ENGRAIS OU ADDITIFS ? Part 2

William Texier - GHE

Boosters

Young root grown with BioRoots, in a RainForest

As the name implies, these are compounds that activate the metabolism of a plant.
Boosters comprise a large family of products and they come in various types: growth boosters, flowering boosters, rooting, etc… The technical term is “elicitors”. Most of the time they are natural extracts from plants. A large number of plants synthesize molecules that are not directly linked to their metabolism. Some of those molecules are useful for plant survival: For instance, they can give it a bitter taste, making them less palatable for grazing animals or they can help the plant survive a cold or hot period.

They are also the chemical weapons used by plants in their never ending fight for space, light and food. For some of them, the benefit for the plant is clear, but in many cases, the reason why the plant spends energy to manufacture them is far from obvious. All those molecules are referred to under the generic name “secondary metabolites”. This includes essential oils, tannins, alkaloids, latex, glycosides, terpens and many others. Those very same secondary metabolites provide us with a number of medicines, essential oils, resins, tannins for leather, natural insecticides, spices and flavours for the kitchen and much more. Nature provides us with thousands of those compounds and a single plant species can produce a large variety of them.

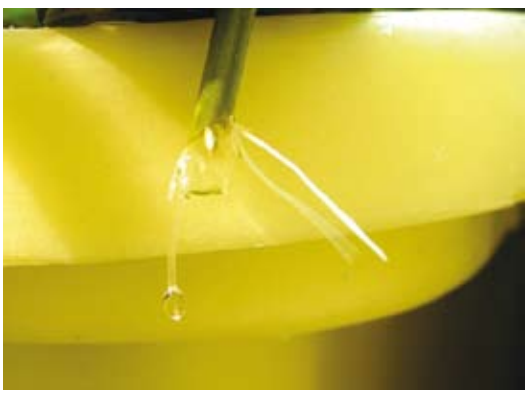
It is amongst the secondary metabolites that we find the building blocks for the boosters. They are extracted from one plant or another according to the effect that one wants to achieve. Here is a simple example that anybody can try: Willow contains molecules that will help a cutting during the rooting stage. If you cut young twigs of willow about 10cm long, soak them in water for a few days. You can then use that water as a root booster by watering your cuttings with it or soaking the stem of cuttings into that water before putting them in place. You will be amazed how efficient the maceration can be!

According to the plant that you chose for extraction as well as the process used, you can achieve a large spectrum of effects. Generally speaking, not only do boosters increase a plant’s intake capacity of nutritional elements but boosters can also help to move them inside the plant. Boosters can also promote the growth of a vigorous root system. As a result, the general health of the plant improves as well as its capacity to fight harmful fungi and pathogens.

On top of this “internal” effect, boosters also play a part in the surroundings of the plant. They favour the development of beneficial micro organisms in the root zone providing a better implantation of the plants in their surroundings. Elicitors are a novelty in the agricultural world. At first, they were used primarily by greenhouse growers, nurseries and plant collectors. In general, they were used on plants which generated a large added value. Slowly they are gaining ground in field agriculture. Even if their price is high, in many cases the economic benefits largely offset their cost. Regulations, rather than price, are slowing down research progress. At the same time, lobbies from large chemical groups are not keen to see natural products coming on the market displacing some of their own products

Hormones

A hormone is a chemical messenger, carrying a message from one cell, or group of cells, to another one. They move with the sap or are transported actively from one cell to another. They act by attaching themselves onto specific receptors. They can also be emitted by plants into their surroundings, in the air (like in the case of ethylene for instance) or in the root zone. When referring to plant hormones, they are properly called phyto-hormones. Unlike the vertebrae kingdom, plants don’t have specific organs to synthesize their hormones. They are commonly produced at the very same spot where they are needed. Hormones are vital for the vegetal world. They regulate all plants’ life cycles, they have an effect on their growth, on their morphology and they also control all the steps of the plant’s life from seed germination to fruit ripening. They trigger flowering and are responsible for the sex of the flower. They regulate the life duration of the leaves and fruits as well as ripening, senescence, and even the death of the plant.



The major hormone families are: auxin, cytokinin and gibberelin. Of course, there are numerous other hormones, the most important being abscissic acid (ABA) and ethylene. Some hormones are specific to a variety of plant.

