

Hydroponics or soil, the big question? Ask a specialist !

When we created GHE in Europe in 1995, people hardly knew what hydroponics was. The first time I showed our AquaFarm and Flora-series 3 components nutrient, they looked at me with the most puzzled look. Many thought that there was no place for this new concept in our countries and that growers would prefer to cultivate in soil, as it has been done for ages, specially in countries like sunny Spain.

But today in Spain , as in all of Europe , our technology is largely adopted and people inquire more and more about it. Most want to know how it really works and which are its advantages over soil. Some want to know how it compares with organic farming and sustainable development. And an ever-increasing number of growers want to know by which “magical” means this amazing technique gives such astounding results.

Although “hydroponics” seems to be a high-tech, sophisticated concept, this growing method exists since the most remote of times. It was first seen at the hanging gardens of Babylon , then used by the ancient Egyptians on the Nile . In the 15 th century, the Aztecs totally perplexed the European conquerors with their “Chinampas”, these island-rafts floating on Lake Tenotchtitlan , and planted with shrubs, trees and abundant crops of vegetables and flowers. In the 17 th century, scientists started to use hydroponics as a research tool to study plant nutrition. In the 20 th century the technology spread to a wider audience; it was re-designed for commercial crops, and have now expanded to all continents.

In the mid 1970s, General Hydroponics designed the first small size hydroponic unit for hobby gardeners: the AquaFarm. This highly efficient module was created to stop dependence from the outside world, and allow people to grow their own “Family Farms”. The idea was to protect crops from « antagonists » of all horizons, be it a crummy season, wrong orientation and poor soil, or bad mannered neighbours and « crop snatchers ».

So what exactly is hydroponics and why should it be used? How does it compare with soil?

In hydroponics, as in the Mexican mountain lakes, plants live on water with their roots hanging in the dynamic flow of a nutritive solution.

The root environment is what separates hydroponics from soil cultivation. Hydroponics is a “no soil” growing concept using specifically designed growing systems and nutrients. Its objective is to stimulate plant growth by controlling the quantities of water, mineral salts and most important, dissolved oxygen, accessible to plants. This “oxygenation” of the root zone is primordial, and one of the essential conditions to your plant's growing process. Like all beings, plants – and their roots – need oxygen to live. Lack of oxygen inhibits the formation and growth of roots, and reduces rooting percentage, root mass and root length. Moreover, it is in the presence of oxygen that the plant's nutritive elements, in the form of molecules, are transported. (See Effects of Dissolved Oxygen– www.eurohydro.com – Faq's and articles).

There are several choices of growing methods, including NFT, Ebb & Flow, and Aero-hydroponics, which function essentially the same way: plants are grown within a container filled with a variable quantity of inert growing media like clay pebbles, coconut fibre, rock-wool, etc. The container rests above a reservoir filled with nutrient-enriched water. A pump drives the nutrient solution from the reservoir to the distribution line, letting it then drip back down along the roots and to the reservoir. This flux infuses the solution with oxygen and constantly bathes the roots, stimulating your plants to grow.

The technology is quite simple. Serious companies will provide you with a quite detailed “modus operandi”; just follow the few basic rules you will generally find in your instructions, and prepare to

be surprised.

The immediate advantages over soil are easy to understand.

