HYDRO LAB book

HYDROLAB
Parts list

Complete Hydrolab
Base
Bottle and top
4 trays
4 panels
Thick wick
Thin wick
Disc with hole
Disc without hole
Syringe + tubing
250 grams of cocopeat
pH paper
pH scale
Plastic tool
1 canister of seeds (In certain country seeds are not included)
2 growth markers
Book

WARNINGS

Keep away from small children.
The supervising adult should read the instructions and make sure that the child understands them.
After 6 weeks of plant growth, it is advisable to add a few drops of commercial plant food. This must be done with adult supervision.
The bottle containing plant food should be kept away from young children.
After use, any water left in the bottle should be disposed of down the toilet.
After use, the bottle should be washed well with soap and water and stored together with the Hydrolab.
Cocopeat is a natural material and can be disposed of in the garden, in plant pots or in the garbage.

The History of Hydroponics

The name comes from the Greek: HYDROS meaning water, and PONOS meaning work. The word Hydroponics is a term used by Dr W.E. Gericke in 1920 to describe the science of growing plants without soil. This was the beginning of modern Hydroponics, but the science can be traced back to the Hanging Gardens of Babylon, one of the Seven Wonders of the World. Hydroponics was also used by the ancient Egyptians to grow crops along the shores of the River Nile.

What is Hydroponics?

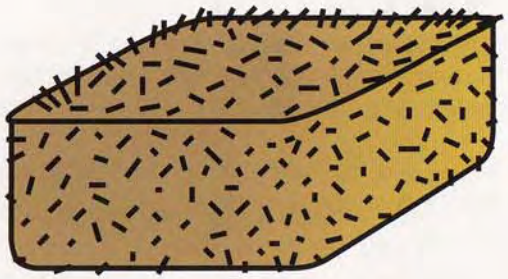
There are several variations of Hydroponic Gardening. Hydroponics is based on the principle of growing plants with water and nutrients, but without soil. One method is to use a growing medium with the addition of a nutrient solution containing all the elements needed for plant growth.
The growing medium can be gravel, sand, rockwool, perlite, or cocopeat, the material you are using now.
Another method of Hydroponics is used in large farms with covered shelters where the plants are suspended in netting over trays containing water. The roots are submerged in the water and plant food is circulated by pumps at regular intervals.
The method used in your Hydrolab is called "Passive Hydroponics". The wick absorbs water from the tank and passes it to the cocopeat, from where the plants take all the water they need. The wick acts as a water regulator, absorbing only the amount of water needed for healthy plant growth.

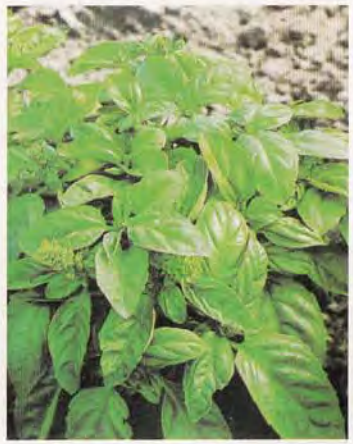
What are the advantages of Hydroponics?

Hydroponics is used in many countries where there is not enough land to grow plants and vegetables. Countries with large desert areas and mountainous regions are ideal locations for Hydroponics. Another reason may be that agricultural land has been used for housing in largely populated countries. Hydroponic systems can be built almost anywhere and more plants can be grown in a smaller area than on the land.
Water conservation is an added advantage as the plants will take only the amount of water that they need.
In Hydroponic systems the plants are not attacked by the various diseases and bugs often found in soil.
The plants can grow in a pest free environment with all the nutrients needed to produce healthy vegetables full of flavor.
The ideal nutrient solution can be added to each crop and the amount can be regulated to produce maximum growth. This is an ideal method for growing organic produce.

What is cocopeat?

