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SEASONAL HISTORY OF LUCERNE JASSIDS IN SOUTH-EAST QUEENSLAND*

by G. K. WAITE, M.Agr.Sc.

SUMMARY

The seasonal history of jassids (*Austroasca alfalfae* (Evans) and *A. viridigrisea* (Paoli)) in irrigated lucerne was investigated at six sites in south-east Queensland from July 1969 to July 1971.

Both species at all locations were subject to large seasonal fluctuations, modified by the timing of harvests. During winter numbers were low, but built up during spring to peak in mid-summer in the case of *A. viridigrisea* and late summer-autumn for *A. alfalfae*.

Maintenance of a vigorous lucerne stand by frequent irrigation, and cutting during the early flower stage reduced jassid numbers by minimizing the time available for development of eggs and nymphs and depriving nymphs of food and shelter. A large proportion of eggs was removed in the hay but when harvest was delayed beyond early flower a greater proportion of nymphs matured and more eggs hatched. This provided the nucleus of a larger breeding population during the succeeding growth period.

I. INTRODUCTION

Jassids have been regarded as pests of lucerne in Queensland for many years (Jarvis and Smith 1946, Hooper 1958), the most common and abundant species being *Austroasca viridigrisea* (Paoli) and *A. alfalfae* (Evans). More recently Waite (1974) established that only extremely high populations (and chiefly *A. alfalfae*) cause significant damage.

A. alfalfae feeds from leaf conductive tissue causing the leaves to turn yellow and wilt and plants to stunt under heavy attack. *A. viridigrisea* feeds from mesophyll tissue and causes the typical white stipple formerly attributed to both species (Waite 1974). High adult populations are obvious as they take to the wing when disturbed. On the other hand, individual adults or nymphs are often difficult to detect since they are small, green and easily secrete themselves under leaves.

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In areas of high-yielding irrigated lucerne, many commercial growers adopt the practice of routine insecticide applications based simply on the presence or absence of obvious numbers of jassids. In such cases, little consideration has been given to the economic justification of the practice or to the possible side effects of heavy pesticide usage on non-target organisms.

The present study was undertaken as a basis for further investigations into the pest status of lucerne jassids in south-east Queensland.

II. METHODS

Seasonal jassid populations in three crops of lucerne in the Lockyer Valley, one at Kingsthorpe on the eastern Darling Downs and two in the Esk district in the upper Brisbane Valley were monitored between July 1969 and July 1971. All crops were irrigated. Lockyer Valley and Kingsthorpe fields were sampled weekly and Esk fields fortnightly.

A vacuum unit was used to collect insects from a 12 m length of lucerne by passing the mouth of the collecting net through the upper canopy of the lucerne. The area thus sampled was $2 \cdot 5$ m^2. The five samples collected at each site on each date were placed in individual glass jars for sorting and counting in the laboratory. Numbers of adults and nymphs grouped as 1st and 2nd, 3rd and 4th, and 5th instars of each species were recorded.

Since cutting effects a major change in the habitat, harvest dates at each site were noted and data on crop height and stage of development were recorded on each sampling occasion.

III. RESULTS AND DISCUSSION

Seasonal population trends of *A. alfalfae* and *A. viridigrisea* were basically similar at all sites and data for adults at Flagstone Creek in the Lockyer Valley, Kingsthorpe and Esk (site 1) are presented in figures 1 to 3 respectively. Data for nymphs at Kingsthorpe are presented in figure 4.

Points on the graphs have been calculated as moving averages (Yamane 1967). Each point is the mean of the sum of the number of jassids collected on a particular sampling date, the number collected on the preceding sampling date and the number collected on the succeeding sampling date.

Figures 1 to 4 show that jassids were most abundant in lucerne during the period September to May inclusive. June, July and August were of low activity with minimal populations providing the nucleus of the spring breeding population. *A. viridigrisea* was able to multiply rapidly as spring progressed and reached peak numbers during November, December and January at all localities. Relatively high numbers of this species were present at Kingsthorpe during the winter of 1969, a period when that crop was not cut for 14 weeks and high numbers were present prior to the onset of winter.

After peak populations were recorded during mid-summer, numbers of *A. viridigrisea* commenced to decline. During this period *A. alfalfae* became the more abundant species and remained at moderate to high levels until colder weather reduced the populations of both species to extremely low levels. During the spring of 1969, moderate populations of *A. alfalfae* developed at both Esk sites, giving rise to unexpectedly high populations of this species during summer. Total numbers of *A. alfalfae* at Esk generally far exceeded those of *A. viridigrisea* but reasons for this remain obscure.

