

Fetrilon® Combi 2



"the cost-effective foliar
safeguard against micronutrient
deficiency in crops"



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Micronutrient fertilisers

Insufficient micronutrient supply limits crop yield in exactly the same way as a deficiency of the macronutrients nitrogen, phosphorus, potassium, calcium, magnesium and sulphur. The six micronutrients iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), boron (B), and molybdenum (Mo) are essential for plant nutrition, although they are required in only small amounts by the crop.

Micronutrient deficiencies in intensively managed crops can be difficult to identify, and symptoms may not be visible (latent deficiency). It may also be the case that symptoms of one deficiency will mask a multitude of micronutrient problems.



According to Liebig's law of the minimum...

"Any essential plant nutrient which is not in sufficient supply may limit the crop yield."

J.v.Liebig 1803-1873

In the diagram above the trace element in shortest supply is copper (Cu), potentially limiting plant development.

| Crops susceptible to deficiency | | | | | | |
|---------------------------------|-----|-------|-----|-----|-----|----|
| | Cu | Fe | Mn | Zn | B | Mo |
| Cereals | ++ | ++(+) | ++ | ++ | | |
| Maize | | | | | ++ | |
| Cotton | | +++ | | +++ | +++ | |
| Sunflower | | | | | +++ | |
| Rice | | ++ | +++ | +++ | | |
| Tobacco | | ++ | ++ | | +++ | |
| Tea | | +++ | ++ | | | |
| Citrus | ++ | +++ | +++ | +++ | +++ | |
| Apple/Pear | ++ | ++ | +++ | +++ | +++ | |
| Apricot | | +++ | +++ | +++ | | |
| Peach | | +++ | +++ | +++ | | |
| Strawberry | ++ | +++ | +++ | | | |
| Melon | | +++ | +++ | +++ | | |
| Vine | ++ | +++ | +++ | +++ | ++ | |
| Tomato | ++ | +++ | ++ | ++ | ++ | ++ |
| Olive | | | +++ | | +++ | |
| Red/Green Peppers | | ++ | +++ | | +++ | |
| Potato | | | +++ | ++ | ++ | |
| Lentil | +++ | ++ | ++ | ++ | +++ | ++ |
| Chickpea | +++ | ++ | ++ | ++ | ++ | ++ |

+ = susceptibility

| Factors influencing availability of micronutrients in soil | | | | | | |
|--|-----|-----|-----|-----|-----|-----|
| | Cu | Fe | Mn | Zn | B | Mo |
| pH >7.0 | --- | --- | -- | --- | -- | ++ |
| pH <5.5 | ++ | +++ | +++ | ++ | -- | -- |
| Water-logged soil | + | -- | ++ | + | | |
| Drought | --- | --- | --- | - | --- | -- |
| High humus content | --- | ++ | ++ | ++ | ++ | - |
| High P-content | - | --- | - | --- | - | +++ |
| Sand | --- | --- | -- | --- | -- | - |
| Compaction | + | ++ | + | + | + | + |

+ = availability
- = deficiency

Fetrilon Combi 2

Fetrilon® Combi 2 is a cost-effective treatment to safeguard and optimise crop yield.

Fetrilon Combi 2 can prevent and correct micronutrient deficiencies, especially during periods of intensive growth where nutrient demand can exceed the rate of absorption. By foliar application, nutrients are supplied directly to where they are needed to take immediate effect in the metabolism of growing plants.

Fetrilon Combi 2 can reduce the impact of adverse weather conditions under which the absorption of micronutrients from the soil is reduced.

Fetrilon Combi 2 is a free-flowing, dust-free microgranule that has been developed to be user-friendly and accurately measured with little or no waste. Complete chelation with EDTA ensures that metallic micronutrients in Fetrilon Combi 2 are protected against premature fixation, and can be rapidly absorbed and easily translocated within the growing plant. This means that Fetrilon Combi 2 is more effective than other products based on mineral salts or other less stable chelates.

