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Easy Gardening With Homegrown Hydroponics

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Whether growing organic hydroponics in your home, on the rooftop, or anywhere else, these helpful hydroponic gardening tips are sure to get you started in the right direction.

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To many, the idea of organic hydroponics seems like an impossible contradiction. Hydroponics, the growing of plants in a medium other than soil, usually utilizes a chemically derived nutrient solution. Organic gardeners, as a rule, do not like hydroponics: for those who love the soil, the prospect of plunging elbow-deep into a gritty mix of perlite and vermiculite is not very inspiring. Nor is brewing up a batch of Hy-pon-ex or Miracle-gro. However, as an enterprising group of urban gardeners in Montreal has discovered, hydroponic food production need not rely upon a chemical nutrient solution ... and, under the unique conditions of rooftop farming in the city, soilless vegetable cultivation has distinct advantages.

The Montreal Project

Two years ago, the Canadian government funded an eighteen-month demonstration project in Montreal to investigate the feasibility of rooftop agriculture. The intent of the funding was the development of appropriate agricultural methods and technology so that people would be able to farm the flat wasteland above their city.

The target community was the inner-city, ethnically mixed neighborhood, St. Louis Sud. Project workers taught courses in gardening and "roof maintenance" skills, so that community residents could take over the project when funding ran out.

The two gardeners who were hired to teach, research, and supervise were experienced organic gardeners who preferred to work with soil. During the first summer, the rooftop gardens were planted in earth. Over 100 cubic yards of dirt had to be carried by hand up two flights of stairs, each cubic yard weighing between 195 and 270 pounds. The soil then had to be loaded into carefully positioned containers, so that the stress on the roof would be minimized. Even though the roof was strong and could support 80 pounds per square foot, still much of the "wasteland" had to remain uncultivated. If a lighter medium had been used, more rooftop space could have been utilized for food production.

During that first summer, the differences between ground level and rooftop agriculture became apparent. Container soil dried rapidly and had to be watered daily. Nutrients leached out with every rain and the plants had to be side-dressed with a variety of fertilizers at least every three weeks. Since the relative populations of soil micro-organisms and animals are greatly reduced in rooftop containers, their role in soil regeneration in the rooftop project was less significant. Earth worms, though they lived well in the boxes, could not bring minerals back into the earth from the parent rock because there were no parent rocks. By July, the root systems had become pot-bound, filling the entire container. It was found that insect problems occurred more easily on the roots than on the ground if strict care was not maintained. It began to look as if organic container gardening could never be more than a poor cousin to ground level organics.

The project workers, however, came up with a solution, a method which could minimize the many logistical and ecological problems that were being encountered. That method was hydroponics and, given their organic gardening background, the workers decided to experiment with organic hydroponics.

The Organic Hydroponic Procedure

Contrary to prevalent thought, it is extremely simple to mix a batch of organic nutrients adequate for the needs of any plant. One can either use a tea made from high quality compost, or a basic solution of 1 1/2 teaspoons fish emulsion, 1 1/2 teaspoons liquid seaweed, and a teaspoon of bloodmeal to each gallon of water. The mix varies, depending upon the type of plant being grown. Less bloodmeal should be used with flowering and fruiting produce than with leafy crops. Other nutrients can also be added: blended eggshells, for example, might be helpful when added to a cabbage crop. There is room for variation and for more experimentation ... the basic mix is meant to be a starting point rather than a proven end product.

The fish emulsion, seaweed, and bloodmeal recipe was developed in trials on lettuce during the Montreal winter. By spring, two successful lettuce crops had been harvested, so the project workers decided to try the nutrient solution with a tomato crop. Two large 5-by-7-foot cold frame boxes were prepared. One was fitted with hydroponic accessories and filled with a growing medium of half perlite (a lava product) and half vermiculite (made from mica) to which fifty pounds of sand were added. This was found, after much experimentation, to be the best medium. The other box was provided with the normal drainage holes, filled with the conventional soil mix, and fertilized on regular schedule.

