FACTSHEET

Wednesday, 14 September 2016

Kym Perry – Senior Research Officer

SOUTH AUSTRALIAN RESEARCH & DEVELOPMENT INSTITUTE
PIRSA

Mandalotus weevils in canola

Mandalotus weevils (*Mandalotus* spp.) are a group of native Australian weevils comprising a large number of described and undescribed species. Since the late 1990s, several species have emerged as significant but sporadic pests of germinating crops in parts of south-eastern Australia. The adults attack seedling crops in autumn causing direct yield losses. A range of crops are attacked but canola is particularly susceptible. In severe cases, large areas of canola can be eaten out, resulting in bare patches that require re-sowing.

Figure 1: Mandalotus adult feeding on canola.

DESCRIPTION

Adults are flightless, approximately 3-5 mm long and dull-brown in colour, often resembling a clod of dirt. They typically have rows of short, thick, paddle-shaped hairs on the back of the body. Adults of some species have a slightly mottled appearance.

Eggs are approximately 1 mm in diameter, whitish and ovoid in shape. Larvae are small, whitish, legless grubs with a hardened yellowish-orange head capsule

(Figure 2). The larvae are completely soil-dwelling and are rarely seen in the field.

There are thought to be several different Mandalotus species responsible for crop damage in south-eastern Australia. The identity and pest status of each species remains unclear as the Mandalotus genus is still awaiting formal taxonomic definition. Figure 3 shows the variation in adult appearance between some of the species.

Adults can be confused with several other weevil pests. These include the spotted vegetable weevil (*Steriphus diversipes*) which is slightly larger (up to 7mm) and has a more distinct weevil snout; Polyphrades weevil (*Polyphrades laetus*), which mainly damages cereals and is only known to occur on Eyre Peninsula in South Australia; Sitona weevil (*Sitona discoideus*), which has a broad snout and three pale stripes on the thorax.

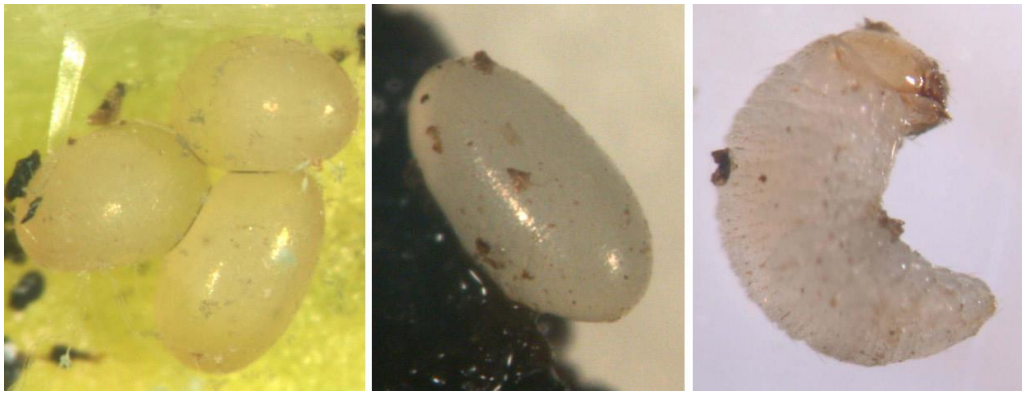


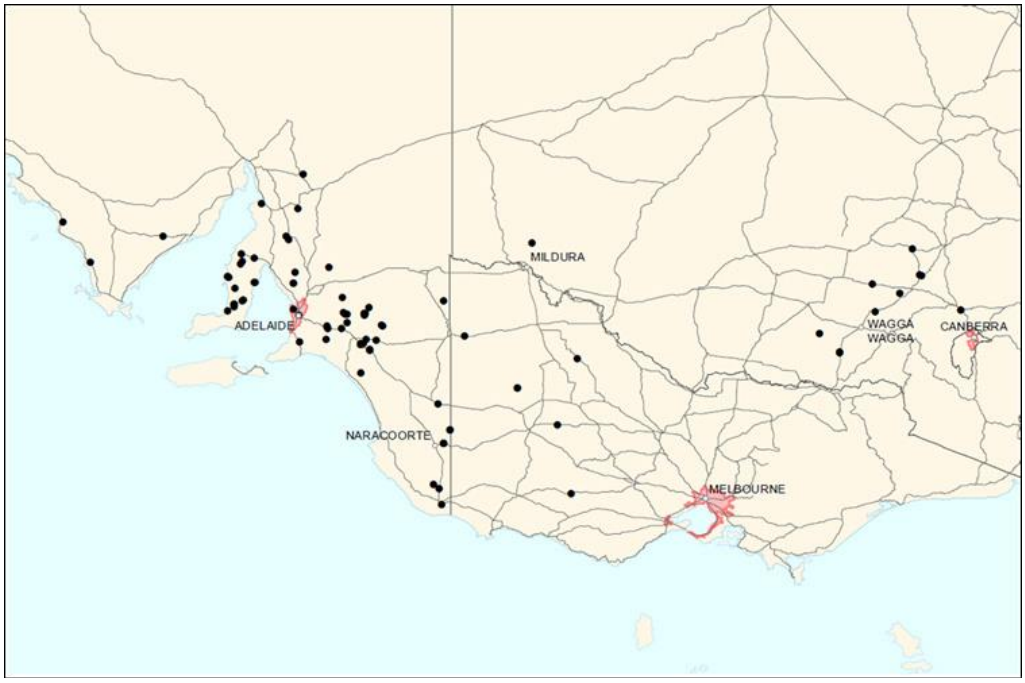
Figure 2: Eggs (left, centre) and 1st instar larva (right).

