

Turf insect pest control on a knife-edge

Dr Terry Mabbett looks at how you can control chafer grubs and leatherjackets – the “economic pests” of UK turf

Fine turf doesn't offer much in the way of sustenance for insect pests above ground. The two insect pests causing widespread economic damage to managed UK turf are subterranean in habit and feed on the fibrous roots of grass plants.

UK golf courses largely escape the worst the world has to offer in arthropod pest damage to temperate turf. Arthropods are a large group invertebrate animals, mostly

small sometimes microscopic and in precise zoological terms have jointed legs. The group includes insects, arachnids and crustaceans.

Only two true insects, chafer grubs (larval stage of chafer beetles) and leatherjackets (larval stage of crane flies) are economic pests of UK turf. They cause significant direct damage in their own right and lure bigger beasts like foxes foraging for a hearty meal and tearing up turf in the process.

Chafer grubs and leatherjackets

Chafer grubs are the larvae of the garden chafer beetle (*Phyllopertha horticola*) and the Welsh chafer beetle (*Hoplia philanthus*) while the leatherjacket is the larval stage of the crane fly (*Tipula* sp) and commonly called 'daddy longlegs'. Both juvenile stages are soil-dwelling pests living under turf and feeding on grass roots.

That such a delicate adult insect as the cranefly should produce such a robust and damaging larva (the leatherjacket) never ceases to amaze
(Picture courtesy Syngenta)

Chafer grubs sport a brown head on a white, distinctly curved and fleshy-segmented body some 3cm long. Legs occur as three pairs on the front segments of the body in contrast to leatherjackets which are legless. Leatherjackets are 'greasy' earth-coloured segmented

grubs, 3 - 4 cm long and with a tough leathery look and feel, as the common name suggests. That such a delicate adult insect like the cranefly should produce such a robust and damaging larva never ceases to amaze.

The seemingly innocent appearance of craneflies in August is a prelude to something altogether more sinister for professional turf. Adults emerge from pupae in dew-

covered turf in the morning and immediately restart the life cycle by laying eggs in the grass sward.

Eggs hatch into larvae within two weeks and waste no time in starting to feed on the grass roots. Leatherjacket feeding occurs throughout winter, accelerating in spring as the larvae approach maturity and pupation. This is the time when leatherjacket damage first becomes apparent, showing up as slow growth of grass and yellow patches of dead and dying turf. Leatherjacket infestation is

encouraged by poorly drained turf and affected areas may become inundated with surface water.

Adult chafer beetles appear in May and June with a characteristically metallic or black head and thorax and reddish brown wing cases.

They are abundant at dusk having just emerged from the pupa case and dug their way out of the soil. The life cycle restarts there and then as they burrow back into the soil to lay eggs which hatch within weeks to produce new chafer grubs that start to feed almost immediately.

Damage to turf is slow at first but accelerates quickly through summer and into autumn (when symptoms become apparent) due to increased cutting and consumption of grass roots by the increasingly large and mature grubs. The larvae, now fully-grown and developed, burrow deeper to over-winter in the soil as hibernating grubs that will pupate in spring.

Damage caused is similar to that by leatherjackets with yellowing, drying and loosening of turf from excision of the roots by sharp biting and cutting mouthparts. Roots lose anchorage and are unable to absorb sufficient water and nutrients.

Growth effectively ceases and large areas of grass are killed off during drought. Turf damaged by chafer grubs lifts up with ease because the anchorage has gone.

Direct pest damage is accompanied by foraging mammals and birds tearing up already loosened turf to get at the grubs. Starlings and corvids are best known for their 'grubbing' activities on leatherjackets. Turf damage by foxes and badgers is more commonly associated with chafer grubs.

The watchful and canny greenkeeper can put these avian activities to good use. If birds and especially starlings and corvids (mainly rooks and crows but also magpies and jays) are showing a 'healthy' interest in your turf then you can bet your bottom dollar there is something 'unhealthy' burrowing beneath that and which requires control.

Damage caused by badgers and foxes is not so easy to utilise. Being nocturnal animals their activities are rarely seen. In the evening the greens are pristine but by morning they may be a mess. Turf damaged by chafer grubs and leatherjackets is more prone to invasion by weeds.

