

# NEWSLETTER

**November 2020 - February 2021**

**Welcome** to Edition 8 of our amenity newsletter. Alas at the time of writing, restrictions on what we can do have been increasing in line with increases in COVID 19 infections as we work through a second spike of this pandemic. There is some excellent news though, with preliminary results from phase 3 tests on various vaccines showing very high efficacy – that was never guaranteed, and vaccination now offers a clear route out of this global crisis. We’ve some months to go yet though before vaccination can start to bring down the spread of the virus but it is very good news and we may even be seeing some of the most vulnerable and exposed people getting their vaccinations this year! In the meantime, of course we should continue to all do our bit to control the spread and not drop our guard.

Although each of the devolved UK governments set their own rules, there does seem to be a growing acceptance of the importance of outdoor sports for peoples fitness and well-being and recognition that participation in many outdoors sports is unlikely to spread the virus significantly.

But enough on COVID and on to this edition.... we have a crossword – put together internally (it looks really good to me – and one person will win a Chromebook too!) plus articles on tips and tricks for spray tank mixing, wetting agent and dew dispersant use over winter and a very technical piece from Peter on cation exchange capacity. The Q & A covers GBR’s export business – many of you will not know that we have been shipping things across the globe for some time now, but we have much greater ambitions for the future!

I hope you find this edition interesting and useful and the crossword enjoyable!

**Paul Morris**  
Managing Director

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**Enter Our  
Competition  
To Win A  
Chromebook**



# Cation Exchange Capacity

**GBR's Peter McMorran talks around the topic of CEC. A technical piece with some useful data contained within – grab yourself a strong cup of coffee and be prepared to read it twice- you have been warned (Ed.)!**

The soil's capacity to hold and release chemical ions linked to plant nutrition is influenced by its texture and this is influenced, in turn, by the amounts of sand, silt, clay and humus that are present. Sand and silt have a low cation exchange capacity and this leaves the clay/humus complex as the more active part of the soil texture regarding reactions that affect nutrient availability. The important factor about clay and humus is their colloidal properties and this comes about due to their large surface area to volume ratio and their electrostatic properties providing sites to attract, hold and release ions. The electrostatic charge can be either permanent or variable and the permanent charge is associated only with 2:1 clays whereas variable charge is linked with both 2:1 and 1:1 clays and humus so the permanent charge is:

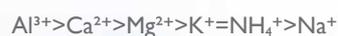
- Mostly negative
- Not affected by soil acidity
- Mainly associated with 2:1 clays

Whereas variable charge is:

- Influenced by soil pH
- Variable so can be positive, negative or no charge
- Linked with 2:1 & 1:1 clays and humus fractions

With greens being constructed of sandy textured soils or are being built up over time with regular sand dressings then the development and management of the humus fractions will be important for 1) increasing the CEC and 2) increasing moisture retention as this is linked with diffusion and mass flow of nutrients to the plant. The two main groups of humus are substances linked with advanced decomposition e.g. waxes, lignin and those substances that are strictly humic material e.g. fulvic and humic acids. The humic materials contain a range of compound groups e.g. hydroxyl, benzene and phenol and these have been given different classifications dependent upon how the molecules are joined together. The degree of polymerisation can be low and form chain like structures and these are mainly associated with fulvic acid whereas ring structures and a greater degree of polymerisation are linked with humic acid.

Where the soil is not too acidic or alkaline both the permanent and variable charge sites will be negative and attract, hold and release cations that have a decreasing strength of attraction e.g.

