Observations on the Life History of Two Sap-feeding Coreid Bugs and their Impact on Growth of Plantation Eucalypts

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Abstract

The effects of shoot feeding by two species of sap-sucking coreid bugs, Amorbus obscuricornis *and* Gelonus tasmanicus, *are examined for the ash eucalypts,* Eucalyptus obliqua *and* E. regnans. *Considerable differences in height increment and recovery time were found between these eucalypt species. The effect of occasional severe damage is demonstrated and the establishment of pest monitoring in plantations and young regeneration areas is advocated. Some observations on the life history of the coreid species are recorded.*

Introduction

The coreid bugs *Amorbus obscuricornis* (Westwood) and *Gelonus tasmanicus* (Le Guillou) (Heteroptera: Coreidae) have a history of causing damage in Tasmanian eucalypt plantations and regeneration areas. Coreids are sap-sucking bugs which feed by insertion of the stylet into the soft phloem tissues of shoot tips. Feeding introduces saliva which causes cell dissolution and subsequent wilt while the mechanical damage of stylet insertion causes necrosis and tannin concentration in those tissues (Miles 1968). A white encrustation which is attractive to ants develops at the feeding site. Following tissue degeneration, shoots may die. The result of attack over several seasons is a flat-top brooming of the tree crown, with associated reduced height increment and poor form.

Amorbus obscuricornis and *Gelonus tasmanicus* are widely distributed throughout both dry and wet sclerophyll forests in Tasmania. The biology of these coreids in southern Tasmania was studied by Green (1972) but little attention has been given to these minor pest species prior to the establishment of plantations of ash species of eucalypts. It is within plantations that damage of significant economic importance has occurred and forest managers should be aware of the impact of these pests.

Methods

A trial to examine the effects of total exclusion of browsing by insects on the height increment of commercial species of plantation eucalypts *Eucalyptus nitens, E. delegatensis, E. obliqua* and *E. regnans* was commenced in the Goulds Country plantation in north-eastern Tasmania in 1986 (Tasmania 1:100 000 Georges Bay Sheet 8515: 937502).

The trial was surveyed at 14-day intervals from July 1986 to April 1989 to identify species of herbivorous insects and to quantify the effects of major pest species on height increment. One hundred and twenty trees of each eucalypt species were sprayed on a fortnightly basis with the synthetic pyrethroid cypermethrin (Ripcord®) at a rate of 10 ml/l to minimise damage. Sixty trees of each species were left untreated.

The presence of a large population of early nymphal stages of the two coreid species was detected during the routine survey and an intense sampling programme initiated to determine the effects of coreid feeding. Observations on the life history of the coreids

were made both in the field and in laboratory cultures.

Results

Life history observations

The population trends for adults and nymphs for each of the three years of the survey are shown in Figure 1. No predators of the coreids were observed throughout the survey period. Recruitment to adult stage, in most seasons, was low due to high nymphal mortality. The suggestion by Miller (1956) that such mortality could be due to bird predation was not substantiated in this study. Observations indicated that high winds or heavy rain caused the nymphs to move down the tree to shelter in litter.

In general, adults of *Amorbus* (Photo 1) were found on trees on sunny days from early October to April but were absent on wet or windy days. Nymphs appeared in November and developed through five instars. However, the first instar, characterized by bright green coloration, was rarely collected. It did not appear to feed and moulted after two days. Eggs laid in captivity hatched in three to five days at 18°C. The first instar stage may be dispersive since most eggs appear to be laid at random on dried leaves in the litter. Movement to a suitable tree and then location of a suitable feeding site may stimulate moulting to second instar. *Gelonus* adults appeared in late October but the nymphs did not appear on the trees until early January. Captive *Gelonus* females laid single eggs on the shoot tips while captive *Amorbus* laid eggs in groups of two to three on old leaf blades and on the walls of the retaining mesh cage.

Antennal length measurements for each nymphal instar of *Amorbus* are shown in Table 1, and the mean and standard deviation of abdominal width for 29 specimens of each species are shown in Table 2.

Progressive measurement of nymphs during the summer indicated only one generation per year. Adults darken with age, and fresh adults, light brown in colour, were easily recognised. Lightly coloured adults of both species appeared in the samples in the middle of February. Most overwintering adults had died by the end of January in 1987/88 (Fig. 1).

