



Damage to a south of England down land course by rooks looking for chafer grubs
Picture courtesy Chris Humphrey, Collier Turf Care

CHAFER GRUB

THE PRE-EMINENT

INSECT PEST OF

UK TURF

By Dr Terry Mabbett

Turf provides an ideal feeding and breeding ground for invertebrate animals including insects, arachnids, crustaceans and nematodes. As a perennial ecosystem turf grass generally offers well-fed and managed foliage and a dynamic thatch layer overlaying a relatively deep and dense fibrous root system.

Pests have access to year round food and harbourage, essentially undisturbed for decades if not centuries. That said turf in the United Kingdom gets off relatively lightly from invertebrate animal pest infestation and damage compared with North America.

Turf grass root zones offer ideal long term habitats for invertebrate animals and much more so than the annual 'grasses' (cereals) cultivated for grain. Many different invertebrate animals inhabit turf root zones and thatch without causing damage.

Around half a dozen are recorded as pests in the UK and just two insects (chafer grubs and leatherjackets) assume major pest status.

Chafer grubs and leatherjackets (larva stage of the crane fly) damage grass roots and attract wild mammal and avian predators that cause even more damage by tearing at the turf to get at the larvae.

Invertebrate pests are without backbones but chafer grubs (and leatherjackets) have the capacity to 'break the back' of fine professional turf by rendering green and tee surfaces unplayable.

Chafer grubs are sporadic and less widespread than leatherjackets but generally result in more economic damage both directly and as collateral turf damage from wild mammalian and avian predators.

Life cycle

Juvenile stages of insect pests generally cause most damage even though the adult is invariably more mobile. Chafer grub which is the larva stage of chafer beetles (Coleoptera) is no exception. Adult chafer beetles feed on a wide variety of plants causing little damage but the larvae cause economic damage to turf grass roots. Species most frequently found in turf are the garden chafer (*Phyllopertha horticola*) and Welsh chafer (*Hoplia philanthis*), the latter especially in sandy soils.

Adult garden chafer beetles have a metallic green head and thorax with light brown wing cases. Welsh chafer beetles are similar in size (9mm length) with a black head and thorax and reddish brown wing cases. The larva (chafer grub) has a white fleshy segmented body in a curved 'letter C' shape with three pairs of legs on anterior (front) segments. The head is distinctively light brown. A full grown chafer grub is about the same length as the adult beetle but if straightened out would be twice as long.

There is little chance of confusing chafer grubs with legless leatherjackets but they can be mistaken for vine weevil larvae 'curse' of the container plant industry. Vine weevil larvae are smaller than chafer grubs and like leatherjackets are without legs.

Adult chafer beetles emerge from the pupa stage in late May and June and dig their way up to the soil surface. Numbers increase rapidly as dusk descends on warm early summer evenings when newly-emerged adults mate before burrowing back into the soil to lay eggs.

Chafer grubs hatch within two to three weeks and start to feed straightaway. Continuous and increasingly intense root feeding will now proceed into October on unprotected turf. Grass roots cut and damaged by chafer grub feeding cannot

maintain water and nutrient supplies leading to undernourished turf that yellows and eventually dries dry out. Accumulating damage destroys grass root anchorage allowing turf to be raised and rolled back easily to expose the chafer grubs. Damage is slight at first but builds up quickly during late summer and early autumn (late August/September), when grubs are almost full-grown with voracious appetites. Chafer grubs are full grown and mature by mid October when they burrow deeper into the soil to over-winter as hibernating larvae before pupating in spring (April).

Direct and collateral damage

Chafer grub infestations develop underground and unnoticed until turf starts to show symptoms of damage in early autumn after summer-long root feeding. Turf damage is now severe and the large succulent and protein rich grubs will have attracted the attention of predators. First on the scene will be 'grubbing' birds especially corvids (rooks, crows, magpies and jays) foraging during the day, and later wild mammals such as badgers and foxes ripping up already loosened turf at night.

This is one instance when biological control of insect pests is undesirable and unwelcome. Collateral damage caused by birds and mammals is considerable, running into thousands of pounds for green and tee repair and as lost fees when large parts of the course are put out of action. Chafer grub infestation is heaviest on greens and tees because established sandy-soil bases offer ideal sites for chafer oviposition by adult chafer beetles. Similarly soft professional turf on greens and tees is easy for birds and animals to tear up.