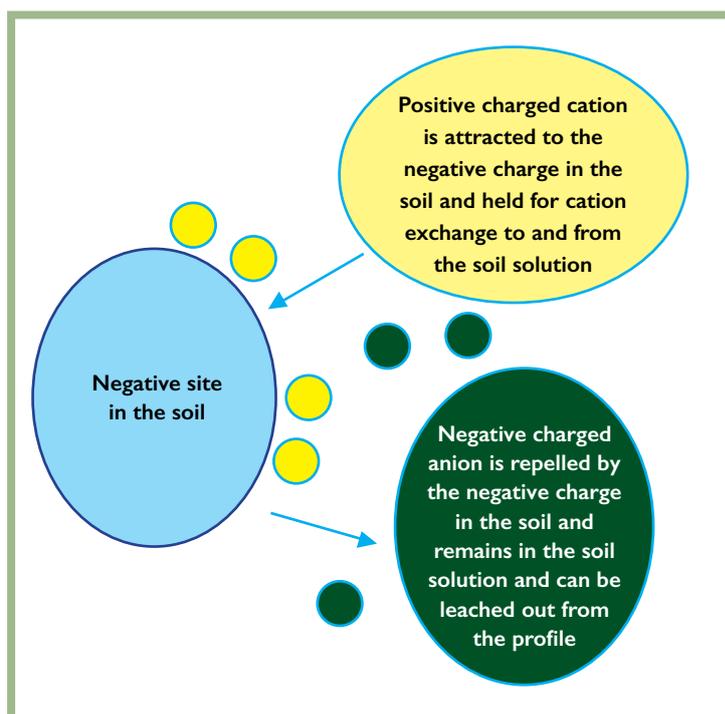


There will be some positive charge sites within the clay/humus complex but most anions are repelled by the negative charge present on the soil colloids and are prone to being leached from the soil e.g. nitrate

The soil colloids and soil water are in a state of constant change as ions are removed by plant uptake, added through fertilisation, lost through leaching, lost through reactions that lead to precipitation and as the water content varies from saturation down to wilting point.

Throughout this state of flux, the natural forces endeavour to maintain a ratio between the elements that are in solution that is equal to the ratio between the elements held on the exchange sites and vice versa and this is known as the Ratio Law.

Buffering capacity is the capability of an individual soil to replace ions that are removed from solution and the capacity to do so is greater when the CEC is higher e.g. clay loam than when the CEC is lower e.g. sandy soil. CECs will range from around 1-4 meq/100g for sand, greater than 50meq/100g for selected 2:1 clays and from 100-300meq/100g for soil humus. The unit of measurement for the negative charge of CEC is in milli equivalents/100g soil or centi moles /kg of soil and a milli equivalent is the amount of a cation that will displace 1mg of hydrogen ions from the cation exchange sites within the clay/humus complex. To keep things as simple as possible the diagram below shows the basics of what is happening:



In conclusion, as sandy textured rootzone and topdressing have lower surface area per volume, low CEC and low soil moisture retention, they will require more attention and monitoring to realise their potential for the health of the sward. Consideration should be given to a drip feed approach that keeps the essential nutrients in balance whilst maintaining soil moisture around field capacity to ensure diffusion and mass flow is not limited. A soil moisture content of 25-30% will deliver optimum microbial activity when soil temperature is high and this is essential to deliver the ongoing development of the strictly humic material i.e. fulvic acid, humic acid and humin that increases the CEC of sand over time.

# Tips and Tricks on Spray Tank Mixing

**Tank mix compatibility is a significant topic of interest to Greenkeepers and Groundsmen. The ability to mix and spray out a variety of products means you can apply a range of NPK and other nutrients as well as other turf treatments.**

So what do we mean by tank mix compatibility? The most obvious answer is to ensure that what you're mixing remains soluble and does not generate any precipitates – this would block nozzles and necessitate a tank clean out.

One of the most frequently generated precipitates is calcium sulphate – this is a white sparingly soluble material – by sparingly soluble we mean not too soluble at all!

So mix for example ammonium sulphate and calcium nitrate and you'll form a thick white precipitate of calcium sulphate – whoops! When you dissolve soluble ionic salts into water they will ionise and the ions will be dispersed in the water. In our example you'll have 4 ions – ammonium, calcium, nitrate and sulphate – the first two are cations (they carry a positive charge) and the latter two anions (they carry a negative charge) – if any combination of cation and anion can combine to form an insoluble salt – guess what – they will do! In this case the calcium finds the sulphate and they combine to form a precipitate which falls out of solution.

