Fuel's gold

How are greenkeepers dealing with rising fuel costs? GI spoke to the team at Minchinhampton Golf Club in Gloucestershire to find out how they're coping

Anyone who regularly fills a car with fuel will be only too aware of the rising cost of petrol and diesel.

As a result fuel is now becoming a major expenditure item for many golf clubs and careful planning and budgeting is required to contain this cost.

Will Harris, Minchinhampton Golf Club (MGC) Machinery Manager, has some strong views on the subject.

Together with Course Manager Paul Worster and his greenkeeper son Matt Worster, they shared these with GI.

Will and Matt do have a number of tactics to ensure the machinery is as economical as possible, so it's interesting to hear their views.

How has the price of red diesel fluctuated over the last few years?

Will: "As the Red Diesel Price Record chart shows, red diesel has had some very interesting price fluctuations in the last ten years.

"It started this period at around 20p per litre, rose to 70p per litre in 2008 (prompting fuel protests and refinery blockades) fell back to 40p in 2010 and has now risen back to 70p per litre again.

"More worryingly at MGC, our consumption has risen dramatically from less than 10,000 litres per year in 2003 to a whopping 22,500 litres last year.

"Our petrol consumption has dropped however which balances this out to an extent."

Key Points

- Keep machinery well maintained
- Do not carry excess weight
- Keep tyres inflated properly
- Avoid unnecessary journeys
- Walk the course where feasible
- Shop around for fuel
- Perform regular jug-tests on fuel consumption and phase out the less economic machines

How do you ensure your machinery is as economical as possible?

Will: "Well maintained machinery uses less fuel. Do not run machinery with blunt blades, soft tyres or dry bearings. Any drag or resistance to forward motion costs fuel. At the end of the season this adds up to a significant cost. Pre-start checks will save you time and money out on the course. If in any doubt – try pushing a loaded wheelbarrow with a soft tyre across the yard!'

Matt: "If the transport box on the run-around is still half full of divot mix from the day before, tip it out before using the vehicle for changing holes.

"Otherwise, it's like filling the boot of your car with sand and then driving it."

What about electric or hybrid machinery? Surely that's cheaper to run?

Will: "There are cost implications beyond not having to fill a machine with fuel every morning. The fundamental is that it still takes X amount of energy to move Y load over any given distance regardless of which fuel is used.

"That energy is expensive. Take lead-acid batteries. Apart from being heavy they require careful use in not allowing them to discharge completely which negatively affects their lifespan.

"After around 1200 - 1500 hours of use over two or three years their capacity will erode away despite careful maintenance.

"A set of eight T125 batteries for example costs around £1000 to replace and around 55p (of electricity) per night to charge, giving an approximate total cost over three years of £1,660. Given a petrol run-around will use maybe 1.5 litres an hour the costs are very similar."

Matt: "Hybrid machines have less friction loss in the drive train – particularly to the reels. The engine is not turning chains or belts or pumping fluid around a system, so there is the potential for much lower fuel use when compared to a conventional machine."

Will: "Unfortunately hybrid machines are generally heavier than their traditional equivalents because they have bigger alternators and more batteries.

"But this will be an interesting area to watch develop in the future and it is encouraging to see this sort of technology coming in to this industry."

How about the new lithium batteries – they must be lighter and more compact?

Matt: "There is no doubt that these batteries are lighter, capable of taking a charge quickly, and particularly well suited to pedestrian machines for example.

"Machine use is virtually silent minimising operator exposure to noise and particularly useful in built up areas."

Will: "In my opinion this technology needs to develop further. These batteries are more fragile – a drop onto the garage floor may well ruin them, and the control systems required to make the best from them are so sophisticated that fault finding is extremely difficult.

"Also, the high cost of these control systems cancels out any energy savings.

"The batteries themselves may have long warranties but will still need replacing after three to five years, and at over a thousand pounds each for even a small one are cost prohibitive and not yet suitable for a run-around vehicle.

