Redheaded pasture cockchafer

Adoryphorus couloni

Fig. 47 Adult beetle of redheaded pasture cockchafer

Fig. 48 Grub of redheaded pasture cockchafer

Fig. 49 Ravens uproot grass after redheaded pasture cockchafers have weakened the roots

Description

The adult stage is a stout, shiny black beetle about 15 mm long (Fig. 47). The ovoid eggs are 2–3 mm in length and pearly–white in colour. The grubs are soft–bodied and white with three pairs of yellowish legs, a hard, reddish brown head capsule and the posterior quarter of the body is a little swollen (Fig. 48). The head capsule appears rough or matte in contrast to the shiny capsule of blackheaded pasture cockchafer. The body wall is transparent. The white colouration of the grub derives from fatty tissue under the skin and the greyish appearance of the rear end results from soil in the gut. The posterior end of the grub is more opaque than in blackheaded pasture cockchafer (Fig. 44). When at rest the body is curved in the shape of a letter C. Grubs are sometimes called 'curl grubs' or 'white grubs'. Newly hatched grubs are only 5 mm long but when mature, are robust and up to 30 mm in length. The grubs are less active when exposed than are blackheaded pasture cockchafer grubs, which retreat rapidly if placed on a spade.

The pupa, about 15 mm long, is soft–bodied and pale yellow–brown in colour.

Distribution

This pest is a native species. Before 1987 the redheaded pasture cockchafer occurred on King Island, but not Flinders Island, and across northern Tasmania as far south as Woodbury in the central Midlands. The cold high plateau around Oatlands slowed its spread into southern Tasmania. It now occurs in the southern Midlands, Derwent Valley, Bothwell district, Hobart, South Arm and other localities including Flinders Island. Its status in the Huon Valley and Channel is uncertain. It has not been recorded at altitudes above 200 metres.

Elsewhere this pest is distributed from southern New South Wales through Victoria to south–eastern South Australia. Prior to 1987 it spread to New Zealand where it now occurs on Banks Peninsula.

Damage—pasture

The adult beetle stage does not cause damage. However, the grub feeds on roots and humus in the root zone, usually within 50 mm of the soil surface. Because the grub spends its entire life feeding underground the effects of this pest can be difficult to appreciate unless populations are extremely high.

Damage is most serious in late autumn and is caused by two factors: severing of the roots during feeding and physical disruption of the roots during underground movement of the grubs. High numbers of the grubs undercut the pasture plants, severing them from their roots. This promotes uprooting by stock and birds (Fig. 49) which, during a dry spell, leads to plant death from moisture stress since the plants cannot tap soil moisture held at depth. Underground movement of grubs also makes the pasture feel spongy underfoot.

Grasses with weak, fibrous roots such as ryegrass are especially vulnerable to damage. In a mixed sward the ryegrass component is often uprooted completely by stock activity. The resulting gaps in the pasture allow fast–growing annuals such as barley–grass, storksbill and capeweed to establish. This trend to weediness is often the only symptom that is clearly visible unless the soil is turned over. Subterranean clover usually re–establishes itself satisfactorily after attack by this pest, provided sufficient soil seed reserves exist.

Damage first appears in late March and may be severe by May or early June when aggravated by bird activity. The forest raven is the main culprit in most regions (Fig. 49).

Low soil temperatures in winter reduce the activity of grubs before more active feeding resumes in late August. Damage to pastures in spring is usually less severe than in autumn. There are several reasons for this: grub numbers will have declined through natural mortality; pathogens accelerate grub death when the soil temperatures are warmer; and the plants compensate much better because the spring growth flush enables them to re–establish a satisfactory root system given sufficient moisture is present.

Although the redheaded pasture cockchafer takes two years to complete its life cycle, the occurrence of overlapping generations means that grubs can be present every year. Usually, one generation is more abundant than the alternate generation so that, in any particular district, damage is seen every second year. The years of severe infestation are not necessarily the same for the Midlands and the north–west coast.

Life cycle—pasture (Fig. 50)

Adult beetles emerge from the soil at dusk in late winter and early spring (from the end of August until mid–October). Swarming flights which occur at this time help to disperse the beetles widely. During the night the female beetle tunnels into the soil to lay eggs, singly or a few at a time, at a depth of up to 80 mm. Each female may lay up to 25 eggs in her lifetime.

The eggs hatch in late spring, 6–8 weeks after being laid. The young grub then passes through three stages. The first two of these are passed rapidly so that by late summer–early autumn the final (third) stage is reached. This stage is the most damaging and feeds for almost 10 months. Feeding is intense during the autumn but is interrupted by the onset of cold weather in June.

