

NEWSLETTER

March - June 2021

Welcome to Edition 9 of our amenity newsletter. The different nations in the UK are adopting slightly different rules around outdoor sports but the news is positive with most golf courses opening for play this week! The weather has also been a challenge this winter with many parts of the UK experiencing their coldest winter since 1978/79. I think we are all looking forward to spring!

So to this edition! We cover wetting agents, humic and fulvic acids, a Q&A on our fertiliser range and we also take a delve into the GCSE biology of plants! Congratulations to James Procter at Windlesham Golf Club who won our crossword competition in the last edition. There is another crossword too in this edition and a chance to win £50 of book tokens.

GBR Technology are delighted to welcome Douglas Hart to our team. Douglas has an absolute wealth of experience, having been in the amenity business for 37yrs. He will play a key role in developing our export sales, support existing business & working on special projects. Welcome Douglas! Douglas is a keen fell walker tackling the Scottish mountains in all seasons – we do like his photo!

Paul Morris
Managing Director



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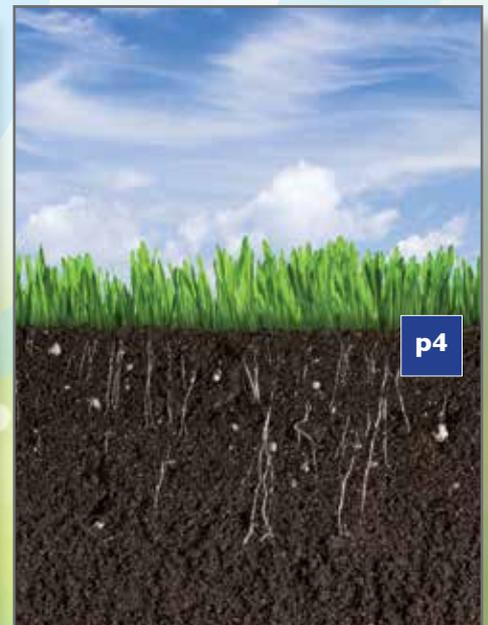
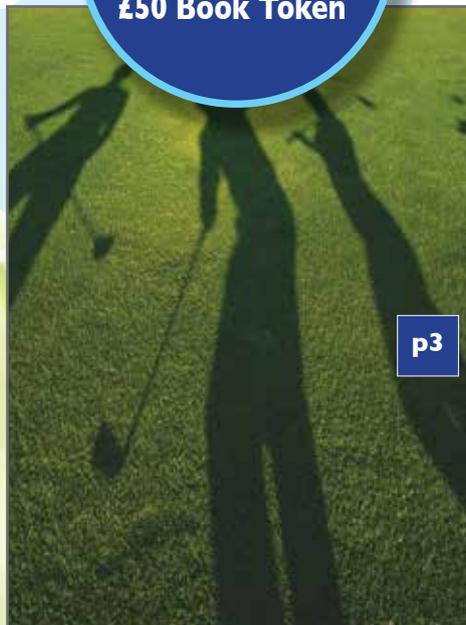
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Douglas Hart – our new team member

Enter Our
Competition
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The Basics of Plant Biology

With a bewildering amount of knowledge coming at us from the industry and it's suppliers, it's not a bad idea to remember from time to time, the basics of the how plants function. In this article we look at some of the basics of plant biology found on many GCSE syllabuses

Photosynthesis:

Fundamental to plants of course is photosynthesis.

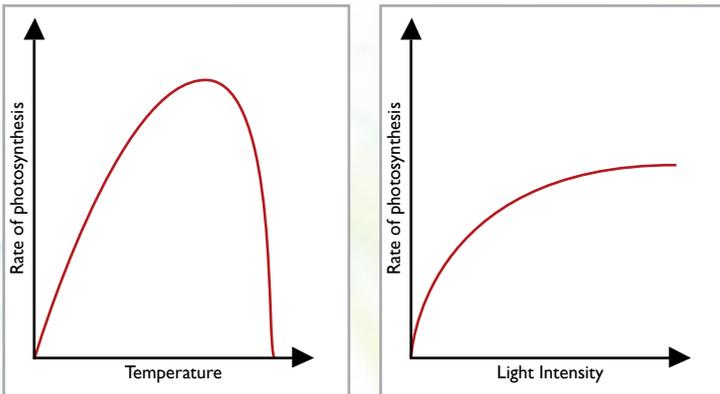
The basic equation is:

Carbon dioxide + water (+ sunlight + chlorophyll) → glucose + oxygen

Glucose is used for respiration (plants also respire) but is also largely converted to starch as energy storage (for later conversion back to glucose).