"However there is no doubt they are ideal for small tools such as chainsaws and blowers."

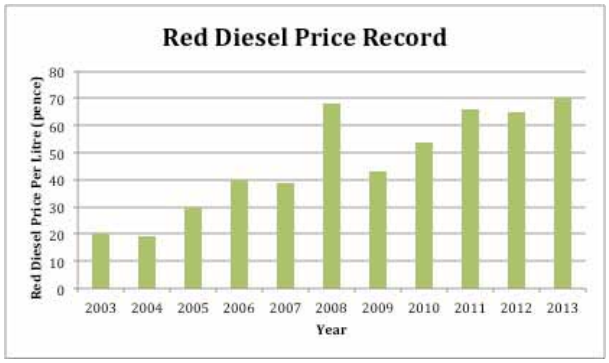
So what are our conclusions?

Clearly there is much to consider apart from practical day to day solutions.

Fuel saving has to be balanced against the overall running costs of the machinery, and noise of machinery is maybe another factor to be take into account. Local pollution is a further factor.

Electric machines are perceived (by customers and bystanders) to be more environmentally friendly, and in some situations this is important for image and possibly marketing.

Finally – shop around for fuel. Don't simply ring your preferred supplier and ask to be filled up. A penny a litre means a £25 saving on a 2500 litre fill.



THE MECHANIC'S VIEW

GI also spoke to Stuart Hall, Ground Care Service Manager at P Tuckwell, for his viewpoint…

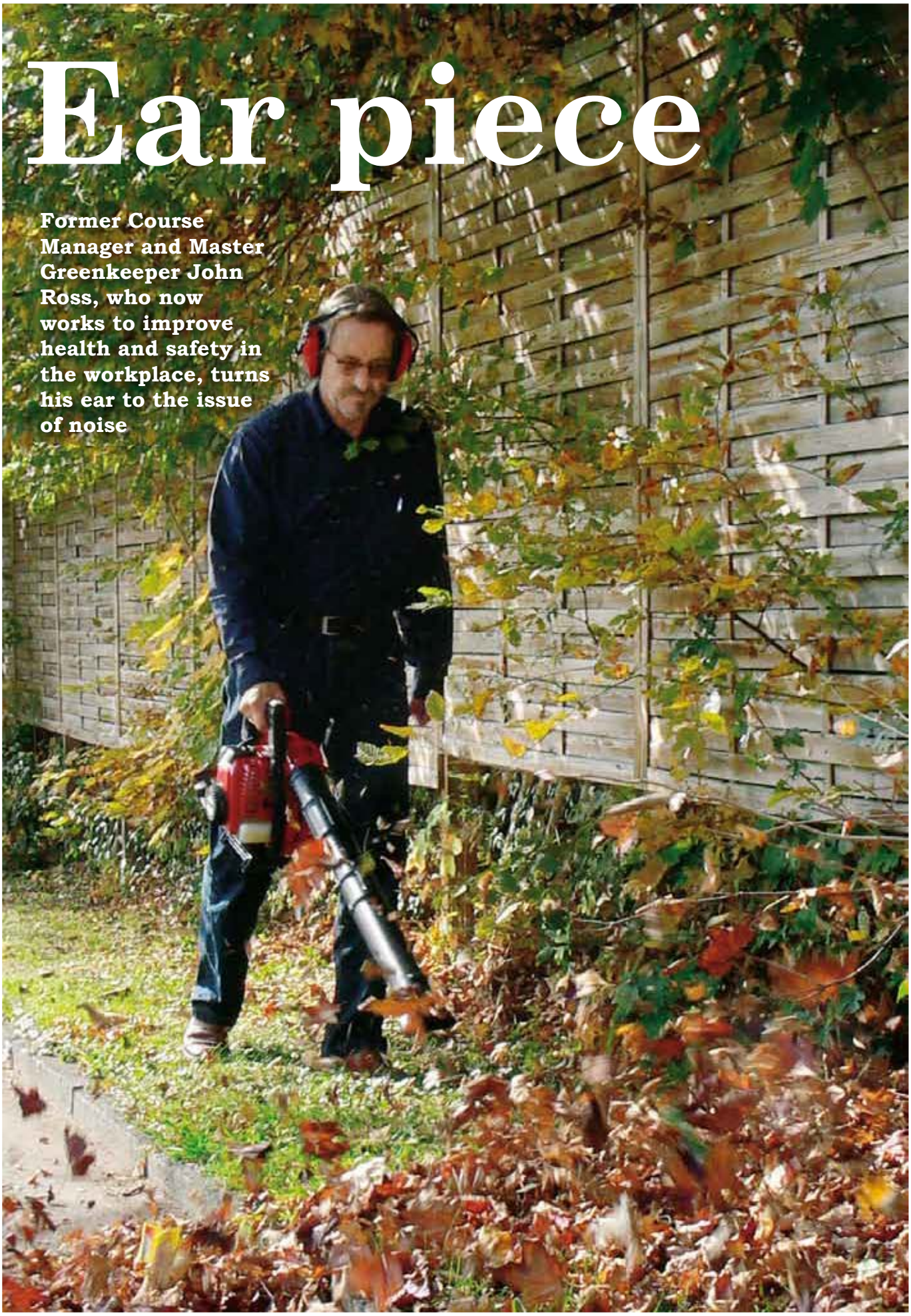
"It's amazing to see the increase in litres consumed, when I was working at John O'Gaunt Golf Club we installed a meter on the heater to see how the fuel was used, between workshop heat and mowing.