Table 1. Antennal length of Amorbus *nymphs.*

Instar	*n*	Antennal length $\bar{x} \pm$ SD
1	6	3.70 ± 0.15
2	17	5.96 ± 0.30
3	34	7.74 ± 0.27
4	28	8.95 ± 0.24
5	28	10.95 ± 0.48

Table 2. Abdominal width (mm) of males and females of Amorbus *and* Gelonus.

Species	Males ($\bar{x}$ ± SD)	Females ($\bar{x}$ ± SD)
Amorbus	7.28 ± 0.32	8.37 ± 0.32
Gelonus	4.26 ± 0.20	6.03 ± 0.28

Effects of coreid feeding on eucalypts

In 1987/88, coreid nymphs caused significant damage to ash species. *Eucalyptus regnans* and *E. obliqua* sustained equivalent crown damage but *E. regnans* maintained increment. Measurements at the end of March showed that uninfested, sprayed *E. obliqua* trees had a height increment advantage over infested trees of 39% (Fig. 2).

Both *E. regnans* and *E. obliqua* were more attractive hosts to the coreids than the glaucous-leaved *E. delegatensis* and *E. nitens*. At the study site, *E. regnans* had very strong mid-to-late-summer growth whereas *E. obliqua* had strong early summer growth. This enabled *E. regnans* to maintain increment levels despite considerable crown damage (Fig. 3).

Trees sprayed at 14-day intervals with insecticide suffered little damage. Coreids