*Mixing of ferrous sulphate and potassium ammonium phosphite produces a heavy precipitate of iron phosphites*



*In this case the potassium ammonium phosphite has been mixed with Forti-Fe – a fully formulated ferrous sulphate rich blend with additional chelating agents – the mix is clear and suitable for spraying*



The good news is that all nitrates and all chlorides are soluble. But beware some phosphates, phosphites and some sulphates aren't! Many carbonates or hydroxides are also insoluble.

The above focus was on mixing straights.

Chelates however can offer tank mix advantages and many chelated products will offer much better tank mix capability. You can even add a pure chelating agent to your tank so you can mix things you couldn't normally mix but make sure you do it in the right order – if the precipitate has already formed it's too late (although some very powerful chelates can put things back into solution – but don't rely on that!). So back to our calcium nitrate and ammonium sulphate example – if you fully dissolve the calcium nitrate then add sufficient citric acid – stir it in well – this will 'chelate' the calcium ions – by that we mean they will bind around them – you can then add the ammonium sulphate and you won't get a precipitate – at least for a while! This must be done right of course – get the order of addition wrong, put insufficient chelator in or don't spray out quickly enough (in this example the citric acid might only give about 30-60 minutes protection until a precipitate starts to form) and you're in trouble – I'd say speak to us first and ensure all your staff are well trained on the mix.

So on to jar testing – in short it's a really good idea to do if you are trying a new mix. Just turn litres into millilitres and kg into grams in going from the real world spray tank to your test jar. Let me give an example. Say you want to spray 20kg ferrous sulphate and 10 litres potassium ammonium phosphite in 400 litres water. That means add 400 millilitres of water to your jar, dissolve 20 grams of ferrous sulphate and then 10 millilitres of phosphite and you have your ratio (in this case you will get a precipitate so you'll know it's not a suitable mix – try again replacing the ferrous sulphate with Forti-Fe – which contains citric acid along with ferrous sulphate and there's no precipitate). Use the water source that you will be using and leave the jar to stand for a few hours (the spray duration). It's fairly straightforward but you may need to buy a relatively inexpensive scale and a few measuring cylinders! Best always to stick to the same order of addition although in most cases it will make no difference – in some it might though!

Moving on from straights to formulated products – the same applies – bear in mind that Companies can sometimes change their formulations slightly. And of course with natural products – you will get a natural variation – unlikely to make the difference between a mix being stable or not most of the time – but it is possible – especially if the product is past its expiry date.



Your supplier can of course comment on what products you can mix especially their own products or combining these with straights where the composition is known.

So now on to not just having a clear solution but is the mix you are wanting to do going to compromise the action of any of the products? This is possible – again seek advice if unsure. A drastic change in pH can cause problems for some systems - siloxane based surfactants can be hydrolysed at low pH (some iron products are highly acidic and could interact) – although you might get away with it if you spray out within a few hours and the pH isn't so low – you won't see a precipitate but the product won't work as well. For some systems a lowering of pH can be beneficial e.g. for optimum uptake of certain nutrients.

Emulsion products might be best not mixed with anything else – as the emulsion stability can be altered.

Calcium thiosulphate is also used in turf applications – acidification can lead to a precipitate of sulphur and generation of pungent sulphur dioxide.

At GBR Technology – we can advise – even our sales staff are trained on the chemistry of our products but they will refer back to our chemists if at all unsure.

Efficient dissolving. When dissolving solid salts into water – this can sometimes take a bit of time. Again another example – take table salt - let's say we want to make a 5% solution. So we take 500 grams of salt - pour it into a bucket - add 10 litres cold water on top and when you are ready start stirring. Notice it actually takes a fair bit of time and effort to get the salt to fully dissolve. Let's do that again another way. This time take 10 litres water in a bucket – begin stirring it with a stick to generate a vortex (a spinning well in the middle of the water) – now smoothly (over just 10 seconds) pour in the salt into the side of the vortex whilst continuing to stir (it can be done with one person with experience but two people can also do this – particularly for solids that don't flow that well when poured - damp or clumpy solids). Keep the vortex going for say 20 seconds after all the salt has been poured in – voila – all the salt has dissolved – easy!