There are three factors that affect the rate of photosynthesis. They are light intensity, temperature and carbon dioxide concentration. As we move from winter to spring light intensity increases and daylight lengthens and temperatures increase.

The graphs below show how the rate of photosynthesis change with increasing light intensity and temperature. Notice that for temperature there is a peak and when the leaf temperature starts to exceed 37°C then the rate of photosynthesis starts to drop.

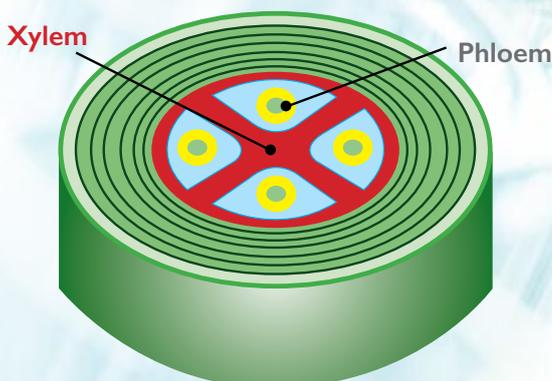


Leaf Structure:

The leaf is designed for effective photosynthesis, it needs to:

- Be efficient at absorbing light
- Be able to exchange gases (carbon dioxide and oxygen)
- Be able to transport water up to the leaf and glucose to other parts of the plant

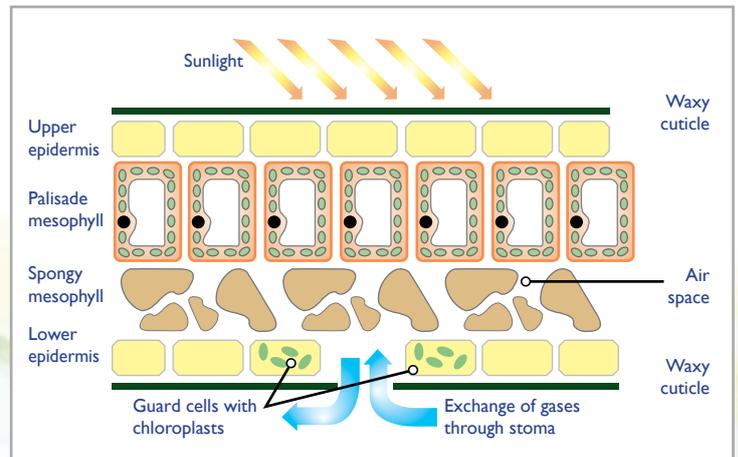
The xylem tissues take water to the leaf from the roots, whilst the phloem transports glucose away from the leaf. These tissues can be found in the plant in the form of vascular bundles as illustrated below:



Gas Exchange:

It's the mesophyll cells where gas exchange happens. Mesophyll cells form spongy tissue – they are loosely packed and covered by a thin layer of water. Stomata are the small pores leading to the mesophyll cells and through which carbon dioxide and oxygen diffuse. The stomata can open and close to control the loss of water (by transpiration) from the leaf. The stomata are located on the underside of the leaf. The top of the leaf is coated with a thin wax cuticle that protects the leaf without cutting out any sunlight.

The below schematic represents a cross section of a leaf:



The palisade mesophyll cells contain many chloroplasts (chloroplast within cells are where photosynthesis occur) and are packed close together.

Absorption of Mineral Ions

Minerals are required by plants for healthy growth. They are absorbed through the roots by a process called 'active transport' (not osmosis) as mineral ions dissolved in soil water. Active transport is a process that requires energy.

