

ESTABLISHMENT AND SPREAD OF *NEUROSTROTA GUNNIELLA* ON  
*MIMOSA PIGRA* IN THE NORTHERN TERRITORY

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*Summary.* The tip-boring moth *Neurostrotta gunniella* was first released in the Northern Territory on 2 February 1989 on the lower Adelaide River floodplains as a biological control agent for *Mimosa pigra*. Twelve months later more than 60% of *M. pigra* tips were infested with *N. gunniella* larvae within 1 km of the release site and recoveries were made up to 7.5 km away. Releases have been made at ten sites and recoveries away from the point of release have been made at six of these.

## INTRODUCTION

Mimosa, *Mimosa pigra*, a prickly, woody shrub of Central American origin, poses an imminent threat to the wetlands of northern Australia. Freed from its natural enemies, it forms huge impenetrable thickets with dire consequences for biological diversity (1), agricultural production and public amenity (5).

A collaborative biological control program involving the Northern Territory Department of Primary Industry and Fisheries and CSIRO commenced in 1980 with assistance, since 1984, from the Australian Centre for International Agricultural Research (6). The main focus of the overseas exploration for natural enemies of mimosa has been Mexico, but limited searches have also been made in Brazil, southern USA and Venezuela (3).

As a result of this program, five species of insects specific to mimosa have been released in Australia. The seed-feeding beetles *Acanthoscelides quadridentatus* and *A. puniceus* (Bruchidae) from Mexico were released in 1983 (6) but have not attained high population densities and have had no significant impact on seed production (4). A leaf-feeding beetle, *Chlamisus* sp. (Chrysomelidae) from Brazil, was released in 1985 (6) but, although established, has had no impact on the growth of mimosa (4). Then in 1989, two Mexican stem-boring moths were released, firstly *Neurostrotta gunniella* (Gracillariidae) and later *Carmenta mimosa* (Sesiidae).

The young larvae of *N. gunniella* mine leaf pinnules, and older larvae tunnel in the young stems and tips. Eggs are usually laid on the leaves nearest the tip (2). Larvae of *C. mimosa* tunnel in stems of larger diameter and hence complement the actions of *N. gunniella* (4). This paper details the initial establishment and spread of *N. gunniella*.

## METHODS

Adult moths of *N. gunniella* were released into field cages with 2m edges that were placed over mimosa bushes. The cages were shifted a few metres every two weeks to allow second generation moths to spread. Eggs and larvae were released by attaching infested stems and leaves to plants outside the cages. Ten release sites were established in six discrete mimosa infestations.

A transect was laid out extending 3km north and 3.3 km south of the original Adelaide River release site, with sample points every 100m. At each sample point, ten tips were examined from each of ten mimosa bushes and scored for presence or absence of *N. gunniella* larvae. Surveys were conducted on 16 - 18 January 1990 and 13 - 15 February 1990. At other sites, haphazard inspections were regularly carried out in the vicinity of the release cages for signs of *N. gunniella* establishment and spread.

## RESULTS AND DISCUSSION

More than 9,000 adults and 24,000 eggs of *N. gunniella* have been released into mimosa infestations since releases began on 2 February 1989 at a site on the lower Adelaide River (Table 1).

Table 1. Releases of *N. gunniella* in the Northern Territory.

First Release	Last release	Site	Number released Adults	Eggs	Latest survey	Spread (km)
2 Feb 89	9 Jun 89	Adelaide R.1	2048	10000	26 Feb 90	7.5
13 Apr 89	15 Jul 89	Sadgroves Ck	579	1200	20 Feb 90	present
25 Apr 89	22 Nov 89	Adelaide R.2	2482	4000	22 Nov 89	0.03
3 May 89	25 Oct 89	Oenpelli	650	4000		
10 Jul 89	20 Oct 89	Finniss R.1	1624	4000	30 Nov 89	0.2
3 Aug 89	3 Aug 89	Adelaide R.3	20			
11 Oct 89	19 Oct 89	Adelaide R.4	600		26 Feb 90	1.5
3 Nov 89	3 Nov 89	Darwin	579			
30 Nov 89	15 Dec 89	Finniss R.2	665	1000	1 Feb 90	0.05
7 Feb 90	15 Feb 90	Elizabeth R.	180	100		
Total			9427	24300		

Early inspections showed promising build-up of moth populations at release sites, but little spread. On 31 August 1989, *N. gunniella* larvae were found up to 200 m from the Adelaide River 1 release site, but by November there had been little further spread.

The results of the January 1990 transect survey were therefore surprising. *N. gunniella* larvae were infesting up to 98% of mimosa tips near the centre, and had spread 1.6 km north and 3.3 km to the end of the southern transect (Fig. 1). A tidal creek prevented further extension of the transect to the south.

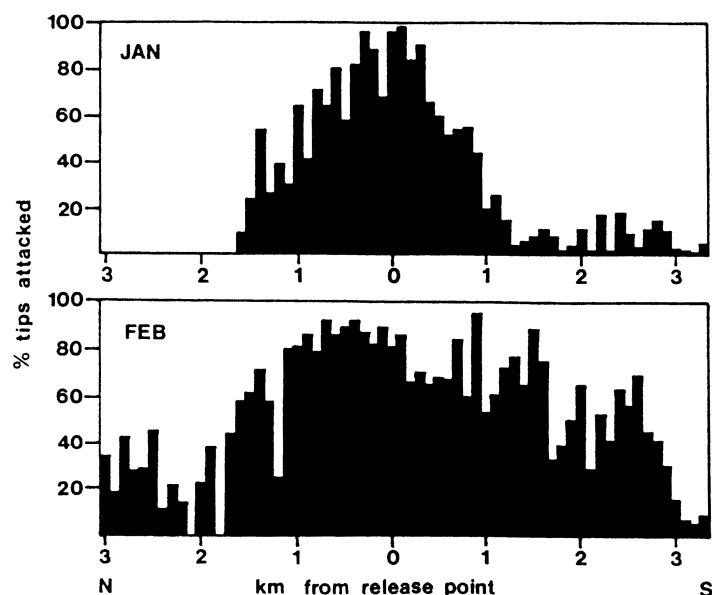


Figure 1. The percentage of mimosa tips attacked by *N. gunniella* larvae about Adelaide River 1 release site. Sample dates were 16-18 January and 13-15 February 1990.

One month, or roughly one generation later, *N. gunniella* had spread a further 1.4 km to the northern end of the transect where a road embankment marked an edge of the mimosa thicket, and had generally increased its abundance along the full length of the transect (Fig. 1). Within 1 km of the release site, more than 60% of mimosa tips were infested.

Recent surveys have shown that populations have persisted for up to eight months following the last release at a site, and have spread up to 7.5 km (Table 1). Recoveries away from the point of release have been made at all six sites where follow-up surveys have been conducted.

*N. gunniella* is well on the way to becoming established throughout the range of mimosa in Australia (see 4). It has the potential to reach extremely high densities. Up to seven larvae and 56 entrance/exit holes have been counted on single mimosa tips in the field and no parasites have yet been found. It is not known what impact it will have on mimosa populations. It is expected that existing and future studies will provide the answers.

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