Rural and urban golf courses are equally affected. Fox population inside the M25 is estimated at 15,000 and the London Evening Standard reported how some 60 foxes dug up greens on a North London golf course causing £30,000 of



Chafer grub displaying the classic curved C-shape



Chafer grubs cut grass roots allowing dried out turf to be rolled back to reveal the pests



Extensive damage to turf by badgers and foxes foraging for chafer grubs

Pictures on this page courtesy Bayer Environmental Science

Raising the Game for Disease Control



damage in the process. Chafer grubs feed on a variety of plants and turf infestations are usually more prevalent near to woodland.

The offenders are highly mobile mammals and birds invariably arriving from neighbouring land and property. Arrival of predatory birds can actually prove useful by alerting greenkeepers to the developing problem. When birds begin to show undue and unhealthy interest in turf it is generally a sure sign that chafer grubs (and/or leatherjackets) are under the grass and insecticide treatment is urgently required.

Chemical control

Only recently has an entirely suitable insecticide treatment become available for control of chafer grubs in turf. Some of the very earliest chemicals used against chafer grubs (and leatherjackets) were acutely toxic and until relatively recently greenkeepers had been forced to use insecticides now seen as damaging to the environment, although they did by and large kill these pests.

Withdrawal of products containing gamma HCH (lindane) in 1999 left a complete void for chafer grub control because contrary to popular belief chlorpyrifos was not recommended for chafer grub control, although it did a perfectly good job against leatherjackets. Reason was simple -

chlorpyrifos resists leaching and stays in the top layer of soil. Under normal circumstances this would be a bonus but the active insecticide is unable to reach the deeper-seated chafer grubs.

Chlorpyrifos is a broad spectrum insecticide used worldwide in agriculture, amenity and public health. It would almost certainly kill chafer grubs if able to reach chafer grubs and make contact after standard spray application.

The void left by withdrawal of gamma HCH in 1999 was soon matched by equally big holes in professional turf.

Greenkeepers were left to face chafer grub infestations and their consequences with no approved recommended insecticides. The situation remained unresolved until 2006 when Bayer Environmental Science introduced Merit Turf a granular formulation containing the insecticide imadocloprid with approval for chafer grub control in turf.

Biological and cultural control

Chafer grubs in turf can be managed by biological control using the entomopathogenic nematode *Heterorhabditis megidis*.

These microscopic roundworms invade chafer grubs infecting the larvae with a fatal bacterial disease. They are watered into the turf when the

soil is already moist and temperature is within the 12-20°C range.

By definition, biological control agents are density dependent factors that 'track' and 'follow' their pest hosts or prey. As such numbers and activity increase with higher pest populations then falling away as the pest population decreases.

As biological systems they require more exacting environmental conditions (e.g. temperature, moisture, pH, soil structure) to grow, move and reproduce for effective pest control.

Biocontrol agents therefore tend to operate within a narrower profile of conditions than do chemical pesticides. They generally need more time to work which greenkeepers may not have. With greens and tees out of action from chafer grubs, and fees and reputations being lost, course managers and club captains will be stalking the course looking for 'trophies' and not the shiny metal kind.

Good golf course management practice will assist turf tolerance and recuperation following chafer grub attack.

Selection of deeper rooting turf grass species and appropriate management practices that encourage rapid and healthy root growth and development (e.g. well-timed and balanced applications of phosphate fertiliser) are recommended.



HEADWAY brings you two of the world's most successful turf fungicide active ingredients in one package – protecting the plant inside and out, from leaf to root. Easy to use and cost effective, HEADWAY is approved for control of key foliar and soil borne turf diseases.

The HEADWAY combination of two powerful actives gives:

- Complimentary power of two actives
- Broad spectrum activity
- Protects the plant as it grows
- Long lasting results
- Trials have shown over eight weeks control of *Fusarium*

HEADWAY protects from leaf to root



HEADWAY is the first multi-active turf fungicide approved for the control of both foliar and soil borne diseases.

syngenta

www.greencast.co.uk