There is a physical chemistry reason for the difference - it's down to something called 'hydration spheres' – I'll spare you the detail but rest assured there is a scientific explanation and the effect is real. Don't forget though you can't dissolve something past its solubility limit (at a particular temperature) no matter how you do it.

Another little tip – for ferrous sulphate – once you dissolve that in water it will slowly oxidise and over the course of minutes and a few hours there will be a growing precipitate of hydrated ferric hydroxides starting to form – this is the result of oxidation of the ferrous form of iron to the ferric form. Often it's not such a problem – the precipitate gradually forms and is initially very fine. If you do find it is blocking your nozzles then there is a fix – the oxidation almost stops at a pH below 3 – so adding some chelator acidifier or pHixer to the spray tank – means you can prevent the precipitate from occurring.

I hope the above has a few handy tips or tricks in there – I'm sure you mostly get along fine with your tank mixes but there might be something in there that can explain what you might sometimes come across.



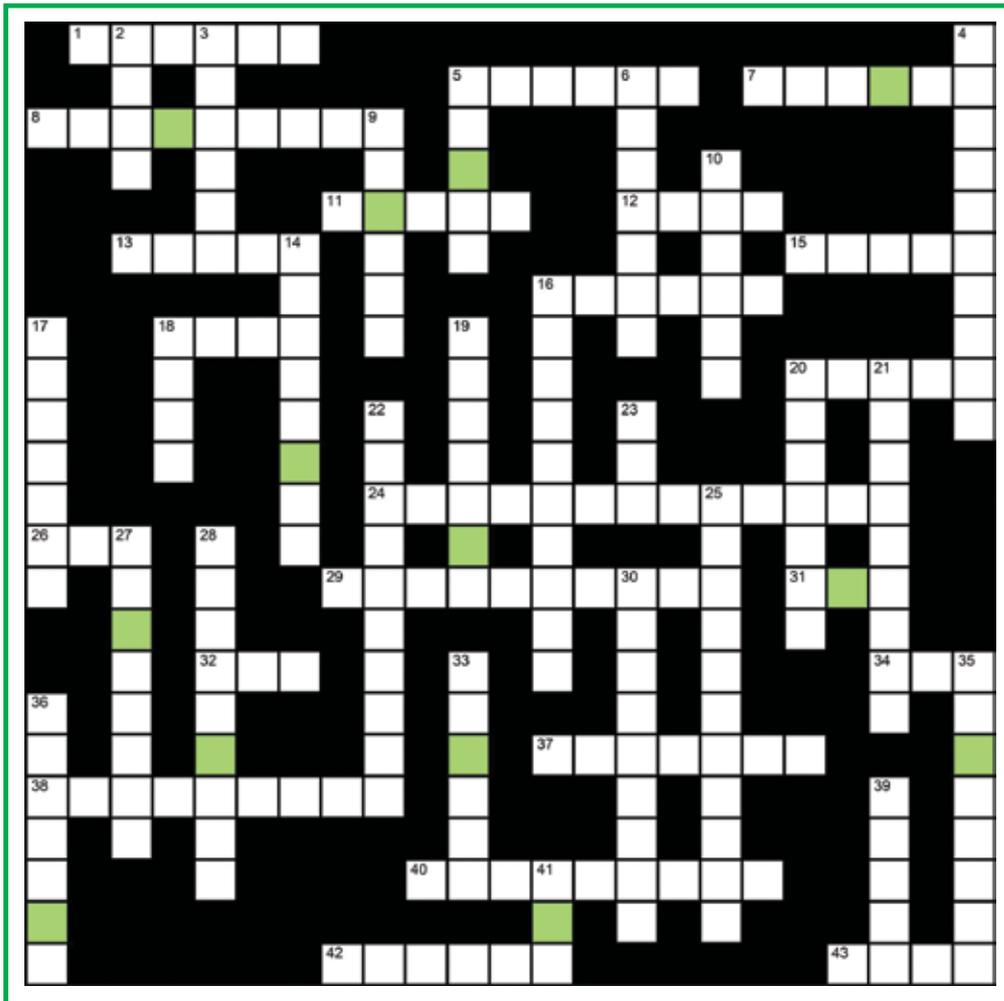
# Competition Time!

