OFFICIAL

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Mis-diagnosing pasture pests



BRC

Melbourne Water

Invertebrates

Agricultural ecosystems are often seen as monocultures, with just one species being grown as a crop (eg. Wheat, Canola) and while pastures usually have more than one species of fodder plants they are also usually seen as being comprised of just very few plant species. These plant species have certain invertebrate pests which are also often associated with particular plant species. Increasing the diversity of plant species leads to a greater diversity of invertebrates, and this includes beneficial species as well as pests. Beneficial can mean a biological control agent that helps to control pests but there are also other sorts of beneficial species.



The majority of the invertebrate species present in pastures will be neither pests nor biological control agents and would be described as benign in IPM terms. However, these "benign" species are highly valuable for other reasons as they provide services that are beneficial in creating a robust and healthy ecosystem. Some of these services include non-bee pollination, nutrient cycling and providing a food source for predatory insects and other animals such as birds, bats and reptiles. In multi-species pasture systems where the aim is to increase biodiversity, labelling invertebrates as either pest or biological control agents limits the understanding of the complex interactions that are occurring on a micro-scale that often go unnoticed.

However, there are times even in a healthy system when invertebrates can become pests so it is important to be able to recognise when an intervention might be needed.

Pests

Pests can be divided into two groups: those that are resident, meaning populations live in the paddock all year (slugs, red legged earth mite, Lucerne flea) and those that are transient, meaning they fly in from outside the farm and will leave again (Diamondback moth, Heliothis, Rutherglen bugs)

Resident Pests

These pests are those which have populations that live permanently in a paddock. So, these pests are not highly mobile but can build up into damaging levels if not controlled. (Control can be achieved by biological, cultural or pesticide options). Some of the most common pests of this type include slugs (several species), redlegged earth mite (RLEM), lucerne flea, cockchafers and black field crickets. Slugs, RLEM and lucerne flea are normally pests in the cooler, wetter months while crickets are active over summer.

Slugs are active whenever moisture is present so they can still be active in wet springs and summers. Each individual can live for more than one year and they are hermaphrodites, meaning that each individual in the population can potentially lay multiple batches of eggs.

RLEM and lucerne flea can have several generations each year so populations can increase significantly even within one season. RLEM populations exist as eggs over summer and are triggered to hatch by a combination of low temperatures and rainfall. Lucerne flea can be active all year provided that there is enough moisture but will generally die off over summer. The first generation will hatch from over-summering eggs with the arrival of rain and here can be several generations a year.

Transient Pests

Some of the most common transient pests include caterpillar stages of Helicoverpa (formerly Heliothis), cabbage white butterfly and cutworm. True bugs such as mirids and Rutherglen bugs and aphids can also be sporadic pests.

Helicoverpa and cutworm caterpillars can cause feeding damage to a range of different plants, but cabbage white butterfly caterpillars will only feed on brassicas. Adult cabbage white butterflies feed on the nectar of many different species of flowers which often leads to misconceptions that they can damage many species of plants.

Rutherglen bugs and mirids are true bugs that feed with sucking mouthparts. They are often feed on developing seeds and mirids can kill the plant cells where they insert their proboscis. These bugs are native species and are often seen at the start of summer when vegetation begins

to dry out. Winged aphids disperse in spring and can reproduce very quickly. Aphids can be host-specific meaning they will only feed on one type of plant such as cabbage aphids that only feed on brassicas and other species such as green peach aphids will feed on a wide range of plants.



Slugs can be found in pastures, especially in wetter months



Crickets can be found in pastures, especially in summer months and dry conditions where they can live in cracking soils. A simple tile can assist with monitoring for ground dwelling invertebrates. Image: Jessica Page



Lucerne flea can be found in pastures and are often overlooked as the cause of pasture damage

Biological Control Agents

Biological control agents include both native and introduced species, which could be predators, parasitoids or pathogens and, like the pests, can be either resident or transient species. The species that control the resident pests are also resident species. These include species of predatory mites, predatory beetles (particularly carabid and staphylinid beetles) and predatory bugs. These species live in the soil or on the soil surface. Larval stages of the beetles are predators that live in the soil. Some of these are generalist predators and so although some of the pests are not native to Australia these predators will still accept them as prey.

There are many different types of predatory mite, but snout mites (Bdellidae) are particularly important in the control of lucerne flea. Similarly, there are different species of carabid and staphylinid beetles in different locations, but each area will have its own set of native species. These beetles can have generation times of a year or more, and so are slow to re-establish if disrupted.