1. No soil means that you can grow everywhere you want. In big cities or small towns, suburbs or countryside, no matter if you have a garden or not, or if your soil is poor, heavy, too acidic or not enough, dry, ...
2. No soil means no soil-born disease and pests, and no weeds. Consequently no herbicides and much less pesticide. Generally the hydroponic gardener will apply Integrated Pest Management (fighting pests through their natural predators) to avoid using harmful chemicals.
3. A closed circuit watering system means huge savings in water - and fertilisers - as the only nutrient solution used is the one that plants absorb. There is no loss in the ground, or by evaporation.
4. In soil, the plant transforms its food into assimilable ions by composting organic matter. In hydroponics these same harmless ions are already available to the plant so it has nothing to do except just absorb and grow.
5. In soil, plants waste a lot of energy developing the large root-mass they need to find and absorb their food. In hydro roots are submerged in a perfectly adapted, oxygen-infused nutrient solution, so the plant will concentrate on developing foliage, flowers and fruit instead. This results in a better use of space, and a visible improvement in growth rates and yields.
6. In soil, unless your ground is quite light and perfectly aerated, it is difficult to achieve adequate levels of gas exchange in the root zone, thus slowing the proper development of your plants.
7. Hydroponics allows you to closely manage your plant's needs and stimulate its growth. The optimal environment it offers promotes best utilisation of the plant's genetic potential, as well as a significant shortening of the growth / production interval.
8. The strength and vigour of plants started in hydroponics then transplanted in soil is such that often soil growers will start their cuttings in hydro during the winter, and transplant them in soil as soon as the good season comes back, gaining several weeks on their outdoor crops.
9. A hydroponic system, once set up, will run almost indefinitely without additional investment. It is clean. No soil to discard, and very little media to dispose of, saves you a lot of work, money and time. (Be careful where you put it though, as leaks can always happen!!!).

In short, with hydroponics we offer you the rule of the 30% increase : 30% more plants, 30% faster growth, 30% higher yields, and 30% more active principles in the plants.

But there still is one decisive question: we all know that soil contains around 100 different elements that are good for plants, and for our general health, and which are not all included in a hydroponic nutrient. Like for wine, the intrinsic qualities of your soil will determine flavour and fragrance.

Will hydroponics render these characteristics? Today hydroponics try to perfect the plant's diet, and gets every day closer from a soil environment. Indeed additives and activators like Green Hope or the Bio Boosters, Diamond Nectar and Mineral Magic, complete their nutrition and introduce "earth" into "hydroponics".

If hydroponic systems stimulate your plants to grow, it is important to keep in mind their other needs. Like in soil, the general environment is decisive, so always monitor temperature, humidity, ventilation, and keep good maintenance habits.

Of course, the right choice of nutrient is crucial and the question of fertilizers is quite recurrent. Even when somebody understands well the functioning of hydroponics, the question of plant nutrition and fertiliser remains.

Hydroponic nutrients are made with purified mineral salts: a mix of primary and secondary macro elements plus micro, sub micro, and trace elements. Some companies present basic nutrients, with a mix of just the main salts, and some, specialised in hydroponics, will offer you extremely

rich and complex formulas, including in hard and soft water form to better adapt to your water's quality. How to make the difference is a difficult task: information on the labels are not always revealing as regulations impose that producers disclose only the minimum guaranteed, so you will never get an exhaustive recipe. The best is to inquire directly with your suppliers or, better still, with the manufacturers; they generally have composition charts that will give you, if not the complete recipe (which remains proprietary), at least enough information to allow you to make a reliable choice.

When formulated correctly, hydroponic nutrients are exhaustive, totally soluble and readily available to the plant. They are generally presented as one part, two part and three part nutrients, sometimes even four part, in liquid or powder form. If one and two part nutrients are quite obvious to use, the three parts may seem a little trickier. In reality it is as easy, and clear application charts are often on the labels.

The concept of a 3 parts nutrient was invented for General Hydroponics by Dr. Cal Herrmann in the early 1980s, then imitated and copied by many. The idea was to closely address each cycle of the plant's growth with the best-tuned diet. As a general rule, a plant consumes more nitrogen during the formative or vegetative stage, and more phosphorus, potassium and magnesium as it flowers. Throughout its growth cycle, the plant will also consume calcium, sulfur and micronutrients such as iron, manganese, boron, molybdenum and copper. The 3 parts nutrient will adapt to each cycle, bringing plants exactly what they need, when they need it, thus drawing the best out of its genetic potential.

But, some will ask, what are hydroponic nutrients made of, are they chemical or organic? To answer this question it is first important to know the difference between organic and hydroponic, and to understand how plants feed.