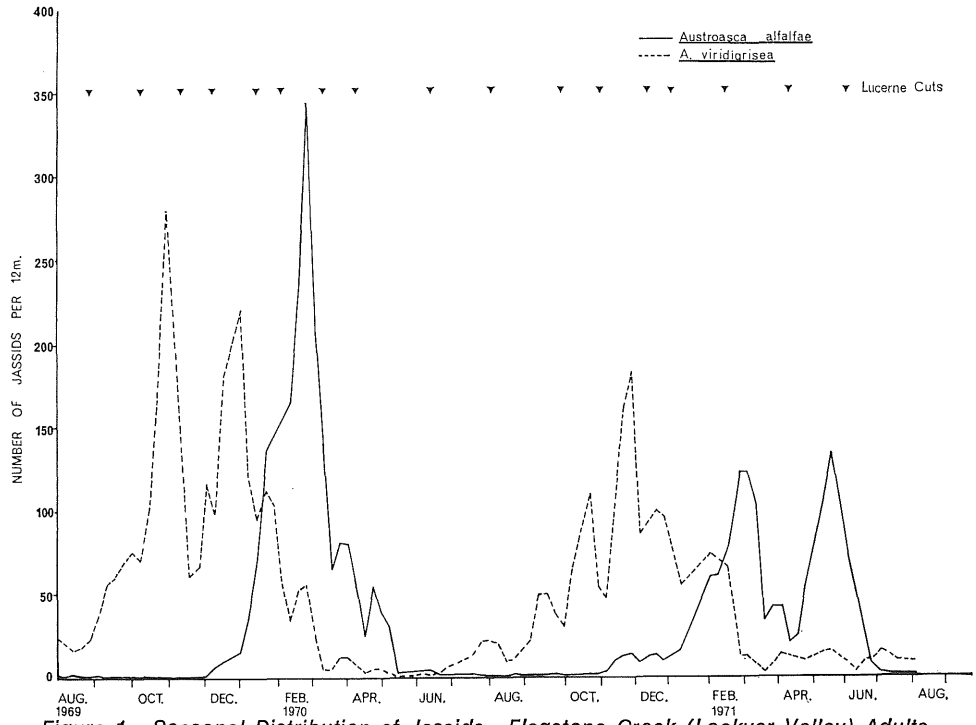

Figure 1. Seasonal Distribution of Jassids—Flagstone Creek (Lockyer Valley) Adults