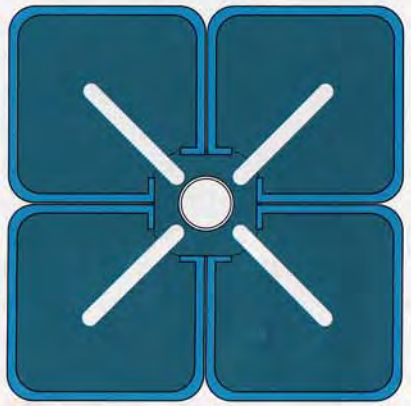
Cocopeat is the "dust" produced when coconut husks are processed to remove the long fibers. If you look at a coconut you will see that the husk (shell) consists of many long fibers meshed together in a binding material. This material is the basis of cocopeat. It is an organic environmentally friendly material and its use in Hydroponics does not harm other ecological systems. Cocopeat consists of millions of tiny sponges which can absorb and hold up to eight times their own weight in water. It is also a very light porous material with a large air content, and as an organic material already contains some of the nutrients needed for plant growth. Plants will grow very well in your Hydrolab for the first few weeks just using the cocopeat. Later you can either add some plant food or replant in pots or in the garden.





How to prepare your Hydrolab.

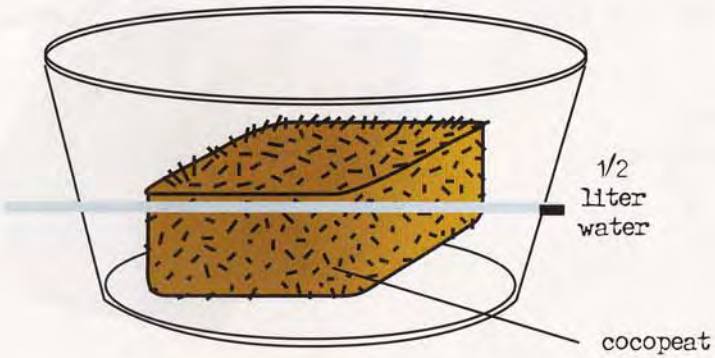
Rinse the base with water to remove any dust or dirt that may have accumulated in it.
Take the 4 small trays and wipe them over with a wet cloth; do not wash under the tap. There are two types of wick in your kit; one is short and thick, the other is thin and long. Take the long thin wick and cut it into 4 pieces of length 13 cms (5 inches). Place each of these wicks diagonally across the base of each tray leaving enough of the wick to pass over the edge of the tray to reach the bottom of the water chamber. See diagram.
Put the base aside now until you are ready to put the cocopeat into the trays.

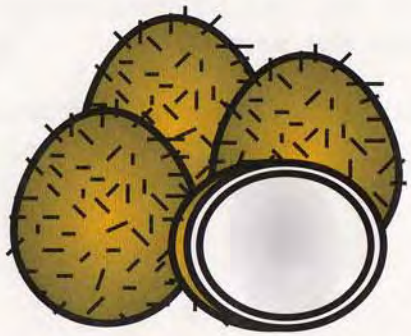


long
thin wick

Prepare the cocopeat.

Place half of the cocopeat brick in a bucket and add 1/2 liter of water. Wait till the cocopeat grows to about 10 times its size and then start to break up the peat with your hands until there are no lumps in it. If you have added too much water squeeze the surplus out with your hands. If the brick will not break up easily, add a little more water and wait another 5 minutes. The peat should be damp, not soaked with water.
Once you have prepared the peat, fill the 4 trays to the top with the prepared, lump free material. Do not press the cocopeat down; it should be loose to allow air through it. Place the 4 trays into the base; this is done by lifting the wick in the corner of each tray and placing it into the water chamber in the middle of the base. Make sure that the wick touches the bottom of the water chamber.
If you have any cocopeat left over, store it for further use.





Planting.

Now you are ready to plant. The cocopeat will be damp and it will not need additional water for 2 to 3 days. We suggest that you plant small plants in two of the trays and seeds in the other two trays. Small plants are available from a nursery or garden center. Gently remove the plant from the container in which it has grown. Take the plant and stand it in lukewarm water: this is to remove the soil from the roots. Then gently hold the plant roots under a tap and remove as much of the soil as possible; the cleaner the roots the better as the soil can contaminate the bedding in the trays. Once the plant is ready, plant it in your tray by making a hole for the roots and then cover all the roots with your bedding. Press gently round the plant with your fingers making sure it is well bedded, much like you would do in a flower pot. Seeds that grow quickly are, peas, sweet peas, beans, lentils. To prepare these seeds, soak them in water over night and then carefully place them 1/4 inch under the surface of the bedding, gently pressing it down to keep it firmly in place. It is best to plant about 10 or more of each seed as only about half of them will germinate.