"In dry weather clubs never say "great we have saved money in fuel", but when a wet year comes around and there is a lot of mowing, instead they ask if fuel is being stolen, so the increased use of fuel is always noted.

"Most large mowers now have turbos fitted so this will increase consumption, so to counteract that you need to regularly regrind your cutting units and make sure machines are well maintained to reduce fuel consumption."

Ear piece

Former Course Manager and Master Greenkeeper John Ross, who now works to improve health and safety in the workplace, turns his ear to the issue of noise



We ask a lot of our ears, and generally they do what they are designed to - transmitting variations in pressure to our brain where we interpret it as sound. Damage to your ears restricts the ability to interpret sound or in extreme cases even to hear some or all sounds, this has implications on your ability to function normally in society and your safety.

Your ears are not simply a funnel, with noise going in and you hearing it, your ears are a complex structure through which a sound wave moves. Waves are transmitted along the ear canal setting the tympanic membrane (ear drum) in motion, this motion is transmitted to the middle ear via the incus, malleus and stapes (hammer anvil and stirrup) which amplify the vibrations. This causes the fluid in the cochlea (inner ear) to move in response to the pressure wave.

Deep within the cochlea are hair cells that sense that pressure wave, these set off nerve impulses which are carried to the brain via the cochlear nerve. This process is finely balanced and is susceptible to damage in numerous ways. Within the workplace one of the ways your hearing can be affected is excessive noise, this is called Noise Induced Hearing Loss, the exposure to which the employer has a duty to manage. How it should be managed is what I hope to clarify for you!

Work related damage occurs in the following forms…

Acute / Temporary Threshold Shift

Short periods of excessive noise producing varying degrees of inner ear damage that is initially reversible. Recovery time can be anything from minutes to days.