Nitrogen is absorbed in the form of nitrate or ammonium ions – plants need sufficient for healthy growth to produce amino acids. Insufficient nitrogen leads to stunted growth. Magnesium is also required for healthy growth – this mineral is found in chlorophyll and a deficiency results in yellowing leaves (chlorosis).

It has also been discovered that minerals can be absorbed by plant leaves (foliar feeding). Minerals in solution applied in this way can get taken up through the stomata and epidermis (with a spray enhancer) and can elicit a rapid response.

Over-use of fertilisers can cause problems within the plant but also eutrophication happens when excess nitrate or phosphate enters rivers or lakes from the land and this can harm aquatic animals.

Monthly Residual Wetting Agents

– Product Summary

As we enter the growing season wetting agents can provide useful assistance for creating good growing conditions for turf. Their effects at reducing surface tension and enabling better wetting enables more complete fluid films in root profiles and this aids uptake of water and water soluble minerals. Root profiles benefit from sufficient water but also sufficient air (in order to encourage aerobic conditions) and wetting agents can assist both of these.

From March/April time through till September/October, monthly applications of residual wetting agents to intensively managed sports turf can dose the profile at a suitable concentration to have positive effects. At GBR Technology we are a leading formulator and manufacturer of wetting agent products and now firmly established as one of the leaders in this field.

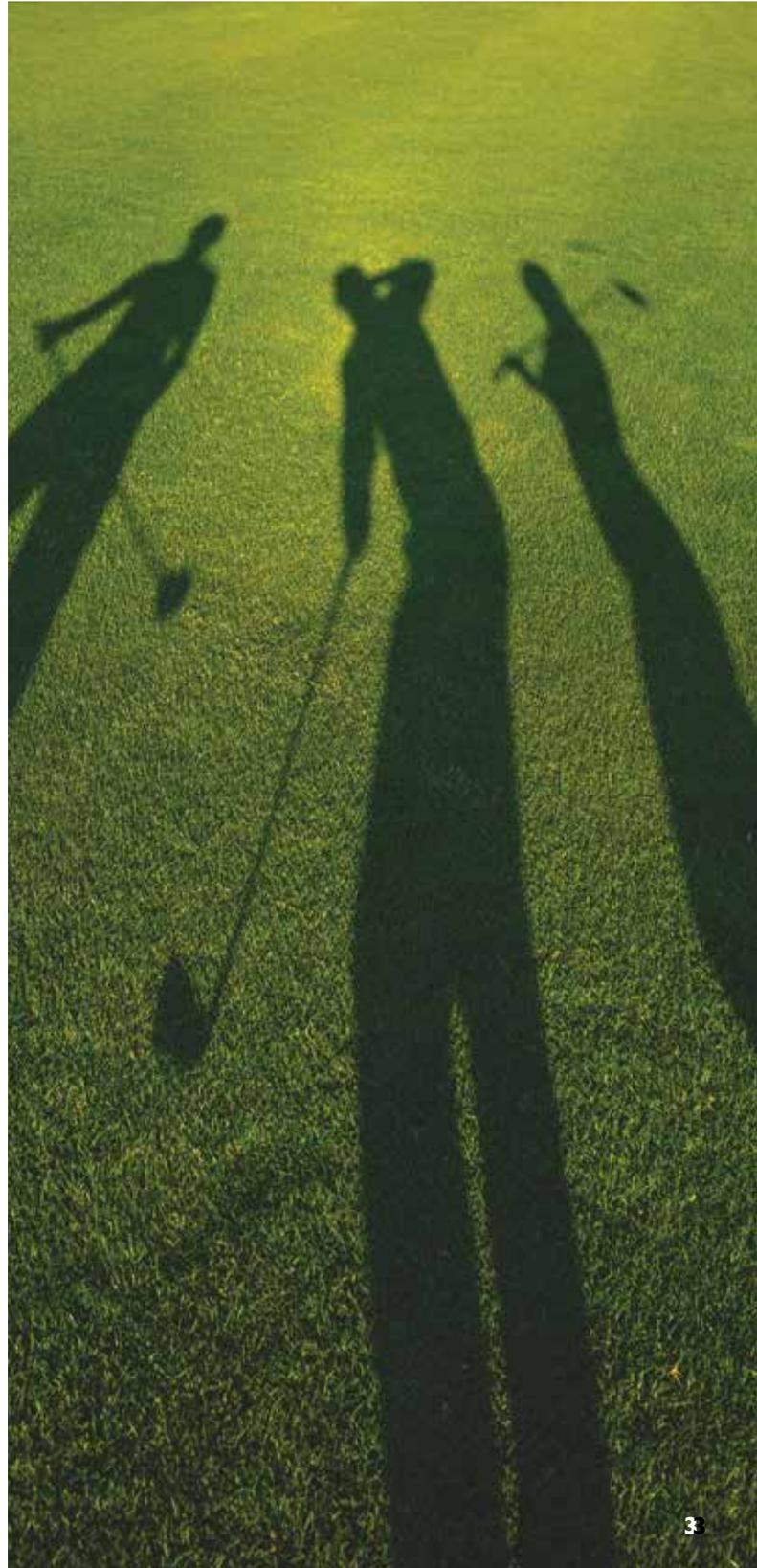
Here's a brief summary of our monthly residual products (all of these products are 100% active – by this we mean 20 litres of product is 20 litres of surfactant – no water or diluents):

