

PEST MONITORING OF LUCERNE

CROP MONITORING SERVICES PTY LTD, KEITH

Pests Of Lucerne

Not all living creatures in a lucerne crop or pasture are pests. Many insects, spiders and mites live by feeding upon pests in the lucerne. In the ideal situation, pests and predators live in balance. The relationship between predators and prey means that not all pest infestations require chemical control. Insecticides generally kill beneficial insects as well as pests, so the decision to spray must be a sensible one. In many situations there is a time delay between the rise in pest number and the subsequent increase in beneficials. It is this delay that causes the necessity to spray. The decision to utilise the presence of beneficials to control pests is one made with the benefit of experience. Often it is the correct choice.

Insect Life Cycles

All insects pass through a series of distinct stages (instars) in their life. These changes (moult) follow one of two basic patterns, either incomplete or complete metamorphosis.

With incomplete metamorphosis both nymphs and adults have the same feeding habits. Nymphs and adults look alike, but are sexually immature and have only wing buds, which develop into full wings on the adults.

With complete metamorphosis the larva is often the main feeding (and damaging) stage. Larvae are very different from adults in appearance and must pass through a resting or pupal stage before becoming an adult. Only adults are sexually mature and have the ability to fly.

Insect Development Rates

The speed of insect development is most affected by temperature, food quality and humidity. In very cold (less than 50° C) or very hot (greater than 40° C) conditions, insect development slows or stops (diapause, overwintering or death). For most insects, optimum development temperatures range from 18 to 30° C.

Under optimum conditions aphids or mites can pass through a generation in 54 days while *Heliothis* may take 30-35 days. Aphids and mites develop more quickly on lush, fast growing lucerne than on more mature flowering lucerne. *Heliothis* develops most quickly on budding lucerne not short vegetative crops. Etiella seed web moth and seed wasp cannot develop until some early seed has set so they multiply on other hosts before attacking lucerne.

Rain is usually associated with cool weather, which slows insect development. Rain may physically wash aphids and mites off the plant which often sets back their rate of development. Under conditions of rain, warmth, and high humidity, diseases such as N.P.V. virus (kills *Heliothis* sp.) and *Entomophthora* fungus (kills blue green aphids) may spread rapidly through insect populations.

Integrated Pest Management

Integrated Pest Management involves the integrated use of as many relevant forms of pest control as possible to manage the pest while optimising crop yield and minimising ecological impact. Cultural controls, selection of resistant cultivars, reliance on beneficial insects, mites or diseases, consideration of weather and crop tolerance should all be employed before chemical control is implemented. Damage thresholds vary greatly depending on the weather as well as crop and bee management. Control decisions should not be based solely on rigid pest levels but also the rate of pest increase. Rapid pest population development means greater damage potential.

Sampling Definitions

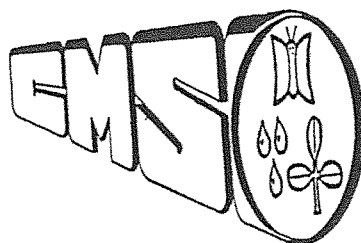
The standard sweep net consists of two swift 2.6 metre sweeps through the top 30cm of crop. The standard white net is 38cm in diameter, 70cm deep and the handle is 75cm long. Ten to twenty samples are taken per 20 hectares and the average number of insects per sample is calculated.

This method is used for most insects and their predators. Etiella seed web moth levels are assessed by inspecting ten lucerne racemes at each sample stop. A percentage infestation of racemes is then derived. Regular, accurate sampling is essential for making good treatment decisions. More samples should be taken when pest distribution is not uniform in a field. Checking fields when poor conditions prevail (eg. wet or windy) often means fewer insects are found. Rechecking soon after, on a better day, is most necessary.

Conclusion

It is recognised that spraying pesticides is still necessary for yield protection in modern agriculture. However, excessive spraying leads to insect resistance through the selection of resistant individuals already present in the pest population. Control of pests by predators and parasites results in the reduction of the numbers of chemical resistant pests, hence inhibiting their build-up in the pest population by slowing their multiplication.

Integrated Pest Management sections are extracts of the publication *Success With Dryland Lucerne* by Mark Stanley and Raymond Christinat. Copies of the manual are available from Crop Monitoring Services P/L PO Box 209 Keith SA 5267 (cost \$37.50 posted)



WEED MANAGEMENT OF LUCERNE

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INTEGRATED PEST MANAGEMENT (IPM)

Planning weed control

Weed control is an essential factor for the establishment and the productivity of dryland lucerne pasture.

The process of weed control does not solely involve the use of herbicides, but rather an integration of techniques of which, one is using herbicides. IPM (integrated pest management or, alternatively, integrated weed control), is a strategy which involves the use of one or more techniques to control a weed problem.

Techniques involved in the integrated approach include cultural controls (such as grazing, fertility management and burning) and mechanical controls (such as cultivation and cutting). Use of biological control agents is implemented if applicable along with chemical control using herbicides. Generally herbicide usage is the last option when the other methods have either failed or are not applicable.

