

# Plant Food, you say?

## Part One: A general description

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Especially when you grow hydroponically, choosing the right nutrient is an essential task. Indeed, when your water is appropriate for hydro, it contains hardly any minerals. So it is important not only that your plant food is dependable, perfectly soluble and pure, but also that it is exhaustive in order to guarantee your plants the complete diet they require. Needless to say that if you want good results, nutrient management is significant in soil cultivation too. Besides you can be sure that when a fertilizer works well in hydro, it will work even better in soil.

### What is a plant nutrient?

The basic definition of a nutrient is a substance which specific function is to bring food to plants. Generally nutrients come in liquid or powder form, in one, two, three and even four parts. There are loads of them on the market, and it is quite difficult to choose the right one for your plant's needs.

Like humans, plants need food. They feed on light, air, water, and on nutrients that they absorb mainly through their root system. Like humans too, they all rely on the same basic elements to develop and propagate. There are 16 basic chemical elements for a balanced plant growth. They are divided in non-minerals and minerals: (see [www.ncagr.com](http://www.ncagr.com))

1. There are 3 non-mineral elements: hydrogen (H), oxygen (O) and carbon (C). They are found in air and water. In the process of photosynthesis, plants use energy from the sun to change carbon dioxide (CO<sub>2</sub> : carbon and oxygen) and water (H<sub>2</sub>O : hydrogen and oxygen) into starches and sugars. The starches and sugars are the plant's food.



Hydroponic nutritive solution

As plants get carbon, hydrogen and oxygen from the air and the water, there is not much you can do to control this when you grow outside. But if you are an indoor grower, you can regulate your environment, and insure good lighting, ventilation and temperature to your plants.

2. To grow and propagate plants consume their food in the form of 13 mineral elements. When growing in soil these are dissolved in water and absorbed through the plant's roots. But there isn't always enough of them in soil, and hardly any when you grow in water. So you need to supplement or enrich your irrigating solution with nutrients.

### The minerals and their role in plant nutrition.

The minerals are divided into 2 groups: macronutrients and micronutrients.

1. Macronutrients are the elements the plants eat most. They are of 2 kinds: primary and secondary.
  - The primary nutrients are nitrogen (N), phosphorus (P), and potassium (K). Plants use lots of these elements so you have to replace them continuously.
  - The secondary nutrients are calcium (Ca), magnesium (Mg), and sulphur (S). There are usually enough of these nutrients in the soil, so fertilization is not always needed. But in hydroponics, you have to bring them in.
2. The micronutrients are essential elements for plant growth and are needed in very small quantities. They are boron (Bo), copper (Cu), iron (Fe), chloride (Cl), manganese (Mn), molybdenum (Mo) and zinc (Zn).



Oxygen flow in the solución

If you want to understand how your plant grows and how to choose the proper nutrient, you may be interested to know the role of these different elements, and their effect on plant growth.

### Macronutrients

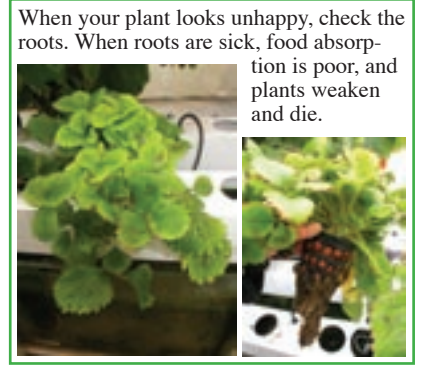
#### The primary

1. **Nitrogen (N)**: Nitrogen is the basic element of all living things. It acts essentially on the upper part of the plant, stem and leaves. Nitrogen is a necessary part of all proteins, enzymes and metabolic processes involved in the synthesis and transfer of energy. It is part of chlorophyll that is responsible for photosynthesis. It helps plants grow rapidly, increasing seed and fruit production.
2. **Phosphorus (P)**: like nitrogen, it is an essential part of the photosynthesis process. It is involved in the formation of oils, sugars, starches, etc. It helps with the transformation of solar energy into chemical energy, proper plant maturation, and withstanding stress. It promotes rapid growth and encourages blooming and root growth.

