

Dr. Ruth Mann explains how the problem with Chafer Grubs could soon be a thing of the past ...

Chafers:

Have they met their match?

In 1983, an article appeared in the Sports Turf Bulletin concerning pests in turf. Chafer grubs (also called white grubs) were included only as a minor pest in the British Isles, although, at this time, they were causing major damage on continental golf courses. Since this article, chafer grubs seem to have been appearing with more regularity, sometimes being an incidental pest and sometimes causing severe damage. This year, perhaps due to a rather mild winter, chafer grubs have become a major pest on some golf courses.

Chafer grubs can be identified by their creamy white bodies with a swollen tail end that is usually darker due to the intestinal contents and lie in a characteristic comma shape (Fig 1). They have three pairs of brown legs and a distinctive shiny brown head with large chewing jaws. They lie just

below the turf surface and feed on the roots. As the roots are severed the turf becomes prone to drought in dry weather. They like to live in sandy soils and thatchy areas with adequate moisture as they can easily move up and down the soil profile. They are most commonly found in roughs, semi-roughs and fairways. They also favour less disturbed areas, such as the sides of bunkers or infrequently used championship tees. Adult females do not tend to move over vast areas. This can lead to the same areas being infested year after year. So far, they have been found from Guernsey, Cornwall and Devon up through East Anglia across to the West coast of Wales and as far North as Cumbria. At this point I have no reports of chafers in Scotland, although I suspect it is just a matter of time before they begin to appear.

We have five species of chafers, the cockchafer, garden chafer, summer chafer, brown chafer and Welsh chafer. The two species that seem to be commonly found on golf courses are the cockchafer and garden chafer. The cockchafer is the largest species. Adults have black heads and reddish-brown wing cases. They are nocturnal, emerging in May and June. The female burrows back down into the soil to lay eggs which hatch 5-6 weeks after laying (around July). Cockchafer grubs take three years to mature and can grow up to 48 mm in length. Therefore, any grubs found actively feeding in springtime, will be cockchafers.

Garden chafers are thought to be the most abundant species on golf courses. The adults are smaller with a metallic green head and reddish-brown wing cases. Grubs are also smaller (around 18 mm when fully grown) and only take one year to mature. The

grubs feed from hatching around July until late autumn when falling temperatures cause them to burrow down the soil profile and hibernate. They do not resume feeding in the spring as cockchafers do, but pupate and emerge as adults in May and June.

Small grubs do not really cause much damage to the turf, unless they are in very large numbers. In such cases, they can weaken turf leaving it prone to increased injury from wear and tear and environmental extremes. Also, once they 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. On golf courses, feeding grubs do not tend to be the major problem. Birds and small mammals searching for juicy grubs can rip up large areas of turf, leaving unsightly scars. To moles and badgers chafer grubs are a delicacy and so they may be encouraged to take up residence in chafer infested areas, causing more problems.

There are no chemicals approved for the control of chafer grubs at the moment which presents a major problem in itself. It has been proposed that physical control methods could be attempted, such as heavy rolling to squash the grubs when they are actively feeding just below the surface. However, research carried out at the University of Kentucky showed that liming, fertilisation, heavy rolling and aerification had no effect on chafer grub numbers over four years. Aluminium sulphate applied just before adults emerged did reduce grub numbers, perhaps showing that, similar to earthworms, chafer grubs do not like acidic conditions.

One control measure currently available in the British Isles is parasitic

Above right: Chafer grubs

Below and far right:
Damage caused by birds
looking for chafer grubs





nematodes. Nematodes are microscopic round worms. Just like fungi and insects there are 'bad' species that parasitise turf leaving the area weak and prone to drought damage and 'good' species that parasitise other turf pests. *Heterorhabditis megidis* is a good species of nematode as it searches for and kills chafer grubs. This nematode naturally occurs in our soils but the numbers are not large enough for chafer control. It is also specific and so does not affect other beneficial insects or animals and humans. The nematodes search for chafers in the soil and enter them through natural openings such as the mouth and anus. Once inside they release a bacterium that multiplies and kills the chafer in a couple of days. The nematodes then feed on the bacteria and reproduce releasing more nematodes into the soil to begin the search again. However, nematodes do not come without their problems. At initial application the soil temperature must be 12°C or above for activation. The nematodes are destroyed by ultra-violet light and high temperatures and so are best applied in early morning or evening when it is not too hot or sunny. The turf needs to be well irrigated after application to wash the nematodes into the soil and

kept moist, but not flooded, for two weeks as the nematodes need a film of water for movement. The nematodes may be easily washed into the soil on areas with short grass, such as greens and tees. However, on areas with long grass like fairways and roughs there have been problems with getting the nematodes into the soil.

Nematodes are being successfully used in gardens here but as yet we have no information regarding usage on golf courses in the UK. However, in Denmark, nematodes have been successful on greens and tees but not on fairways, possibly due to the nematodes failing to penetrate the long grass and thatch. They are expensive for treating large areas. The aforementioned golf course in Denmark spent £25,000 treating the whole course. However, work carried out by Imperial College, Berkshire on garden chafers infesting a golf tee showed that the grubs aggregated under grassy areas. They suggested that this may be due to the female laying eggs which hatched in batches and the grubs did not move far from their preferred food source of grass roots. The grubs were less associated with bare areas or areas colonised by broadleaved weeds. Therefore, spot treatment of grassy

areas infested with chafer grubs may be possible.

Research is required here to determine whether nematodes are successful at treating chafer infestations on golf courses and if the longer grass on rough areas presents a major problem in preventing nematode penetration into the soil. If, and when, this research occurs we will let you know the outcome! Other research at STRI, such as our Pests and Disease Survey 2001, will help to determine which years chafers cause the most

damage and if they are slowly moving North into Scotland as we suspect. Therefore I would like to remind all greenkeepers about returning their questionnaire. There is no time limit on these and the more we receive the better the results we can give you. If you have not received a copy of the STRI questionnaire please contact me.

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