It is a common mistake to think that each one of those names applies to a single molecule; auxins, cytokinins and gibberellins are families, sometimes very large. Inside of the same family, hormones with the same name can have a different effect.
Very roughly, their main actions are as follow:

Auxins: growth, root initiation, bud formation
Cytokinins: cell division
Gibberelins: germination, stem elongation, flowering

Of all complements that can be used in agriculture, hormones are by and large the most controversial…and for good reasons. First and most important, a hormone never acts alone: The plant morphology is the result of the antagonist effect of a certain number of different hormones. It is a delicate matter to shift the balance in favour of a hormone rather than another one. Additionally, hormones are active in minute quantities. It is easy to pass the optimum level when you provide them from an outside source. The result is abnormal growth, or sometimes, the opposite to the desired effect. Lastly, many users are put off by the fact that most hormones on the market are of made synthetically.

In many European countries, the use of hormones is strictly regulated, sometimes even completely forbidden. The most commonly offered to the public are cloning hormones, mostly auxins. They are efficient, but it is better to avoid the ones that are in a dry powder form: Often, when you dip the stem into the powder, you clog the canals through which the cutting absorbs water necessary for its survival.
Personally, and despite their efficiency, I never use hormones because there are numerous other effective ways to achieve the same results with more natural means and with a more comprehensive approach, such as fulvic acid and elicitors.

Fungi and bacteria

Fungi and bacteria are both present naturally in soil, but it is often useful to increase their numbers. They are especially useful in hydroponics because they help recreate in the root zone conditions similar to the one encountered in soil. Those micro organisms can colonise a wet substrate such as coco fibres, rock wool, or pumice, but if the substrate is a dry one such as clay pebbles, then you will need to use a biofilter to provide the organisms with a breeding ground. A biofilter can be a simple plastic pot filled with pumice, provided that you establish a continuous circulation to maintain the oxygen level. This is achieved either by putting the pot in the system, in place of a growing pot, or with a small accessory pump that will draw water from the main tank and back to it.

A home made biofiltre with sponge, stars and BioMagix, placed inline, in a Dutch Pot Hydro growing system

When introducing living colonies in the system, the grower faces an increased level of complexity. For instance, if the population of micro organisms increases too fast, or if they die massively from thermal problems, they will acidify the pH of the solution. They also compete with the roots for dissolved oxygen. You need to use a well designed hydroponic system that provides a nutrient solution that is constantly rich in oxygen.

A little experience will allow you to rapidly get over those little inconveniences. It is worth ascending the learning curve because, once mastered, the use of micro organisms brings a lot of benefits in your hydroponics cultivation. They help plants to absorb mineral salts but they are also little factories continuously manufacturing enzymes. Those enzymes will decompose vegetal debris present in the solution from decaying roots or leaves, or other organic matter, and transform them into useful nutritive elements. Therefore, they have a cleaning effect on the nutrient solution. They are also your best friends in the fight against pathogenic fungi such as pythium or fusarium. They have a dual action: they occupy the ecological niche of those pathogens and they emit substances that kill the spores by contact. This allows the roots to survive temperatures that would normally kill them.
Not every researcher agrees on the type of mix to use. Some use a large spectrum of organisms, others prefer to use only one variety at a time to avoid a competition between the species. Whichever way you go, it is highly desirable to introduce those micro organisms in the nutrient solution. You can make a simple experiment by introducing trichodermas. You will rapidly see a difference in the cleanliness of your nutrient solution and the health of your plants.

Ok, so we've taken a quick look at the main types of supplements that you can find on the market today. However

Roots with and without BioMagix, at high temperature (>48° C !).

it's worth pointing out that there are others. Some have an interest only in a lab but fall short of providing a significant difference outside of it, in normal conditions of cultivation. Others are still at a research level: They will be the additives of tomorrow.

Is it a good idea to use supplements? The answer is a loud yes, absolutely! That said, there are many products on the market and it's best to be a little cautious when buying an additive. Choose a product by a company with a solid reputation. Read the labels carefully to make sure that the active ingredient and its mode of action are identified clearly. Always reserve a critical eye for the claims made in advertisements whilst remembering that supplements really can improve your results tremendously and, as a consequence, simplify your life as a grower.