

FeEDTA and FeDTPA are both very sensitive to solution pH, which practically determines the maximum pH at which they remain effective. This sensitivity is increased by the presence of other nutrient solution components notably unchelated metal cations such as calcium, copper, manganese and zinc and in particular the presence of bicarbonate ions. Exactly what a normal nutrient solution is!

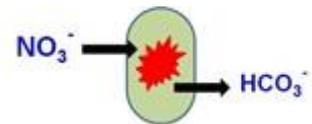
Chelate	Deionised water	Soft water 1°	Hard water 20°	Only Fe chelated	All metals chelated
FeEDTA	7.3	7.3	6.7	6.3	7.1
FeDTPA	8.0	8.0	7.4	6.8	7.8
FeEDDHA	>10	>10	>10	>10	>10

The above table compares the apparent upper pH limit for the three main chelate types in different conditions showing the effect of the presence of other components in the nutrient solution. Both FeEDTA and FeDTPA are significantly affected but FeEDDHA is not.

Bicarbonate – the hidden villain

Happily in a well-managed growing system where pH is carefully controlled all this is usually not a problem. But there are times when despite every best effort, things go awry. One situation is during the vegetative growth stage of say a crop of tomatoes or cucumbers when light levels are high. Here rapid growth is promoted which in turn increases nitrate nitrogen (NO_3^-) uptake by roots.

For each nitrate ion absorbed by the root one bicarbonate ion (HCO_3^-) is released and so bicarbonate accumulates.



Bicarbonate increases (local) pH, interferes with the iron chelation, and restricts uptake and translocation of the element by plants. The effect is to induce iron deficiency and all the associated symptoms - notably leaf yellowing (or chlorosis) and a check productivity.

The special role of FeEDDHA

Fortunately, FeEDDHA chelate remains stable up to ~pH 10 far beyond anything encountered in a glasshouse! But more importantly it is unaffected by bicarbonate or other solution components thereby being able to maintain a supply of biologically available iron. Therefore by substituting with the more robust FeEDDHA chelate the problem described above can be largely avoided.

Solufeed Fe 6 EDDHA Standard (available as LibFer SP in the British Isles) is the recommended product for this application.

Remember though that the solubility (at high concentrations) of FeEDDHA is reduced when the solution pH is less than 4.0 (approx.) so add the chelate to the non-acidified "A" ("Calcium") tank.

Quality is Key

pH and chemical stability of FeEDDHA formulations are related to the *ortho-ortho* FeEDDHA isomer content. Required by EC fertilizer regulations, this is shown on the

product label and must be a minimum of 3.0%. For good quality products the value is typically 3.5 – 4.8%.

Solubility in terms of speed but more importantly completeness, of the FeEDDHA formulation is also critical. Only products that dissolve completely are truly effective; this is achieved by careful manufacture usually employing the *spray agglomeration* technique which produces highly soluble microgranules. Inferior spray-dried powders often struggle to dissolve completely and fail to perform well. Whilst evidence of insolubility is difficult to see because of the intensely dark solution colour, it can be detected by simple filtration.

Solufeed Fe 6 EDDHA Standard (LibFer SP) and other Solufeed FeEDDHA-based products are supplied as high quality spray agglomerated microgranules.



The rapid and complete solubility of Solufeed Fe 6 EDDHA Standard is demonstrated by the above photo sequence, each image taken at 1 second intervals.

Please contact Solufeed at the address below for more information and to ask about training programmes/presentations about this subject and other plant nutrition topics.

Important

Always read the label before using any product.

The information in this document has been prepared carefully and is provided in good faith. The application, use and processing of any material together with regulatory compliance is the absolute responsibility of the Buyer. All technical information or other advice provided by the Seller in any form is given without warranty to the full extent provided by law.

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