Aquazone™: Based on standard block copolymers*, Aquazone gives reliable performance at 20 litres per hectare monthly and has been tested by the STRI. It's a well used product and has the lowest price per litre of our three residuals. As well as being widely used on greens it's also our top seller for use on fairways.

Hydrozone™: Uses reverse block copolymers* and additional superwetting agents to give greater longevity of performance (more resistance to water washout and biodegradation – so it holds it's concentration for longer in the soil profile). Hydrozone contains a surfactant additive to help it absorb into the profile on application and will give the wetting performance an additional boost for a period of time. The block copolymers in Hydrozone as well as being engineered for greater longevity also give a slightly superior wetting performance compared with many block copolymer formulations. Hydrozone is an advanced product with a very wide usage and has also been STRI tested.

Formulation 42™: A new innovation developed and tested in 2019 and released for commercial sale in 2020. Formulation 42 achieves a new level of performance in terms of longevity and wetting power from block copolymer formulations. It has a lower recommended application rate. A significant innovation is a penetrant component that is uniquely engineered to resist biodegradation for longer (normally it's only the residual component that is engineered in this way). Formulation 42 also contains a larger amount of superwetting surfactant which also functions to disperse rain and dew and assist in reduction of disease pressure as the season draws to a close.

* block copolymers are generally a tri-block arrangement of ethylene oxide (EO) and propylene oxide (PO) blocks within a long chain molecule. Standard block copolymers have an arrangement with a chain of PO at the centre and a chain of EO at each end (EO-PO-EO). Reverse blocks conversely, have EO at the centre and chains of PO at each end (PO-EO-PO). Reverse blocks can have some performance advantages in turf wetting formulations, although there are many other factors to consider when developing an optimised turf wetting agent.



Humic and Fulvic Acids

Nathan Scarff is GBR's Mid UK Area Technical Sales Representative and an ex-Head Groundsman (Championship Groundsman of the Year 2015/16) with 13 years' experience of managing sports turf. In this article, Nathan talks about humic and fulvic acids. Over to you Nathan...



Humic and Fulvic acids have been gaining popularity over recent years for a number of reasons including their chelating ability to improve uptake of certain nutrients, and a shift in focus towards soil health and biology which can use these materials as an energy source.