Figure 3: Adult variation in Mandalotus species.

PEST STATUS AND DISTRIBUTION

Mandalotus weevils were first described as destructive to Australian grain crops in the 1920s. There were very few reports of crop damage until 1997 when adults were recorded damaging a canola crop in the South Australian Mallee. There were further sporadic reports in the SA Mallee in subsequent seasons. In 2003, 500 hectares of canola was severely damaged in the SA Mallee resulting in significant yield losses.

Since then, the frequency and geographic extent of Mandalotus damage reports has increased and damage is now recorded from the Yorke Peninsula and Mid-North regions of South Australia, the Mallee and Wimmera regions of Victoria, and the Riverina, South West Slopes, Central and Southern Tablelands regions of southern New South Wales (Figure 4). The majority of damage has been typically reported in emerging canola crops mainly sown into lighter, calcareous soils. Mandalotus weevils are not known to occur in Western Australia.



(Figure 4). The distribution of Mandalotus crop damage reported in Australia..

LIFE HISTORY

Mandalotus weevils have one generation per year. They can complete their lifecycle (Figure 5) within a paddock.

Moisture events during autumn and early winter stimulate the adults to emerge from over-summering sites and move to the soil surface where they commence feeding. Weeds, including those drying off following herbicide application, provide an early source of food and shelter for adults before the crop emerges. During the winter period they continue feeding, mating and laying eggs in the soil. Laboratory studies suggest that eggs hatch after 2-3 weeks. Most adults have emerged onto the soil surface by late June and numbers decline by late winter.

Larvae develop in the soil during winter, spring and summer. There is a short period of pupation over summer. Newly developed adults remain deep in the soil to over-summer (12-40+cm depth). Figure 6 shows the depth of larvae and adults in the soil profile at various times during the season.

Laboratory studies indicate that the number of eggs produced by a female depends on plant diet. A female feeding on canola may lay approximately 400 eggs in her lifetime, compared to less than 300 eggs on a vetch diet, approximately 100-150 eggs on a diet of other pulse crops and only 15-40 eggs on a diet of cereal crops.