Enter  
To Win A  
Chromebook

Test your amenity knowledge with our new crossword and you could win a Chromebook.

For a chance to win a Chromebook, 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@gbrtech.co.uk](mailto:info@gbrtech.co.uk) and include your name and phone number. Closing date is 31st January 2021 at 23.59



#### Terms and conditions

Closing date for receipt of all entries is 31st January 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@gbrtech.co.uk](mailto:info@gbrtech.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.

#### Across

1. An above ground creeping stem (6)
5. See 38 Across
7. Festuca (Common name) (6)
8. Crooked snitch! (9)
11. A unit measurement of surface tension (5)
12. Fine turf really likes it! Sarel ...? or Rock n...? (4)
13. More than 50 shades seen of this colour (5)
15. Takes it up! (5)
16. Takes it down! (6)
18. Soil – mix of sand, clay, silt and organic matter (4)
20. TE linked with cell membrane permeability (5)
24. Hide garment! (13)
26. Nutrient holding potential (1,1,1)
29. Currency recognition! (6,4)
31. Classical element (3)
32. Can it be cut at 2mm? (3)
34. Asian fungus kills this tree (3)
37. Waxy film on the epidermis (7)

38 & 5. GBR Penetrant. (9,6)

40. TE assists control of TA! (9)
42. Church Pews, Principal Nose and Lions Mouth! (6)
43. Corvus (common name) (4)

#### Down

2. A large receptacle for gas or liquid (4)
3. Membranous outgrowth from the leaf (6)
4. Main component in top dressing (6,4)
5. Fundamental element (5)
6. GBR iron product linked with Éireann (7)
9. Nematode mouthpart (6)
10. Could be dominant or recessive (6)
14. A wee worm (8)
16. Element linked with ATP and energy transfer (10)
17. Surfactants break this stress! .....Tension (7)
18. Sometimes these fibs are preferred! (4)
19. Leave nothing! (4,3)
20. A quick sharpen (7)

21. This yarn is found at the end of the spectrum (3,6)
22. A void at the centre of this aeration technique (6,4)
23. Mix test! The door is a ... (3)
25. A senectopathic disorder (11)
27. The maximum amount that something can contain (8)
28. Yield to what is taken off! (9)
30. Often used in the winter to move moisture (9)
33. Pause for a cuppa! (Disease) (6)
35. A weighty amount of condensed water (5,3)
36. An underground creeping stem (7)
39. Person or machine? (5)
41. Best amenity company in Great Britain! (1,1,1)

Good Luck! 

# Winter Wetting Agents and Dew Dispersants

***The monthly residual programmes at golf courses have generally come to an end by around October (although some courses will apply year round to greens). These programmes aim to allow the turf to have better access to water – reduce drought stress, promote recovery, reduce/eliminate dry patch as well as a range of other potential benefits (e.g. better nutrient uptake, more consistent conditions across the green, less water use, greater safety margin to dry down ahead of competitions).***

Writing this in November, the ground is much damper – evapotranspiration rates much less and growth reduced, but surfactants still have a role during this season and an increasing one too.

It's the surfactants in dew dispersant formulations that are the active material responsible for the effect and we are seeing dramatic results on how keeping the sward dry can reduce fungal disease pressure – especially fusarium patch. With the loss of iprodione many golf clubs are embracing increasingly effective dew dispersant formulations to help keep disease at bay and they can prove highly effective.

At GBR Technology we have two chemistries to offer: Influxer Excel based on alkoxyated siloxane chemistry (use rate 2-2.5 litres/Ha) and Endew Plus which is anionic in nature (use rate 5-7 litres/Ha) – they both achieve similar levels of dew dispersancy at these rates and for very similar cost per hectare.

