

What is hydroponics?

Welcome to the world of hydroponics, the art of soilless gardening.

Hydroponics and plant grow lights are the gardening tools for the 21st Century. They make gardening, a year round hobby and literally mean you can grow any plant, anytime, anywhere. You will be amazed at the results you can achieve using the range of products that are supplied from HydroGarden, this includes everything from hydroponic systems, plant grow lights, growing media, plant feeds, plant nutrients along with testing and monitoring equipment to ensure the perfect growing environment is maintained. Increased yields, faster growth rates and year round gardening are just a few of the benefits from gardening this way.

Since 1996 the staff at HydroGarden have been using and searching for the best products from around the world and this website brings their knowledge together to enable you to achieve maximum results with minimum effort.

So what are the benefits of growing hydroponically?

There are numerous reasons why more and more people around the world are growing plants using hydroponic techniques.

With the continuing concerns about the level of pesticide and herbicide residues remaining in bought produce, the only guaranteed way to ensure healthy eating is to grow your own. With the self watering and rapid growth rates achievable in soilless gardening, this is now more possible.

When you grow hydroponically there is no digging, weeding or soil borne pests or diseases to ruin your enjoyment of clean, easy and productive gardening. There is no need to worry about fluctuations in the weather such as too much rain, frost or not enough sunlight. You are in control and you can achieve amazing results.

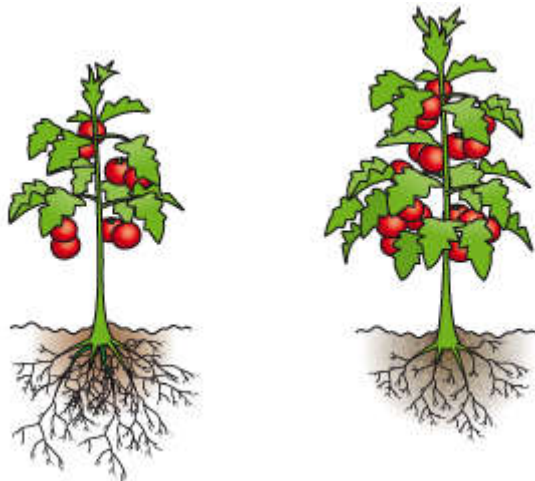
Please ask your specialist Hydroponic retailer for any advice relating to the products contained within this web site. Our equipment is stocked by all leading hydroponic stores around the country. Go to the retailer locator to find your nearest specialist retailer.

Happy Gardening!

How do Plants Grow?

All plants have the same basic needs of light, food in the form of nutrients, carbon dioxide (CO₂), water, heat and fresh air. If plants are not given enough of these essential elements then it will not grow or will have problems growing. Different plants require these elements in differing ratios but they are all needed whether the plant is in the soil or grown hydroponically.

When you grow hydroponically you can control and enhance all of a plant's basic needs and you even have the ability to ensure adequate Oxygen is available to the roots. This all helps to grow big strong plants with excellent crops and fantastic yields.



SOIL GROWN
Small plant - big root

HYDROPONICALLY GROWN
Big plant - small root

Hydroponics is Simple

Hydroponics, by its most simple definition, is the growing of plants without soil.

The plants are supported in an inert media such as perlite, vermiculite, clay pebbles, or rockwool and are fed a nutrient solution. This means that the plants do not have to develop a large root system in order to feed. Soil based plants divide their energy evenly between growing upwards and growing downwards (rooting).

A hydroponically grown plant expends a greater proportion of its effort growing upwards because all the nutrients it requires are readily available.

With the plant having all nutrients available, the plant benefits from having quicker growth and, in the case of crop bearing plants, higher yields. Furthermore, hydroponically grown plants are healthier and more robust than their soil grown counterparts and when grown at home fruit and vegetables taste superior to those found in supermarkets. Under the right conditions a hydroponically grown plant will grow between 2 to 4 times more quickly than in soil. For tomatoes commercial growers have realised yields per hectare of up to 40 times that of soil grown plants.