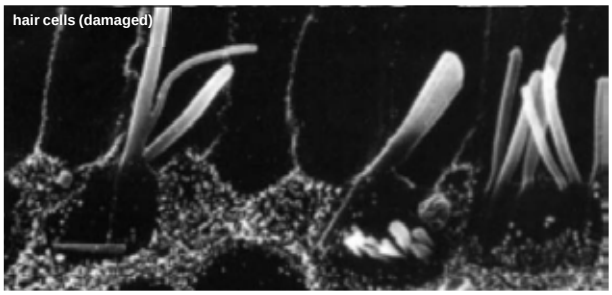
Chronic/ Permanent Threshold Shift

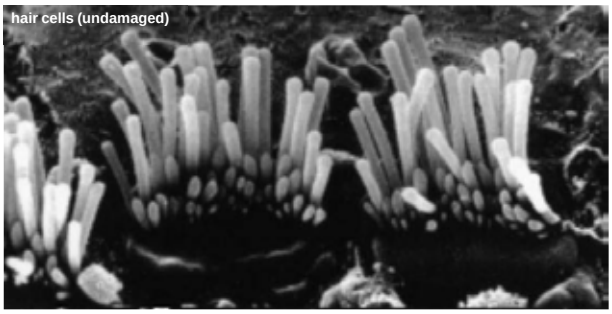
Permanent damage, known as noise induced hearing loss occurs when exposure to excessive noise continues over a long period of time, and it generally takes a long period to identify. This includes a condition that results in a permanent sound in the ear known as Tinnitus.

What do the Regulations Say?

The duty to manage noise is set out in the Control of Noise at Work Regulations 2005, these introduce the concept of a noise dose - the amount of noise you can be exposed to within an eight hour period. Noise must be measured, and as we all know it is measured in decibels (dB) therefore, a noise dose is the amount of decibels you can be exposed to over that period. It is important to understand that every 3 dB is a doubling of audible sound meaning 84dB is only half the exposure that 87dB is.

The regulations allow for variations, so if noise exposure varies





about the author

John Ross MG

John was a Course Manager for 20 years. After taking redundancy in 2010 he studied for a degree in Health and Safety. He established 'Compliant Grounds' with the intent of providing a qualified competent service to the golf industry - www.compliantgrounds.co.uk

over the day, you are allowed a weekly exposure to be considered, instead of a daily exposure. The regulations also establish three very clear points, called action levels, these are used in controlling noise exposure.

LEAV - Lower Exposure Action Value of 80dB or peak sound pressure of 135dB - Action is required if this level is exceeded.

UEAV - Upper Exposure Action Value of 85dB or peak sound pressure of 137dB - Employers have a duty not to expose employees to noise above this level, the employer must reduce exposure to as low as reasonably practicable by establishing or implementing a programme of organisational and technical procedures

ELV - Exposure Limit Value of 87dB or peak sound pressure140dB - Employers must ensure this limit is not exceeded and if it is, reduce the level immediately, investigate and modify measures to prevent recurrence.

If the noise an employee is exposed to exceeds the ELV, the employer must make a suitable and sufficient risk assessment, that risk assessment should include duration of exposure, and determine the procedures in place to reduce exposure to a level less than 80dB.

Right now I can hear greenkeepers reading this and thinking, how can this be done? We are often using equipment that is running at greater than 100dB, the answer is that CNWR05 and other regulations allow for that situation.

How to manage noise

The relevant Regulations are:

MHSWR1999 (4) The Principles of Prevention – If noise can be enclosed, vibration reduced or if people can be screened or distanced from the noise source, it should be done and there is no need for Personal Protective Equipment (PPE). This is difficult to do with turf maintenance machinery, however we could consider dB output in the purchasing process! One of the objectives of the principles of prevention is that all PPE is only considered as a last resort.