At this time the grubs may dig to warmer depths in the soil and stop gaining weight. Nevertheless, the grubs do feed during spells of mild weather in winter. Active feeding and weight gain resume in early spring and continue until early summer when grubs reach full maturity and finish feeding. They then leave the root zone and dig deeper into the soil, often up to 200 mm below the surface, where they form a small cell by compacting the soil around them. Here they expel their gut contents, their body fat turns a yellowish colour and their body takes on a J–shape. This is the prepupal stage. After two weeks the grub's skin is split off to reveal the pupa. The pupal stage lasts 6–8 weeks before the beetle emerges in February–March. However, the beetle remains in the pupal cell as a sexually immature adult for about six months until it digs its way to the surface to engage in locally synchronised flights in late winter–early spring. The beetles do not feed and rely on energy reserves laid down during the larval stage.

Control—pasture

Spraying will not control this pest in pasture. There are no synthetic insecticides that give effective, economical control of redheaded pasture cockchafers since their subterranean feeding habits create difficulties in the penetration and stability of chemicals. This contrasts to blackheaded pasture cockchafers, which feed above ground and are therefore susceptible to synthetic insecticides.

In existing pastures, management practices must be integrated and aimed at limiting damage as much as possible. When damage is noticed in mid–autumn, stock should be removed, particularly from ryegrass dominant pastures, and the paddock spelled until late winter. This will help prevent all the ryegrass being uprooted by grazing animals and maintain maximum leaf area needed to re–establish root growth. Although supplementary feed may have to be bought to carry displaced stock over winter, the expense will usually be repaid in superior spring production and the maintenance of desired botanical composition in the infested paddock.

Diversify feed sources on the farm away from total dependence on ryegrass pastures. This might entail sowing some autumn forage crops, storing extra hay in anticipation of a winter feed shortage aggravated by pests, or sowing down some areas of cockchafer tolerant pastures. Such pastures could include phalaris, cocksfoot or tall fescue with a small percentage of ryegrass mixed in. Dairy farmers are not advised to mix grasses in one paddock. Lucerne and oats are also relatively tolerant of cockchafer attack. It is not yet known if the novel endophytes MaxP and AR1, plus other new novel endophytes yet to be released, will protect some new fescues and ryegrass from root–feeding cockchafers.

If conditions are not too boggy, rolling of the infested pasture can be beneficial since this helps the sward or seed re–establish contact with the soil and may kill grubs close to the soil surface.

Large numbers of cockchafers can be destroyed by the trampling effect of block grazing stock. This should be done before the end of May while grubs are still close to the surface. This strategy should be employed when large numbers of grubs are first noticed, even if it means upsetting a carefully planned rotation, since the benefits in the longer term will be substantial.

A carefully planned rotation could include this strategy, but would not be advised if the grazing animals were milking cows.

A biological insecticide Chafer Guard™ (previously BioGreen) is available for redheaded pasture cockchafer. It is a potent strain of a native soil fungus, *Metarhizium anisopliae,* formulated as a granule that is mixed with seed, but not fertiliser, when sowing pasture. It causes fatal infections in the pest. It is best used as a preventative strategy whose benefits accumulate over several years and is not a quick remedial strategy for one season. See www.beckerunderwood.com or phone 1800 558 399 to speak to the Australian agents for this perishable product.

Redheaded pasture cockchafer life cycle

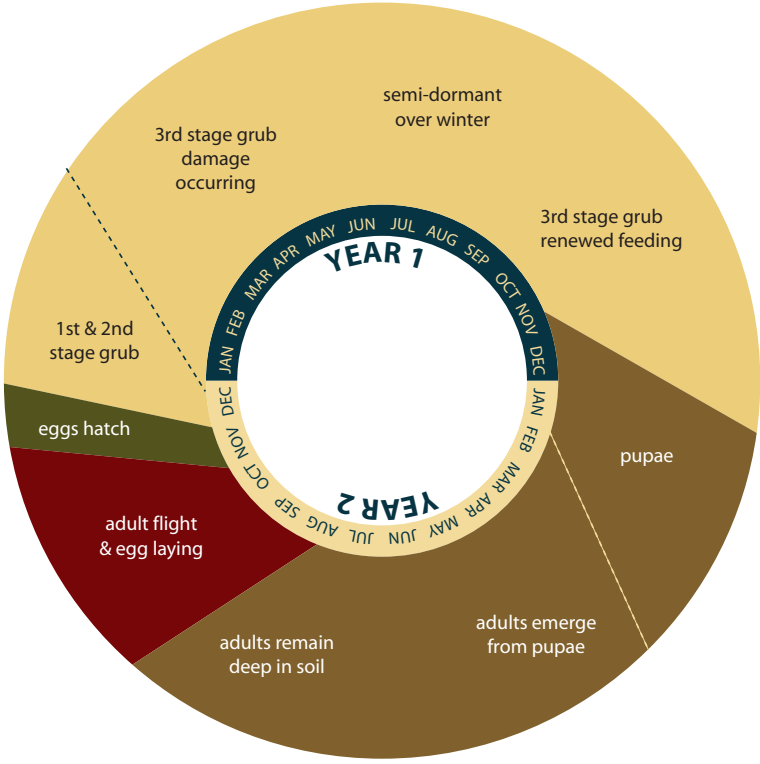

Fig. 50