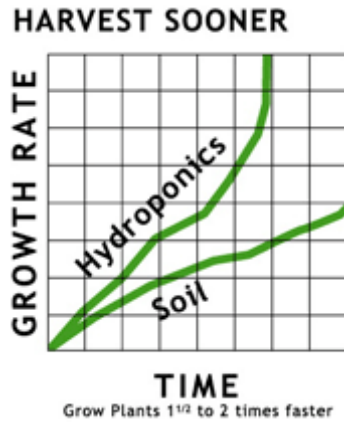
Due to environmental concerns regarding the reduction of water consumption and the worries over the indiscriminate use of nitrates and other fertilisers, herbicides and pesticides in soil based agriculture, hydroponic methods of cultivation are increasing in popularity.

Hydroponics has existed for years

The Hanging Gardens of Babylon used hydroponics and the US Army used the technique to feed soldiers during WW2 on the Pacific Islands. Today soilless gardening is rapidly expanding throughout the world and hydroponic installations can be found in all corners of the globe from Australia, the USA, New Zealand, Spain, Holland, Israel, Thailand and the UK. Many of the commercial growers around the world grow produce such as lettuce and tomatoes on a huge scale utilising hydroponic techniques.

Productive Hydroponics

Commercial crop growers have been using hydroponic techniques for many years. The speed of growth combined with the control over the growing environment means higher quality crops. The worry about soil borne pests and diseases are reduced dramatically, and weeding is a thing of the past. For commercial growers rapid harvests and higher yields are great reasons to grow this way.



HydroGarden makes hydroponics easy

The techniques used by commercial growers are now available to the home gardener. All of our systems give you the advantages of commercial style hydroponics in easy to use kits and nutrients. All you need to add are seeds and water.

Setting up a system is quick and easy and once running, maintenance consists of monitoring the nutrients and periodically adding more nutrients and water. The system does the hard work for you! You spend the time literally enjoying the fruits of your labour.

Hydroponics can be used anywhere

Hydroponic techniques have been tested by NASA to feed astronauts on long space flights with fresh vegetables; even lettuces are grown on submarines using these techniques.

Due to the different sizes and types of systems available means you can grow in any location where there is sufficient light. As the systems are self contained and clean, they can be used indoors such as in a conservatory, greenhouse, cellar, attic, garage or kitchen. Because there is no messy soil and the systems are usually quite light in weight, any indoor location is suitable. They can even be moved outside in the summer.

Grow all year round

Add a plant grow light and you can grow literally all year round. Easy, clean and productive, you can enjoy fresh herbs and produce even when it is cold and raining outside. By altering the time grow lights are on you can simulate winter or summer day lengths, enabling the plants to fruit or flower earlier or later in the season. You are in control.



The benefits of hydroponics

- You can grow all year round - indoors or outdoors
- Conserves water and plant nutrients are controlled
- More plants can be grown in a given area and crop flavour is enhanced
- Plants grow quicker with increased yields
- Soil borne pests are eliminated leading to reduced need for pesticides

Guide to Hydroponic System Types

In general we can divide hydroponic gardening into 2 types

1. Passive systems, where the nutrient is generally given to the plant by hand
2. Active systems, where the nutrient is given to the plant by some automatic means, usually using a pump.

Passive Systems

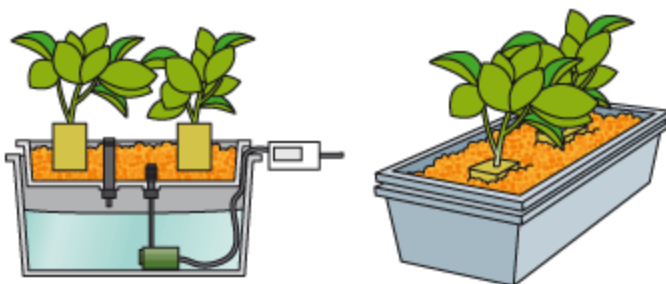
Pot Culture



Growing using the pot culture method is the cheapest and simplest means to grow hydroponically and is ideal for beginners. Simply fill a suitable pot with a soilless medium and fill a bottom tray or saucer with nutrient solution by hand. The nutrient will reach the plant using capillary action.

