It's that time of year again

It's time to ensure that the irrigation system is ready for the next six months, and to take into account all associated aspects of its operation. Here Kneale Diamond, Golf District Manager at Rain Bird, offers some key tips

Water Source/Supply

The source/supply of water can be from either mains water supply, winter storage reservoir, summer borehole supply or emergency top up (borehole), grey water, or treated sewage effluent.

Whatever the source, the end user must ensure that the supply is adequate and provides enough water for the areas in question. Is it licensed and legal?

Is it regularly tested for pH, N, P, K and trace elements?

Is it tested for associated disease risks such as Weils disease or Legionella?

Pumping Stations

The pump station is the heart of the system – too low a flow and the sprinklers are ineffective, too low a pressure and the sprinklers are ineffective, too high a pressure (without pressure regulation in place) and the sprinklers are ineffective.

If it's incorrectly configured or maintained it's could be extremely dangerous.

What else does the greenkeeper use that operates usually at 8.0 bar pressure (80 metres), and relies on high voltage power to work correctly?

Water, electricity, and pressure – a potentially lethal combination.

The pump station must be adequately signed, the pressure vessel safe to use and certified, a risk assessment be in place, and adequate segregation be in place (8.0 bar pressure will blow a valve stem 240 feet into the air before coming down!).

Therefore leaking pumps, slippery floors, poorly earthed pumps and inadequately signed pumphouses all need to be addressed before we even look into the pump duty.

Example of a wet pump house floor

Underground Mainline

This is usually made up from UPVC with joints every six metres, or possibly a more modern system which should have Medium Density or High Performance polyethylene as the mainline piping materials.

UPVC is prone to age deterioration, typically a system over approximately 20-25 years in age (some a lot less than this) will suffer from leakage which reduces pressure and reduces sprinkler performance, as well as wasting water and reducing efficiency of usage.

Underground pipelines must be 'sized' to take into account required water flows and pressures at the sprinkler; too small a pipelines size creates a higher velocity, more friction loss, more water hammer, more joint damage, and less water pressure at the sprinkler.

Solenoid Valve Assemblies and Solenoid Valves

Solenoid valves should be installed within assemblies and chambers that allow easy access, are clean and free of debris and allow manual operation of the system if required.

Many valve assemblies within ageing irrigation systems are incorrectly installed, within poorly installed chambers, with products that are prone to failure as they age, harden and corrode.

Solenoid valves should be pressure regulating in operation, allowing the correct downstream pressure into the sprinklers preventing over-pressurisation of the droplet and subsequent wind drift.

Poorly installed chambers, cracked lids, leaking or corroded valve assemblies all create a risk to health and safety to both the operator and golfer, and should be repaired or replaced as soon as possible.

Sprinklers

All sprinklers on the course should be regularly inspected for correct operation i.e.

pop up action, nozzle performance and pressure, action in operation, radius of throw, and correct retraction.

In order for sprinklers to achieve uniform application they must be evenly spaced, throw head to head and be set level within the turf.

Once this is achieved, accurate precipitation rates and run times can be calculated which will improve water use, efficiency, and provide a more consistent uniformity.

Sprinkler models and mode of operation will also play a huge part in uniformity and reliability.

For example, modern sprinklers have nozzles and gear drive units designed to higher tolerances, thus providing much higher uniformity across the area of coverage.

Older sprinklers lose efficiency, have non uniform rotation speeds, and worn nozzles.

Liken the sprinkler to an engine, the older it is, the more likely it is to be inefficient, be underpowered, and to lose reliability.

Control Systems

When I ask golf clubs how much water they apply to their course, how often do you think I get the reply "Six minutes most days and 10 minutes when it is really hot"? This is no use, we need to calculate in millimetres per m^2 per day, and it can be done (remember $1m^3$ of water is 220 gallons).

So, how much water do you want to apply to your golf course? Maybe 3mm per m^2?

This is where you can use weather stations to give you accurate readings to help you make that decision based on fact rather than guesswork.

You can then apply exactly the amount required and you can prove your efficiency and conserve water!

All modern PC based control systems will allow you to do this if properly configured and used correctly, if you are unsure please check with your manufacturer.

Other elements associated with the control system operation apart from programming are usually cable jointing and reliability and this is one of the most crucial parts within an irrigation system.

This can be maintained prior to the season starting when the ground is wet and when time is a little less urgent.

So, if you have prepared yourself for the summer ahead then well done, if not don't worry.

There are some very good independent consultants in the market who can help you put a plan in place to reach your end goal and set a blueprint within your golf club for years to come.

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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 craneflies) 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 cranefly (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 c m 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 chlorpyriphos 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.

Chlorpyriphos 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.

Chlorpyriphos, 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 chlorpyriphos 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 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.

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)

Chlorpyriphos 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.