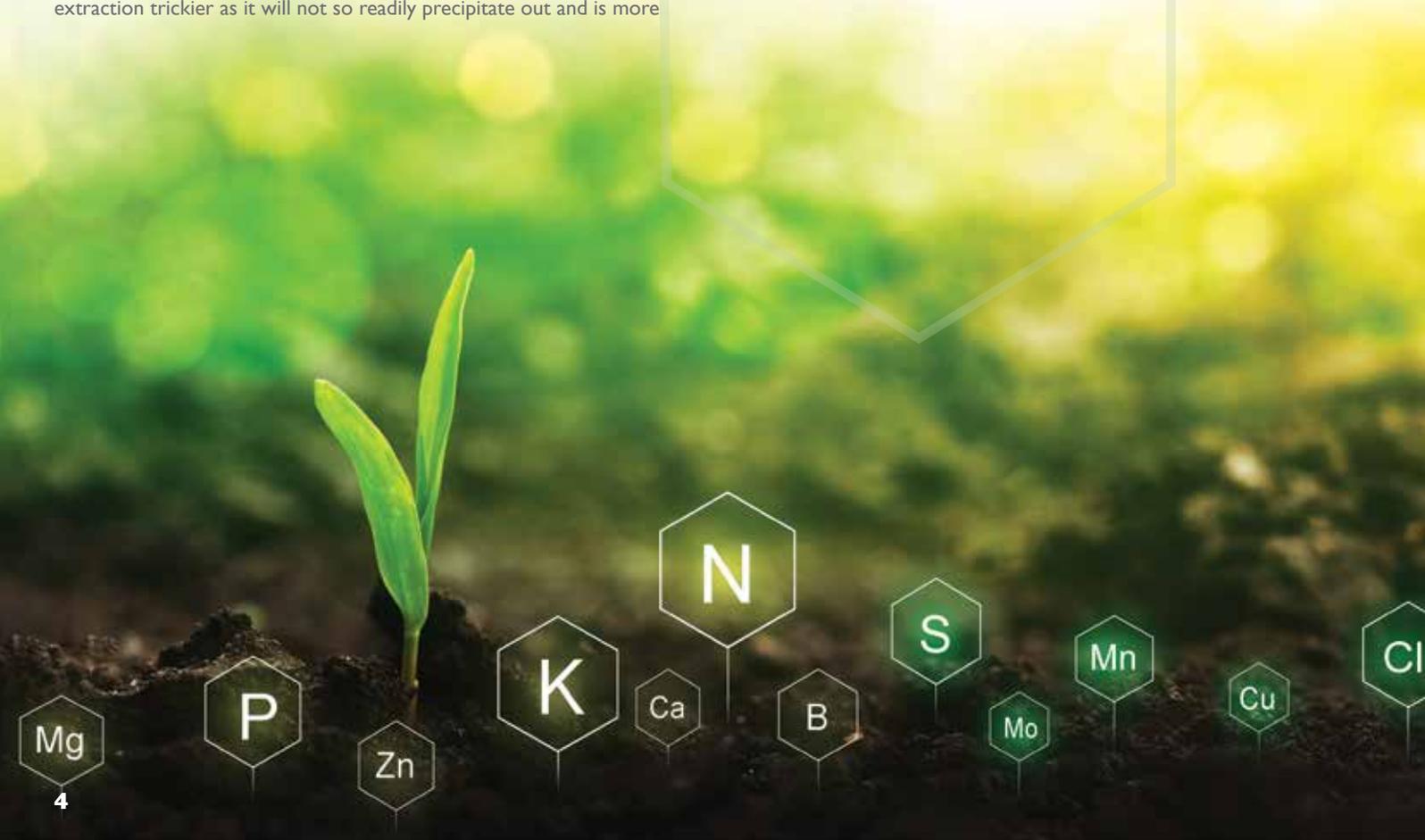
Both materials are formed naturally in healthy soils, however, where sports turf has been under increasing pressure from maintenance, play and dilution of organic matter via inert sand top dressing soil carbon and humus will have become depleted over a number of years. The effort to reverse this carbon and humus deficit, much like the effort that will have initially reduced soil carbon and humus, will take a number of years of good management practice to reverse. But there is no time like the present to start incorporating these changes, particularly as we seem on an inevitable slope towards being fungicide free like many of our European friends such as Germany, Belgium and The Netherlands. Soil health supporting plant health will continue to grow in importance over the coming years.