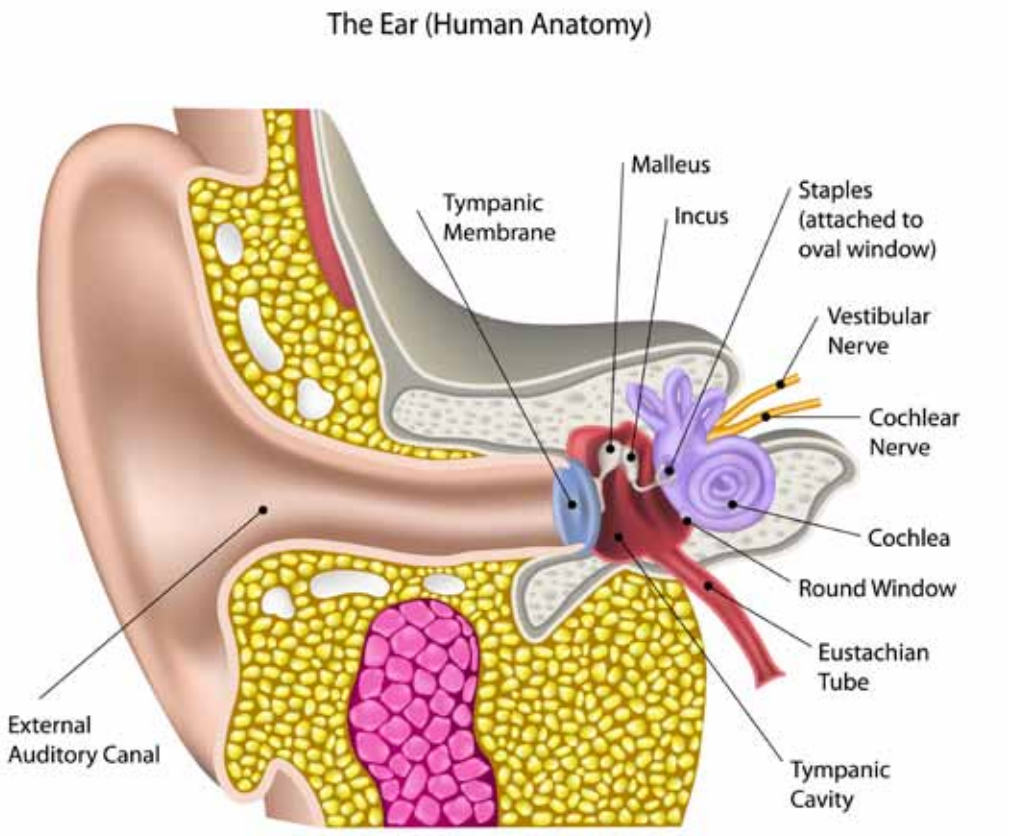
CNWR2005 (4) Exposure Limit Values and Action Values - When exposure is unavoidable, we can supply PPE and consider the protection it offers at the ear in calculating a noise dose.

CNWR2005 (7) Hearing Protection – Any equipment louder than 85dB should have a blue mandatory hearing protection sticker on it, designating it a hearing protection zone.

HASAWA1974 (8) General duties of the employee – If hearing protection is supplied, it must not be impeded, i.e. by wearing music speakers on the inside. This is a duty placed on the employee!

PPE protection - The objective of hearing protection is to take the noise level at the ear to between 70dB and 85dB.

To protect below 70dB is considered overprotection, meaning the user would not be able to hear alarms, machinery failures or even a simple call of fore from a golfer, this gives the manager or safety consultant a margin of 15dB when selecting hearing protection.



Key points on how to manage noise:

- Know the levels of noise being created
- If it is over 80dB supply PPE
- If it is over 85dB ensure it is worn and not interfered with, declare area a mandatory hearing protection zone
- Understand the PPE you are using and ensure it offers protection at the ear between 70-85dB(a)
- If noise can be enclosed do so (compressors, grinders, pump stations etc.)
- Inform and instruct staff on dangers oh NIHL and on how to wear PPE
- If any member of already staff suffers damaged hearing extra consideration must be given to them
- Maintain equipment and machinery according to manufacturers recommendations

Greenkeeper Case Study

Noise induced hearing loss creeps up on you and is a chronic condition that will not go away once you have it. An interview with a well-known course manager who suffers from tinnitus highlighted the need to take it very seriously. He wishes to remain anonymous.

