Chafer grubs

Based on STRI Technical Note

Chafer grubs (or white grubs) are the larvae of the chafer beetle. The most problematic pest species in the UK are the garden chafer, cockchafer and summer chafer. Chafer grubs cause problems on many grassed areas such as golf courses, sports pitches, lawns, cemeteries, airfields and parks but are rarely found in golf greens preferring sandy areas of less intensively managed grassland such as rough or fairway.

Chafer biology

The lifecycle and characteristics of the chafer depends on the species:

The garden chafer (*Phyllopertha horticola)* is probably the most abundant species throughout Europe. The adult is around 9 mm long with brown wing cases and a bottle green head. The larvae grow to around 18 mm. It has a one-year lifecycle and adults are traditionally found in late May or June (depending on the soil temperature in spring).

The cockchafer (*Melolontha melolontha*) is the largest species. The adults are around 30 mm long with brown wing cases, white flashes under the wings, a black head and feathery antennae. The larvae can grow up to 45 mm long. They have a three- year lifecycle. Cockchafers are mostly associated with grass near deciduous woodland as the adults feed on the tree foliage. The adults appear between April and July.

The summer chafer (*Amphimallon solstitialis*) is 14-18 mm long, a mid-brown colour and hairy. The larvae grow up to 30 mm long. They have a two-year lifecycle. The adults fly between June and August. The female remains on the turf surface waiting for the flying males that search for dark objects against the light sky. This can lead to males landing on golfers at dusk.

Problems of chafers on turf

Apart from burrowing (which may leave small mounds of earth), the adults do not cause any damage to turf. However, the larvae can cause extensive damage. Small grubs do not cause much damage to the turf, unless they are present in very large numbers. In such cases, they can weaken turf leaving it prone to increased injury from wear and tear and environmental extremes. In hot summers, the weakened root system leaves the grass plants very susceptible to drought.

Initially, areas heavily infested with chafer larvae will appear thin and straw coloured. The turf will be easily lifted due to the severed roots. On lifting the turf, the grubs can be easily base of the sward and so increase the efficacy of treatment.

Once the larvae have grown quite large, small numbers of grubs can kill areas of turf, which then encourages the influx of weed grasses and broad- leaved weeds. This is especially true of the cockchafers in their third year when they are very large.

Although large numbers of feeding larvae can be a problem, predators searching for the grubs cause the most severe damage. Birds, badgers, foxes and other small mammals searching for the larvae can rip up large areas of turf, leaving unsightly scars. On golf courses, damage is most common on fairways, roughs and sloped areas.

Well-drained, sandy soils and less disturbed areas are more commonly affected. Therefore, chafer damage can be extensive at the sides of bunkers or on championship tees.

Control measures

Chafer grub numbers are affected by soil moisture. Areas irrigated while adults were flying were found to suffer more damage than areas that were not irrigated. It is possible that withholding irrigation when the adults are active may reduce the chance of eggs being successfully laid and so reduce larval numbers.

Scarification has often been suggested to physically remove chafer larvae. Research has shown that this was best done when grubs were small, between July and September and were feeding close to the base of the sward. However, in dry conditions the grubs move down the soil profile. Therefore, in dry conditions it may be important to irrigate before scarification to encourage the grubs to come to the surface.

Biological control in the form of entomopathogenic nematodes (*Heterorhabditis megidis*) have been shown to control chafer grubs. They have evolved a symbiotic relationship with bacteria which survive in the intestinal area of the nematode. Once the nematode has entered the insect through natural openings (mouth, anus and spiracles), the bacteria are released. The bacteria multiply, accelerating the death of the insect and form the nematodes food. Results from applications of entomopathogenic nematodes have been variable. It is possible that this may be due to poor application and maintenance of the nematodes. It is suggested that to improve control rates the following rules should be adhered to (McMaugh, 2002):

- Nematodes should be applied in the evening (when there is less chance of the surface drying out and no UV light).
- Drying winds should be avoided.
- The turf should be irrigated before and after application to wash the nematodes into the soil and a high level of moisture maintained for several days afterwards.
- Nematodes should not be stored for too long before application as efficacy declines in storage.
- Soil temperatures below 12°C should be avoided.
- The tank should be kept agitated to avoid settling and so uneven coverage.

Chemical control options

Acelepryn is a relatively new insecticide containing the active ingredient chlorantraniliprole and has been available for the past few years for use in certain amenity turf situations for the control of chafer grubs including golf greens, tees, horse racetracks and airfields. This insecticide works by paralysing the small grubs for a sufficient length of time that they die, applied too late and larger grubs will be able to survive the period of paralysis and will not be effective. Timing of application is critical to achieving control with this chemical. There are specific guidelines relating to the application of the product which should be carefully followed to reduce chafer grub population numbers, timing is different for controlling chafer grubs as compared to leatherjackets for which this insecticide is also used.