Transient biological control agents can be either predators or parasitoids and like the transient pests they move in from outside the paddock. Some important predators in this category include brown lacewings, ladybirds and damsel bugs. The winged adults fly into the paddock and then the wingless offspring will prey on certain pests, particularly aphids and small caterpillars. They have life cycles of several weeks and if food (prey) is still present then there will be multiple generations before they leave.



Snout mites are small red-orange mites that prey on lucerne flea

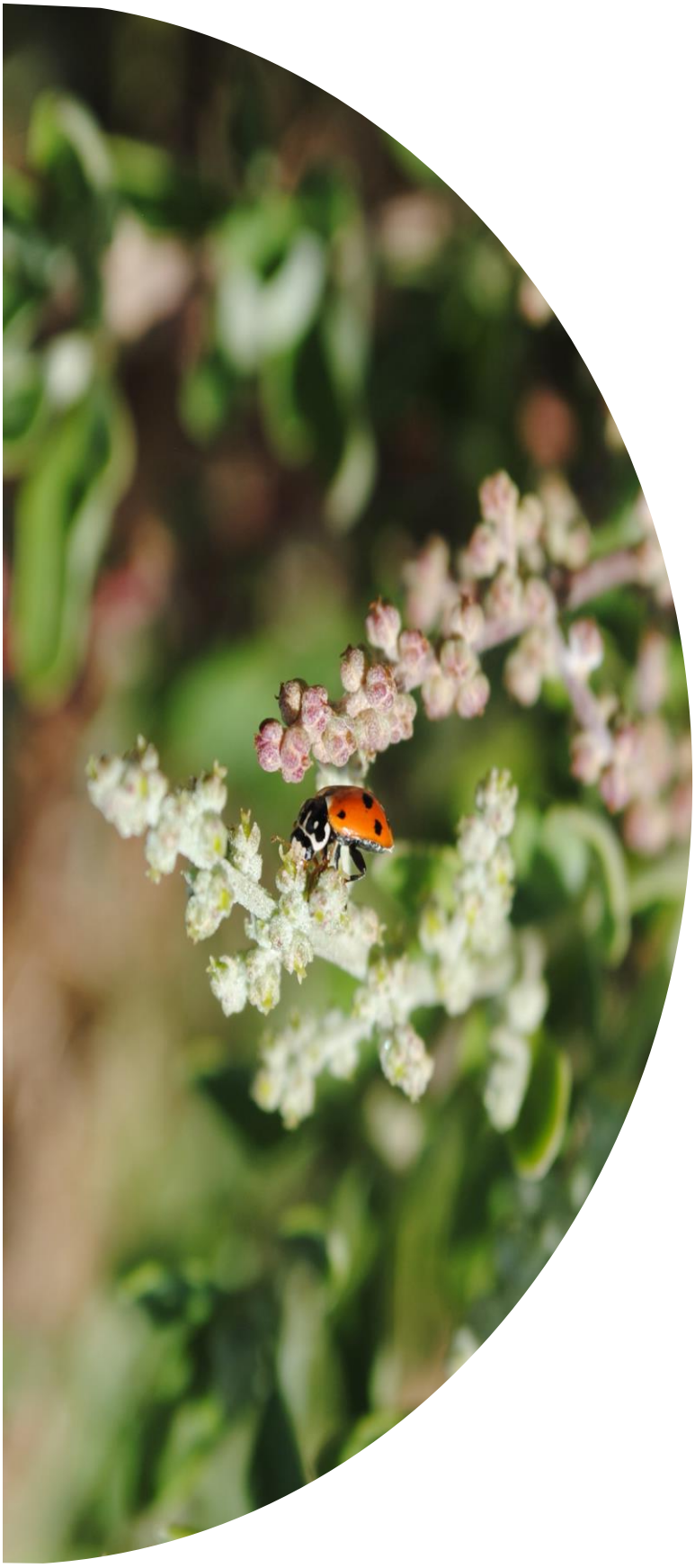
Parasitoids are insects that parasitise other insects. These are usually species of wasps or flies, and they typically have a small number of host species (often just one). The adult female lays its eggs either into or onto the host and the larvae develop on the still living host. The caterpillar pests mentioned above are parasitised by a number of species, with some attacking the egg stage, others the larval stages and some attack the pupal stage. The species that develop inside the host are essentially invisible until they pupate and so are often underestimated or overlooked.

