Cause and effe

Jenny Murphy examines the types of pests in turf, and the treatments available

The management of fine turf will occasionally require the control of turf pest problems. This article aims to provide a working knowledge of the four major pests of turf, and how best to control them.

The problem of wormcasts is well known and an easy one to identify. However, the presence of insect pests such as leatherjackets, frit fly and chafer grubs are not so readily recognised and requires closer examination of the turf.

Worm casts

Earthworm casts are a mixture of earth and decomposing organic matter. In the UK, there are 25 species of earthworm commonly occurring. However, the majority of worm casting problems are the responsibility of just three species.

Earthworms feed on decaying organic matter found either on the surface or in the humus fraction of the soil. Some worms feed exclusively on humus found lower down in the soil profile. These species deposit their casts in their burrows. Other species may be described as 'surface feeders' and it is this group that contains the three species responsible for worm casts which have been deposited on the surface.

Benefits of worms

It is widely recognised that earthworms are beneficial to soil, especially in agricultural and amateur gardening situations. They aerate the soil and assist in drainage by producing deep burrows, which are kept open when worms are active. In addition they are important in the re-cycling of organic matter.

Disadvantages of worms

In the professional turf market, these benefits are out-weighed by the disadvantages and worms unfortunately reach pest status. Worms live in colonies so that their beneficial effects are not evenly spread. They cannot be relied on to produce the standards of drainage and aeration acceptable to the management of fine turf areas such as bowling and golf greens. The disadvantages can be devastating on fine turf:

- Worm casts are unsightly: the aesthetic appearance of a green is highly important to greenkeeper and golfer alike
- Worm casts disrupt the playing surface of a golf or bowls green: a smooth surface with an appropriate speed is essential for both games
- An unresolved cast problem could create a slip hazard for players
- Casts form ideal sites for weed establishment and encourage the spread of turf disease
- The presence of high worm populations in fine turf is likely to attract moles - with devastating effect.

Factors influencing worm populations

Worms are encouraged by the conditions necessary to grow fine turf grasses:

- The right pH (6.5 - 7.5)
- A good soil texture (light, sandy soil/medium loam)
- A regular supply of food (grass clippings)
- Optimum temperature (similar to that for healthy grass growth)

Treatment

Apply a pesticide to moist turf at the first sign of casting activity. Do not apply when earthworms are inactive, such as during periods of drought or when the ground is frozen.

Leatherjackets

Leatherjackets are the larval stage of the cranefly (Tipula spp.) and can cause widespread damage to turf.

Identification

The grubs are legless, brown/grey or earth coloured and 4 cm long when fully grown.

The head is black and retractile, with a pair of horny jaws. On the last body segment, there are two dark coloured holes through which air enters the body; these are surrounded by six conical projections.

Life Cycle

Adult flies usually emerge in early September and lay their eggs in the sward. The eggs hatch after a few weeks, and the larvae which emerge start to feed immediately. They may become dormant during cold winter months and may even be killed by severe frosts. If a high population survives the winter, extensive damage is caused in the spring, by which time the larvae have grown up to 4cm long, with a voracious appetite for grass roots and stems.

Damage by leatherjackets is often very severe if the autumn of the previous year was wet (i.e. favourable for growth and feeding of newly hatched larvae).

Symptoms

Both old grassland and newly established swards are attacked. The damage to turf is seen as patches of dead or dying grass. Examination of the turf by lifting sections of the affected grass will often reveal the grubs.

Large numbers of leatherjackets may also be indicated by the persistent attention of birds feeding on the grubs. The main culprits are rooks, starlings and gulls. These birds often do more damage than the grubs themselves, tearing up sections of turf in search of a meal.

Treatment

Application of pesticides can be made at any time from the beginning of November where high larval populations are detected or damage is first seen.

You should not apply during periods of frost, as leatherjacket activity is reduced under these conditions and treatment may not be as effective.

Chafer Grubs

Chafer grubs are the larvae of the chafer beetle family. The most frequently found chafer grub in turf is the garden chafer. Occurrence of these pests appears to be increasing in the UK.

Identification

Chafer grubs are pale, fleshy grubs with brown heads and curved bodies. They have three pairs of legs carried on the front segments of the body. They grow to about 1.2 cm long, although other less common species of chafer grub may grow upto 4 cm in length.

Life Cycle

The life cycle of the chafer grub is variable (one - three years), depending on the species. For example, the garden chafer (Phyllopertha horticola) completes its life cycle in one year. The adult beetles emerge in late May and early June. Soon afterwards, the female burrows into the ground to lay her eggs, which take about five weeks to hatch. The emerging grubs feed on the grass roots until late autumn, when they burrow deeper to hibernate for the winter. The grubs pupate in the following spring and after about four weeks the adults dig their way out of the soil.

