

WORMS

In the 1960s, when the writer first became involved in golf course agronomy work, worm control was no problem whatsoever. Where worm casting was a problem, the routine solution was to apply either lead arsenate or chlordane – the former usually effectively controlling worms for five to ten years, the latter often solving the problem for up to five years, its persistency depending largely on soil type. Very effective wormkillers – long term in their action – were therefore freely available and widely used. The fly in the ointment as far as this complacent situation was concerned was, of course, the question of health and environmental damage. Persistent worm poisons such as those mentioned above are unfortunately toxic to greenkeepers, golfers – indeed most of God's creatures – and ecological and welfare considerations have hence led to a ban in recent years.

Lead arsenate was banned years ago and chlordane usage is now severely restricted – the ban on the latter chemical becoming total at the end of 1992. In a more environmentally conscious age this is all to the good, but it does raise the question of how troublesome worm casting can be controlled on the course in the absence of the more effective chemical methods.

Short-term control can of course still be achieved using less dangerous methods, ie. Sevin (also called Carbaryl) or thiophanate-methyl/Gamma HCH mixes, but these are short term in their action compared to the traditional toxins mentioned previously. Even these may be under threat from even tighter pesticide regulation (there is a total ban on worm control already in effect in some EEC countries), so it is quite possible in the future that we will have to rely on cultural methods to keep golf course worm populations down to acceptable levels.

Some background knowledge can be useful in order to understand such an approach more fully. There are about 25 species of earthworm which may be active in turfgrass in the UK. Only three species, however, produce surface casts and it is the casts alone which are objected to as far as course management is concerned. There may be up to 1 million earthworms per hectare of sportsturf and these have a very significant effect on the soil ecosystem and play an important role in the decomposition process and in modifying soil structure. Apart from the surface casting habit of a restricted number of species, earthworms are beneficial. Their tunnels alleviate soil compaction and provide beneficial aeration. Worms also secrete mucus to stabilise their burrow linings, thus aggregating soil particles and improving structure. Indeed, it is true to say that where earthworm populations have been eliminated by chemical means, it is more necessary to carry out mechanical aeration to compensate for the lack of earthworm activity.

The eating habits of earthworms are also beneficial to turfgrass in that they eat living and dead plant material and also small soil fauna. Hence they are significant in breaking down thatch and fibre and by breaking up organic matter they make soil nutrients available for plant growth. Indeed, it is only their indigestible waste material ejected on the surface as a cast which is a disadvantage in the golf course situation.

We object to casts because they are unsightly, because they interfere with the run of the ball on the green and



because they cause muddy conditions – sealing the surface and thus reducing surface drainage. These objections do not of course apply to earthworm species which live in the turf but do not cast on the surface – if we have to use chemicals at all then ideally these should kill casting species and leave the harmless non-casting species unaffected. Chemicals like lead arsenate, chlordane and Carbaryl probably kill all earthworm species, whilst evidence is mixed regarding the selectivity of other possible chemical wormkiller.

Earthworms are not active during frosty weather, when they burrow more deeply, or during drought when they similarly become dormant. It is in mild moist weather, usually during spring and autumn, that they are most active, although effective irrigation does also increase their activity. Sandy links courses are not as prone to infestation as heavy soil parkland courses – earthworms preferring moisture retentive soils where there is a higher percentage of organic matter.

Since worms feed readily on thatch they can be discouraged by eliminating sub-surface thatch layers, which are an undesirable feature on most sports turf surfaces from other points of view as well. It is also true that allowing clippings to fly encourages earthworms as these provide them with a constant source of nutriment – gang mowing is the equivalent of a fast-food joint in earthworm terms! From this point of view it would be an advantage to box off clippings from all playing surfaces on a golf course, though whether this is a practical possibility is another matter entirely. However, boxing off clippings should be the rule on greens and tees and excessively organic top dressings (again providing worms with a food supply) should be avoided.

Fortunately worms do not like acidic conditions, probably because soil acids irritate sensitive skins. This is most useful as far as fine turf cultivation is concerned as acidic → 33

'Apart from the surface casting habit of a restricted number of species, earthworms are beneficial. Their tunnels alleviate soil compaction and provide beneficial aeration'

WORMS

31 → soil conditions also favour the desirable bent and fescue grasses. By maintaining the correct degree of soil acidity we can therefore kill two birds with one stone as far as this is concerned.

Modifying soil acidity levels is indeed one of the most hopeful lines of approach as far as limiting future worm populations is concerned. In future situations where casting is causing problems and where effective chemicals are prohibited, there remains the possibility that we can discourage worms to an acceptable degree by enhancing soil acidity. Of course this process can be carried too far – if we reduced the soil pH to 3.0, for example, then there would be virtually no natural earthworm activity.