3. Potassium (K): Potassium is absorbed by plants in larger amounts than any other mineral element, except nitrogen and in some cases, calcium. It helps building protein, photosynthesis, fruit quality, and reduction of diseases.

### The secondary

4. Calcium (Ca): an essential part of the structure of the plant's cell wall, it helps normal transport and retention of other elements, as well as strength of the plant. It is thought to counteract the effect of alkali salts and organic acids.
5. Magnesium (Mg): is part of the chlorophyll in all green plants and essential for photosynthesis. It also helps activate many plant enzymes needed for growth.
6. Sulphur (S): is essential for the production of protein. It promotes the development of enzymes and vitamins. It helps in chlorophyll formation, improves root growth and resistance to cold.



### Micronutrients:

7. Boron (Bo): aids production of sugars and carbohydrates. It is essential for seed production.
8. Copper (Cu): is important for reproductive growth. It aids in root metabolism and helps in the utilization of proteins.
9. Chloride (Cl) aids plant metabolism.
10. Iron (Fe): is essential for the formation of chlorophyll.
11. Manganese (Mn): functions with the enzyme systems involved in the breakdown of carbohydrates and nitrogen metabolism.
12. Molybdenum (Mo): helps in the use of nitrogen.
13. Zinc (Zn): essential in the transformation of carbohydrates. It regulates the consumption of sugars as well as plant growth.



Typical iron deficiency

This is the list of the essential basic elements recognized for a healthy plant's diet. But there is more to it than that. It is like a cake recipe, you can use the basic ingredients and make a good cake, or you can add a few extras and make a gourmet cake. To be of good quality a nutrient must necessarily include these basic 13 salts. But high-end formulas will include more than that, as they add other elements (many of them in minute quantities), that are important and do make the difference.

As you see, plants need several elements to thrive and give you the best of their genetic potential. Of course all plants don't eat the same amounts, nor do they all need the same combinations of foods. So it is important to adapt the nutrition to the plants you are growing. Generally you will find clear indications on the labels of your fertilizer bottles, or you can call the manufacturers, they will be happy to help.

### How to choose the right nutrient?

Our market is a niche market, where clients are little or not informed, and where marketing is unfortunately a determining sales factor. In the middle of the countless brands you find on the shelves, it is not easy to make sure you are getting what you really are looking for.

As described above, nutrients are made of 3 major salts: nitrogen, phosphate and potassium. To these are added secondary and micro elements. It may look easy to make, and indeed it is: you can even find simple formulas in books or on the net. But nutrients are not all alike, and by far. It takes more than a blending machine and a recipe to make a true plant nutrient. It takes research and invention and specialized in-house chemists. Many manufacturers will blend simple recipes with the major elements, and just a few of the secondary and the microelements. Some, in order to make more profits or to offer a more seemingly competitive product, will make a micronutrient mix replacing the very efficient chelates with cheaper sulphates.

Be it in powder or in liquid form, for soil or for hydro, a good nutrient is recognized by the amount and quality of salts included, and most of all, of their proportions. This is where the true recipe, the proprietary creation comes into the game. And mainly this is what you are looking for. But how to recognize the proper nutrient when you are choosing your fertilizer?

I can understand the dismay of the buyer, be it a distributor choosing the products he wants to offer his clients or the gardener who is trying to make sense out of the myriads of products advertised or on display! There are indeed loads of nutrients available on the market, and every day brings in new ones. They come, as we said before, in powder and liquid form, in one, two, three or four parts. Some are exclusively for soil, for coco, for hydro, others are adapted to all substrates. Some marketing gimmicks even go to the extent of offering specific foods per plant; and then you have the boosters, the activators, the hormones, etc...

This series of articles will develop the different steps towards a proper choice of nutrients, one that will please your plants, and at the same time give you the most beneficial return on your investments.