Symptoms

The damage caused to turf by chafer grubs is very much the same as with leatherjackets - i.e. dead / dying grass and flocks of birds - and can be severe. Positive identification of a chafer grub problem relies on finding the grubs under the affected patches.

Treatment

There is currently no pesticide available for the specific treatment of chafer grubs. Aventis is currently meeting this challenge with a new research programme to find a suitable product to control this pest. In the meantime, chlorpyrifos-based products are used. In the case of severe infestations, two applications are required two to three weeks apart, to suppress the problem.

Frit Fly

The frit fly causes problems in the establishment of newly-sown turf.

Identification

The larvae are almost colourless and very small, being just visible to the naked eye.

Life Cycle

Up to three generations of frit fly can occur in one year. However, damage to turf is restricted to those generations which are active at the normal sowing time for grass (spring and autumn). The adult fly lays its eggs on the shoots of young grasses and the emerging maggots burrow into the young shoots, causing withering of the affected plants. When fully grown, the maggots pupate and give rise to adult flies.

Although a fairly rare problem in the UK, the occasional attacks can be phenomenal, particularly in autumn. Populations in excess of three million per hectare have been recorded.

Symptoms

The larvae destroy the central shoots of ryegrass, fescues and bents. They may affect both establishment and development.

Serious thinning of newly-sown grass swards can be seen following an attack. Close examination of the affected plants will often reveal the maggot or the small brown puparia (cases left behind).

Treatment

Application of a pesticide should be made at emergence, where damage is anticipated, or at first signs of attack.

Conclusion

Information from the Aventis Environmental Science Technical Helpline indicates that turf pest problems generally, and chafer grub populations in particular, are on the increase.

This could be due to climate change. Milder winters and fewer frosts allow higher populations of leatherjackets to survive the winter, and reduce the period of dormancy, encouraging pests to feed earlier in the year. In addition, warmer summers appear to be causing a trend towards greater occurrence of ants and more unusual species such as mining bees and cutworms (moth larvae).

Until recently, we often commented that the climate of the British Isles restricts turf pests to a manageable few. As indicated above, perhaps we should not be so self-assured....

To combat changing/increasing pest populations, current research and development (at EAS) is looking at new active ingredients and methods of application, with a wider target pest spectrum in mind.

The author, Jenny Murphy is Technical and Registration Manager of Aventis Environmental Science

Golf Course Architect Ronald Fream identifies a problem that may have crept up on you and gives some advice on how to counteract it...

Does your course suffer from green creep?

Golf courses experience evolution, alteration, maturation and aging just as all other living things do. Having the benefit of almost 35 years as a golf architect and observing some courses for 25 years or longer, it is quite easy to notice the incremental, and at times, profound changes that occur.

The alterations I refer to are natural and evolutionary. Golf course maintenance crews cause and enhance alteration. Technological advances have accelerated change. Plant physiology, human genetics, nutrition, television and golf publications have expedited the demand or need for alteration. The focus of this article is on those alterations that are more or less naturally occurring as distinguished from greens committee action or periodic remodelling for design sake.

Green creep is a catch-all phrase I use to describe the inevitable alterations which emerge on every course. The rate of emergence, the frequency and the extent are variable in response to the type of course, location, climate, turfgrass varieties, soil conditions, original design and construction methods. Intensity of, and quality of maintenance, volume of play and financial strength of the owner or operator of the golf course.

Green creep begins to emerge as soon as maintenance begns on a new course. However, it increases in prominence the older the course is. Green creep is part of the aging process of almost every course, everywhere. There really is no easy way to avoid some component of green creep. That green creep is so prevalent and yet so unnoticed, is due to the almost glacial rate of occurrence.

At its most basic, Green creep is altered shapes and sizes of putting surfaces, the repositioning of bunker edges and altered tee surfaces due to insidious, little by little, mowing changes and sand edging practices. These changes can become many feet over time.

Maintenance personnel keep their jobs by not killing the grass. As the person mowing the putting surfaces does the job, each day a little uncut collar is left to prevent scalping. The person mowing tends to cut inside yesterday's cut.

Concurrently, straighter lines or more rounded lines of cut emerge over time. The putting green surface becomes smaller and rounder or oval, more uniform and less visually appealing in shape.