Humic acid can be extracted from humus by mixing humus in a diluted alkali followed by acidifying to a pH of around 1-2 to create a precipitate of humic acid. Fulvic acid is much more soluble than humic, making its extraction trickier as it will not so readily precipitate out and is more

likely to leach from its parent material before its extraction. It's for this reason that a humic and fulvic acid product will typically have a higher humic acid content than fulvic, such as Leonardite extractions.

These substances contain functional groups like carboxylic and phenol groups which allows them to form complexes with ions such as magnesium (Mg^{2+}), calcium (Ca^{2+}) and iron (in both ferrous and ferric forms). Hopefully you all know the difference in that from a previous article. In most situations, these substances will have two or more of these functional groups which will actually allow them to form chelates. This means that these types of substances can be utilised to enhance uptake of nutrients and in some cases improve tank mix compatibility, particularly fulvic acids.

Fulvic acids are much lower molecular weight than humic acids, which means they are more mobile within the soil and able to move through soil/water solutions to chelate nutrients and turn them into plant available form. They also carry a higher CEC, but this mobility means they are more likely to leach through the soil in time. Humic acids carry a higher molecular weight, which means they will be less mobile but will stay within the profile and create sites with a very high CEC (Cation Exchange Capacity- again you should all be well versed on this from a recent article!)



So, what is the benefit of all of this?

Well, one key factor is this binding ability of fulvic acids has an affinity for nitrate. This means that fulvic acid compounds can improve the uptake of the most readily leached form of nitrogen, but also the form that is the most readily available to the plant, making fulvic acid an excellent low-light and low-temperature growth stimulator. Secondly, fulvic acids solubilising power of nutrients, (I only mentioned a few earlier), means it can bring ions that would typically form insoluble compounds with phosphate into a plant available state, freeing up the nutrient but also the phosphate. These abilities can bring on a two-fold benefit; increased plant health and growth via the taken-up nutrient, but also increased rooting via the additional phosphorus uptake. Deeper rooting brings on some significant benefits of its own as we know.

Humic acid will work differently and will utilise its lower molecular weight counter part to carry its bound nutrient away and into the plant. Crucially though, humic acid will hold onto several ions and prevent them going through unwanted reactions in the soil.

Fulvic acid has a water bridging ability, meaning it attracts water molecules. This will help the soil remain moist and aid the movement of nutrient into plant roots. Its small molecular size also means it can enter the plant itself making it an excellent tank mixing partner for foliar sprays as it will enhance the uptake of nutrients. Coupled with this knowledge we could easily utilise fulvic acid and wetting agents to greatly increase the efficacy of foliar sprays, making better use of fertiliser such as calcium, magnesium and potassium in nitrate form. It could also show a more pronounced green-up when using iron and magnesium solutions.

So here is my summary on humic and fulvic acids- think of them like a bus stop. Passengers are the nutrients, humic acid is the bus stop itself and fulvic is the bus. The bus stop will keep the passengers dry and safe while they are waiting, and the bus comes along and picks up the passengers to take them where the need to go. This is where we can utilise humic materials to gain benefits, humic acid becoming a safe "holding" high CEC site within the profile and fulvic as the transporter for the nutrients.

Ways of applying these substances:

The crudest would be good old-fashioned muck spreading! In reality, turf has adopted this method for a number of years by the use of fine turf granular organic fertiliser derived from animal manure/litter (keep an eye out for a new one coming from ourselves!) or vegetal derived organic fertiliser such as our 10-0-4 and 7-2-5 organics. It is also possible to buy granular humic acids and these will often contain some fulvic acids too.

The next would be the use of liquid solutions. The market is flooded with these options and it is worth shopping around to get the best bang for your buck, looking at the percentage of humic and fulvic acids and calculating cost per kilo or litre can help you find ultimate value.

Another option is soluble powders. For those of you not wanting to dissolve things down prior to spraying, the solubility of our fulvic acid powder is hard to beat. Straight into the sprayer and it will dissolve better than some liquids!