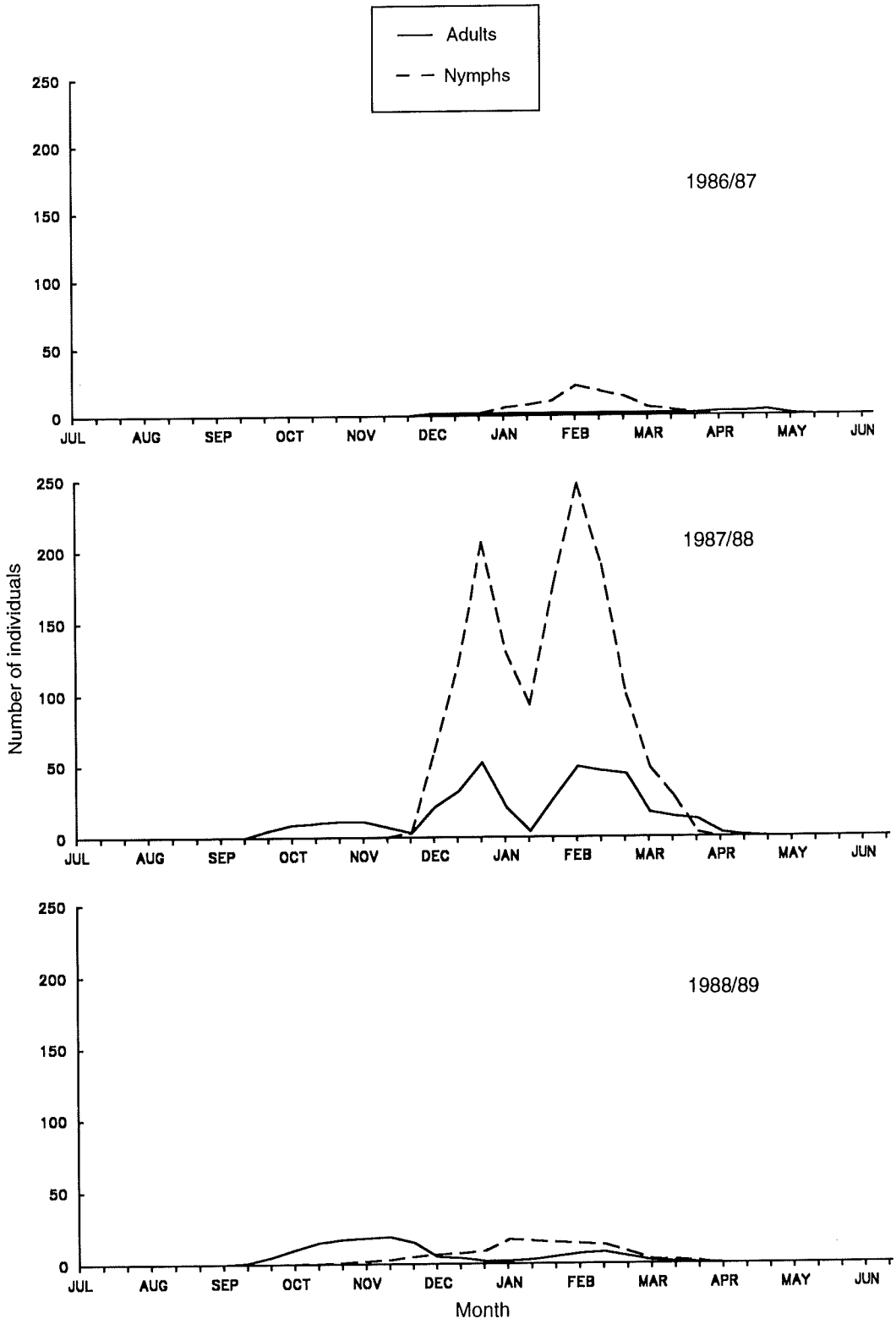

Figure 1. Coreid populations on infested E. regnans *and* E. obliqua *at the Goulds Country plantation.*

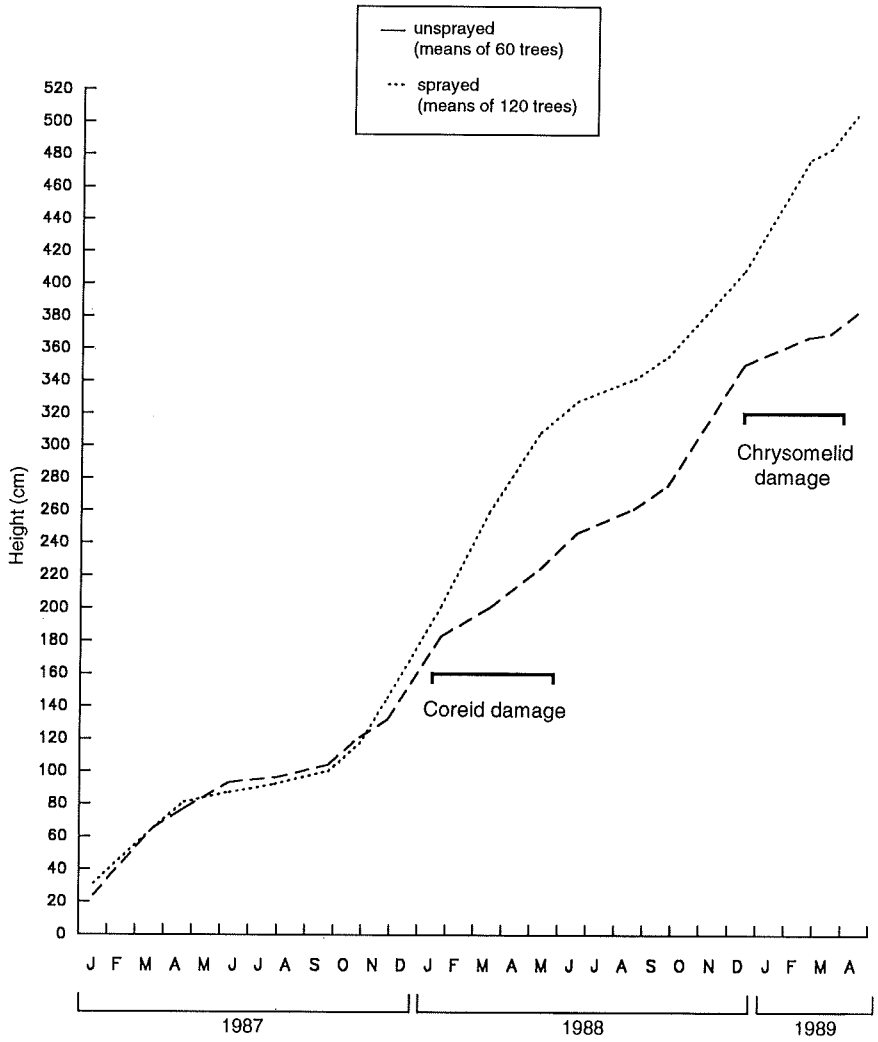

Figure 2. Height increment for Eucalyptus obliqua *at the Goulds Country plantation.*

Table 3. Coreid populations collected from sprayed and unsprayed trees.

Treatment	Species	Number of individuals 1986/87	1987/88	1988/89
Sprayed trees	*E. regnans*	48	350	7
	E. obliqua	37	258	10
Unsprayed trees	*E. regnans*	38	366	38
	E. obliqua	31	536	67

present on the trees at the time of spraying were killed and very low numbers returned to the trees during the subsequent 14 days. The numbers of individuals collected from the sprayed and unsprayed trees of both eucalypt species are shown in Table 3. In total numbers, it was found that *Amorbus* outnumbered *Gelonus* by a ratio of two to one.