"I became a Greenkeeper in 1966 and spent 15 years as an assistant before becoming a Head Greenkeeper in 1981. In those days no one had heard of PPE, we just used to get on with it, I knew of tinnitus because my dad, suffered it from his time in national service". He added how, as a hands-on greenkeeper, he spent days using strimmers and chainsaws, sitting on early cutting machinery, walking behind a Ransomes Matador or in tractors that had no cabs.

He said: "It 's not just the tinnitus, but the reduced hearing ability". This means that often he is lip reading in conversation, unable to hear the doorbell being rung, and having to double check when crossing the road – generally just taking more care in life.

"I saw my first pair of ear protectors in 1994, they were considered a bit of a joke and were worn only on a voluntary basis, we called them ear muffs" he explained, describing the early attitude to hearing protection.

"I first became aware I had tinnitus on the day William and Kate married, I was watching the television and suddenly there was a noise inside my head, I was devastated because I knew straight away from my dad's experience it was tinnitus. For days it was all I could think of, I have had it ever since, it is constant."

In his latest article which features a quiz offering CPD Credits, Henry Bechelet explores soil sampling techniques

Sampling technique

Everris are specialists in plant nutrition and nutrient delivery technologies. We draw from a proud heritage of fertiliser production from Fisons then Levingtons, ICI then Zeneca, before merging into Scotts Professional and then becoming Everris.

Over the years we have produced and continue to produce high quality fertilisers specifically formulated to deliver nutrient for the production of high quality turf throughout the year. We have always invested heavily in research and development to support our recommendations and drive our innovations. We try to lead from the front.

We also understand the importance of our products being used correctly and invest in training our staff to the very highest industry standards (FACTS and BASIS). We work hard to ensure that our customers understand our products and know how to get the very best out of them. When making recommendations for fertiliser programmes, we have traditionally used soil analysis results as a start of the process.

Generally, we use soil sample analysis to provide meaningful information about the chemical and nutrient status of the soil to help with the creation of fertiliser programmes. We need to know the soil pH because it influences nutrient availability and grass type suitability.

The cation exchange capacity (CEC) of the soil is important because it affects nutrient retention and could influence the choice of fertiliser type, the quantity applied and release pattern.

Electrical Conductivity (or salinity) can have a big impact on the condition and health of turf. We also need to know the availability of the major nutrients P, K, Ca and Mg to see if they are at sufficient levels to sustain turf health.

Micro nutrient analysis may also be undertaken in response to deficiency/toxicity problems.

So, there are a number of tests that are essential to help us put together a good nutrition programme.

But before we can even think about the results, we need to make sure that the sampling is carried correctly. Careless soil sampling can be the greatest single source of error when formulating fertiliser programmes.

This is because the way in which we take the samples can radically affect the results and so it is important that we get the sampling right to be able to focus the nutrition programme properly.

The key considerations are:

- Taking a representative sample
- Sampling from the right depth
- Do we include thatch?
- Timing of sampling
- Frequency of sampling

about the author

Henry Bechelet

After working in the turf and amenity sector for over 20 years, Henry joined STRI as a trainee agronomist. He then became Northern Technical Sales Representative for a fertiliser supplier. He rejoined STRI in 2000 as an agronomist, and since has been a writer, and a speaker.

Soil Sampler

Firstly, you will need a round metal corer that is capable of retrieving enough sample from the required depth without causing too much surface disruption. This would commonly be a 15mm diameter corer 15-20cm in length. Suitable stainless steel samplers are widely available, but some work better than others, so choose carefully.

Sampling pattern

You must employ a sampling pattern that is able to produce a good representative sample. Our aim is to obtain a composite nutrient value to represent each area. In general, we form a representative sample from 20 cores, which are then mixed together to form the sample for analysis. The sampling pattern should be drawn up by creating 20 sub-areas (i.e. an imaginary grid) from which the samples are taken from a random position within each area. The sampling pattern should not be oriented in straight lines because the results may be biased by treatment affects (such as fertiliser applications, maintenance operations etc.)