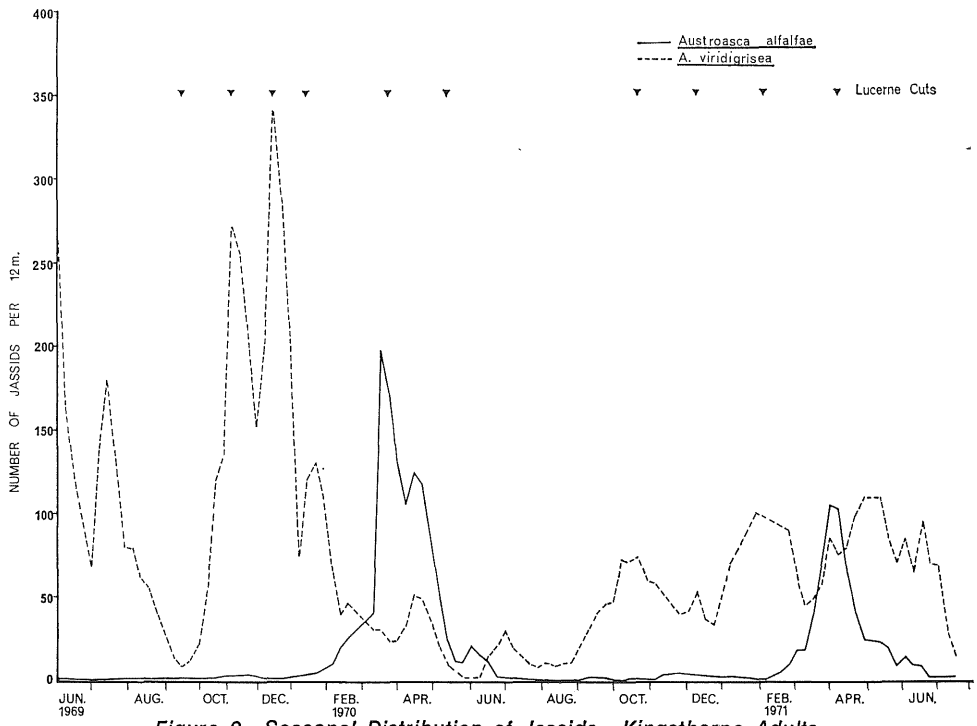

Figure 2. Seasonal Distribution of Jassids—Kingsthorpe Adults

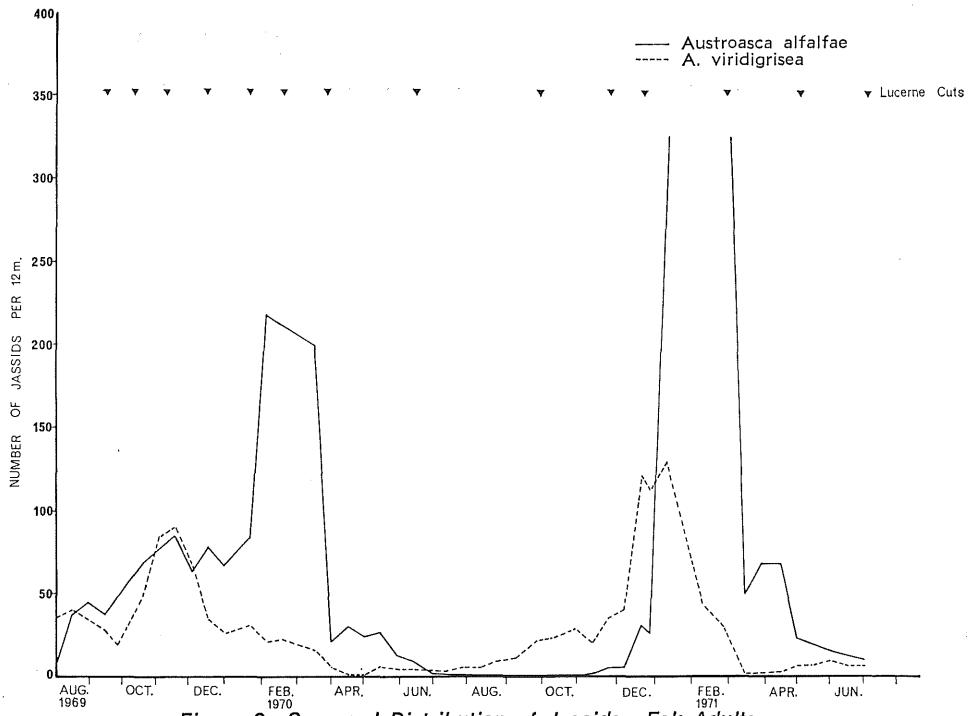

Figure 3. Seasonal Distribution of Jassids—Esk Adults

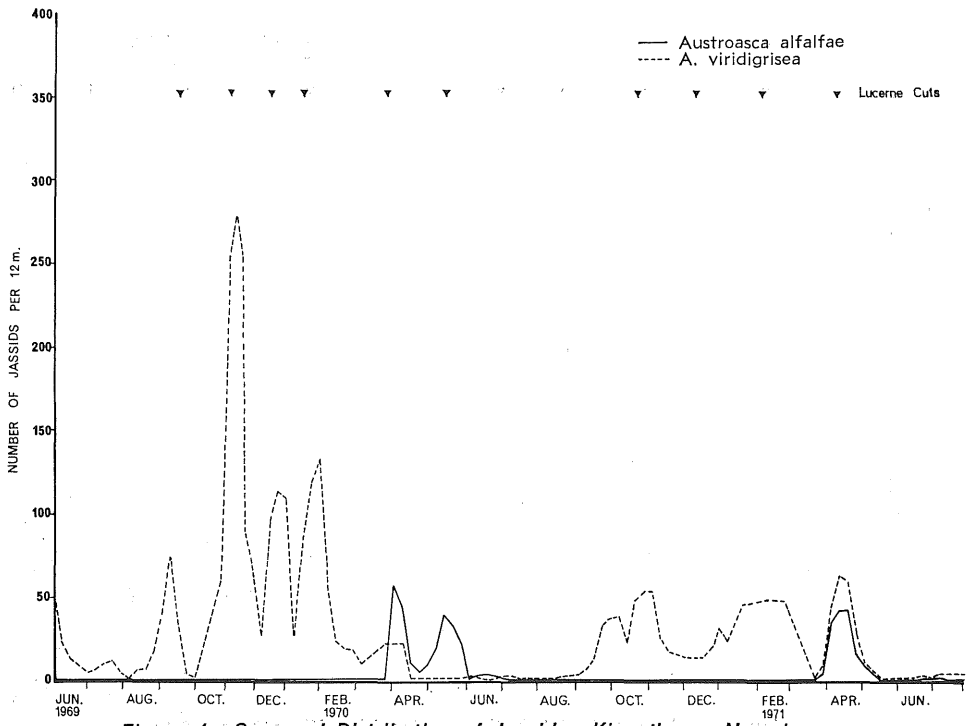

Figure 4. Seasonal Distribution of Jassids—Kingsthorpe Nymphs

At Kingsthorpe, numbers of *A. viridigrisea* were higher during all or part of the winter periods than at any of the other localities. This was attributed to the initial high summer population being able to carry over because of neglect to the crop. Water stress caused stunting and the lucerne was left for long periods between successive cuts. This assisted the build-up of high populations through the preservation of the jassids' food supply, shelter and oviposition sites. Data obtained from other localities indicated that maintaining a rapid growth rate through regular irrigation, and subsequent timely cutting of the lucerne would have reduced this high population to the normal winter low.

Figure 4 is representative of the seasonal distribution of nymph populations at all sites. As expected, similar trends occurred as for the adults of both species.

Populations at all sites and at all times of the year were obviously affected by harvests. An immediate decline in numbers occurred at cutting which could be attributed to the emigration of adults and the death of poorly-mobile nymphs from starvation and lack of suitable cover. Physical injuries caused by harvesting resulted in some mortality of adults and nymphs. Unhatched eggs remaining in lucerne stems and leaves were removed with the hay. When a clear cut was not achieved and a significant amount of green growth was left, a higher proportion of nymphs survived and a greater number of adults remained. Population build-up within the succeeding growth period then commenced sooner and at a higher initial level.

Laboratory studies have shown that at 27°C jassid eggs hatch in approximately 6 to 8 days and the nymphal period occupies a further 10 days (Waite 1974). At this rate of development in summer, when the period between successive cuts averages approximately 28 days, only eggs laid within the first 10 days of the growth period could produce mature jassids before harvest and so have a reasonable chance of survival. Eggs laid and nymphs hatching after this period cannot mature unless harvest is delayed.