Bunker edging often does not cut back all of the growth that has occurred since the bunker edge was last trimmed. The person doing the edging often overlooks the original outline shape. The grass remaining has grown more onto the sand than before. Continued edging over time tends to cut off or ignore originally designed undulations or irregular outlined shapes. The sand surface area becomes less. What were visible sand surfaces from the tee now are grass. What had been a visible bunker in the fairway is now a slightly visible sand depression or appears from the players view to be only grass. The aesthetic and strategic reason for the bunker has been lost. Now the sand is blind to the player and has become an unfair hazard.

Excessive adding of sand over time tends to flatten and make shallower what originally was a meaningful hazard. Siltation has clogged the drainage system and the bunker is a pond when it rains. In some environments, the action of blowing wind can cause sand to accumulate at one prevailing edge or side of the bunker. Sand accumulates and the grass continues to grow. Now that portion is substantially higher than before. A mound or ridge now obscures what was once visible sand. This same result occurs from the use of mechanised bunker raking machines.

As the green surfaces become smaller and rounder, day by day and year by year, the area for pin placement is reduced. The distance relationship between pin position and adjacent sand bunker is expanded. The golfer's visibility of the sand basin often is

Below: An existing, traditionally shaped green is given a softer and more interesting outline (bottom)

reduced. Topdressing of greens as a normal process of maintenance will, over time smooth out a green surface, remove some original contour and perhaps not make it easier for most golfers, but make the putting surface flatter, less contoured.

Progressively smaller greens, greater distance between pin and sand, less pre shot awareness of bunker locations, all contribute to substantially different playing conditions than the original design possessed.

Changing putting surface shapes do alter what were originally designed-in approach play strategic factors, often lessening the challenge and diversity. Smaller green sites that are more flat and round begin to all look the same. Reductions of 25% or more in pinable green surface is common after 10 or 15 years.

Smaller putting surfaces reduce pin placement options. The original variety in pin placement variation now has become lost. Smaller putting surfaces concentrate golfer wear and tear, increase compaction, turf wear and tear. Deteriorating putting surfaces are the result. Increased maintenance costs are a result. Missed putts are also a result.

Similar slow motion changes occur on tees. Day by day mowing can change the shape, reduce the usable surface, alter the outline edge and adversely impact play and wear and tear. Smaller teeing area is the result. Incorrect or inattentive divot repair and inadequate or incorrect tee surface topdressing will, over time, turn a flat comfortable surface into one more crowned, bumpy, or with a surface sloping in several directions. Traffic induced compaction problems increase. Turf quality often deteriorates. Any of these creeping changes can alter how the player addresses the ball. Inattentive mowing can lead to tee surface alignments not focused on the centre of the fairway or par 3 green site. The person setting the tee blocks often then does not orient the markers correctly and perpendicular to the desired line of play. Inattentive golfers often line up their shot on this incorrect orientation hitting inaccurate shots, wasting time, and raising scores. Miss-hit shots result, through no fault of the golfer.

Changes such as these are incremental and very slow. Ten to 15 years after opening is a good time to really begin to see the difference. However, some green and bunker shape changes can often be noted by year five. When visiting older courses, the extent of change can be remarkable. These changes are so glacial that to the Green Committee or Course Manager, the changes may not even be apparent. The players hardly notice, unless turf deterioration becomes obvious.

A new Course Manager, a new pro or General Manager taking over 10 or 20 years after opening, or a first time player, seldom will even be aware of what might have been the original design intent. The golf architect's name may have been lost. The original design drawings often have been lost or discarded. Unfortunately, these creeping changes tend to soften the course and will remove much of the original playing strategy.

Tree growth also creeps upon a course. Too often, greenkeepers budget little for annual tree care, particularly proper pruning. Players seldom notice the annual growth of a free, yet overplanting of new courses in originally open areas. and too gentle a clearing on wooded sites. leave ample tree growth over time. Ongoing general thinning and reshaping of trees is lacking, so excessive growth results. Creeping tree expansion directly influences golf shots on the same hole differently over time if left untouched. Fairways become narrower. The strategy of play around a tree can be significantly altered.

An alert greenkeeper can regularly overcut the green or tee edge apron by a few inches. A yellowish discolouration will be visible for a few days. However, this repositioning of the putting or teeing surface can help retain the original outline shape and surface area.

Fairway mowing patterns and fairway outline shapes often have crept over time. New machinery at least can provide visually attractive patterns even if the width or outline shape of the fairway has changed over the years. Fairways often become narrower.

Maintained or semi-maintained rough closer to the preferred lie. Rough areas tend to creep inward as well.

