

The hydroponic system – a way to get vegetable crops through performance methods

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ABSTRACT

In the current crisis, in order to cope the situation, many of us are trying to refocus into other more profitable fields. A reliable source of income is getting vegetables on the nutritious substrate, or hydroponics system, a system in which vegetables do not need soil, these are developing successfully in environments loaded with nutrients such as water, sand or sawdust. The techniques to start a hydroponic culture must be performed by specialized growers.

Keywords: Hydroponics cultures, tomatoes, nutrients substances, vegetable care.

INTRODUCTION

The lately socio-economic conditions of our country, imposed by the economic downturn, a new orientation favored work for most people. For various reasons, some people were forced to abandon their core and embrace another profession.

The need to support a family, and later a business can choose farming as a way of life. Thus, under stress conditions, man gives up many pleasures, but not food. So they set vegetables microfarms. But man is a major consumer of fruits and vegetables, so by modern means, can have throughout the year.

The greater is the demand of these products onto the market so large are their imports. We Romanians, eat vegetables imported from abroad. Few know that many of these countries import vegetables from Romania, which then processes them.

We know that Romania has a great intellectual capital, and a "bio" also, the later referring to the almost inexhaustible source of biological material as a nutrient substrate for many cultures. Vegetable growing in parallel with the development of agriculture has undergone a number of changes and gradually came to be organized on other scientific principles in order to supply the population with fresh throughout the year. It went from extensive to intensive one on account enhancing product quality with respect to customer requirements.

The organization of micro vegetables, are the two very important strategies: production management and the marketing. There are two distinct but mutually influence each other to be successful in the chosen business.

Production management involves choosing a location for the activity, in a scientific knowledge of the technological process and selection of staff motivated in business success and willing performance. It is not enough to produce vegetables; we must know them and sell. Otherwise, the goods remain in stock, and finally we will have to come to see that business doesn't work.

A reliable source of income is getting nutritious vegetable substrate or in hydroponic system. Hydroponics is growing plants without the soil. There are countless types of hydroponic systems; some using only water, but most are composed of an inert growing medium, such as sand or gravel, to support plants. Hydroponic growers use many types of growing media, including gravel, marble, sand, rubber, foam, mineral wool, wood, slate, peat and sphagnum moss, plastic beads, polystyrene, crushed brick or vinyl to list some.

Many hydroponic systems intended for farming marijuana include containers, growing media, nutrients formulas and sometimes include an irrigation system based on pumps and timers. Manufacturers claim that they have "magic formula" that will increase the plant bigger and stronger.

There are four key points that apply universally, in hydroponics and they are more important than any particular ratio of nitrogen and phosphorus or something, no matter the type of hydroponic system chosen.

The most important criterion is pH. The pH depends on the water and the nutrient solution is used to dissolve in water. The pH of the result will determine which nutrients are absorbed and how easy it will be absorbed by the plants of each substance.

The second criterion is the aeration. An environment that is too hard (consisting only of organic matter, such as manure), or a system that is constantly saturated with stagnant water will suffocate the roots. Roots need oxygen and in the absence of air (oxygen) will actually choke or will drown and plant health and development will suffer. Submerged roots are difficult rehabilitated without affecting the smooth development of the plant, the culture must be dry and decongestants and the plant may need to be transplanted into fresh medium. If one uses any of the above-mentioned culture medium, when such a problem will not occur as long as the plants will not be in water uncirculated.

The third criterion is the accumulation of salts. Excess accumulation of salts causes many "signs of weakness" and can lead to toxic conditions. To fix the problem the container should be flooded, repeatedly with pure water, hoping that will be drained of toxic salts medium. Reuse containers for the second crop is discouraged due to accumulation of salts. It always starts with a new medium that can dry quickly, such as gravel, sand or plastic beads. Even these environments must be rinsed several times with clean water before reuse. Hydroponic mixes are cheap and easy.

The fourth and last criterion is the ratio between nitrogen and potassium. The duration and intensity of light affects the absorption and utilization of both elements. Under a high intensity light like a greenhouse in summer, plants need double the amount of nitrogen to the potassium. In winter, under low light intensity (illumination systems based on tubes) plants require approximately equal amounts of nitrogen and potassium.

The word hydroponics technically means working water, stemming from the Latin words "hydro" meaning water, and "ponos" meaning labor. Many different civilizations from the beginning of time have relied on hydroponics for growing plants, such as the early Mexican and Egyptian civilizations. However, recently growing hydroponically has grown in popularity and use across many different markets.

There are six different types of hydroponic growing systems, they are: Aeroponic, Drip, Ebb and Flow, N.F.T, Water Culture and Wick.