Preparation of a paddock for lucerne should be part of a long term rotational plan. The plan should combine grazing, cropping, hay production and spraying to reduce the build up of weed seeds prior to sowing lucerne. An effective weed control strategy may involve the use of several methods of weed control. This is preferable to the continuous use of any single method as this may lead to weeds developing resistance to or escaping that method.

Poor management allows weeds to become established in a stand. It may include overgrazing, too-frequent or ill-timed cutting, poor nutrition or poor insect and disease control.

Weed and lucerne relationship

The balance of weeds and lucerne in a lucerne stand generally tends to follow a particular pattern. In the winter-to-summer period of the establishment year, annual weeds dominate.

In the following winter, annual weeds again predominate but, with good stand density and any necessary weed control, the stand will be almost pure lucerne after the first spring cut. From this time on lucerne will predominate in summers, if managed well, as it out-competes summer weeds for light and moisture.

In winter, lucerne does not grow quickly due to cold weather and short days. Annual winter weeds grow in the gaps left between lucerne plants. As the stand ages and plants die, annual and perennial weeds proliferate in the gaps until they out-compete the lucerne.

Fertiliser management

Proper nutrition generally results in negligible increases in weed infestation. Too much fertiliser encourages weeds, especially barley grass, but also encourages good lucerne growth. Insufficient fertiliser leads to poor lucerne vigour and susceptibility to weed competition. Soil and tissue tests are valuable aids in monitoring fertiliser requirements.

Biological weed control

Biological control involves the release of a predator, parasite or disease of a particular weed. If conditions are ideal the control agent establishes itself in the weed's environment to control it - not by elimination, but by maintaining it at a low level where both live in balance.

Chemical weed control

Herbicide use should be part of an integrated weed control strategy. Attention should be given to the control of problem perennial and annual weeds in previous pastures or crops where more suitable products may be available. Herbicide use will improve the proportion of lucerne in a stand, but does not necessarily increase dry matter production, nor does it guarantee longer stand survival.

If alternative management procedures fail or are inappropriate, herbicides can be used to control many weeds. They should not be a substitute for good management, but form a valuable part of a sound IPM program.

Seedling and established lucerne

Lucerne seedlings are highly vulnerable to weed competition, especially annual species. The aim should be to sow into a weed-free seedbed. Good weed control in preceding crops or pastures can significantly reduce the weed population during the establishment year. Perennial weeds may affect establishment as well as future productivity and stand life, and should be eradicated prior to sowing.

Herbicide use is important in many situations in the establishment year. Lucerne seedlings grow slowly over winter relative to annual weeds and, with no weed control, vigour is reduced. With the need to conserve moisture for spring and summer use by lucerne in the establishment year, chemical control of competitive infestations of annual weeds may be economic.

In established stands the method of IPM depends on the intended use of the stand. Many winter annuals which grow while lucerne is dormant add to feed quality and quantity. If the level of weed infestation is only moderate, and depending on the plans for the lucerne stand, (eg. seed or hay production or pasture), then there may be no need for weed control.

Perennial weed control in an established stand requires vigilant spot spraying or hand pulling, although total control is often difficult.

Wintercleaning

The process of wintercleaning involves controlling unwanted grasses and/or broadleaf weeds with selective herbicides in lucerne stands in midwinter. Removing weed competition at this time allows the lucerne to grow unimpaired into the spring, resulting in significant improvements in lucerne production.

If the lucerne is to be cut for hay, wintercleaning will improve the quality of the first hay cut. Another advantage of wintercleaning is that it can lengthen the life of a lucerne stand by removing excessive weed competition.

The technique should only be used in lucerne stands with adequate plant numbers. If used in thin stands, it will leave soil between lucerne plants bare and vulnerable to wind and water erosion.

Cultural control

Cultural control of weeds involves sowing weed-free certified seed. It requires cleaning machinery used for cultivation and sowing to reduce weed transport between paddocks by seeds or rhizomes.

Cultivation of an established stand when dormant (in winter) may assist in weed control, although it can damage lucerne plants and should be used only when considered necessary.

Grazing management

Proper grazing management reduces weed problems in established stands.

Rotational grazing maintains a vigorous stand. This is an important factor in the IPM approach. Dense stands resist weed invasion reasonably well. The stocking rate should be high enough to utilise all available feed.

In moderate rainfall areas, a six paddock rotation will maximise production and persistence. There should be a rest period of at least five weeks between grazing with a grazing period of one week. In lower rainfall areas, the rotation should be extended to six or eight weeks.

Grazing too often significantly increases weed infestation and growth due to reduced competition from less vigorous lucerne growth.

Cutting and burning

Cutting too often (eg. every 3-4 weeks) significantly increases weed infestation and growth when compared to a six-week program. Cutting hay in spring may help to control erect weeds and prevent seed set. Burning assists in removing weedy trash and sterilising seeds in the topsoil, with little damage to established lucerne. Strategic burning every few years can remove unmanageable weed growth, but heed must be paid to any possibility of erosion.