

Research Reports

A survey of Fireweed (*Senecio madagascariensis* Poir) and its natural enemies in Madagascar with a view to biological control in Australia

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Summary

A preliminary survey of fireweed (*Senecio madagascariensis* Poir) and its insect fauna was made in Madagascar with a view to possible biological control of the weed in Australia. Fireweed was found to be limited in its distribution to two climatically different regions in Madagascar; the wet tropical south east and the semi-arid south and south west of the island. Numerous insects were found feeding on fireweed of which a stem borer *Lobesia* new sp. (Lepidoptera: Tortricidae), and a seed-head borer, *Phycitodes* new sp. (Lepidoptera: Pyralidae), are potential biological control agents.

Introduction

Fireweed, *Senecio madagascariensis* Poir (Asteraceae), is a major weed of improved pastures in coastal New South Wales (Sindel and Michael 1988) and south eastern Queensland (Armstrong 1988 pers. comm.). In bad years it may result in over 10% reduction in pasture productivity (Sindel and Michael 1988) as well as being associated with poisoning and poor stock growth (Walker and Kirkland 1981). There is no single best control method; herbicides, slashing and hand weeding give some immediate relief while the establishment of competitive pastures offers longer term control (Sindel and Michael 1988).

Fireweed is native to Madagascar and southern Africa (Michael 1981). Biological control, using insects and plant diseases from these countries, offers the possibility of long term sustainable control.

Occurrence and distribution in Madagascar

In Madagascar, fireweed is not found over the entire island as suggested in Sindel (1986). It is restricted in its distribution to the low altitude south and south west of the island, between the latitudes of 21° 31' and 25° 31' (Figure 1). This region includes two very different climatic zones separated by a pluviometric fault line at the Anosy escarpment (Donque 1972). To the east of the escarp-

ment the climate is hot and wet (Paulian 1984) with a mean annual rainfall in excess of 1,500 mm and no dry months. In contrast, the zone west of the escarpment is hot but semi-arid, with a mean annual rainfall of less than 600 mm (Paulian 1984). Rainfall is very irregular in this western zone and long periods of drought are not uncommon.

Fireweed is not a common or weedy species in Madagascar and its life cycle differs in each climatic zone. In the wetter south east it behaves as a winter flowering perennial. Isolated plants and occasional small populations can be found where the soil has been recently disturbed and in particular where the soil is periodically disturbed, e.g. areas bordering cultivation and along roads and tracks. It appears to favour sandy situations though plants have been found growing in a variety of soil types.

In the harsher environment of the semi-arid south and south west, fireweed behaves as a short-lived annual. Isolated populations appear only after rain and only in recently disturbed sandy situations. It is then quickly replaced by secondary colonizers and may not appear again in a particular area for many years. This suggests that fireweed seed may lay dormant in soil for considerable periods of time and still be viable when environmental conditions are favourable for germination.

Possible biological control agents

Table 1 lists the insects found feeding on fireweed in Madagascar, with notes on their biologies where known. Some of the insect species would not be suitable biological control agents as they are known to be capable of feeding on other plant genera. The host range of many of the species is not known. Two species which appeared damaging in the field and which are likely to be sufficiently specific for biological control are a seed-head borer, *Phycitodes* new species (Lepidoptera: Pyralidae), and a stem borer, *Lobesia* new species (Lepidoptera: Tortricidae). However detailed host specificity testing would be necessary to confirm their suitability.

Phycitodes new species (Lepidoptera:Pyralidae)

Larvae of this moth feed on the achenes (seeds) in the flowerheads. The developing achenes of several flower heads will be consumed in the course of development of a single larva. The larvae pupate in situ. The moth was present in large numbers wherever there was a local abundance of *S. madagascariensis* in south east Madagascar. The species was also present in the western zone.

S. madagascariensis is the only known host for this undescribed species of Pyralid. Little is known of the biology of other species in this genus. Only two records could be found: larvae of *Phycitodes binaevella* (Hubner) have been recorded attacking the flower heads of *Cirsium vulgare*, Asteraceae, in Holland (Klinkhammer *et al.* 1988), and larvae of an undetermined species of *Phycitodes* were recorded attacking the flower heads of *Ptilostemon gnaphaloides*, also Asteraceae, in Crete (Neuenschwander 1984).

