Blue-Green Lucerne Aphid

POPULATION DYNAMICS OF BLUE-GREEN LUCERNE APHID IN THE LOWER NORTH ISLAND

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Summary

The results of a monitoring survey of blue-green lucerne aphid (*Acyrtosiphon kondoi*) populations in the lower North Island during the 1976-77 season are given. Most aphid build ups occurred within three periods. No correlation could be established between the time or rate of build up and district meteorological records; management appeared to be a factor affecting the timing of the build ups. Cutting or spraying caused rapid population declines but, in the absence of treatment, spontaneous declines occurred. Some geographical differences in aphid build ups were noted in early spring and late autumn.

INTRODUCTION

Since August 1976 a scheme to monitor blue-green lucerne aphid (BGLA) populations throughout the lower North Island has been undertaken by the Entomology Section of the Plant Health and Diagnostic Station, MAF, Levin in collaboration with the Insect Control Group, Soil and Field Research Station, MAF, Palmerston North. It was hoped that by regularly recording BGLA population fluctuations over a wide area and correlating these with climatic data, an understanding of the seasonal patterns of BGLA could be obtained.

METHODS

A simple technique of collecting samples of lucerne (*Medicago sativa*) each week, washing the aphids out in hot water and counting on gridded filter paper has been used. Some sampling sites were within established trials; others in farmers' paddocks: in all, seventeen sites were used, located in Taihape (3), Flock House (1), Dannevirke (4), Masterton (3) and Horowhenua (6).

Meteorological records for each district were supplied by the Meteorological Service and aphid numbers were plotted against the weekly mean maximum air temperature and the rainfall.

RESULTS

Most crops throughout the region showed several explosive increases in aphid numbers, but these were confined to three main periods. BGLA population explosions for one paddock in each area are shown graphically on a log scale in fig. 1. Other paddocks showed population increases of similar magnitude and rate but these have been omitted from the graph for clarity.

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FIG 1: BGLA population build ups in one crop in each of the five districts surveyed – August 1976 - May 1977. For clarity, each curve has been discontinued at its maximum point.

Populations increased exponentially and, with few exceptions, at a similar rate throughout the season. After reaching a maximum, aphid numbers at most sites rapidly declined to less than 10 per stem. This was usually the result of cutting, grazing or spraying although in the absence of such treatment, similar spontaneous declines usually occurred. In one paddock in the Horowhenua, used for a simple spray trial, aphid numbers in the unsprayed plots reached a peak (250 per stem) in February then rapidly declined until two weeks later only dead aphids were found. There appeared to be no excessive increase in predator numbers, and attempts to isolate fungal pathogens were unsuccessful. No cause for the spontaneous decline was established. In neighbouring plots, where plants remained undamaged, the aphid population began to increase as that in the unsprayed plots declined.

Between September and March no clear correlation between meteorological records and a build up in BGLA population could be established.

The majority of the population peaks occurred within three periods –

Mid September	– mid October
End of November	– mid December
Mid January	– mid February

In 80% of the sites for which cutting and spraying times are available, aphid population build-ups reached a significant level (10 per stem) 3-4 weeks after cutting. The time taken for the population to reach a maximum from this point varied from 1-5 weeks – depending on how long the increase was allowed to continue without remedial action being taken (i.e. cutting or spraying).

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In the spring, sampling sites at Flock House and some in the Horowhenua carried significant levels of aphids 6-8 weeks before sites at Dannevirke and Taihape; in the autumn aphid build ups have occurred in Horowhenua at least 8-12 weeks after other areas.

DISCUSSION

Summer (1975) suggested that BGLA populations disappear in hot summer temperatures. However, in the San Joaquin Valley, California, where this observation was made, the mean maximum temperature for July is 33°C (Neuenschwander *et al* 1975) compared with the highest mean weekly temperatures of 25°C in the North Island districts surveyed this summer.

Our results give no indication of any correlation between the rate of BGLA build up and climate — populations have increased at similar rates whether in early spring or mid summer.

Most crops were cut and/or sprayed in the first three weeks of October and again in the first three weeks of December. The two latter periods of population build up are therefore thought to reflect the time taken for the populations to increase again, following these periods of cutting/spraying, rather than any climatic or locality factor.

Although the role of predators and pathogens in the decline of BGLA populations may be significant in some crops, observations in the Horowhenua suggest that the state of the host plant may also play an important part. The rapid decline in aphid population was restricted to those plots where the host plants were severely damaged by the BGLA infestation.

No explanation is offered for the geographical differences in the time of BGLA build ups in early spring and late autumn, but it is tempting to suggest that differences in the beginning and end of the growing season for the lucerne plant in different districts may be important.

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