Turf pest control on a knife-edge

Just two insecticides are approved for use in managed turf on golf courses in the UK, imidacloprid for the control of chafer grubs and leatherjackets and chlorpyrifos for the latter only.

From 1999 when the organochlorine insecticide gamma HCH was withdrawn until imidacloprid approval in 2006, there was a gaping hole in the market for chafer grub control, matched only by the gaping holes in turf caused by badgers, foxes and birds foraging for chafer beetle grubs.

Chlorpyrifos would have almost certainly killed chafer grubs but because the insecticide remains in the top layer of soil it cannot access chafer grubs deeper down.

This minimises any potential for leachable contamination of groundwater but excludes its use for chafer grub control.

Insect pest control in UK turf



Chafer grubs are highly attractive to foraging foxes and badgers (Picture courtesy Syngenta)

White clover in full flower across the fairway in mid-summer



is in safe hands while these two insecticides are on the market but turf pesticides in general are largely at the mercy of what happens in the agricultural sector, where most pesticides approved for turf are additionally used in hugely greater amounts and for a wider range of applications.

If either of these insecticides currently used in turf ever falls foul of EU regulatory authorities and/or becomes commercially less palatable it will be because of what has been done (or not been done) in the agricultural arena.

Chlorpyrifos, an organophosphate insecticide, stands accused of contaminating water resources from spray drift during broad-acre arable crop spraying including for orange wheat blossom midge control.

Clearly fearing for future approved uses of chlorpyrifos the agricultural industry has mounted a robust defence via product stewardship including a 'Say NO to DRIFT' campaign.

Imidacloprid is a neonicotinoid insecticide that has recently been accused of having an alleged impact on populations of pollinating bees, and which subsequently led to a two-year trial ban imposed by the EU for application to crops that attracts bees.

Managed turf is a different kettle of fish because short-interval low cut mowing inhibits the flowering of turf grasses and any broad leaf weeds. I often hear the word 'never' used to describe the incidence of flowering in managed turf but 'never say never' as that well-worn phrase goes.

By its very nature turf is composed of prostrate plants with low-positioned growing points that miss the mower's blades and turf grass plants inherently so.

Broadleaf weed plants naturally suited to turf include dandelion, common daisy and white clover, but short-interval low cut mowing can actually assist these weeds by selecting out biotypes with the lowest positioned growing points. It is not unusual to see dandelions which are capable of flowering on golf tees despite short-interval low cut mowing.

Large patches of white clover flower across fairways despite mowing especially during drought conditions.

The single biggest danger to any pesticide used in turf is becoming a casualty of legislation aimed at the much bigger and wider-ranging uses of the same active ingredient in the agricultural arena. Imidacloprid



TOP: Extensive damage caused by badgers foraging for chafer grubs on an East Anglian golf course in the years before the approval of imidacloprid for chafer grub control (Picture courtesy Bayer Environmental Sciences)

MIDDLE: Damage on a South Downs golf course caused by rooks and crows 'grubbing' for chafer grubs (Picture courtesy Chris Humphrey)

LEFT: Damage on a South Downs golf course caused by rooks and crows 'grubbing' for chafer grubs (Picture courtesy Chris Humphrey)

is in a stronger position because the one and only commercial product used by UK greenkeepers is a dedicated turf insecticide formulated as a granule.

Chlorpyrifos products tend to be formulated as sprayable emulsifiable concentrates with label approval in managed turf alongside a large number of agricultural crops.

Dual chemical control of chafer grubs and leatherjackets currently depends on the long-term availability of imidacloprid. Right or wrong imidacloprid is under scrutiny in the wider agricultural and horticultural arenas. Clearly there is need to develop additional actives for control of chafer grubs and leatherjackets in professional turf.

Most of the so-called new pesticide actives coming onto the UK sports turf market will have already done the rounds in agriculture for years beforehand.

Approval for the use of imidacloprid as a turf insecticide in the UK was gained in 2006.

In 1992 I was writing about an exciting brand new insecticide used for the control of insect pests on paddy rice. Its name was imidacloprid.

North American sports turf suffers sustained attack by 'white grubs' the generic name for larvae of a range of beetles including chafer beetles (chafer grubs).

Imidacloprid is just one of a number of modern insecticides approved for use against these soil borne pests in North America.