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Mexico, Factor 2

In the capital of Mexico, 62% of the city is urban and the other 48% represents the sector responsible for the income of 20 thousand producers and 20% of the city's supply.

Xochimilco is an example of a unique type of system that is sustained in the water, and maize, lucerne, carrots, flowers, and beans are produced.

But today the big farms in Mexico City are disappearing like "Rancho Zumpango" that produces 5,000 tons of maize annually and 50,000 liters of milk, or "Rancheria Buenavista" that has been transformed into condominiums. The problem with this is that if we pretend to continue with soil cultivation, we have two options: to bring products to the city from the outside or take the farms farther and deforest complete areas. If we bring the food from elsewhere, the prices will rise because of transportation and if we deforest for space, the holes in the city's forests will grow and the water problem in the city will rise.

There are smallholders that are aware of these problems and are trying to do something. The "Asociacion Civil Mexicana de Trabajadores Urbanos" (Civil Association of Mexican Urban Farmers) have been planting for four years, not in the rural part, but in the urban part of the city, and they teach people how to grow small crops in their house hold. (Oeidrus 2009)

Why hydroponics?

I started a project with my mom two years ago when she wanted to have a little crop in our house. Then we heard that "Amar A.C." was teaching hydroponics to the people in the city. After that we started with our hydroponic project in our backyard. We grew tomatoes, and peppers. We stopped the project because we remodeled our house. When I heard the proposal for smallholders I thought it was ideal to work with factor #6 that talks about the combat to erosion, and implementing sustainable agricultural practices.

Soil cultivation is good for a limited amount of people, but in this city of 13 million people, it isn't enough.

Hydroponics, in my opinion, is the best solution for the smallholders because you don't need big spaces for soil, and you don't need too much water. The fact that the plants are cultivated in a reusable water system saves water and space at the same time. For the smallholder this is the best solution because you don't need that much money for building a greenhouse: you don't need a tractor, the handwork is not tedious or expensive, and the only thing you'll need is a space as big as a house.

This is a new opportunity for smallholders because the big farms in Mexico City are disappearing and, in the future, they can permanently sell their products to the markets because the other ones will be too expensive, and you will not spend that much in transportation.

In fact, the only down side to hydroponics is that you can't plant trees for pineapples, and watermelons because of their weight. However, hydroponics is ideal for vegetables. (Amar A.C. 2010)

The history of hydroponics

Hydroponics has existed for 23 centuries. The first document is registered in the year 1600 by the Belgian chemist and physicist, Jan Van Helmond. It was about how plants obtained nutrients from water.

In 1699, the English naturalist John Woodward cultivated plants in water, and found that they grow because of substances in it.

In 1804, chemist and naturalist Nicolas De Saussure, exposed the principle of the plants that said that they grow because of chemical elements in the water, soil, and air.
In the early 1930, the University of California called this system hydroponics because of the Greek words *Hydro*-water and *Ponos*-labour.

And with the help of plastics, the techniques have been developed and have been spread through our country. Thus in 1994 the “Asociación Hidróponica Mexicana A.C.” was born. (Agriculture, 2010)

Hydroponics in Mexico City

Hydroponic products in Mexico City are in super markets and specialized stores and they are very expensive because they are rare and have more nutrients. The products are bigger and juicer. For example, a family of four members or more, whose father is the only one working and who makes five dollars per day, (like most people in the country) spends about one dollar in transportation every day. The other four dollars are for house's expenses (including the family meals). So, if hydroponic tomatoes cost 3 dollars, then they will spend their money in the cheapest tomatoes harvested in a soil farm, which cost 25 cents of dollar a pound.

If the hydroponic products were common in Mexico, the costs would be reduced to half the price from the soil cultivated ones because they could be produced in half of the time and in a smaller space, compared to the big areas of soil that are needed for the traditional cultivation. For example: if I were a farmer in the areas surrounding the city and I was planning to do a plantation field, my field would be reduced in 100x100 feet because of public constructions, I would most certainly die of hunger, however this space would be perfect for a hydroponic facility.(Hydroponics Mexican Association 2010)

Hydroponic Installation.