Moving on to penetrants. Most people are aware of these materials and the concept of 'a penetrant wetting agent' but it might be less clear on exactly how they work. Here's the explanation:

Compared with residual wetting agents (which are based mostly on block copolymers), penetrant wetting agents use surfactants that are generally more soluble, more mobile (they are lower molecular weight and can migrate more quickly) and they lower surface tension more effectively. Typically a block copolymer will reduce the surface tension of water from around 73 dynes/cm to around 40 dynes/cm at a concentration of 0.1%. Most penetrant surfactants will lower surface tension to 28 dynes/cm or lower at a 0.1% solution (lower surface tension = better wetting).

Consider then a rootzone dosed with a residual or a penetrant. A downpour comes along and in the case of a penetrant the surfactant transitions into the water that's moving through much more readily than the residual does – because (as covered in the previous paragraph) it is more soluble and lower molecular weight – and, once in the aqueous phase, since it lowers surface tension more effectively, then it will lower the surface tension of the water more than a residual will. The water can then continue its journey with significantly lower surface tension than if it had passed through a rootzone dosed with a residual – and this helps it penetrate.

Residuals really come into their own in the growing season as they can effectively last between monthly treatments because you can safely put down much more than a penetrant (penetrants risk severe scorch at monthly residual levels) and they don't wash out as quickly. Also, residuals can be engineered to resist biodegradation for longer whereas most penetrants will rapidly biodegrade once in the soil under summer conditions.

So penetrants can help with alleviating the effects of very wet conditions under many circumstances. Another very useful effect is their ability to disperse water from upper thatchy layers. Such water held in thatch can create a barrier to the diffusion of oxygen and this can encourage anaerobic conditions – a penetrant can help here.

Another useful application of a penetrant is the addition of a small amount to puddles in bunkers - this can disperse the puddle much more quickly.

So for preventing disease, playability and maintaining a healthy aerobic profile, surfactants have a very useful role to play over the winter months.





***'It's the surfactants in dew dispersant formulations that are the active material responsible for the effect and we are seeing dramatic results on how keeping the sward dry can reduce fungal disease pressure – especially fusarium patch'***



## Exports & Future Intentions 2020/21 . . .

### So Paul tell me about GBR Technology's export business

For sure – we have been exporting specialist lubricants since we started trading around 27 years ago. There are some quite key products in the vacuum sector where we are a significant global player. Over the years we have built up a fair amount of export business and get relied on to supply some crucial inputs.

### How about in the amenity sector?

We do have business overseas. Some are resellers selling our products or things we have manufactured for them under their brands and we also have a growing number of direct end user golf courses. We are very competent at getting goods to customers located around the world and they can rely on us to service them well.

### Do you plan to grow your amenity exports?

Absolutely – we have formulating and manufacturing expertise that can compete effectively in overseas markets and we are working on an export development plan. Where we can find partners overseas that will benefit along with us then we will do, but in territories where this initially proves difficult we will not shy away from direct business if this is what it takes.

### How are you resourcing this?

We already have in-house expertise and both my time and some of our sales teams' time is spent on export opportunities. However, in the coming months we are planning to create a new role that will be more focused on growing our overseas business – be that in Europe and Asia mostly or even the Middle East – these will be our focus areas.

### Not America?

I've got lots of experience in past roles in developing business in the USA and whilst there were some successes, it is the case that in some markets they are very well equipped with their own supply base and making progress can be more difficult. Golf of course is particularly strong over there like it is in the UK. Ok, something could happen to open an opportunity, but I think our focus is best off on other markets right now.

### So why are you looking at export markets?

Domestically we are growing nicely and still have some years of growth yet. Our 2019/20 year, which ended 30th June saw us post a record turnover even despite COVID. We think COVID took around 10% off our turnover but our underlying growth was sufficiently strong to still grow as a Company. But we want to maximise our growth, service more customers with our products and we have the expertise to do just that in export markets.

### Do you have strategy?

Yes, we do – we have done work in the past with the UK Department for International Trade to put together an export strategy specifically for our amenity products – it is now time to get on and deliver the results. But you must also be open to what develops. For us we'll have a strategy but exactly how it pans out is part of the fun of the journey and we can be flexible – significant export growth for our amenity business is the target and we are confident we'll deliver that!

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