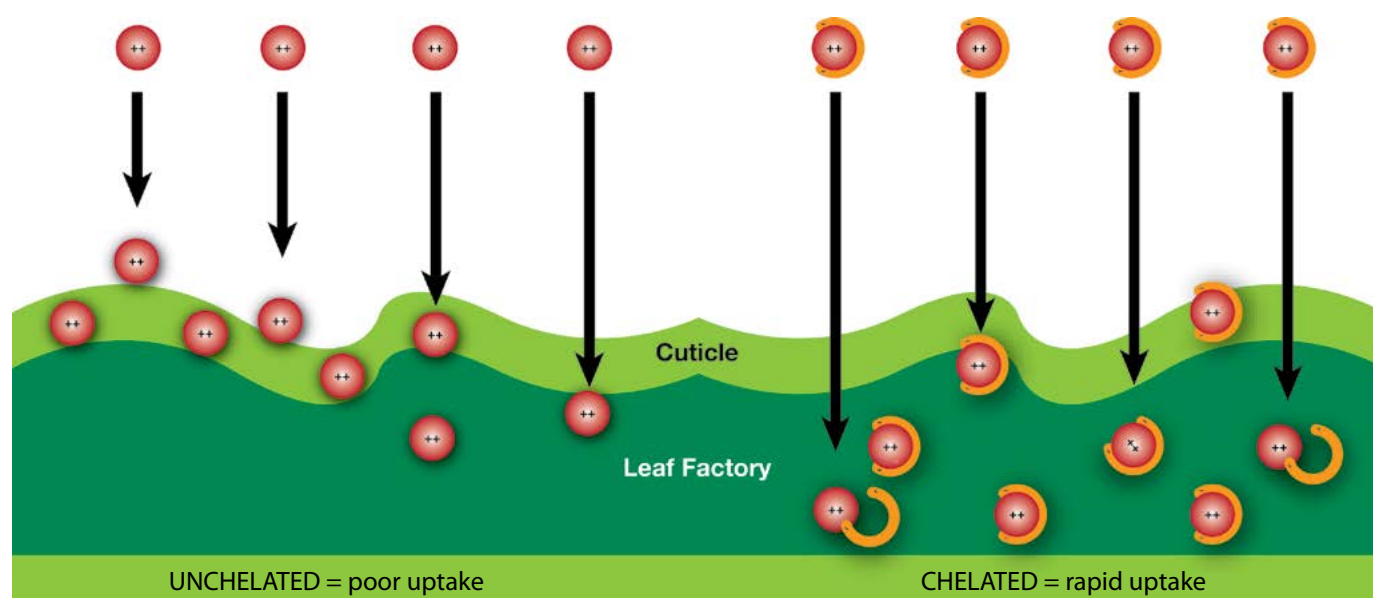
Fetrilon Combi 2 is the leader among chelated trace element foliar fertilisers with a high nutrient concentration, excellent solubility and proven efficacy in a wide range of applications.

Mineral nutrition with micronutrients: comparison of salts and chelates

| Criteria | Chelates | Salts |
|--|----------|-------|
| Uptake by foliage | +++ | ++ |
| Availability in soil | +++ | ---- |
| Change of conductivity in soil | ---- | +++ |
| Chlorosis on leaves (osmotic effect) | ---- | +++ |
| Miscibility with plant protection products | +++ | + |
| Solubility in water | +++ | ++ |
| Residues | ---- | ++ |
| Wettability on leaves | +++ | + |
| Stability of solution | +++ | + |
| Compatibility | +++ | + |

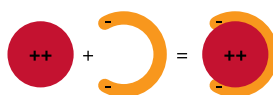
+ = positive attribute
- = negative attribute

Principle and effect of chelation



UNCHELATED

++ Ions of metallic micronutrients carry positive charge Mn^{++} , $Fe^{++/+}$, Cu^{++} , Zn^{++} (Sulfates, Oxides and others)



CHELATED

Metallic ions with positive charge are 'wrapped' by a chemical substance which is negatively charged. This means the originally positively charged metallic ions are now 'neutral', and are more readily absorbed by the leaf, giving a higher concentration of the nutrient in the plant.