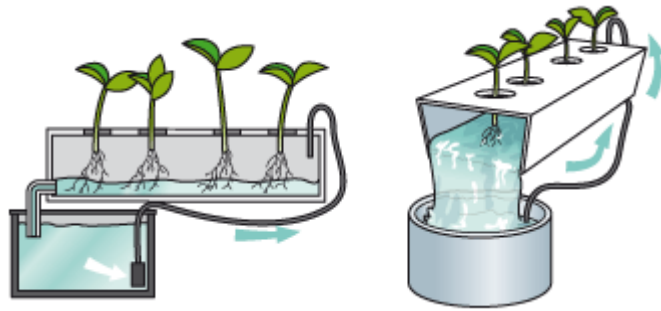
Active Systems

Ebb and Flow - also known as Flood and Drain



Plants grown using the Ebb and Flow (Flood and Drain) method are often supported in pots, filled with clay pebbles, which are placed into a special tray. The tray is regularly flooded to soak the clay with nutrient solution and then it is allowed to drain back into a holding tank. This cycle is repeated several times a day. When the nutrient drains away fresh air and oxygen are drawn to the root zone of the plants. Growing using the Ebb and Flow (Flood and Drain) method is an efficient and easy to manage method of soilless gardening.

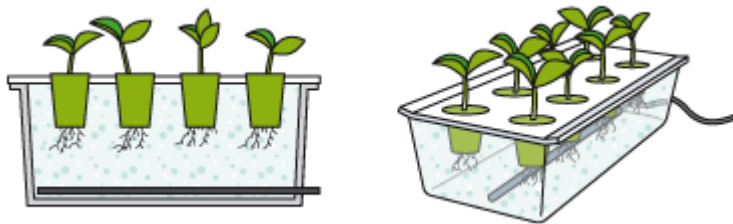
NFT (Nutrient Film Technique)



The nutrient solution fed to the plants by simply re-circulating the solution around the system with the roots bathed by a constant flow of nutrient feed. The system is easy and quick to install and provides fast growth rates.

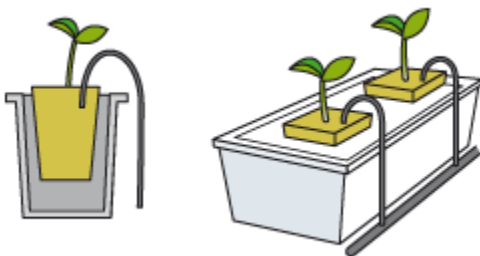
These systems are usually run on a constant basis (during daylight hours) which means that the management of NFT systems has to be more diligent than other types of systems. Should the re-circulating pump fail, the plants will die due to the lack of growing media to hold water and food for the plants. However, if managed correctly, this system will outperform all other system types currently available.

Aeroponics



Growing using the Aeroponics method involves suspending the roots of the plants in a darkened sealed chamber. The nutrient is fed to the plant's roots in the form of a 'mist' which contains the nutrients. Due to the high oxygen levels in such a system, rapid growth rates can be achieved. As with growing using the NFT (Nutrient Film Technique), it is important to ensure that the system is monitored and maintained in order to ensure nutrient is being fed to the plants.

Drip Irrigation



When plants are grown using the drip irrigation method, a reservoir of nutrient is pumped via drippers to plants usually supported in pots, rockwool cubes or rockwool slabs. The excess nutrient may then be re-circulated or allowed to drain away which is known as 'run to waste'. Use this excess nutrient to feed to your soil based plants!

As an alternative you can use the drip irrigation method to feed plants which are placed into individual pots that are filled with either coco coir or clay pebbles.

Maintaining active systems

All active systems will need to be maintained and monitored. There are 2 factors that need to be monitored.

1. The pH of the nutrient solution, which is a measure of how alkaline or acidic the nutrient solution is. The pH needs to be maintained between 5.8 and 6.3, with the optimum level being 6.2. pH
2. The EC/CF which is the measurement of how much dissolved nutrient is contained within the solution. Different plants at differing stages of growth will need differing strengths of nutrient. On a hot day additional water may need to be added to the system due to the high transpiration rates of the plants

What is pH?

The pH scale runs from 0 to 14, with 0 to 7 being acidic and 7 to 14 being alkaline. pH 7 is neutral, being neither acid or alkaline. The majority of plants prefer the pH between 5.5 and 7.5, beyond this range some nutrient elements will be unavailable to the plants, the optimum pH being between 5.8 and 6.3. Most tap waters are between pH 7 and 8. Monitoring the pH is a good idea to ensure that the plants have the optimum nutrient mix available to them.

What is EC/CF?