If you want to plant seeds such as water cress, bazilicum, mustard or any other very small seeds, its best to use many seeds so that you will be sure that some of them will germinate. It is not necessary to soak these seeds overnight

Place them in the bedding, about 5mm under the surface.

The seeds supplied in your kit are Cat Grass seeds. Cats love to eat this and it is also a nice plant. Place about a tablespoon of seeds in a glass of water to soak overnight.

Plant the seeds in one of the trays and lightly cover them with the cocopeat. They will germinate within 24 hours and in 4 or 5 days they will reach a height of about 5 cms (2 inches). They can grow to a height of 20 cms (8 inches) or more. If you cut the cat grass it will continue to grow.

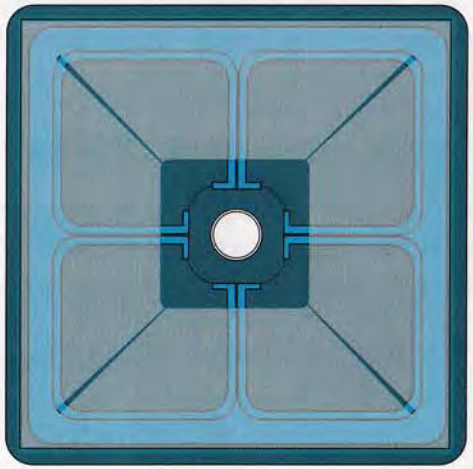
It will take several days for some seeds to germinate, maybe up to 7 days, so be patient!

At this stage you should decide the best place to stand the Hydro-Lab. It needs to be in a spot where it gets as much sun light as possible. It should also stand on a flat surface as the base needs to be as level as possible. In the summer it should not be in direct sun light .It is possible to use artificial fluorescent lighting or special "growing lamps", however this is more difficult as you must let the plants be in the dark for at least 8 hrs a day.

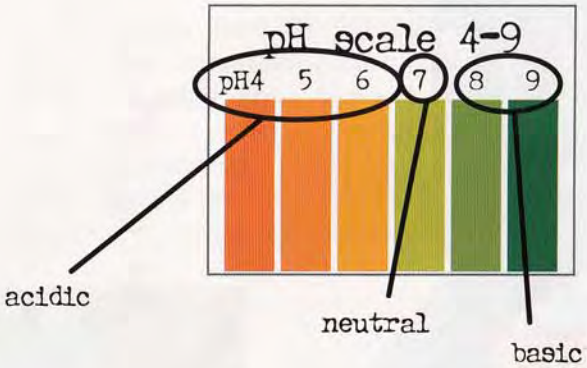
When you have chosen the right place, where it will not be disturbed too much, you can close all of the 4 panels to keep the plants sheltered and warm

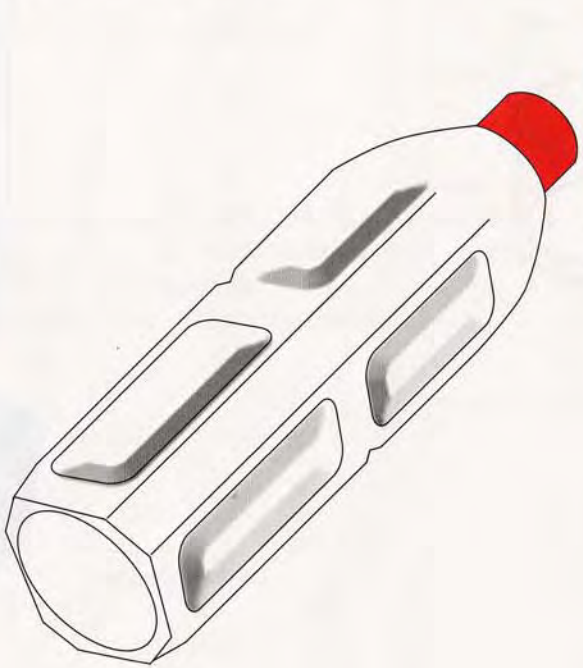
Once you have planted the seeds and plants, wait a day. Check the moisture of the cocopeat; it should feel damp to the touch. Now you should prepare the water container.

