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Learning to live with the spotted alfalfa aphid

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The spotted alfalfa aphid which can devastate lucerne crops and perhaps also medic pastures, has been established in Western Australia since early 1978*. However several methods of control are being developed, which could allow continued production of lucerne.

Within three years of becoming established in the United States, in 1953, the spotted alfalfa aphid was devastating crops of lucerne in 30 States. In April 1977, it was found simultaneously in Queensland, New South Wales and Victoria, and a month later was found in South Australia.

Despite quarantine precautions, the aphid was found in Western Australia in irrigated lucerne at Upper Swan, Wanneroo and Gingin in January 1978. By March 1979, it had spread to major lucerne growing areas along the west coast, around Manjimup and at Esperance.

The variety Hunter River is particularly susceptible to attack by the aphid. Crops can be completely defoliated within a few weeks and even light infestations can kill seedlings.

The aphid can also attack annual medic and some clovers, such as crimson and strawberry. Subterranean, red and white clovers and vetches have not been damaged.

Description

Spotted alfalfa aphid is a yellow-green aphid with six to eight rows of darker spots on the abdomen visible through a hand lens. It is about 1.5 mm long.

The winged form of the aphid has smoky marks around the veins in the wings.

Aphids first appear underneath the lower lucerne leaves, and spread to the stems as the infestation increases.

Leaves turn yellow and drop off progressively from the bottom of the plant. This is a reaction to salivary toxins produced by the aphid as well as a reaction to sap sucking.

Where numbers are low, there may be no visible damage and the aphids are hard to find without special sampling nets.

The aphids produce large quantities of honeydew (excreted excess sugars), and sooty mould grows over the honeydew. When damage is severe only black sticky stems remain standing.

Attempts to make hay from heavily infested lucerne have been unsatisfactory. Hay balers can be severely damaged because the sticky nature of the honeydew reduces flow through the baler. However, bailing on a hot afternoon may help.

Another problem is that cattle may scour when feeding on heavily infested lucerne.

Aphids normally occur only as asexually-reproducing females. Sexual forms have developed in areas experiencing winter cold. Both winged and wingless females occur; more winged aphids develop with crowding.

The spotted alfalfa aphid breeds almost continuously throughout the year, but breeding is favoured by warm, dry weather.

An adult aphid gives birth to 25 to 100 live young over a period of up to a month. Young aphids pass through four juvenile stages in six to 10 days and some 20 to 40 generations may occur in a year.

Grazing management

Experience elsewhere in Australia has shown that the spotted alfalfa

Parasite rearing. Aphids are reared inside collapsable cages, and the colonies are inoculated with parasitic wasps which reproduce in the cages.

*Since preparation of this article, another aphid pest of lucerne, the blue-green aphid, has become established in Western Australia. The principles of control of the spotted alfalfa aphid also apply to the blue-green aphid.
aphid can be controlled with a combination of grazing management, release of parasite insects and chemical spraying. In time, resistant varieties with production at least equal to that of the variety Hunter River will also become available. This combination of controls has been almost completely successful in the United States.

In Western Australia, lucerne stands will require closer attention. While it is impossible to stop the aphid spreading, the spread could be minimised by avoiding stock movements from infested to clean paddocks, and by restricting vehicle movement into infested areas. South Australian experience suggests that almost all aphids can be destroyed by complete defoliation, although when some green material is left, the reduction is only 50 to 95 per cent of the population. Based on this, a system of grazing "one week on, four weeks off" is recommended. Sheep are necessary to graze the lucerne hard enough to give control, and should therefore follow cattle in the rotation. Heavy grazing or other control will be particularly important during spring and early summer, or after any summer rain or irrigation.

Spraying
Aphids are not usually evenly distributed, either in individual paddocks or over the farm. Before considering spraying, every paddock should be inspected thoroughly. The inspection should be every two or three days except in mid-winter when a weekly assessment should do. The frequent inspections are required because the aphid can, under conditions ideal for multiplication, destroy a crop in three days.