Depth of sampling

It is critically important to be accurate and consistent with our depth of sampling. Nutrient levels vary significantly through the depth of the profile, so altering the depth of sampling might appear to give significant changes in nutrient levels when no change has actually occurred. Generally, we sample the zone from which the roots draw nutrients (generally 2.5 – 10mm). It is good practice to carve guideline notches into the soil augur to ensure consistency of sampling depth.

Splitting samples

You may wish to split the cores to analyse the soil status taken from different depths. Sometimes significant differences within the profile need to be identified rather than absorbed into a bulked up composite sample.

For instance, in sand-based constructions the properties of the upper soil profile might vary significantly from the rootzone (pH especially) to potentially cause problems, which is something we would need to know.

Alternatively, soil-based greens that have been heavily amended with sand top dressing, might display a reduced nutrient holding capability in the upper soil profile compared to lower down, which we need to understand. Again, if you are intending to analyse trends within the profile over time, you will need to be consistent with your depth of sampling.

Remove the thatch?

It is generally recommended to remove thatch from samples before testing. Organic matter usually increases the nutrient levels because it can contain significant amounts of the nutrients required to support plant growth. At the moment I find it better to split the samples at around 25mm then analyse the upper portion for pH, P, K and organic matter (LOI) with more comprehensive testing lower down. This can be very helpful in understanding the dynamics of the situation and also putting a more meaningful number on the organic matter content.

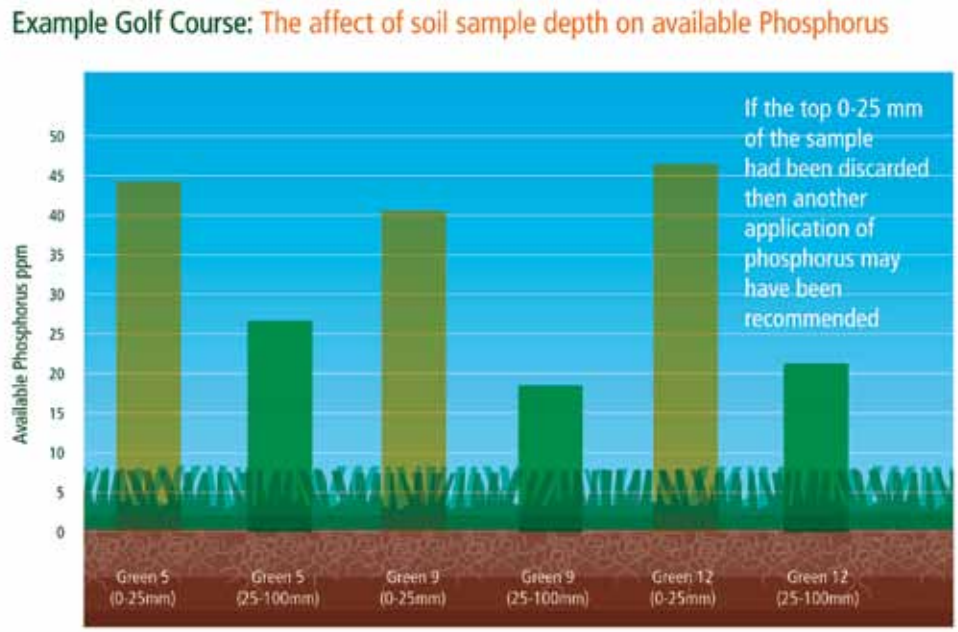
Time of year

Timing of sampling time is also important if you want to make year-on-year comparisons. The soil pH as well as the available P and K can vary throughout the year, so sampling timing can affect the results. Again, you need to be consistent with your timings to be able to draw out meaningful trends.

Frequency of testing

The frequency of testing would be dependent on the potential for rapid and significant changes in soil status to occur. In new sand-based constructions the pH can drop rapidly if there is a low CEC, which could cause problems of nutrient lock up or general turf stress.

More regular monitoring during the early weeks and months of new establishments can help us understand the situation and guide the fertiliser programme properly.