Pathogens may be viruses or bacteria (and some others) and occur naturally but some are also produced commercially and can be sprayed to control certain pests.

Vertebrates such as birds, bats and reptiles are also important biological control.



Black-faced Cuckoo-shrike- insect eater using a sunflower as a perch. The small flock were eating Cabbage White Butterflies in the multi-species



Cultural Controls

In addition to the biological control agents described here, there are also a range of cultural controls that can be used. These are simply management techniques that either discourage the pests or favour the biological control agents. Often they are things that would be desirable anyway for other reasons.

Some examples of cultural controls include plant health, a nectar source for beneficials, grazing management and species mix. Lucerne flea and RLEM preferentially feed on species such as clovers so a strategy could be to delay planting clovers if the pest population is high as they are more likely to suffer from damage at the early leaf stage (lab trials 2019). It is necessary to know what pest or beneficial you are targeting as some techniques may have detrimental impacts that are not intended. That is, they may control the target pest but also have a negative impact on beneficials or favour other pests.

Spotted Amber Ladybird on saltbush

Diagnosing and Controlling a Pest Problem

Typically, the first signs of a pest problem in pastures will be bare patches and/ or leaf damage.

At establishment the most likely cause of bare patches are slugs. Slugs can be difficult to find during the day so the best option is to use shelter traps (tiles, wood, sacks, etc.) Slugs will retreat under these during the day provided that the ground underneath is moist and can checked easily. If there are slugs and there is significant damage then using baits is the best option. There are organic and non-organic bait options but whichever bait is chosen it is important to use the highest rate possible and ideally, bait twice.

RLEM and Lucerne flea are the most likely culprits for leaf damage during establishment. The damage caused by Lucerne fleas is often attributed to RLEM. The way to tell them apart is by the type of damage; Lucerne fleas make windows in the leaf cuticle and RLEM causes silvering of the leaf. The standard methods of dealing with these pests have for many years relied solely on the use of synthetic pesticides either as seed dressings or foliar applications. In mixed species pastures where the decision has been made to not use synthetic pesticides then management is achieved through cultural practices, and in particular grazing management, weed control, and the choice of seed mix. For the most part, these practices are being used for other reasons but they also help to reduce the impact of these pests by providing a habitat for soil-dwelling biological control such as predatory mites and beetles. When selecting the seed mix for a paddock with a history of high numbers Lucerne flea and/or RLEM include species that establish quickly and can tolerate some feeding damage and save the more high-value clovers and broad-leaf seeds for paddocks with pest pressure. Lucerne fleas tend to be patches whereas RLEM can be more evenly spread or invade from weedy borders.



Lucerne flea damage- windows in the leaf cuticle

RLEM and Lucerne flea both thrive on cape weed so getting rid of this weed will help to reduce problems with these pests. Both Lucerne flea and RLEM can cause significant damage at establishment, particularly in weedy, overgrazed paddocks with poor soils but the damage they cause will become significantly less as the overall health of the paddock improves.

Transient foliar pests

Insects such as caterpillars, aphids and other true bugs are significant pests in a wide variety of crops but in well-established mixed pastures, it is unlikely that these insects will cause enough damage to warrant any action. In many cases they will have gone or been controlled by natural enemies by the time the damage is noticed. The most likely pests that can cause damage to pastures include armyworm caterpillars and underground grass grubs (*Oncopera sp*.).

Grazing management is important in controlling cockchafers. Avoid bare ground over summer months if black headed cockchafers are of concern and avoid long grass in September when redheaded cockchafers are flying. If slugs are the major problem, then intensive grazing (strip grazing) will reduce populations by removing food and shelter and by trampling.

These caterpillar pests are native species that have a range of both invertebrate and vertebrate natural enemies. The role of birds, bats and small mammals is not really quantified but is likely to be very significant.

Crickets and wingless grasshoppers

They can cause significant damage when in high numbers. They are more likely to be a problem in areas with cracking soil, and once again, planting species that have deep roots can assist in reducing the amount of cracking. When in sufficient numbers to warrant treatment then the use of baits is the most efficient way of reducing the population.



Image: Black field cricket. Credit Andrew Weeks Cesar Australia

Links

Cesar Australia IPM

Cesar Australia Black crickets

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