Prepare the Water Container



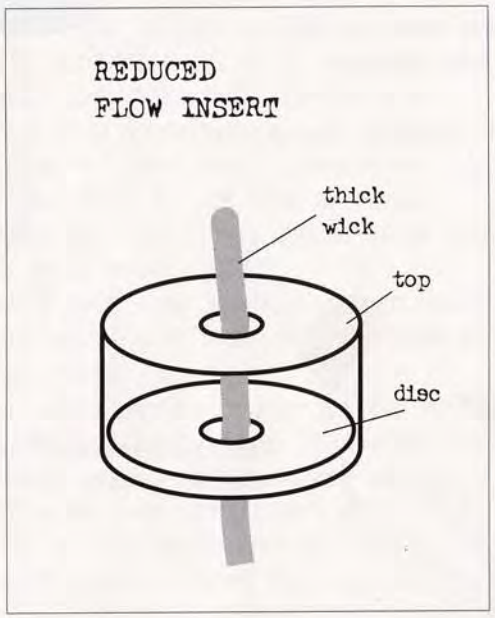
Before you start, wash the water container well with water to remove any dirt or dust.
Do not use tap water, use only boiled or bottled water: this is to make sure that there is no chlorine or other additives in the water.
You should now test the pH of the water to check if it is suitable for growing plants.
pH is the value that indicates if a substance is acid or base with a range of 1 to 14.
Substances with a pH lower than 7 are acidic; e.g. lemon juice. (pH-1 is the most acidic).
Substances with a pH equal to 7 are neutral.
Substances with a pH higher than 7 are basic: e.g. baking powder. (pH-14 is the most basic).
Tear off a small piece of pH paper and hold it lightly at the corner. Dip it into the water and see how it changes color. Compare the color of the pH paper to the colored stripes on the pH scale and you will know the pH of the water.
The pH of the water should be between 5 and 7. If the pH is under 5 - too acidic; add a pinch of baking powder (the tip of a teaspoon). If the pH is over 7 - too basic; add 1 or 2 drops of lemon juice.
For the first 2 or 3 weeks, until the plants reach a height of 10 cms (4 inches), the water flow should be reduced to a minimum, just to keep the cocopeat damp.

