

Understanding Nutrients

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All plants require a range of different minerals for healthy growth. Usually, a plant absorbs the minerals it needs from the soil in which it is growing. However, with hydroponics you need to provide your plants with the minerals they require in the form of a nutrient solution. This allows you tight control over the minerals your plants receive.

Nutrients explained

Nutrients contain essential elements that are vital for plant growth. If these essential elements, as well as carbon dioxide (Co²) and light are made available to a plant, it can produce the compounds (food) it needs for normal growth. The most important elements are known as the Macro elements. These consist of:

- Nitrogen (N)

A plant uses Nitrogen for rapid growth and the development of foliage, leaves, flowers/fruit and seeds.

- Phosphorus (P)

Phosphorus plays a major role in transporting glucose (plant food), stimulating root development, and promoting flower/fruit and seed production.

- Potassium (K)

Like Phosphorus, Potassium promotes flower/fruit and seed production. It also helps to protect a plant from disease.

All plants require large quantities of the Macro elements. During the vegetative cycle your plants will benefit from extra Nitrogen, while more Phosphorus and Potassium is beneficial in the flowering stage.

Different nutrients are used to ensure that your plants receive all the minerals they need in the right proportions at the correct stage of their lifecycle. There are two types of nutrient solutions available:

- *'Grow' mix*

A 'Grow' mix contains high levels of Nitrogen; you should, therefore, use this nutrient solution during your plants' vegetative cycle.

- *'Bloom' mix*

A 'Bloom' mix contains high levels of Potassium and Phosphorus, so change to this solution when your plants start flowering.

Other elements

Plants also require other elements known as Secondary Macro elements and Micro elements. Secondary Macro elements are Magnesium, Calcium and Sulphur. Micro elements (also known as Micronutrients) are Manganese, Boron, Copper, Zinc and Molybdenum. The table at the end of this document highlights why a plant needs each of these minerals.

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Nutrient Solutions

Nutrient solutions are available in a one, two and three-part packs, normally in concentrate form:

- **One-part nutrient solutions**

One-part nutrient solutions are very easy to use and popular with beginners or growers who want an easy life. The one-part removes the chance of incorrectly measuring the components of the two-part and three-part.

- **Two-part nutrient solutions**

Two-part nutrient solutions consist of two bottles which are added (in equal amounts) to water in order to supply a full spectrum of elements to your plants. As the nutrients are more concentrated and specific, you can achieve very accurate feed levels for your plants at all stages of their life cycle. This helps to improve plant growth and health.

Two-part feeds are the most popular nutrients as they are easy to use whilst delivering good nutrient levels.

- **Three-part nutrient solutions**

Three-part nutrient solutions require three bottles to complete the nutrient formulation and are generally more suited to the professional grower. A three-part solution enables you to provide your plants with the most precise nutrient management throughout their life cycle— even more so than a two-part. This allows maximum control over the nutrient delivered to your plants. Due to its more complex nature, three-parts are not suitable for beginners.

Maintaining the nutrient solution

Maintaining the nutrient solution involves keeping a good food strength, pH level and optimum temperature.

- **Food strength**

The strength of nutrient is the amount of dissolved salts that a nutrient contains. Nutrient strength plays an important role in maintaining the health of a plant. If the nutrient is too strong, the leaves of the plant can become leathery, curl downwards or even burn at the tips. Too low and the plant will yellow, stretch and become susceptible to disease. The strength of a nutrient solution is known as the Conductivity Factor (CF) or Electrical Conductivity (EC). These can be measured with a CF/EC meter, which allows you to maintain the required level for the stage of your plants life cycle.

- **pH level**

The pH is the measure of the acidity or alkalinity of a nutrient solution. A pH value of 0 to 6.9 indicates the nutrient solution is acidic, 7.1 to 14.0 alkaline. While a reading of 7 shows the nutrient solution is neutral.

Ideally, the pH level should range between 5.5 and 6.5. If you allow the pH level to fall outside of this scope, it will affect your plants' ability to absorb nutrients. This results in poor yields and slow growth rates.

- **Temperature**

A good temperature around the roots can encourage root growth and nutrient uptake. Never let the temperature of your nutrient solution drop below 15°C as very cold water limits the ability of roots to absorb water and minerals. This can drastically reduce yields. However, a temperature which exceeds 30°C will starve your plants of the oxygen they need for healthy growth. Ideally, you should aim for a temperature of approximately 21°C.

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Additives - Additives are extra supplements that can be added to nutrient solutions to help the plant use nutrients more effectively. This can promote growth and improve the general health of your plants. Additives can also encourage specific processes, such as rooting and flowering. Although they're not essential, additives can be very beneficial in achieving the most from your plants.

Maintaining all of the factors discussed in this article should help your plants to grow strong and healthy. If you require any more information, please don't hesitate to contact us. Please see below for a list of essential elements

The essential mineral elements a plant requires

Element	Symbol	Type	Symptoms of deficiency
Nitrogen	N	Macronutrient	Stunted growth and/or yellow leaves. Purpling along the veins on the underside of larger leaves.
Phosphorus	P	Macronutrient	Growth stunted, very dark green plant, leaves develop grey to purple dead patches.
Potassium	K	Macronutrient	Slow growth and /or yellow to brown margins on older leaves
Magnesium	Mg	Secondary	Older leaves yellow; as the deficiency progresses, small brown patches develop in the yellow areas.
Calcium	Ca	Secondary	Yellow/brown spots appear on the edge of leaves. These spots can also be surrounded by a sharp brown outlined edge. This often affects the older leaves first.
Sulfur	S	Secondary	Small growth, all leaves turn yellow, reddening of the veins on the underside of leaves.
Iron	Fe	Micronutrient	Uniform yellowing of young leaves, while the veins remain green. Eventually, the whole leaf becomes bleached.
Manganese	Mn	Micronutrient	Yellowing between veins on young leaves, with brown patches forming along the veins.
Boron	B	Micronutrient	Younger leaves show a light yellowing/browning. A cluster of leaves develop in the same place. Leaf margins twist and leaves become brittle.
Copper	Cu	Micronutrient	Young leaves drooping, a wilted appearance, yellow to brown patches. Mature leaves may become bleached between the veins.
Zinc	Zn	Micronutrient	Older leaves develop brown patches in between the veins. Young leaves very small and/develop in a cluster in the same space.
Molybdenum	Mo	Micronutrient	Upward cupping of the leaves with mottling. Looks like nitrogen deficiency without the reddening on underside of the leaves.

If you require further information on nutrient solutions, please don't hesitate to contact us.

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