

Did you know?

Minerals which power photosynthesis

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Did you know plants need more than sunlight and water to photosynthesise?

They rely on key minerals from the soil to build chlorophyll, move energy and capture sunlight.

Magnesium deficiency on a lemon tree



Why this matters:

Magnesium: This is the core ingredient of chlorophyll; it is at the centre of the chlorophyll molecule; it helps the plant to capture sunlight. Without it leaves will turn yellow.

Nitrogen: Nitrogen works with magnesium to form the chlorophyll molecule. It helps create enzymes needed in photosynthesis. It helps to make leaves green and increases photosynthesis.

Iron: helps plants to produce chlorophyll, it helps support the electron transport chain where energy is moved during photosynthesis. Deficiencies show yellow leaves with green veins.

Manganese: helps to split the water molecule which is essential for photosynthesis to take place. It helps to activate enzymes in leaves.

Potassium: are used to open and shut stomata which let in CO₂. It helps plants move water and energy around.

Phosphorus: it is needed to make the plants energy supply and helps to power the chemical reactions in photosynthesis. It also helps with root production to supply water and nutrients to the plant.

Sulphur: helps plant build enzymes and proteins and supports a healthy leaf production.

Copper: helps with chlorophyll formation and energy transfer.

How to Apply it:

The macro nutrients: N, P, K, Mg and S are applied as a base fertiliser in spring. Copper, Iron, Manganese and magnesium can be applied as a side dressing or in liquid form during the growing season.

Resources:

Soil Process and Management Short Course, Massey University

Fertiliser.org (2020) *14 essential nutrients diagram*

Want to find out more? Massey has several degrees where you can learn more about this topic: [Bachelor of Agriculture Science](#), [Bachelor of Horticultural and Plant Systems](#) and the [Bachelor of Earth and Environmental Science](#). Contact Bronwyn Dyer to find out more: b.dyer1@massey.ac.nz

Careers which use this knowledge: Agronomist, Plant and Soil Scientist, Environmental Advisor, Policy Analyst, Crop advisor, Regenerative specialist, Grower, Farmer, Fertiliser industry roles

Do Now: What is the most important first step to help a farmer understand what is limiting in their soil? Phosphorus is also important for root growth, how do you think this indirectly impacts on photosynthesis and therefore plant growth? Hint: what is the role of roots?