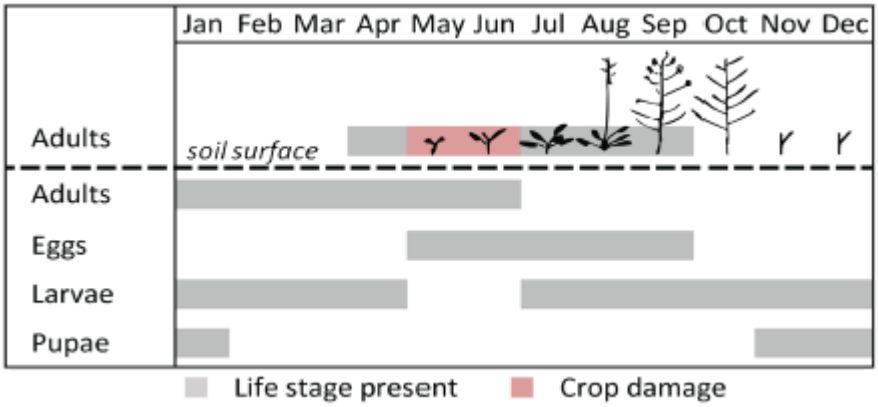


Figure 5: Lifecycle and presence of life stages

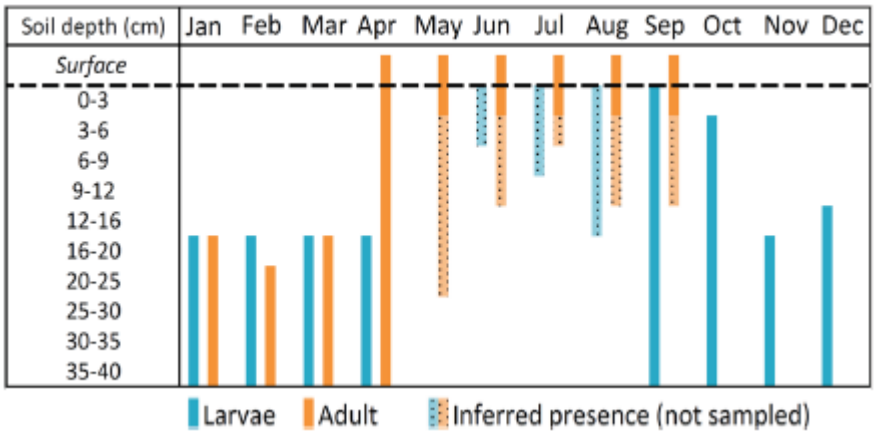


Figure 6: The depth of larvae and adults in the soil profile. Note: Solid coloured bars represent sampling data. Patterned bars represent inferred occurrence of life stages based on current understanding.

CROP DAMAGE

Adults attack a range of seedling crops including canola, cereals, lentils, vetch, beans, peas, chickpeas, and medic. They chew the leaves, cotyledons and stems of seedlings resulting in defoliation or seedling death.

Canola is particularly susceptible to damage; seedlings are often ring-barked just above ground level, lopping the seedling which is then consumed on the ground (Figure 8). Adult densities in excess of 300-400 per m2 have been recorded in germinating canola, causing considerable damage. In severe cases, large areas of canola may be rapidly destroyed resulting in bare patches that require re-sowing (Figure 7).

The main risk period is during autumn in the first 4-6 weeks after crop emergence. In canola, the damage is typically first noticed one week or so after seedling emergence. In cereals and pulses, there is usually only minor damage to the leaves and the plants often recover. Damage is typically very patchy and often associated with paddocks and areas of paddocks with lighter, calcareous soil types. Mandalotus populations often

recur within the same paddocks and areas of paddocks across seasons, however feeding damage is usually only noticed in a canola rotation.

Figure 7: Canola crop thinning (near) and bare patches (far) from adult feeding.

Figure 8: Typical ringbarking damage to canola.

MONITORING

Monitoring for adults is difficult. They feed mostly at night and during the day often shelter in the top 1-2cm of soil at the base of plants. Searching at night with a torch can detect adults feeding up on plant leaves. Prior to crop sowing, adults can be found under a wide variety of broadleaf weeds including cape weed, turnip weed, skeleton weed, prickly lettuce, and also volunteer grasses. Within cereal crops, they prefer to shelter under any broadleaf weeds present.

Detection by direct searching of weeds is more efficient where weeds are sparsely distributed. There are no accurate methods for estimating adult densities due to their cryptic habits, and economic thresholds have not been established. Prior to sowing, knowledge of paddock history and where problems have occurred in previous seasons can be a guide to the areas most at risk.

Above: Adults at the base of canola plant.

CULTURAL CONTROL

There are no cultural methods available to directly control weevils. The over-summering strategy means that chemical or cultural methods cannot be used during the non-crop period to control adults sheltering deep in the soil profile.

The impact of weevil feeding on the crop may be reduced by early crop establishment before all adults have emerged onto the soil surface, and while warmer conditions promote plant growth. Use of higher vigour canola varieties may aid early establishment. Increasing sowing rates can also help offset some damage.

CHEMICAL CONTROL

Chemical control of adults on the soil surface is currently the most effective management tool. There are no insecticides registered for Mandalotus control in field crops, however some insecticide seed treatments and surface applied broad spectrum insecticides registered in canola offer some control. Trials in South Australia have shown that a bare earth application of bifenthrin can provide reasonable control at the higher label rates targeted at redlegged earth mite. Fipronil seed treatments on canola seed offer some adult control, however seed treatments alone are unlikely to provide adequate protection of seedlings at higher adult densities.

Acknowledgements: This information in this Fact Sheet was obtained by research funded by the Grains Research and Development Corporation under project DAS00094.

The contributions of Helen DeGraaf and Greg Baker in the research and Ken Henry in reviewing this Fact Sheet are gratefully acknowledged.

For more information visit
http://www.pir.sa.gov.au/research/research_specialties/sustainable_systems/entomology Information may be used with acknowledgement.