Bunker creep and technology have overtaken the irrigation system too. A new more versatile and efficient pumping plant may be necessary. Upgrading the irrigation system controls to computer operation may save labour, improve turf quality and help conserve water and electricity. Reshaping of green sites, or repositioning of fairway bunkers can also require sprinkler head replacement repositioning or the addition of heads to assure uniform coverage. Recent improvements in sprinkler head operation, water distribution and water efficiency may encourage sprinkler head replacement. Adapting to the use of sewage effluent irrigation water may be a necessity of the times in some areas.

Few old and older courses are today

Does your course suffer from

green creep?

as they were when they first opened. Noted examples, such as Augusta National, Pine Valley and Pebble Beach, bear little resemblance to their early years of operation, even though current owners or members believe they are holders of the original design or original product. Some changes are committee induced, not green creep however, and still result in substantial alteration from the original design.

Green creep makes courses more homogeneous, more similar in visual and playing appearance and certainly decreases the playing challenge of the original design. Few professional golf architects of the last half of the 20th century would have designed every green round, every fairway flat and every bunker in the image of a peanut

When I am doing bunker and green creep corrections, I feel just like a plastic surgeon. I am doing nip and tuck, wrinkle removal, a little middle-age facelift and enhancement, and a few hair grafts. Pouty lips on a bunker are preferable to thin ones.

Correcting green creep really becomes a remodelling and modernisation programmeme, even if some effort is devoted to recapturing a long lost glory. Modem volumes of play, enhanced expectations for turfgrass quality, a focus on visual dynamics and who has the toughest course will influence some remodelling efforts. Remodelling to a budget, to meet user market green fees or membership capability is certainly feasible. Revitalising an older course to join today's standards and meet today's expectations while accommodating more play is attainable and can occur in an affordable way. Often corrections can involve only mowing pattern changes or bunker edge re-cutting. A comprehensive master plan should guide more involved elaborate directives. The master plan for a hole or a course should be precise and comprehensive. Accurate working drawings should be utilised. Not only golf design. but also ornamental horticulture and turfgrass agronomics are part of the solution. The corrective effort can occur over an extended period of time, be sequential or priority phased or occur quite quickly over an entire course. Bunker edge corrective changes can occur quickly and have a clear obvious and beneficial result.

To do nothing, and continue with the status quo, is a continuing downward slide. From a competitive viewpoint, the slowly deteriorating course that does nothing in response certainly loses market share to newer courses in the area. Golfers today are highly attuned to the visually dynamic style of golf. Countering years of evolutionary change will have direct and positive economic benefit. To see the problem, to understand there is a problem, is not for everyone to do. Being too close, being there too long, being too new to the situation and not being attuned to the action shields the viewer from the knowledge of what had been and often also what can be. An impartial. experienced eye brings great value.

Much of this article's focus is on easy to implement. relatively inexpensive actions to reclaim what once was there. This must not be confused with the more extensive makeover or upgrade and repositioning that can be very elaborate, involved, costly and very beneficial. An assessment of existing playing conditions, the members desires, analysis of current market competition, user demographics, operational goals, economics, agronomics, local competition and other factors become part of any renovation or modernisation programme.

The restoration or modernisation programme must be carefully planned and correctly implemented. The results can be spectacular, the cost of implementation need not be excessive. Green creep is here to stay and we must deal with it, sooner or later.

Above and right: Extensive planning goes into redesigning existing greens

Ronald Fream has recently joined with Mark James and Andrew Mair to form Golfplan Europe providing source golf course planning, design, construction, turfgrass agronomic, operational and golf academy teaching services.

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Roland Taylor takes time to meet with the irrigation specialists and find out what is afoot...

WATER OF LIFE

Above: Irrigation in action at The Belfry

From the moment man started growing plants for food he discovered that they needed sufficient quantities of the elixir of life – water, to flourish. When it failed to descend from the heavens he had to provide it from another source.

Over the centuries this need has lead to some highly innovative systems. In the quest to provide water for crops animal power and counter-weighted devices were used in early Middle Eastern countries. The portable Archimedes screw was invented in Syracuse for lifting river water into irrigation ditches and the Romans built aqueducts that transported water from the snow melts in the mountains to their cities on the plains. With the advent of steam power and followed by the combustion engine, plus electricity, irrigation became mechanised.

In today's world the word "irrigation" conjures up complex systems with pumps, electronics and computers. Strip away all the razz, flashing lights, gizmos and bells and in its crudest form the principle is no different to that of early man carrying water in a pig skin from a river to his vegetable plot. It is simply the transporting of this vital liquid in sufficient quantities from A to B, plus controlling the timing of when this happens.

