



جامعة الإمام عبد الرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

مستشفى الملك فهد الجامعي
King Fahad Hospital The University

HYDROPONIC







What is hydroponic hydroponics?

Hydroponic is a form of soilless agriculture and means growing plants in water as an essential medium for growth in addition to the nutrients (fertilizers) that plants need to grow normally. There are many forms of hydroponic that vary depending on the movement of water around the roots, between static and mobile.





What are the advantages of hydroponics?

1. Significant savings in irrigation water and fertilizers to about 80%.
2. Doubling the production per unit area.
3. Saving in agricultural labor.
4. The speed of agricultural crop production.
5. Reducing the use of agricultural pesticides





What are the disadvantages of hydroponics?

1. The high cost of infrastructure construction
2. Nutrient solution contamination has an immediate effect on plants and infecting them with pathogenic organisms.
3. It needs qualified human cadres



What are the hydroponic system components?



Two structures were built inside the greenhouse in the form of a pyramid (vertical expansion) in which 4" diameter PVC pipes were placed (24) lines inside the greenhouse through which the nutrient solution passes.

The network ends with a 1000 L tank with a pump to transport the nutrient solution To the pipe network to feed the plants and then the nutrient solution back to the tank. This preserves the nutrient solution, does not lose it and makes use of it again compared to traditional irrigation.





What are the hydroponic system components?

Table showing structure construction:

Total pipe length	432 m
The tube Diameter	4 inches
Total number of holes	1656 holes
The distance between the holes	20 cm
hole diameter	8 cm

Agriculture:

One of the American lettuce types was planted as a first experiment in the nursery, and after **2-3 weeks** it was transferred to the pots designated for cultivation.

Agricultural perlite was placed to stabilize the seedlings when placed through the pipe holes.

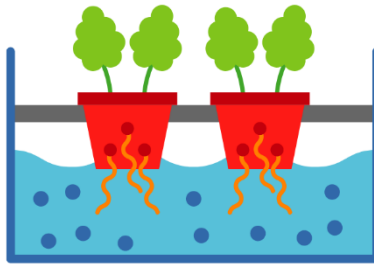
Agriculture



Table showing the name of the types and the beginning of agriculture:

Product Name	summer king
The beginning of agriculture	2/1/2015 AD
The temperature at house	8*20°C

Photos of some pots:





How to Prepare the nutrient?

The concentrated solution nutrient solution (B-A) was prepared.

According to the following schedule for ICARDA Organization.

Nutrient solution for hydroponics system.

The components of the elements solution A:

npk 12/12/36	8,4 kg / 40 liters of water
MgSo₄	6.1 kg / 40 liters of water
Microplex	270 g / 40 liters of water



How to Prepare the nutrient?



The components of the elements solutionB:

Compound name	Ratio
$\text{Ca}(\text{NO}_3)_2$	6.7 kg / 40 liters of water
Fe	400 g / 40 liters of water

Note: The water used to mix the elements is fresh



What is the method of adding Fertilizers?



solution, the concentrated solution is After preparing the added in an amount (5 liters A + 5 liters B) to each tank capacity of 1000 liters, to prepare a diluted solution and it is preferable to move the solution before each irrigation, and here the pH shall be measured or the so-called pH of the nutrient solution and the ppm Every two to three days, through measuring devices available in the market in the appropriate way for measurement.





What is measurement of pH and ppm?

The pH of the nutrient solution is preferably in the range from 8.5 to 5.6. Whereas, a decrease in pH to the acidic limits leads to damage to the roots of plants, while the rise of pH to the basal side leads to the deposition of many elements in the solution in the form of insoluble salts that the plant does not benefit from. Therefore, it is preferable to use some devices available in the market to measure the nutrient solution and can be added a H_3PO_4 when the pH rises above 5.6 to reach the required degree of the nutrient solution as well as can also be added KOH when the pH drops below 8.5 to raise the pH to the required degree.



What is measurement of the ppm of the nutrient solution?

The ppm in the nutrient solution is a very important in its effect on plant growth. A significant increase ppm leads to a clear decrease in the yield, as the plant's ability to absorb water decreases as a result of the high osmotic pressure of the solution. Therefore, after preparing the diluted nutrient solution, the ppm shall be measured, and this is done by a special device (TDS). Note that each crop has a tolerance degree of salts in cucumber can bear up to 1200 parts per million.



what is the irrigations?



The number of irrigations can vary according to the system for hydroponics, but in this experiment a timer was placed to control the number of irrigations and the duration of each irrigation, as it was distributed three irrigations per day for a period of **15 minutes** for each irrigation and increases to four irrigations when temperatures rise. The diluted solution was changed every **7-10 days** so that the salts are not concentrated in the root area, as well as the removal of any pathogenic organisms inside the nutrient solution that may infect all plant roots.



How to Prevent the crop?



Monitor the crop for fungal diseases or toxicity caused by an increased concentration of certain elements. It is preferable to remove any seedlings infected with any fungal so that it not spread to other seedlings and loss of the crop, and appropriate fungicides may be added as necessary.

Wht is the harvest?

The crop were harvested on **1/3/2015**, and the quantity of concentrated nutrient solution added to the tank was taken into account in the last two weeks of the plant's life, this gives a safe and healthy product to consumers.





Guidance and training

One of the most important objectives of this experience is to introduce the agricultural engineers and technicians working in the Ministry of Agriculture to the most important modern technologies to rationalize water consumption and information farmers with them.



Resources and references:

All illustrations used are from [Canva.com](https://www.canva.com)

Review and audit:

The content of this booklet has been reviewed by Green Spaces
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