Hydroponics has to replace the soil's nutrients. Because of this, we need a water solution called “nutritive solution” that consists in 2 solutions: solution A, and solution B.

Material required:

Plastic tray of 5.28 gallons.

Plastic or glass recipient of 0.53 gallons.

Solution A: solution for planting the seeds and start growth

Substances:

Mono ammonic phosphate: 11.9 oz.

Calcium nitrate: 0.0728 oz.

Potassium nitrate: 0.0385 oz.

Solution B: elements for installation and growth of products.

Substances:

Magnesium sulfate: 17.22 oz.

Copper sulfate: 0.0168 oz.

Zinc sulfate: 0.042 oz.

Boric acid: 0.217 oz.

Ammonium molibdate: 0.007 oz.

Iron quelate: 1.75 oz.

There are three main ways of cultivating in hydroponics are these:

POPULAR USED TECHNIQUES		
Technique	Characteristics	Crop type
Floating root	With this technique the phenomenon of absorption is present. The roots of the plants are submerged in nutritive solution. The media to hold can be diverse but it has to be with forceful aeration (oxygenation)	-Lettuce (<i>Lactuca sativa</i>) -Celery (<i>Apium graveolens</i>) -Tomato (<i>Solanum lycopersicum</i>)
Crop in solid substrate	This technique is like the soil one. But the subtract is holding the plant allowing to the plant to have enough humidity this permits the expansion of the tuber	-Tomato (<i>Solanum lycopersicum</i>) -Cucumber (<i>Cucumis sativus</i>) -Celery (<i>Apium graveolens</i>) -Chard
N.F.T.	Technique in which the nutritive solution is in constant movement allowing the plant to be fed.	-Lettuce (<i>Lactuca sativa</i>) -Tomato (<i>Solanum lycopersicum</i>) -etc.

(Hidroponia, 2007)

These techniques can be used on a roof or a back yard, but if you want to produce more, it is recommended to do it in a space for storage or a cemented place. The most common of them is in a PVC structure because it can be attached to a wall or it can be done vertically. This is easier than the soil cultivation.

The differences between soil plantation and hydroponic plantation are:

Type of farming	Soil	Hydroponic
Number of plants	Limited for the nutrition that the soil provides, and the access to light.	Limited by illumination, more plants per feet, and more products per plant.
Preparation of the soil	Ploughing take a lot of time and space, and sometimes it'll need a soil exam.	There is not preparation of soil, in case of reusing the substrate is cleaned with bleach.
Bad herbs control	You'll need money for herbicides and hand work to take the undergrowth.	The bad herbs don't exist
Parasites and illnesses	Huge amount of parasites, insects and illnesses of the ground that can damage the crops, to avoid this it is necessary the rotation of crops.	It has fewer amounts of parasites and not illnesses, there is no root illness and you'll need no rotation.
Water	The lack of water can damage the crops, and sometimes it's used treated water that can damage the soil and the plant.	The water is reusable by a system of plumping and is by far less water
Quality of the product	The product is often white because of the lack of nutrients, Ca, and K, and is poor for conservation, sometimes they are cut when their green, and forced for maturation.	It is well conserved and it is bigger, the products of hydroponics have more of vitamin A
Fertilizers	Its applied by showering the fertilizer on top of the plants, and there is loss for washing by 50% to 80%	It can be showered by small amounts and there is little loss by wash.

(Hidroponia, 2007).

Conclusions:

Hydroponics in this city are poorly used, and is a sustainable market for the smallholders, because when the soil cultivated products become expensive, the markets will start to look for alternatives, and hydroponics is one of the best options because of appeal and price. It isn't invasive as the soil cultivation, it doesn't cause erosion non environmental damage, and it has no waste. So is ideal for the smallholders.

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