The last way, and perhaps as a fertiliser salesperson I shouldn't be suggesting this one, converting your thatch and organic matter into humus, which in turn will break down into humic and fulvic acids. Naturally you won't gain the benefit of adding to sprays to enhance uptake, but utilising biostimulants and biological products to break down thatch and organic matter provides a superb option for utilising what is already there and reducing the need for labour intensive and play disrupting maintenance such as deep scarification and hollow coring. Molasses has been shown to have excellent thatch degrading properties, more on this another time, while utilising bacteria and fungi thatch degraders which break down lignin to accelerate the decomposition of thatch.



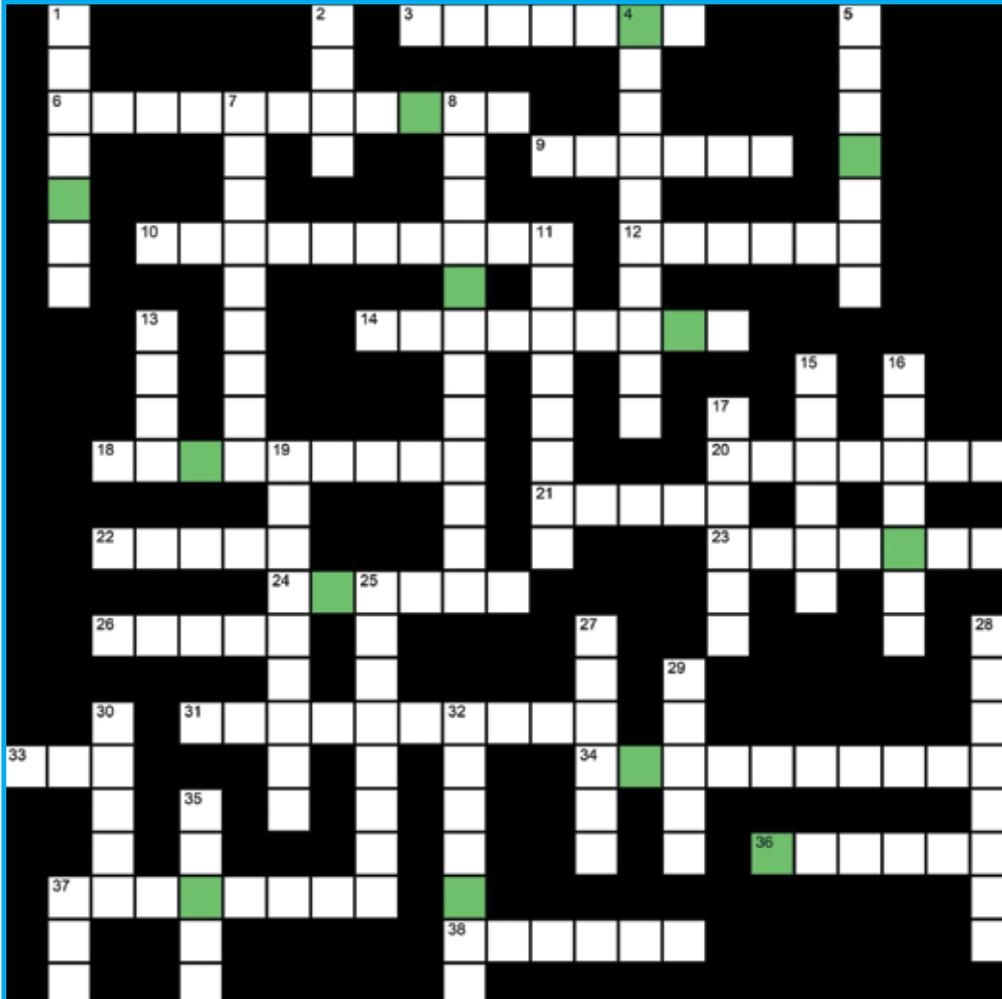
Competition Time!

Test your amenity knowledge with our new crossword and you could win a £50 book token.

For a chance to win the book token, complete the crossword to reveal 13 shaded letters that can be arranged to form a hidden amenity word.

How to enter: To enter, simply email the hidden word to info@gbritech.co.uk and include your name and phone number. Closing date is 31st May 2021 at 23.59

Enter
To Win A £50
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Congratulations to James Procter at Windlesham Golf Club who won our crossword competition in the last edition. The hidden word was compatibility. Thanks for all your entries.

