CHOOSING THE RIGHT FERTILISER FOR FERTIGATION

with Don May, Guest Writer for Ferti-Ject.

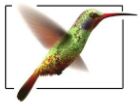
Check the solubility of the fertiliser being applied.
Not all fertilisers are suitable for use in fertigation systems as some are insoluble due to their chemical properties or their manufacturing process.

In this article we talk with Global Irrigation Technology Guru, Don May as he shares some insights into the art of Fertigation.

As a general rule of thumb the following chemical properties should be adhered to in determining the suitability of certain fertiliser types for use with fertigation systems,

a) All ammonium, nitrate, potassium, sodium and chloride salts are soluble.
b) All oxides, hydroxides and carbonates are insoluble.
c) All sulphates are soluble, except for calcium sulphate.
d) All Liquid fertilizers are ideal.

Using these rules, calcium nitrate is soluble (rule A), calcium carbonate and magnesium carbonate (lime & dolomite) are insoluble (rule B), magnesium sulphate (Epsom salts) is soluble but calcium sulphate (gypsum) is not soluble (rule C).



Be careful when mixing Fertilisers.

Consideration also needs to be given to these rules of thumb when different fertilizers are mixed in solution and applied together as it is very possible that a precipitate (sediment) may form.

For example,

- Calcium nitrate and potassium sulphate if mixed together they will separate and reform as potassium, nitrate and calcium sulphate (gypsum).
- It is generally safe to mix urea, muriate of potash, potassium nitrate and chelated trace Elements.
- Phosphates, sulphates, calcium, magnesium and trace elements are problematic as insoluble reaction products may form in the mixing tank.

Due to the manufacture of certain fertiliser products and their purpose of use some contain insoluble impurities, coating agents or granulation.

- These impurities may block filters, emitters and potentially large sections of irrigation infrastructure (drip tape blocks).
- Some fertilisers that may be used in fertigation programs are coated. The coating agents are used to improve the handling characteristics as a dry solid before the products are used. When these products are dissolved in water the coatings begin to break down and may present problems with blockages of filters and small emitters.
- Some fertilisers have a coarse particle size and take a long time to dissolve. Coarse, granular and prilled products can be used, provided they do not contain excessive amounts of impurities. However, they may require more agitation. To resolve this, source soluble fine or solution grade products that dissolve more quickly.

Solubility of fertilisers.

The maximum solubility of a fertiliser in water, while temperature dependent, is a physical constant. As a fertiliser solution becomes more concentrated it becomes increasingly difficult to dissolve more fertiliser. When no more fertiliser can be dissolved regardless of continual agitation, the solution is at saturation point.

Any remaining undissolved fertiliser has the potential to precipitate. Some fertilisers also cause the temperature of the solution to fall which reduces the solubility e.g. urea and nitrates.

Product	kg / 100 L @ 20° C	Product	kg / 100 L @ 20° C
Ammonium nitrate	192	Calcium nitrate	60
Ammonium sulphate	75	Magnesium sulphate	71
Mono-ammonium phosphate MAP	37	Magnesium nitrate	71
Liquifert P (Tech MAP)	20	Soluble boron	9.5
Mono-potassium phosphate MKP	12	Zinc sulphate	44
Potassium chloride	34	Liquifert K (KCl)	20
Potassium nitrate	8	Liquifert N (Urea)	25
Potassium sulphate	10	Urea (water temperature 5° C)	45

The importance of Agitation.

Fertilisers have different solubilities therefore need different amounts of water to dissolve and should be completely mixed before being injected. This is where agitation plays an important role in the effectiveness of injection.

Agitation is easier in vertical tanks as there is a smaller surface area at the base of tank. It is also essential that the mix is tested for corrosion potential and deposition, eg; phosphorous has high a corrosion potential when used in galvanised iron tanks.

Good agitation and a fine particle size results in a quicker dissolve rate, but the maximum concentration that is able to be dissolved does not change.

If you are considering applying two chemicals at once, test the compatibility with each other and with the irrigation water as a precipitate (sediment) may form.

Fertiliser manufacturers can be of great assistance here and are able to advise on the corrosion potential of their products.

Urea, muriate of potash, potassium nitrate & chelated trace elements are generally considered safe to mix. However, phosphates, sulphates, calcium, magnesium and trace elements can create problems, check with the manufacturers MDS before using them.

When there is a reaction and separation occurs, the following can happen:

- Precipitates may settle to the bottom of the tank or block filters and emitters.
- Precipitates may also form if the water is hard (i.e. high in calcium and magnesium or contains carbonate).

Therefore, the trace elements to avoid are copper, zinc, manganese and iron sulphates. These cannot be mixed with calcium nitrate, MAP or MKP. Best practice is to always use chelated forms of trace elements if mixing products.

In summary.

Choosing the correct form of fertiliser for use in your fertigation system is an important factor in the success of the system.

In most cases, spending a little more on your bulk fertiliser will pay dividends with less wastage, minimising wear to your infrastructure and better uptake by the irrigated crop.

Don May is a guest writer of articles for Ferti-Ject and is not otherwise affiliated.