Different plants need differing strengths of nutrient mixes through the growth cycle, especially if fruiting or flowering is to occur. To measure the strength of a solution a CF (Conductivity Factor) or EC (Electrical Conductivity) meter is needed. CF or EC is the measurement of how much dissolved nutrient is contained within the solution. The higher the number the stronger the nutrient solution is. In general, leafy vegetables like lettuces will need a weaker strength solution than a fruiting or flowering plant, such as peppers, tomatoes or roses.

Recommended easy to grow hydroponic crops and typical target CF for nutrient strength and pH

Fruit & Vegetables:

Asparagus	CF14/18	pH6.0/6.8
Banana	CF18/22	pH5.5/6.5
Broccoli	CF28/35	pH6.0/6.8
Cabbage	CF25/30	pH6.5/7.0
Celery	CF18/24	pH6.5
Common Bean	CF20/40	pH6.0
Courgettes	CF18/24	pH6.0
Cucumbers	CF17/25	pH5.5
Leek	CF14/18	pH6.5/7.0

Herbs:

Basil	CF10/16	pH5.5/6.0
Parsley	CF8/18	pH5.5/6.0
Sage	CF10/16	pH5.5/6.5

Fruit & Vegetables:

Lettuce	CF8/12	pH 6.0/7.0
Marrow	CF18/24	pH6.0
Okra	CF20/24	pH6.5
Pak-Choi	CF15/20	pH7.0
Peppers	CF18/22	pH6.0/6.5
Rhubarb	CF16/20	pH5.5/6.0
Spinach	CF18/23	pH6.0/7.0

Strawberries	CF18/22	pH6.0
Tomatoes	CF20/50	pH 6.0/6.5

Flowers:

African Violet	CF12/15	pH6.0/7.0
Carnation	CF20/35	pH6.0
Ficus	CF16/24	pH5.5/6.0
Rose	CF15/25	pH5.5/6.0

Guide to Nutrients

The Basics

Essential Elements	HydroGarden Nutrients	Common Plant Foods
Nitrogen	Yes	Yes
Phosphorous	Yes	Yes
Potassium	Yes	Yes
Calcium	Yes	Some
Magnesium	Yes	Some
Sulphur	Yes	No
Iron	Yes	No
Manganese	Yes	No
Boron	Yes	No
Copper	Yes	No
Zinc	Yes	No
Molybdenum	Yes	No
Chlorine	Yes	No

When growing using hydroponic methods, the plants are grown in an inert media and the plant's nutrition is supplied from the nutrient mix. In fact a plant obtains only 25% of what it needs through its roots, the other 75% comes from the air in the form of Carbon Dioxide (CO2). The nutrients and water mix you use in hydroponic growing are the sole source for a number of mineral elements, it is important that you use nutrients that are made for hydroponics and that the water is good quality - tap water is usually fine.

This means that nutrients are a key factor in hydroponic growing. A complete and balanced formula is needed to obtain the best results from your chosen system and for your plants. In soil based gardening it is impossible to know how little or how much of a particular mineral is available to the plants. In hydroponics we must provide ALL the minerals necessary for successful plant growth. We therefore use feeds that contain all of the 14 essential minerals required. For these reasons ordinary soil based garden plant foods are unsuitable for use in hydroponic systems. However, hydroponic nutrients are especially good for use on soil based plants due to the complete feed they represent.

In general there are 2 types of nutrients available to the hydroponic grower - a 'Grow' nutrient and a 'Bloom' nutrient.

1. The 'Grow' nutrient is used for young plants, plants in vegetative growth and for plants which do not flower or produce blooms or fruit.
2. The 'Bloom' nutrient is used for flowering and fruiting when necessary.

Some nutrients are also supplied in a Hard Water and Soft Water formulation. In the UK most of our water is termed as being 'hard' and as such contains high levels of bicarbonates. In these circumstances it is better to use a hard water mix which has less of the minerals that are already found in the 'hard' water.

All of the nutrient brands supplied by HydroGarden contain everything that a plant requires in exactly the right ratios to obtain maximum results. All the nutrients are mineral elements that are water soluble so as to be readily available to the plants in the system.