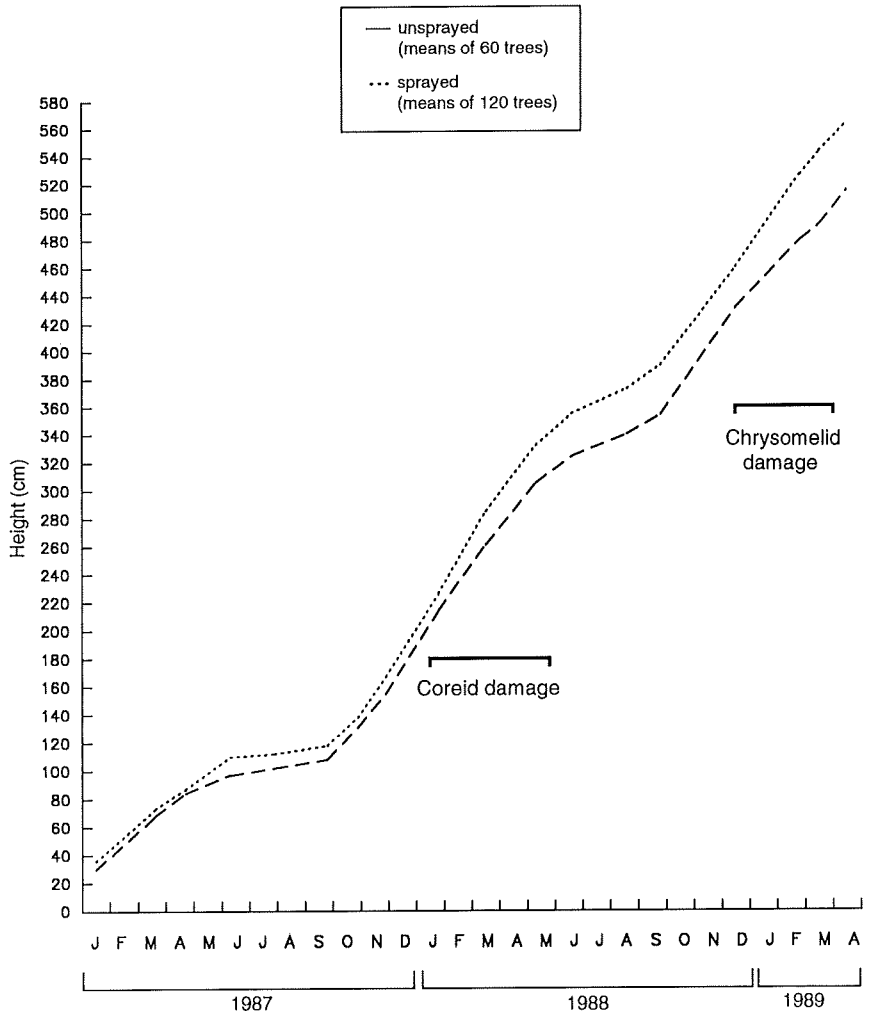

Figure 3. Height increment for Eucalyptus regnans *at the Goulds Country plantation.*

The limitations of spraying at intervals longer than a fortnight permitted individual coreids to move onto the sprayed trees although observations showed that these insects only began feeding in the last two days of the period.

The incremental height difference between sprayed and unsprayed trees during the twelve-month period 1987/88 is shown in Table 4.

The height advantage of *E. regnans* over *E. obliqua* was 8.5% for sprayed trees and 32.3% for unsprayed trees. The difference between sprayed and unsprayed *E. obliqua* was 38.8%.

Re-measurement of previously unsprayed trees of *E. regnans* and *E. obliqua* in December 1991 showed a height deficit in *E. obliqua* of 18.2% despite low infestation levels since 1987/88.