Here in the UK "timing" is the operative word because unlike other parts of the globe Mother Nature frequently takes over and provides much more water than is needed. Only when she fails to come up with the goods does man have to act. This reason alone raises the question of whether it is necessary to go to the expense of installing a system. In the eventuality of a drought setting in, the chances are that severe and expensive, damage can occur very quickly. This alone says that irrigation needs to be given serious consideration.

During a dry summer transpiration can account for an average loss of moisture of up to 75mm (3 inches) per month in some areas. If there is no rain the grass roots are unable to obtain sufficient water to make up for transpiration losses and problems start to occur. Artificial watering in this situation is needed to adjust the balance.

The installation of an irrigation system is a big project and requires expert advice and planning. There are plenty of consultants and specialist irrigation companies to choose from and it is worth talking to other greenkeepers who have used their services before deciding who to call in. A number of quotes should be obtained based on a standard specification, which needs to lay out the most important points, including performance requirements.

One of the main items that will have to be considered is where the water is to come from, because an 18-hole course will require a large quantity. Whatever the source, be it purpose-built reservoir, natural lake, river, stream or bore holes an extraction licence from the Environmental Agency will be required.

Changes are continually being made and those courses that already have irrigation systems may want to use the services of a specialist and update their existing units with the latest introductions.

WATER OF LIFE

Ocmis

When it comes to designing and putting in a system, Ocmis has installed over 3,000 here in the UK - so they clearly know what is needed. Once a decision has been reached to either install a system or up-grade the existing one their qualified course surveyor will visit and draw up a detailed survey that shows what will be required to achieve optimum performance. If some form of irrigation is already in place this will be tested to determine whether it can be integrated into the new proposals.

A detailed plan of the course, plus costings, will then be submitted. This will illustrate what can be achieved within a certain budget. Also included are recommendations regarding the necessary installations to meet all the needs. The latest state of the art computer aided design (CAD) is used to come up with a suitable system for specific course requirements. Once an agreement has been reached, the company carries out the installation. Ocmis also offers a programme of repair, updating and replacement parts.

Greenkeepers and their staff are trained to ensure they get the best out of their installation.

Above: Rox Burche Golf Club displays its irrigation system

York & Martin

With over 30 years experience in irrigation, York & Martin say they have the expertise and knowledge to provide independent advice and project management when it comes to fine turf irrigation.

Their services include feasibility studies, site surveys, water sourcing, abstraction licenses, existing system evaluations, design and installation.

Some courses that have older irrigation systems may not be able to meet today's requirements. This is especially the case where changes in the course have taken place, such as lengthening or shortening holes by moving tees or enlarging putting areas. All these affect the irrigation requirements and, according to York & Martin, their experience over the last three decades enables them to provide sound advice on the most economical and best possible action for obtaining satisfactory results.

Rain Bird

When it comes to sprinklers, the range offered by Rain Bird is extensive. As you would expect from one of the market leaders, their rotors incorporate a host of features to ensure optimum performance, minimum maintenance, plus savings in energy and water.

They have been designed to prevent algae and debris blocking the unit and on the electric Impact rotors there is a pressure regulator to adjust variation in the supply, thus saving water, eliminating puddling and erosion around the head. Their low angle of trajectory minimises wind drift and the arm is kept out of the water stream to give increased coverage.

The Eagle series of gear-driven rotors have a closed case for protecting the motor and are claimed to be the only units available with self-flushing when they pop up or down. The gear driven rotors are designed to work with water so no lubrication is required. Maintenance has been kept as simple as possible with patented features that enable clearance of debris and removal of the valve seat to be carried out quickly.

The development of computers and the use of satellites in recent years have led to the introduction of software programmes that allow you to monitor and control the flow of water over the entire course without leaving your chair. Rain Bird's Nimbus II provides a map of the course and enables the user to constantly monitor irrigation activities. The efficiency of each pump is monitored and watering can be controlled to prevent over application on areas such as slopes, or where there is poor drainage. There is the option of a Virtual Weather programme that enables transpiration rates to be created from either user-defined values or an optional Weather Station, which collects data on wind, temperature, solar radiation and rainfall.

The Cirrus programme graphically creates the course, including irrigation layout and showing each individual rotor. This enables the user to click on a specific sprinkler and instantly obtain a status report.

Using Rain Bird's advanced line weather stations the programme is able to monitor and respond to climate changes. By tracking transpiration and using data from other sensory inputs it can alter watering schedules. This helps conserve water and reduce costs. The Phenology Models will send out a warning when conditions are favourable for disease and insect infestations.

All Rain Bird programmes use the latest Microsoft® Windows™ format.

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