

HYDRO 101



An 8-step guide to
successful indoor
gardening

1) The right movement Having the right environment is critical for your garden. Key elements to a successful garden room include relative humidity, temperature, CO₂ (Carbon Dioxide) and air circulation/exchange. The ideal humidity for a garden room falls between 40 & 60 percent. Some plants like higher humidity, but know that higher humidity can lead to problems with fungus and disease. Temperatures in your grow room should be between 68-75 F degrees. Temperature changes will lead to variations in humidity levels. Avoid drastic temperature changes over a short period of time. Your plants need to CO₂ to grow. Assuming you have good air circulation/exchange, your garden room will naturally have between 300-400 PPM (parts per million) of CO₂; higher CO₂ levels should accelerate growth rates. If you choose not to supplement CO₂ in your garden room, it is important to address the air circulation/exchange so that your plants will receive fresh CO₂.

2) Start off with good water The water you use for your plants will determine how well your plants will grow, regardless of what you add in terms of nutrients and supplements. PPM (parts per million) or EC (electrical

conductivity) are the measurement of the salts in a solution. Neither PPM nor EC readings will tell you what is in your solution / water, but rather are indicators of the solution's ability to conduct electricity. Ideally, you want to start off with a low PPM or EC then you can add nutrients specific to your plants requirements. You can reduce the PPM of your water using a Reverse Osmosis (R.O.) unit then build your nutrient solution around what your plants need. pH (potential hydrogen) measures the acidity or alkalinity of your solution on a scale of 0-14. A solution is considered acidic below 7 and basic at 7 or higher. When working with hydroponics you typically want your pH to fall between 6.0 and 6.8. The most important rule to remember with pH is to avoid extremes. Nutrient "lockout" occurs with high and low pH levels.

3) Choose a method Ebb & Flow gardens flood and drain a tray of plants with a nutrient solution at regular intervals. A drip garden provides nutrient solution to the plant through tubes & emitters (drip stakes) to each plant. Aeroponic growing mists an oxygenated nutrient solution directly to the roots of a plant.

NFT (Nutrient Film Technique) gardens create a slow moving nutrient solution - 'film' - that flows over the roots of the plants. Organics have become a preferred method of growing. Choose the size container you want, an organic soil/medium, an organic fertilizer and water by hand.

4) **Choose a medium** Growing mediums act as the anchor for the plants root system. Some add nutritional value to your plants while others simply give the roots something to hold on to. Some mediums to consider are soil, soil-less mixes, coco, hydroton, rockwool/stonewool, or silica stone. Coco is available in both a loose and compressed form. Coco is made from the husks of a coconut, and it is very pH stable and provides good moisture retention and natural aeration qualities. Hydroton or clay pebbles are made from expanded, pH neutral clay. They tend to hold water well and have great oxygen to water ratio; this makes hydroton suitable for hydroponic and soil gardens. With proper sterilization techniques, hydroton can be reused. Rockwool is made from stone that is heated then spun into fibers. It is then compressed into starter cubes, grow blocks, or slabs. This medium has excellent oxygen to water ratio. Rockwool tends to have a higher pH, so flushing with 5.5-5.8 pH balanced water or a rockwool solution is recommended. Rockwool works best in an ebb & flow and drip systems. Silica stone is a rock that contains high levels of silicate which helps slow transpiration rates of plants. This is especially helpful in garden rooms that have temperatures about 85 F degrees. Silica stone is pH neutral and environmentally friendly. Like hydroton, silica stone can be reused and is suitable for hydroponics and soil gardens.

5) **Nutrients** Like humans, plants require food (nutrients) to grow. Nutrients come in organic and synthetic varieties and are available in both liquid and dry form. Nutrients can be separated into two categories, macro and micro nutrients. The macronutrients are nitrogen, phosphorous, potassium, calcium, magnesium and sulfur. The micronutrients or trace nutrients include iron, manganese, boron, zinc, copper, molybdenum and chlorine. If the nutrients are deficient or are abundant you may see burning, curling or yellowing. You do not want to over or under fertilize. There are many different types of nutrients/fertilizers will have an N-P-K (Nitrogen, Phosphorous, and Potassium) on the front of the bottle. In the vegetative or growth stage the "N" will typically be higher. In the flowering or bloom stage the "P" will typically be higher. You may also consider implementing additive/supplements into your nutrient mix. Additives/supplements can bolster microbial activity at the root zone, increase size, flavor and aroma. When used together, nutrients and supplements will help you achieve maximum results.

6) **Lighting** High Intensity Discharge (HID) is the preferred lighting in a garden room. The two types of HID lighting commonly used are HPS (High Pressure Sodium) and MH (Metal Halide). HPS lamps deliver more of an orange/red spectrum, which is ideal for most plants in the flowering/bloom stage. MH lamps deliver more of a blue/green spectrum, which is ideal for most plants in the vegetative/growth stage. Another type of lighting ideal for plant growth is T5 lighting. T5 lighting is a high-output fluorescent light with low heat and minimal energy consumption. It is an ideal light for cuttings, mother plants and short growth cycles. All plants require light in order to grow and bloom. Most plants grow and bloom according to the amount of light they are given. In the growth or vegetative stage plants typically want 15-18 hours of light. In the bloom stage you reduce the amount of light your plants get to 10-12 hours. You want to make sure the light comes on and off at the same time everyday (just like mother nature). The best way to accomplish this is by putting your light on a timer. Please consult your nearest hydroponic retail store for more information on which light is best for you.

7) **Testing equipment** There are many different meters available for testing pH, PPM, EC, temperature, humidity, CO₂ and light levels. Single meters are available as are combination meters that test and/or monitor your environmental conditions. The important thing to remember is your garden will only be as good as the limiting factor. Water, nutrient, light, temperature, humidity, CO₂ & circulation are the elements to a successful garden room. By "dialing in" these elements, you will ensure a successful and bountiful garden.

8) **Optional accessories** There are many items available to help your garden grow. Organics, controls, fans, blowers, plant stakes, relays, nutritional supplements and the list goes on. Consult with your retail supplier to discuss what the best accessories for your garden are. Happy Gardening!