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Technical specifications

Fetrilon Combi 2 has all essential micronutrients for optimum production, as well as the macronutrients magnesium and sulphur.

| Micronutrients: | |
|---------------------------------|------------------|
| 1.5% | boron (B) |
| 0.6% | copper (Cu) * |
| 4.0% | iron (Fe) * |
| 3.0% | manganese (Mn) * |
| 0.05% | molybdenum (Mo) |
| 4.0% | zinc (Zn) * |
| Additional secondary nutrients: | |
| 0.8% | magnesium (Mg) |
| 1.3% | sulphur (S) |

*All metallic micronutrients are fully chelated by EDTA

| | |
|----------------------|---|
| Chelate: | EDTA (ethylene diaminetetraacetic acid) |
| Physical properties: | Fetrilon Combi 2 is a homogeneous, free flowing microgranule manufactured by a spray drying process. |
| Particle size: | 95% <0.5 mm |
| Colour: | Green |
| Bulk density: | 730-980 g/L |
| Solubility: | Soluble in water in the recommended concentrations without residues. |
| Storage: | Fetrilon Combi 2 is hygroscopic, and the package should be resealed immediately after use. The product can be stored in the originally sealed and undamaged packaging for several years at moderate temperatures. |

Recommendations for use in soil application

When plants show visible signs of deficiency and/or are sensitive to foliar application, Fetrilon Combi 2 can be applied via the soil. Prepare a solution of 0.5-2.0% Fetrilon Combi 2 (5-20 g Fetrilon Combi 2 per 1 L water) and apply 1 L per square metre. On alkaline soils the effect is improved by adding 3-5 kg ammonium sulphate per 100 L solution.

Soil application is ideal for tree crops including pome, stone and citrus post-flowering.

Recommendations for use in substrates

Fetrilon Combi 2 can also be incorporated directly into substrates. The metal micronutrient chelates will remain available to ensure the supply of micronutrients. Incorporation can be facilitated by dissolving the correct rate of Fetrilon Combi 2 in 10 litres of water and moistening the substrate.

| Culture | g/m ³ of substrate |
|--|-------------------------------|
| Nursery plants fruit trees and vines in bags | 50 to 60 |
| Potted plants | 50 to 60 |
| Containers | 50 to 60 |
| Seedlings | 30 |

Why use Fetrilon Combi 2?



... because the leaves are the factory of the plant!

Recommendations for foliar application

| Crop | Number of applications per growing period | Application rate kg/ha | Maximum concentration in % |
|-----------------------------------|---|------------------------|----------------------------|
| Citrus | 1-4 | 0.5-1.5 | 0.2 |
| Pomefruit, grapes | 1-3 | 0.7-1.0 | 0.1 |
| Stone fruit, berries | 1-3 | 0.5-0.7 | 0.1 |
| Coffee, cocoa, tea | 1-3 | 0.5-1.0 | 0.2 |
| Bananas | 1-8 | 0.5-1.5 | 0.2 |
| Pineapples | 1-6 | 0.5-1.0 | 0.2 |
| Cotton | 1-4 | 0.7-1.0 | 0.3 |
| Rice, wheat, barley | 1-3 | 0.5-1.0 | 0.3 |
| Maize, sorghum, pearl millet | 1-3 | 0.5-1.0 | 0.3 |
| Soybeans, peanuts, beans, lucerne | 1-3 | 0.5-1.0 | 0.2 |
| Peas, other grain legumes | 1-3 | 0.5-0.7 | 0.1 |
| Potatoes, sweet potato | 1-5 | 0.5-1.0 | 0.3 |
| Tomatoes, peppers, eggplant | 1-5 | 0.5-1.0 | 0.2 |
| Cucumbers, melons | 1-4 | 0.5-0.7 | 0.2 |
| Cabbages, cauliflower | 1-6 | 0.5-0.7 | 0.2 |
| Onions, garlic | 1-4 | 0.5-0.7 | 0.2 |