For the first month of the summer, the 36 tomato plants being grown hydroponically lagged behind the 36 soil-grown tomatoes. This was because no seedling tomatoes had been started in a soilless mix and it was necessary to take the plants from the soil, wash the earth off their roots, and then set them in the hydroponic

box.

By July, the hydroponically grown tomatoes were larger, more sturdy, and had more fruit set than the soil-grown controls. They also had a much greater resistance to the aphids which infested downtown Montreal last summer. This increased resistance is a good indication that the plants were receiving excellent nutrition from the organic mix. Comparisons of the final yields are not yet available, but by mid-August the hydroponic tomato plants were producing about a third more tomatoes than the soil-grown controls. There is no doubt that this simple nutrient solution provides excellent nourishment.

Benefits of Hydroponic Gardening

Critics of hydroponics claim that the method is too expensive and too complex. They also claim that it takes the fun out of gardening and is unaesthetic. The latter claim has some validity. Some community residents in Montreal were put off by the boxes of sterile, almost feathery growing medium. Many stressed that they were gardening for more than the potential vegetable yield, that they enjoyed working with dirt and compost. They wanted to learn about earth and they were quite willing to make do with the Intensified problems of container soil for the chance to work with that medium.

For people concerned with the economics and yields of urban gardening, though, hydroponics makes a great deal of sense. Though soil is cheaper to buy than perlite and vermiculite, the labor costs for the Montreal group in carting 100 cubic yards of earth to the roof were significant. These costs were slashed with the switch to the hydroponic medium which weighed only two percent the weight of dirt. Further, since container soil does leach so readily and does require repeated fertilization, the actual cost of fertilizer for container plants grown in soil is comparable to the cost for hydroponic nutrients. Two more considerations must be mentioned. First, since the hydroponic medium is so much lighter than dirt, a much larger surface area of the roof can be covered with containers without the fear of structural collapse. Also, since hydroponic roots do not need to grow as far in search of nourishment as do the roots of plants grown in soil, planting densities can be more intensive and higher yields can be achieved.

In terms of complexity, hydroponic gardening requires neither sophisticated equipment nor supervision. The technology is simple and easy to construct. The container must be slightly elevated at one end and have drainage holes at the opposite end. One-inch polyvinyl chloride pipes with holes drilled every three inches are laid about an inch under the medium and raised at both ends of the box. Smaller rubber hoses from the nutrient supply are inserted into the pipe at one end and the upward bend in the pipe at the other end stops the flow of the solution. A gravity system for controlling nutrient flow, composed of two five-gallon buckets elevated on boxes and standing two feet above the top of the growing container makes care for the hydroponic vegetables simple. The nutrients can be mixed directly into the water in the buckets and filling the buckets and adding the nutrients takes approximately five minutes of work each day. The hydroponic medium holds water so effectively that rare is further simplified: it is quite possible to skip a feeding for a day or two without causing any damage to the plants.

The experiments conducted in Montreal are important ones: the potential of organic hydroponics for producing both high yields and healthy produce on the rooftops of urban homes and businesses is significant. That the project was conducted in a low-income area and that the community residents have indeed taken over the garden project is also encouraging. Further work remains to be done: we hope to continue researching the methods and techniques of organic hydroponics in our newly completed rooftop greenhouse at the Institute for Local Self-Reliance in Washington, D.C. And we hope that more community groups try

their luck with organic hydroponics ... in Montreal, some people grew to love it.

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What is Hydroponics?

Hydroponics is the cultivation of plants in a medium other than soil. When you start an avocado pit or root a plant cutting in a glass of water, you are practicing the simplest form of hydroponic culture. As the technique is more commonly used, plants are grown in a bed of material such as gravel, sand, or even sawdust. At ILSR, we use a mix of perlite and vermiculite, the one a lava product and the other a kind of puffed mica. The soilless growing material provides the physical support which the root system needs. A nutrient solution is fed into the mix periodically so that the roots can absorb all the nutrients which they would normally extract from soil.