The consequences of delayed harvests were observed on numerous occasions and the population figures quoted in table 1 resulted after cutting was delayed for 14 days at Kingsthorpe in November 1969. The high adult population which developed because of the lengthy postponement of harvest, reinvaded the lucerne from surrounding fields immediately regrowth commenced. One week after harvest the adult population had reached 372 per unit sample compared with populations of the order of 30 to 40 per unit sample when crops harbouring comparable populations were cut at the recommended one-tenth flowering stage.

TABLE 1

INCREASE IN NUMBERS OF *A. viridigrisea* AT KINGSTHORPE WITH CUTTING DELAYED BEYOND 1/10 FLOWERING

Date	Lucerne Height (cm)	No. of Jassids per 12 m Suction Sample			
		Adults	Instars 1 and 2	Instars 3 and 4	Instar 5
21 Oct 1969	61 (1/10 flower recommended cutting stage)	37	0	3	0
28 Oct 1969	66 ($\frac{1}{2}$ flower)	115	143	26	2
3 Nov 1969	71 (full flower)	214	425	153	20

The host range of *A. viridigrisea* was found to be extensive and included lucerne, a variety of other legumes, potato, tomato, cotton, beet, pigweed (*Portulacca oleracea*) and numerous other weed species. Many of these hosts were common in spring and summer in areas where most lucerne was grown. Numbers of *A. viridigrisea* built up on such alternative hosts which provided a reservoir for continuous infestation of lucerne. On the other hand, *A. alfalfae* was restricted to fewer hosts, the major one being lucerne. This, when cut regularly, limited the ability of *A. alfalfae* to multiply as quickly as *A. viridigrisea*. High populations of *A. alfalfae* generally did not develop until late-summer to autumn, when seasonal temperatures prolonged the intercut period sufficiently to enable a significant proportion of nymphs to attain maturity and the mobility which enhanced their survival chances after the lucerne was cut.

Damaging populations were rarely encountered during the course of the study. Such populations are most likely to develop during the late-summer and autumn period, especially when harvest is delayed. Such occurrences are inevitable during prolonged periods of wet weather but where conditions permit, every endeavour should be made by the grower to cut regularly at early flower. Strip-cutting is not advised as the uncut portion of crop provides convenient refuge for displaced jassid populations, as does the residue left by inefficient and ragged mowing.

Under a programme of regular irrigation to maintain rapid growth, and timely harvesting to minimize jassid breeding opportunities, insecticidal control of the insects should seldom be necessary. When required, however, the insecticide dimethoate is recommended for control (Waite and Passlow 1971).

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The author is an officer of Entomology Branch, Queensland Department of Primary Industries, stationed at Emerald.