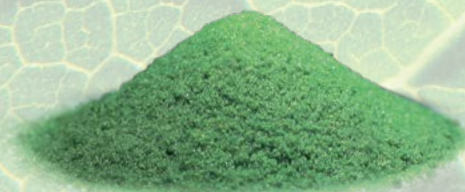
For preventive treatment (as determined in conjunction with tissue testing or sap analysis), applications with the lower rates given above are sufficient. If plants show slight deficiency symptoms, higher rates should be applied at 3–4 weekly intervals until the deficiency is corrected. Plants suffering from a severe deficiency are weakened and should be treated repeatedly with the lower rate every 2 weeks.

Optimum results will be achieved through regular application of Fetrilon Combi 2 at low concentrations, and beginning as early as possible in the plant growth cycle. **Application to tree crops including pome, stone and citrus should not occur after flower initiation as skin finish may be adversely affected.**

Fetrilon Combi 2 is compatible with most plant protection products, and can be applied in tank mixtures. **However, before applying Fetrilon Combi 2 in tank mix for the first time, a compatibility test/jar test should be performed. Fetrilon Combi 2 is not compatible with highly alkaline sprays (for example, Bordeaux mixture, calcium nitrate, etc) or any non-chelated trace elements.**

Fill the spray tank with water to half of the tank capacity and then add Fetrilon Combi 2 slowly and evenly while the agitator is running, until the Fetrilon Combi 2 is dissolved. Add the crop protectant and finish filling the tank with water. Keep the agitator running and apply the tank mix immediately.

For plants in seed and nursery beds, weekly applications should be at a maximum concentration of 0.05%.



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Recommendations for foliar applications for turf

| Crop | Rate per 100 m ² per 18 L of water | Time of application |
|-----------|---|---|
| Greens | 15-20 g | At renovation 1-2 days after dethatching, grooming, hollow tyning, verticutting etc |
| Tee boxes | 15-20 g | 8 week intervals |

Recommendations for drip irrigation

Fetrilon Combi 2 is suitable for applications via drip irrigation because of its high solubility and chelated metal micronutrients. Drip irrigation is recommended in situations where foliar sprays are difficult to apply. It is also recommended for cut flowers and ornamentals to avoid stains on the flowers and leaves.

Fetrilon Combi 2 should be applied at the rate of 300-500 g/1000 L water every 10 days. Apply monthly in established perennial crops either prior to flowering or post-harvest (2-3 applications). In vegetable crops apply post-transplanting every 10-15 days until crop is established (2-3 applications).

Note: Fetrilon Combi 2 should not be applied at rates above those on the product label.

Miscibility

Fetrilon Combi 2 is miscible with most plant protection products. It should not be mixed with highly alkaline sprays (for example, Bordeaux mixture, calcium nitrate, etc.) or any non-chelated trace elements. Fungicides containing metals bound in stable organic complexes may be applied together with Fetrilon Combi 2.

Before combining Fetrilon Combi 2 with one or more plant protection products for the first time a miscibility test should be carried out. To do this, mix all the products to be applied in a screw-top bottle or glass. The sequence in which the products are added, and the proportions, should be the same as in the field. After mixing and filling with water to give the correct concentration, the container should be closed and shaken thoroughly. The state of the solution should be judged immediately and then again after leaving to stand for 2 hours, according to the following:

| State of solution | | |
|----------------------------------|--|--|
| Immediately after mixing | 2 hours later | Sprayability |
| Well dispersed, no precipitation | No precipitation or separating out | Good for spraying |
| Slight fine flocculation | Slight precipitate even after inverting 3 times | Good for spraying |
| Medium flocculation | Slight precipitate even after inverting 4 times | Good for spraying |
| Large flakes separating out | Slight precipitate, even after inverting 5 times | May be sprayed with agitator running |
| Cheesy or lumpy mixture | Heavy precipitate or formation of lumps | Incompatible. Do not spray even after inverting 10 times |

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