Nutrient ratios are commonly noted as NPK ratios, each representing the ratio of Nitrogen (N), Phosphorous (P) and Potassium (K). These are the three main minerals required for plant growth, but are not the only ones

Types of Nutrients Available

HydroGarden offers a complete range of nutrient formulations. This includes single pack nutrients whereby the complete nutrient is contained within one bottle or pack, twin packs, where each 'grow' and 'bloom' nutrient is supplied in an A and B pack separately through to nutrient ranges that perform specific functions at each stage of the plants growing cycle.

Guide to Growing Media

In any soilless gardening system that uses a media its purpose is solely to anchor the roots and hold moisture/nutrients for the plant. The media itself is inert and contains no plant nutrients. Made of various inert materials it will not decompose, nor harbour any soil borne pests or diseases.

The plant's complete nutritional needs are met by the special nutrient mixes that you add to the individual system.

We offer a range of growing media that have been selected due to their high quality and superior capacity for holding nutrient solutions, while still retaining a good balance of oxygen and moisture.

Hydroton Clay



Clay pebbles are special kiln fired clay based aggregate that is super heated and formed into small 'marbles' usually between 4mm to 16mm in diameter. The inner core structure is porous and will absorb and release nutrient and water to the plants as required. This media will not compact and ensures excellent aeration for the root zone. Clay pebbles can be reused if thoroughly washed.

Clay pebbles are an excellent medium for pot culture, to mix with coco coir and for use in Ebb & Flow systems. It is especially popular with Orchid growers. Clay pebbles will readily accept transplanted seedling started in rockwool or any other traditional planting mix.

Coco Coir



Coco Coir is rapidly becoming the media of choice for both soilless gardeners and soil based gardeners who are concerned about the depletion of rare peat bogs in the world. Coco Coir is a waste material derived from the processing of coconuts and is 100% renewable.

Coco Coir has usually been pre-treated or washed to eliminate the high level of salts often found in the raw material.

Horticultural Rockwool



Rockwool is made from molten basalt rock spun into a dense candy floss like material. Rockwool is a popular medium used by hobby gardeners and commercial growers alike.

The material is available in small starter cubes for propagating seeds or cuttings, through to large slabs in which plants will happily grow to full maturity.

Rooting Sponges



Rooting sponges are an excellent growing medium specifically for medium for taking cuttings or growing from

seed. Easy to use, with great aeration properties, rooting sponge grown plants can be transplanted into any system with minimum transplant shock. Rooting sponges are an environmentally friendly product which is biodegradable! They are made from composted organic materials which are held together using a special water based polymer that ensures just the right amount of moisture is maintained.

Other Media

Other media that are often used in hydroponics include Sand, Gravel, Vermiculite and Perlite. In fact any media that is inert and pH neutral can be used, but other issues such as compaction and air to water ratios are very important to consider.

Guide to Plant Grow Lights

No light... no plants!

Light is the most important environmental factor to consider whether growing in soil outside, hydroponically inside or in a greenhouse. Depending upon where you live and where you want to grow, the sun will not always be there for you. With plant grow lights you can grow any plant, anywhere, at anytime! HydroGarden provide a wide range of grow lamps, reflectors, ballasts and accessories.

Grow Lights - How do they work?

Based on proven horticultural technology plant grow lights consists of three individual items.

1. A reflector, which protects the lamp and directs the light to where we want it
2. A ballast box, which contains the components necessary to ignite the lamp and to regulate the current when the lamp is running
3. Finally, the lamp itself

Halide and Sodium

Depending upon the location of your hydroponic system and whether there is any natural day light available, you will most often start off with a High Pressure Sodium lamp. This is the type used by commercial growers to 'supplement' natural light and to extend the 'day length' that a plant is subjected to. Ask your specialist retailer for advice. Metal Halide lamps give off a 'blue' light which is more suitable for young plants and vegetative growth. High Pressure Sodium lamps put out light which is more 'red' and can be compared to the light of an autumn sunset. The addition of High Pressure Sodium lamps enhances flowering in many crops and are the preferred option if natural day light is also available.

The range of light energy emitted from any light source, from ultraviolet to infra red. The wavelength is measured in nanometers (nm).

Light Colour Range	
Violet	380-430nm
Blue	430-490nm
Green	490-570nm
Yellow	570-590nm
Orange	590-630nm
Red	630-750nm

Average light Coverage Guide

Lamp	250W	400W	600W	1000W
Area Covered	0.5m ²	1m ²	1.5m ²	2m ²