Discussion

The coreid bugs *Amorbus obscuricornis* and *Gelonus tasmanicus* significantly affected height increment, form and general health of *Eucalyptus obliqua* and *E. regnans* which had

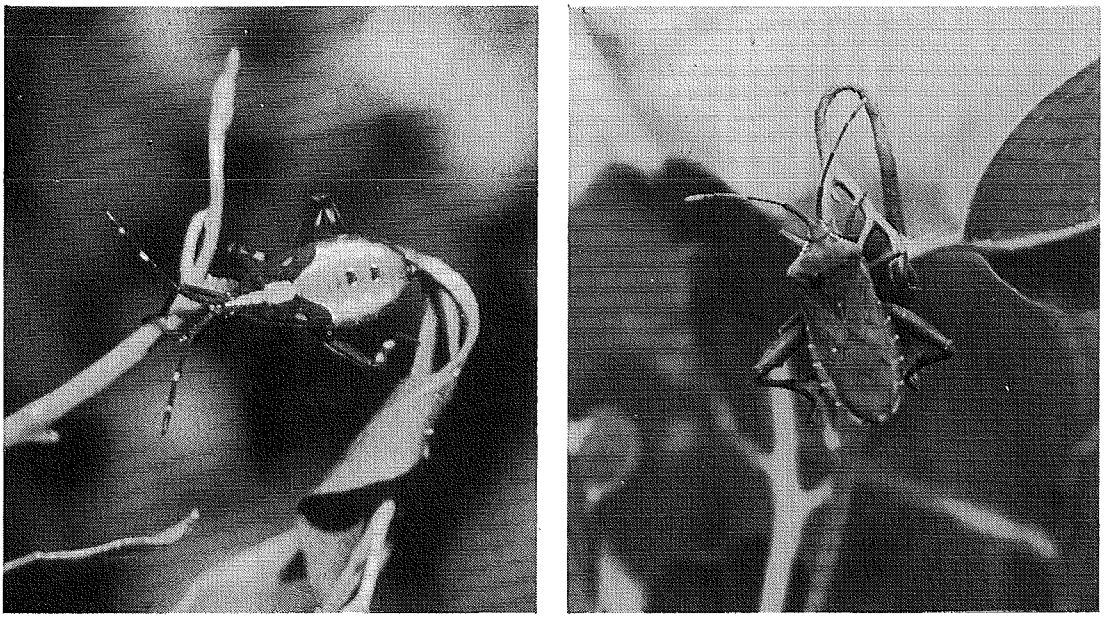

Photo 1. Feeding Amorbus obscuricornis: *(left) third instar nymph, X1.5, and (right) adult, X2.*

Table 4. Effects of coreid feeding on height increment of ash species over the 1987/88 12-month period.

	Eucalyptus regnans		*Eucalyptus obliqua*	
	Insecticide	Control	Insecticide	Control
Height increment (%)	112	109	126	86
Mean height (cm, ± SE)	356 ± 10	324 ± 16	328 ± 10	245 ± 11

similar infestation levels. The growth habit of *E. regnans* enabled it to grow out of the flat-top form.

Although historical evidence does not indicate that annual damage occurs, several outbreaks in the first five years following regeneration or plantation establishment have been recorded and the resultant effects are long term for species such as *E. obliqua* and *E. delegatensis*. Only the ash species of eucalypts are severely damaged. Occasional minor tip damage to *E. globulus* has been observed but apparently without long-term effects.

During the survey period, no predators or parasites were collected or reared from nymphs or adults of the coreids. These insects have large abdominal scent glands which are used as a deterrent mechanism releasing complex acetates and up to 10% acetic acid (Waterhouse and Gilby 1964). Examination of several hundred individuals did not reveal the presence of trombidiform mites as found by Green (1972).

Control of nymphs and adults in the trial was achieved using the synthetic pyrethroid cypermethrin. The repellent effect of the synthetic pyrethroids is of relatively short duration (10-12 days) and single applications do not provide long-term protection from mobile and long-lived insects such as the coreids. A similar result, where efficacy persisted for at least 14 days, was obtained by

McDonald *et al.* (1986) when testing a series of synthetic pyrethroids against the lygaeid bug *Nysius vinitor* on sunflowers.

This study indicates that coreid bugs are a potential threat to rapidly growing eucalypt plantations containing ash species. Height increment potential can be reduced by a third in one year, and poor form, resulting in multileaders, flat-top crowns and diseased branches, maintains the effects of a single season's feeding over several years. Occasionally, severe damage has been recorded in several young plantations in the past which, when combined with the increasingly serious problem of chrysomelid defoliation, demonstrates the necessity of improving pest monitoring and control techniques. Plantations of eucalypt ash species would seem to be ideal sites for population increases of coreids due to the ease of location of feeding sites by early stage nymphs.

Acknowledgement

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