Lobesia new species (Lepidoptera:Tortricidae)

Larvae of this moth bore within the stem and root and pupate in situ. Withering of the leaves and green stem above the point of attack is common with, in some instances, complete death of the infested plant. The species was found in both the eastern and western zone.

S. madagascariensis, and a different unidentified species of *Senecio* found growing on the sand dunes in south eastern Madagascar, are the only known hosts for this undescribed species of Tortricid. Other species in this genus have been recorded from plant

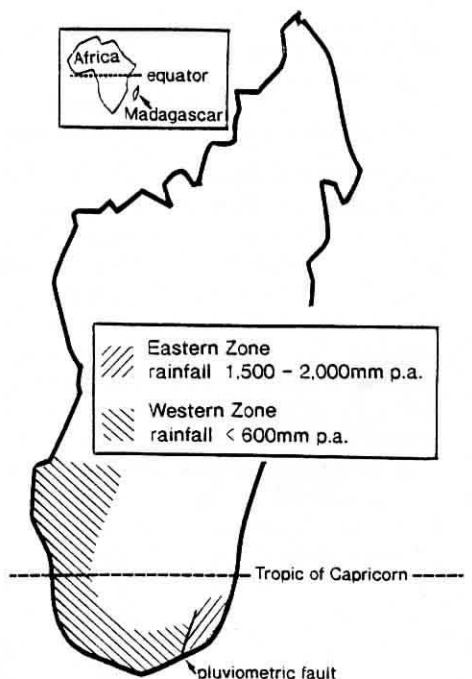


Figure 1. Distribution of fireweed, *Senecio madagascariensis*, in Madagascar

Table 1. Natural enemies of fireweed, *Senecio madagascariensis*, in Madagascar.

ORDER and FAMILY	SPECIES	NATURE OF ATTACK	HOST RANGE
LEPIDOPTERA			
Noctuidae	<i>Thysanoplusia orichalcea</i> (Fabricius)	larvae leaf feeding	polyphagous pest species
	<i>Condica conducta</i> (Walker)	larvae leaf feeding	general Compositae feeder
Geometridae	genus and species indetermined	larvae leaf feeding	host range unknown
Pyalidae	<i>Phycitodes</i> new species	larvae feed in seed heads	host range unknown likely to be specific
Tortricidae	<i>Lobesia</i> new species	larvae feed internally in stem and root	host range unknown likely to be specific
DIPTERA			
Tephritidae	<i>Sphenella marginata</i> (Linnaeus)	fly maggots feed in flower head	cosmopolitan species, present in Australia
Agromyzidae	<i>Liriomyza trifolii</i> (Burgess)	larvae leaf mining	polyphagous pest species
HOMOPTERA			
Pseudococcidae	<i>Tylococcus ?harongae</i> Mamet	phloem feeding	host range unknown
Aphididae	<i>Aphis gossypii</i> Glover	phloem feeding	polyphagous pest species
HETEROPTERA			
Rhopalidae	<i>Stictopleurus scutellaris coquerelli</i> (Signoret)	phloem feeding	host range unknown
Lygaeidae	<i>Nysius albipennis</i> Distant	feeds at seed-head	host range unknown
Lygaeidae	<i>Nysius ericae</i> (Schiling)	feeds at seed-head	host range unknown
COLEOPTERA			
Curculionidae	? <i>Throgonius</i> species	new adults at flowers, larval host(s) unknown	larvae probably polyphagous
THYSANOPTERA			
Phlaeothripidae	<i>Haplothrips nigricornis</i> (Bagnall)	feeds within seed head	host range unknown

species in several different families in different parts of the Old World. The genus includes the pest species *L. botrana* (Marcelin 1985), *L. reliquana* (Golutvina 1973), and *L. aeolopa* (Evans 1970), which appear specific to their particular host plants and are damaging. The species *L. euphorbiana* was recommended for introduction into Canada and North America for the biological control of leaf spurge, after screening by the CAB Institute of Biological Control's European Station showed that the species was specific to *Euphorbia cyparissias* and *E. lucida* (Schroder 1981).

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