Terms and conditions

Closing date for receipt of all entries is 31st May 2021. Open to UK residents only aged 18 and over. The competition is not open to GBR Technology Limited employees or their families. One entry per person. Entries must be emailed to info@gbritech.co.uk. There will be one winner only. The winner will be selected at random from all correct entries entered by the closing date. The winner will be notified by email or phone. If the prize is not claimed within 28 days of the closing date, a redraw will take place. GBR Technology Limited reserves the right to substitute a prize of equal value, should this be necessary. Entrants agree to be bound by these terms and conditions.

Good Luck!



Across

3. Natural! Car go in (anag.) (7)
6. A simple soil test for stability (7,4)
9. Where pollen germinates (6)
10. Acid! Acrylic box (anag.) (10)
12. Found at the top of the filament (6)
14. Bio-stimulant or fungicide? (9)
18. Formula for calculating drainage rate between drains (9)
20. (and 29 & 30 down) USGA Inverted filter (7)
21. A quality in a GBR sales rep (5)
22. Not to be confused with the Middle Eastern dip! (5)
23. Cultural practice to reduce disease (7)
24. When? is everything! (6)
26. Acid! I moan (anag.) (5)
31. A G Leonards soil conditioner (10)
33. JA's favourite grass (3)

34. Charges the battery (10)
36. Cleaning barrier (6)
37. Grease that stands above the rest (8)
38. Chemical element with the symbol C (6)

Down

1. A ligand bonded to metal atom (7)
2. Has an atomic weight of 65.39 (4)
4. Means of watering turf (10)
5. Increases air speed in the carburettor (7)
7. Bung that ignites (5,4)
8. Roots extract nutrients from this (4,8)
11. Maximum amount something can contain (8)
13. All-rounder lubricant (4)
15. Not favourite of Dracula (6)
16. MLSN testing method (7)
17. Down give (opposite) (6)
19. Soil group rich in organic matter (9)
25. Sugary extract (8)
27. 1978 musical film (6)
28. A wee knob creek (5,3)
29. AKA H2O (5)
30. Put your cards on the (5)
32. Fortification, Protection, deterrent etc. (7)
35. Two stroke has...ports (5)
37. Parts per million (Abbr.) (3)



The lowdown on fertilisers at GBR

So Paul, tell me about GBR Technology's fertiliser range.

What fertilisers do GBR offer?

Ok so firstly we classify fertilisers as products supplying NPK primarily. So this includes granulars, solubles (including straights), and liquids.

What granulars do you offer?

We don't make granulars but we have a number of partners for different grades and supply a wide range. Standard blended fertilisers, homogenous crumb granulars and then a range of slow release. Slow release grades include polymer coated, methylene urea and grades that employ inhibitors that slow the conversion of less bio-available nitrogen forms to more bio-available forms and so give a more controlled release. We also offer organic grades – based on vegetable sources or chicken litter.

For many surfaces we focus on turf health and applying appropriate levels of nutrients – bringing along growth but without over application that can encourage disease and excessive leaching and run off. For some sports, nitrogen applications need to be higher to support the growth and look required for that sport.

How about liquids?

We make these ourselves in-house. We have some excellent grades carefully blended with added micro-nutrients and biostimulants.

And solubles?

We sell a lot of soluble straights now – stocked in our warehouse and ready to ship quickly. These can be very cost effective and the control you get from liquids and solubles can be really beneficial. They require more work i.e. more applications and getting used to preparing the solutions for spray but they can really be worth it on say golf greens due to the control you can get.

How is the range of products evolving?

Our range is quite extensive, however we will be working hard this year to further grow our sales in this area and firm up a preferred range of granulars stocked in our warehouse for rapid dispatch (as are the liquids and straights). We are also working on our branding and will be implementing a new bag design and literature to support the launch later this year.

Get your fertilisers from GBR then?

Ha ha yes – I like that! I think we have a good offering and we are seeing good growth in our fertiliser sales – I think that will only increase. Please discuss your needs with one of our technical sales staff.



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