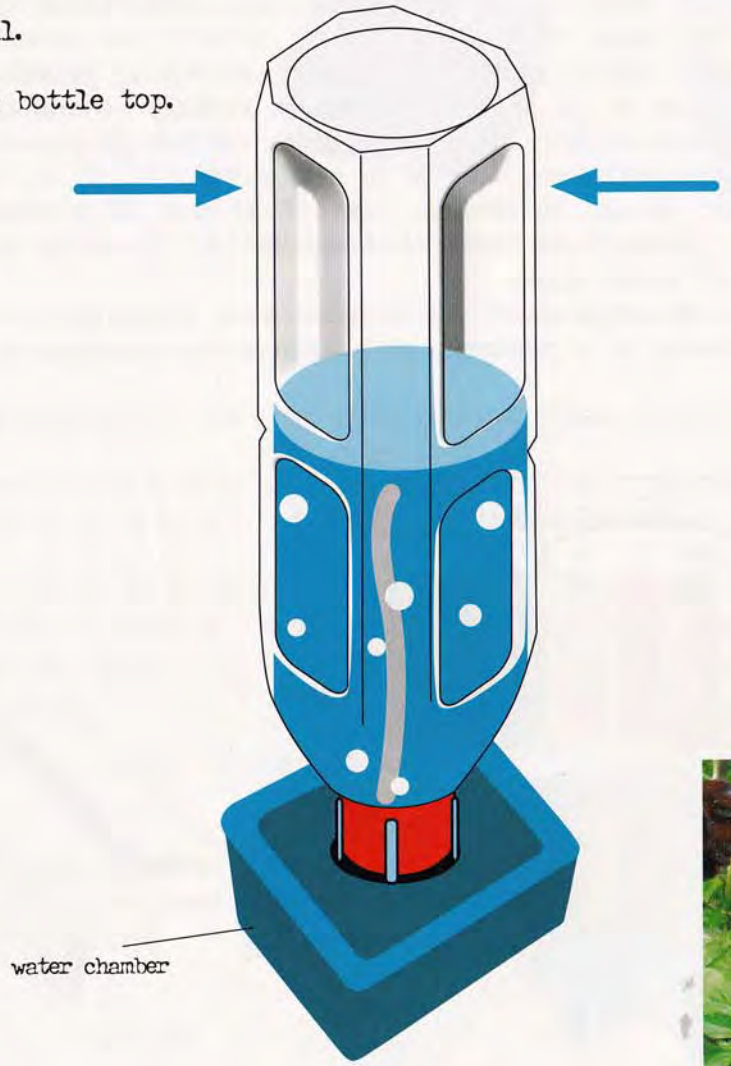




Fil the container with boiled or bottled water.

To set up for a reduced water flow, take the thin disc with the hole and thread the thick wick through the hole so that about 1 cm (3/8 inch) sticks out from one side; the rest on the other side. To push the wick through the hole, twist it slightly and pull it through using your gardening tool. Place the disc into the bottle top so that the 2 cms end comes out of the bottle top and will enter the water chamber when the bottle is in position. The rest of the wick will be inside the bottle. Fill the bottle with water, close the bottle and stand it in the base with the top in the chamber. Replenish the bottle every 2 days so that the bottle is nearly full. As the plants develop and grow, they may need more water. To increase the water flow, remove the disc and the wick from the bottle top.



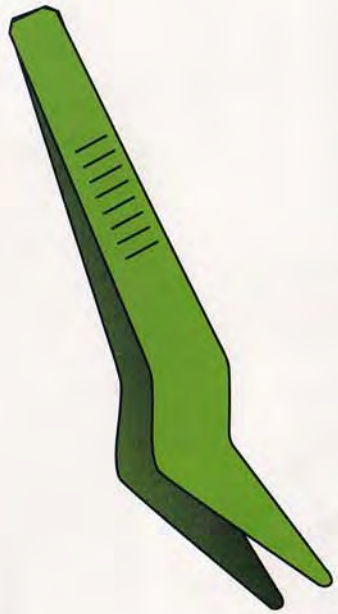


Watering your plants

In Hydroponics, the amount of water needed by the plants is absorbed through the growing medium (cocopeat) to reach the roots of the plants.
It is essential that that the correct amount of water reaches the roots. Too much or too little water will hinder the development of the plants.
The cocopeat should be damp to the touch, check the cocopeat daily in all 4 trays.
If you find that the cocopeat is too wet, gently lift the tray out of the base to check if there is water in the base.
If there is more than 10 mls of water in the base, remove all of the trays and empty the base. To do this, attach the PVC tubing to the syringe and extract the water from the base.
If this happens, remove the wicks from the water chamber for a few days till the cocopeat is just damp. Remember to return the wicks when you decide to restore the water flow.
The water content of each tray may vary, so treat each tray individually. If the cocopeat is too wet, remove the wick from the water chamber. If the cocopeat is too dry, return the wick.
It is possible to remove the water container if there is too much water.

Using your gardening tool

The tool can be used in several different ways.
To spread the cocopeat gently in the tray.
To place the wick into the water chamber.
To plant beans or large seeds, use the tool to make a small hole in the cocopeat.
Pick up the seed with the tool like with tweezers, place it in the hole and cover.
To rake the top of the cocopeat once the seeds have germinated.
To prepare furrows in straight lines in the cocopeat for planting seeds.