- Aeroponic System: One of the most high tech growing systems;
- Drip System: The most widely used type of hydroponic systems;
- Ebb and Flow System: The system can be modified in many ways;
- N.F.T.: Nutrient Film Technique System - most commonly thought of;
- Water Culture System: A very simple to use hydroponic system;
- Wick System: The simplest of all hydroponic systems.

Plants that are not traditionally grown in a climate would be possible to grow using a controlled environment system like hydroponics. NASA has also looked to utilize hydroponics in the space program. Ray Wheeler, plant physiologist at Kennedy Space Center's Space Life Science Lab, believes that hydroponics will create advances within space travel. He terms this as a bio regenerative life support system.

THE ADVANTAGES OF USING HYDROPONICS SYSTEM

- ✓ No soil is needed for hydroponics;
- ✓ The water stays in the system and can be reused - thus, a lower water requirement;
- ✓ It is possible to control the nutrition levels in their entirety - thus, lower nutrition requirements;
- ✓ No nutrition pollution is released into the environment because of the controlled system;
- ✓ Stable and high yields;
- ✓ Pests and diseases are easier to get rid of than in soil because of the container's mobility;
- ✓ Ease of harvesting;
- ✓ No pesticide damage;
- ✓ Plants grow healthier;
- ✓ It is better for consumption.

Today, hydroponics is an established branch of agronomy. Progress has been rapid, and results obtained in various countries have proved it to be thoroughly practical and to have very definite advantages over conventional methods of horticulture.

There are two chief merits of the soil-less cultivation of plants. First, hydroponics may potentially produce much higher crop yields. Also, hydroponics can be used in places where in-ground agriculture or gardening are not possible.

THE DISADVANTAGES OF USING HYDROPONICS SYSTEM

Without soil as a buffer, any failure to the hydroponic system leads to rapid plant death. Other disadvantages include pathogen attacks such as damp-off due to *Verticillium* wilt caused by the high moisture levels associated with hydroponics and over watering of soil based plants. Also, many hydroponic plants require different fertilizers and containment systems.

HYDROPONIC SYSTEMS - ADVANCEMENTS

With pest problems reduced, and nutrients constantly fed to the roots, productivity in hydroponics is high, although plant growth can be limited by the low levels of carbon dioxide in the atmosphere, or limited light exposure. To increase yield further, some sealed greenhouses inject carbon dioxide into their environment to help growth (CO₂ enrichment), add lights to lengthen the day, or control vegetative growth.

Having some data of a standard unit of Romania greenhouses, we could make a calculation of an investment in a hydroponic system for growing tomatoes, obtained in 2012.

Thereby, the area was 90 ha and the substrate nutrient acquisition costs "Grodan Rockwool" were about 12000 Euro / ha. For a glass-covered greenhouse ha and a boiler necessary to ensure the heating in winter, the total costs have risen to an amount around 1200 000Euro. Seedling requirements for tomatoes culture amounted to approx. 27 - 30000plante/ha, with an average price of 0.8 Euro / thread, respectively 232000Euro/ha.

The total costs for 90ha in 2012 have been near 1,008,208 Euro and the income from the exploitation vegetables were about 99 Euro 1020, being registered a gross profit of 120 862 Euro.

As a conclusion we can say that the conditions in Romania, were the hydroponics system is not very well developed, obtaining a 450t/ha production of tomato (culture substrate) is a good annual production.

CONCLUSION

The fundamental component in hydroponic system is represented by the nutrient solution. The control of nutrient solution concentration, referred as electrical conductivity or osmotic pressure, allows the culture of a great diversity of species. Moreover, the accurate control of nutrient supply to the plant represents the main advantage of soilless culture. Additionally, the regulation of pH, root temperature among others factors, leads to increased yield and quality.

Below are some pictures of obtaining vegetable crops in hydroponic system.



Hydroponics is a versatile technology; appropriate for both village and backyard production systems to high-tech space stations. Hydroponic technology can be an efficient mean for food production from extreme environmental ecosystems such as deserts, mountainous regions, or arctic communities. In highly populated areas, hydroponics can provide locally grown high-value crops such as leafy vegetables or cut flowers.

The future use of controlled environment agriculture and hydroponics must be cost-competitive with those of opened filed agriculture. Therefore, associated technologies such as artificial lighting, plastics, and new cultivars with better biotic and abiotic resistance will increase crop yields and reduce unit costs of production.

Prospects for hydroponics may improve if governments design public policies supporting subsidies for such production systems. Besides economic benefits, hydroponics implies conservation of water, cogeneration of energy, income-producing employment for, reducing the impact on welfare rolls and improving the quality of life.

Nowadays, development and use of hydroponics has enhanced the economic well-being of many communities both in developing and developed countries.

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