Lepidoptera; Tischeridae). This leaf mining moth has recently been introduced and it is too early to know if it will accept groundsel bush.

DISCUSSION

At present the insect which causes most damage to groundsel bush in Queensland is the foliage feeding beetle *Trirhabda baccharidis*. Its control of groundsel bush is limited to reducing viable seed production in only a small proportion of the total area infested because it only survives in coastal areas and only defoliates the plants once per year. It is nevertheless valuable in these areas as other control measures in semi-tidal areas such as off-shore islands are often difficult and costly.

The recent discovery of the establishment of the foliage feeding beetle *Anacassis fuscata* at Springbrook is encouraging but at this stage it is not known if the population will reach high enough levels to damage the weed. The establishment of the stem borer *Megacyllene mellyi* at three sites is promising as this insect can cause considerable damage even at relatively low densities. It appears to offer the best prospects for control of groundsel bush at present and a large scale rearing and release programme is successfully under way. Whether the optimism for this species is justified will depend on the results of releases to be made in the 1981-82 summer season.

Other insects introduced recently are still undergoing testing in quarantine so it is too early to know if they will control groundsel bush.

Although there is no insect or groups of insects which will satisfactorily control groundsel bush at present, the insects currently being studied and released have the potential to be effective control agents.

LITERATURE CITED

- Bailey, F. 1900. The Queensland Flora, Part 3. A.J. Diddams & Co., Brisbane.
- Barroso, G. 1973. Compositae, Sub Tribe Baccharidinae. Ph.D. thesis. University of Sao Paulo, Brazil.
- Bennett, F. 1963. Final report on surveys of the insects attacking *Baccharis* spp. in the S.E. United States of America and Brazil 1960-63. Common. Inst. Biol. Control Report.
- Shetler, S., and L. Skog, (Eds.) 1978. A provisional checklist of species for Flora North America (Revised), Missouri Botanical Garden, 199 pp.