Clean and orderly

Above all, the samples should be collected carefully and cleanly without external contamination before being amalgamated and mixed in a non-metallic container prior to bagging up and labelling.

Most laboratories provide kits and offer guidance on how best to take samples and the amount of sample required to carry out the various tests.

Conclusion

Soil analysis provides us with vital information to help us formulate our nutrition programmes.

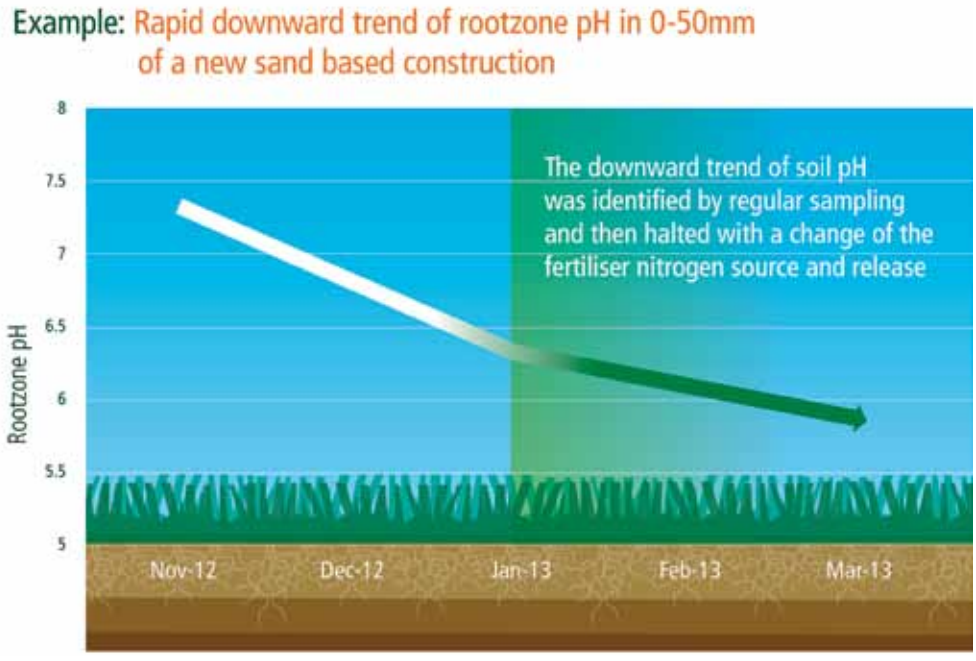
We must, however, be extremely strict with the sampling method if the results are to be trusted.

The rules of soil sampling are:

- Take 20 core samples from the selected area using an imaginary grid pattern with randomization within the grid squares
- Sample to the depth of root activity (25mm-100mm generally)
- Split the samples if needed to understand profile differences
- Be consistent in your sampling methods to allow ongoing comparisons
- Mix the samples cleanly before bagging up and sending away
- Label the samples clearly

This way you will produce a set of results that you can work with. There is little point in using results or comparing different results obtained from careless sampling.

This is one of those areas that we just need to get right. Interpreting the results is something else we need to discuss.



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CPD Questions

1. What sampling pattern should we employ?
a. Simple grid pattern
b. Straight lines
c. Randomised in a grid pattern

2. How many samples should you take from each area to achieve a representative sample?
a. 1-5
b. 5-10
c. 20

3. What depth should you take samples from?
a. The zone of root activity
b. 0-100mm
c. 100-150mm

4. Should we include or discard the thatch?
a. Include
b. Discard
c. Analyse both

5. What time of year is best to take samples?
a. Spring-summer
b. Autumn-winter
c. It is most important to be consistent with the time of year.

6. How frequently do we need to take samples?
a. Depends on the situation
b. Annually
c. Monthly

7. How do we create the final sample for analysis?
a. Just put the cores into the bag and send them off
b. Retrieve the required portion of the sample and mix thoroughly before bagging up
c. Who cares?

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