Caring for your plants

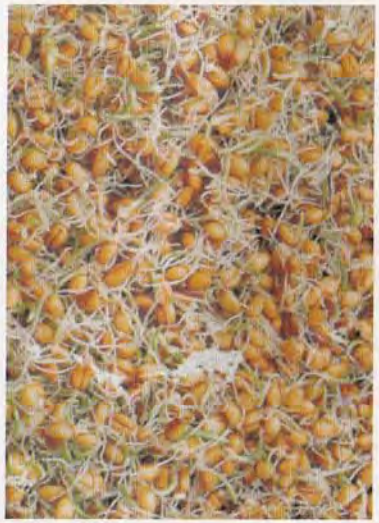
Every day or two, lightly move the top surface of the cocopeat around with your gardening tool; be careful not to damage the seeds or plants.
When you see the seeds starting to germinate, check if there is condensation on the panels; if there is you can open or remove one or two of the panels to allow air to flow through the "green house".
Once the plants are about 5 cm high (2inches) you can remove the panels depending on the warmth of the room.
As soon as the plants have fully developed you can replant them outside or in flower pots.
If you decide to continue growing the plants for a more than 6 weeks in the Hydro-Lab it would be advisable to add a few drops of liquid plant-food to a full water container. Using the disk without a hole to shake the bottle well.
Than remove the disk without a hole and return the top as it was before adding the plant food. If you do not have any plant food at home you can find this in any nurseryor plant shop. Remember only a very few drops, too much plant-food will harm the plants.
Use the growth markers supplied in the kit to measure the plants' growth and use the chart (at the back of the book) to record the development of your plants. You can record the time of germination, the growth period, any special conditions required and your own personal comments.

What conditions are necessary for healthy plant growth?

1. Nutrients in correct proportions are vital for healthy plant growth. Soil always contains nutrients, but if they are not in the right proportions the yield will be poor and the produce stunted. Many farmers have to add fertilizer to their land to correct the soil's nutrient content. In Hydroponics, this problem does not occur as the correct proportion of nutrients will be used from the start. The main elements requires are: Nitrogen, Phosphorus, Potassium, Calcium, Magnesium and Sulfur.
   Trace elements required are: Iron, Manganese, Boron, Copper, Sodium, Cobalt and Silicon.

2. Water is essential for plants to grow. Water is drawn up through a plant's roots into the stem and leaves by a process called "capillary attraction". The water carries the nutrients up into the plant where each nutrient has a different job to do to create ahealthy plant that will grow strong and flourish.

3. Light is also essential for plants to grow. Plant leaves are green because they contain a substance called chlorophyll and it is this substance that absorbs light rays.
   The energy from the light rays is converted into food energy ; a form of sugar called glucose, which the plants store in their roots. The process of converting light energy into glucose is called "photosynthesis". As well as producing glucose, photosynthesis produces oxygen which is essential for humans and animals to live. Plant life and animal life are completely interdependent and the destruction of rain forests and jungles will reduce the amount of oxygen we have to breathe.



4. Heat and Humidity.
   Plants need a warm atmosphere to grow in; a temperature of about 21 degrees Centigrade (70 degrees Fahrenheit) is ideal. Plants also need some humidity to grow well.
   Humidity is the amount of moisture in the air. This varies depending on the location and the weather. The plastic panels on your Hydrolab can be closed, opened or even removed to control the amount of heat and humidity affecting your plants.

Checklist

If you have any problems growing your plants: check the following:

1. Check the temperature of the room.
2. Check if there is enough light; we suggest placing the Hydrolab near a window, but not in direct sunlight.
3. Check the pH of the water.
4. Check the humidity: if there is a lot of moisture on the inside of the panels, open them or even remove them.
5. Check if the cocopeat is waterlogged or too dry.
   If it is too dry, make sure the water reservoir is not blocked with cocopeat or roots, and that water can run freely out of the container.
   Check if the cocopeat is waterlogged by putting your finger into the cocopeat, or by removing one of the trays to see if there is water in the base. Extract any excess water with the syringe.
   Remove the water container until the cocopeat has dried out and is damp to the touch.

Gardening Tips

Once your plants have grown to a height of more than 2.5 cms (1 inch), use the fork to gently loosen the cocopeat. This will increase the air content and will help your plants to grow.
Remove any dead or yellow leaves from the plants and also any fallen leaves from the surface of the cocopeat.
Keep your Hydrolab clean; especially the panels so that light can reach the plants.
Enjoy your Hydrolab!

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