The difference between organic and hydroponics is based on the following :

“Organic” means that no “unnatural” or “manmade” chemicals are used to make the fertilizer, while in “hydroponics” the fertilizers are made out of purified mineral salts.

In soil, billions (several millions per gram of earth) of micro-organisms decompose organic matter and transform organic molecules (non-assimilable by plants) into ions that plants can absorb.

In water, as in soil, plants absorb their foods in the form of ions. When you come to think of it, there is no difference between an ion of organic or of mineral origin. What matters is whether or not they are in a form that is harmless and whether or not they can be used by plants. The same minerals are absorbed in either hydroponic or organic growing. In the organic garden they are provided to the plant as ions, as they are released from organic matter by the action of worms and bacteria, through the composting process. In hydroponics, water-soluble mineral salts, in the form of the same ions, provide these same elements.

While being a “natural” transformation, composting introduces an uncertainty factor in the procedure. Sometimes you will find toxic substances introduced in the compost or created by the composting process (harmful pesticides and herbicides carried from previous crops used in the compost, or heavy metals like lead, mercury, tin or nickel which can be present in significant quantities in the fish waste and seaweed commonly used in organic fertilizers).

Another factor of uncertainty in organic nutrients is the fact that some are derived from waste treatment factories, made with muds that not only may be radioactive, but also full of heavy metals, particularly zinc and lead. These nutrients, even when recommended at homeopathic dosage, are toxic and are forbidden in most countries for horticulture or floriculture.

Finally, most organic fertilizers lack of essential trace elements like manganese, copper, zinc, boron and molybdenum which must be present in small amounts for proper growth and are catalysts that help in nitrogen assimilation, ion transport and enzyme manufacture. Used as is, these nutrients will create deficiencies in the plants you eat and of course, in your diet.

In hydroponics, mineral elements are provided by the use of mineral salts in the form of ions. These may be either naturally derived or manmade, but most have been purified and processed

so that they are water-soluble and in a pure form. Many start out as mined minerals or naturally concentrated deposits that are dissolved and processed into compounds with a definite molecular structure and composition. In the refining process, these mineral salts are purified to remove heavy metal contaminants and toxic substances that could harm plants or people.

Since the chemical composition is precisely known, different mineral salts can be combined to form a balanced hydroponic nutrient. When dissolved in the proper proportions with good quality water, a hydroponic nutrient solution will provide all of the mineral elements needed for plant growth and give pure, healthy plants. By its nature the hydroponic methods eliminate much of the uncertainty found in organic growing.

Of course, you can use a hydroponic fertilizer with soil cultivation. There are many advantages to this kind of hybrid application. Care must be given not to overdose the plants, but a good hydroponic manufacturer will give you proper application instructions. The results are always astounding.

In the US and in Europe , numerous rules and different offices regulate what's organic and what's not, with more or less consistency. Still, the fashion of organic motivates nutrient companies to now offer organic labels. To avoid errors and misunderstandings, it is best to ensure that the products you buy as organic are reliably registered.

A last question is often asked to us directly. Are Flora-series and One Part adapted to grow marijuana? General Hydroponics is based in California on one continent, and in France on the other. Knowing the laws in these 2 countries, it is very difficult to address this question. It may be enough to say that since 1996, with the first laws voted on legalising medical marijuana, Flora-series is chosen by medicinal research laboratories as well as by the Cannabis Buyers Clubs and the official medicinal marijuana growers in the US and in Canada.

I would like to thank Cal Hermann, Lawrence Brooke, and William Texier (partners at GHE) for their contribution to this essay.

If you want to know more about hydroponics, you can open a few websites, unfortunately all in English :

- www.growingedge.com
- www.carbon.org
- www.maximumyield.com
- www.hydrogarden.com
- www.genhydro.com/articles.html

Noucetta Kehdi, Co-manager of General Hydroponics Europe.