Methods of assessing aphid populations, and therefore whether spraying is necessary, are relatively simple. They involve counts of the numbers of leaves with aphids and the number without. The proportion of infested leaves indicates whether spraying is necessary. Spraying is unnecessary or often positively harmful unless aphids are building up in clusters on the lower 5 to 8 cm of lucerne stems. If the aphid infestation is patchy and the patches can be accurately determined, only the patches require spraying, leaving the rest of the paddock unsprayed. If weather is expected to be favourable for rapid aphid multiplication (warm and calm) and few predators are present, spraying must be carried out when the aphids are building up in clusters. Spraying at this time will prevent destruction of current growth of lucerne. If cool, windy weather is expected, or there are many predators and parasites, do not spray but make
further field assessments every two days. Spraying can be done with a boom, mister or by ultra-low volume aerial application. Rates of chemical should be as low as possible, as frequent use of high rates can allow aphids to develop resistance to the chemical. Parasites and predator insects are not harmed as much at the low rates, and the treatment is cheaper. Rates as low as 75 ml/ha of Metasystox have been effective and this costs only about 60 cents/ha.

**Predators and parasites of aphids**

Natural predators of the spotted alfalfa aphid, such as the ladybird and lacewing, already occur in Western Australian lucerne crops. Provided recommended insecticide practices are followed, predators will increase and help suppress the aphid population. Sprays should only be applied when aphid numbers justify it and then at low rates, so that predators of the aphid can multiply. Three types of small wasp parasites were introduced from the Middle East into the United States. These were effective, and suitable types have therefore been introduced into Australia. One of these species has been much more effective than the others in the Eastern States, but all three species have been imported for release in Western Australia as a precaution against the first species failing. In Western Australia, the three species are mass-reared in Department of Agriculture laboratories at South Perth. Thousands of the small wasps are released at a time, and releases are planned to coincide with an increase in aphid numbers. A fungus which kills the aphids has also helped control in the United States, and has been imported into Australia for testing before release. This fungus is particularly effective after rainfall.

**Resistant varieties**

Varieties of lucerne resistant to the spotted alfalfa aphid have been bred in the United States, and seed has been imported into Australia. Strict quarantine is essential to help prevent the introduction of serious diseases and pests, notably bacterial wilt disease. One resistant variety is Falkiner, which was originally selected by the CSIRO for its tolerance of waterlogging, and another is CUF 101, which has been introduced from the United States. However, most current resistant varieties including Falkiner, are resistant only to the spotted alfalfa aphid and not the other major aphid pest, the blue-green aphid. Furthermore, most varieties in the United States have never been grown without irrigation, and none have been tested under continuous grazing. All new Australian-bred varieties will be resistant to both aphids, and a range of varieties is likely to be available, for example for irrigated hay crops or for dryland crops. Although the Western Australian Department of Agriculture does not have a lucerne breeding programme, it is co-operating with other State Departments and the CSIRO programmes. Resistant varieties are expected to be available within a couple of years. The spotted alfalfa aphid can also damage Harbinger medic, but Cyprus and Jemalong are resistant to damage. Damage is most likely in the spring, but a check should be maintained through the growing period.

**Blue-green aphid**

The blue-green aphid is possibly a greater threat to Western Australia than the spotted alfalfa aphid. It is active in the cooler, wetter months, whereas the spotted alfalfa aphid prefers warmer weather. The honeydew which is characteristic of the spotted alfalfa aphid, is not produced by the blue-green aphid, and the colour of this aphid blends with the lucerne, making detection difficult. All medics and sub clovers are susceptible to the blue-green aphid, although in South Australia where the aphid has become established, sub clover has not been damaged in the field. It seems inevitable that the blue-green aphid will be introduced to Western Australia eventually. Control will then be attempted in a similar way to the control of the spotted alfalfa aphid, using the combination of chemical sprays, natural predators and in the longer term, resistant varieties.

**Future for lucerne**

Lucerne has been a valuable fodder plant in areas of Western Australia where it has been established. It is likely to continue to be useful because of the success of the combination of chemical control and control by predators, but will require more effort in management of the stand. In future years, high yielding, aphid-resistant varieties of lucerne will become available. In the meantime, further plantings of the variety Hunter River should be avoided.