Unfortunately, even the fine turfgrasses would then tend to suffer from such a heavy degree of acidity and the resultant turf would be weak, prone to moss invasion and witness the appearance of bare patches. A compromise could be reached, however, where sufficient acidity was present to have a markedly discouraging effect on the worm whilst at the same time allowing sufficient grass growth. At the present time one tends to see more worm activity on parkland fairways than elsewhere and it should certainly be possible

'Effective chemicals may well be banned but we may be able to keep worm populations down to acceptable levels'

to treat such fairways with acidic materials without detriment to the playing quality – indeed it is perfectly possible that playing quality could be enhanced by such treatments. The chemical which most readily springs to mind in

the context of soil acidity is sulphate of iron and this chemical is already playing a not insignificant role in reducing earthworm populations on golf greens. In the future, if chemical toxins are banned, sulphate of iron may be increasingly used for worm discouragement purposes, even on fairways. A rather more drastic treatment of a similar kind would be to use sulphur itself and such treatment is already occasionally carried out where fairway soils are too alkaline. It should however be stressed that sulphur requires careful handling: a trial plot involving applications of several rates per square metre must be laid down on an individual fairway and the effects assessed over a 12 month period before definite recommendations can be made on a more widescale use of the chemical.

In summary, earthworm control is more difficult now than in the past, due to the increasingly responsible attitude taken by public opinion towards environmental matters. Effective chemicals may well be banned but there is every possibility that we may be able to keep worm populations down to acceptable levels by other means which are not ecologically unacceptable.

■ Roger Evans BSc is an Advisory Agronomist with The Sports Turf Research Institute.

Taking STOCK

THE OTHER SIDE OF THE GREEN

Part 6

A major requirement for a chairman of green is detailed knowledge of the machinery and tools owned by the Club and subsequently used on the course. Having discussed this matter with other green chairmen, it seems that it is handled in several different ways.

Some have little knowledge of machinery and rely entirely on the greenkeeper. Most others realise that the knowledge must be shared. Whilst the greenkeeper and chairman of green have a direct responsibility for each item the secretary also requires detailed cost information to arrange for effective and adequate insurance cover.

A proven method of bringing all relevant information together is to produce a two part register. Part One for plant and equipment and Part Two for tools. When complete the register can become an integral part of the Club records and an essential for annual stocktaking.

Plant and equipment

First an individual form is required for each item. To record the relevant details, columns will need to include type of machine, manufacturer, model, serial number, year of purchase, cost when new, replacement value, condition, purpose of use, date and originator. Whilst some details may be taken from the manufacturers supplied data the original cost may require a visit to the office archives. Replacement values may also be a little more difficult to obtain and will almost certainly require help from a local supplier who is aware of current prices.

Selected information for each item can be progressed to a second or master list which will allow the value columns to be totalled. This second list can best be prepared by sorting individual forms according to type of machine, eg: tractor, PTO driven, tractor mounted, ride-on, pedestrian, carried and ride-in.

Tools

For tools a single alphabetical list is sufficient and should include column headings for quantity, type of tool and replacement value.

A greenkeeper directly involved in the project will have an excellent opportunity to discuss the merits of each item as it is recorded, an example being at my own Club when we found one machine that was almost medieval, another without safety guards and several tools – including a ladder – which were dangerous and needed replacing.

A usual response to the completed project is

one of surprise at the amount of capital invested, the age of some machines and particularly the replacement value. It can prove to be an ideal aid for those required to make recommendations for machine replacement.

Soon after completing the register we suffered a break-in. Together with several hand tools we lost a pedestrian scarifying machine.

The investigating officer was most impressed when we produced our register enabling us to supply details of the machine. However his eyes glazed over when we tried to describe the machine to him, especially as he was concerned that during investigations he may see the machine but not recognise it from our description. At that moment we realised that our register was incomplete and a photograph would have saved a thousand words.

As a result of our loss and acting upon the recommendations of the investigating officer we received a later visit from the crime prevention officer. He warned that if we were thought of as being a 'soft touch' thieves would likely return with a shopping list. He went on to advise that our machines were highly desirable and would be easily disposed of by crooks. He suggested that we:

- Paint the name of the Club on each machine.
- Mark the handle of each tool with the same paint.
- Fit security grills to all windows.
- Install a floodlight with infra-red sensor to illuminate the area in case thieves made a repeat visit.
- Extend the clubhouse burglar alarm to include the workshops and vehicle storage sheds.
- Ensure that workshops are locked when unattended.
- Display notices to would-be thieves that every item was colour-coded and that all buildings were protected with sophisticated burglar alarms.

Our experience has served to remind us that we cannot scrimp on security and that the opportunity for both impulsive and premeditated theft must be reduced to a minimum. If this means the installation of expensive security systems, then so be it. Unfortunately it will most likely result in an increased membership subscription and/or reduction in the annual machinery replacement fund.

■ Readers may care to know that whilst a computer package cannot yet physically paint tools and equipment in the manner described, the TRIMS programme, specifically designed for greenkeepers, is available to record all the essential data outlined above.