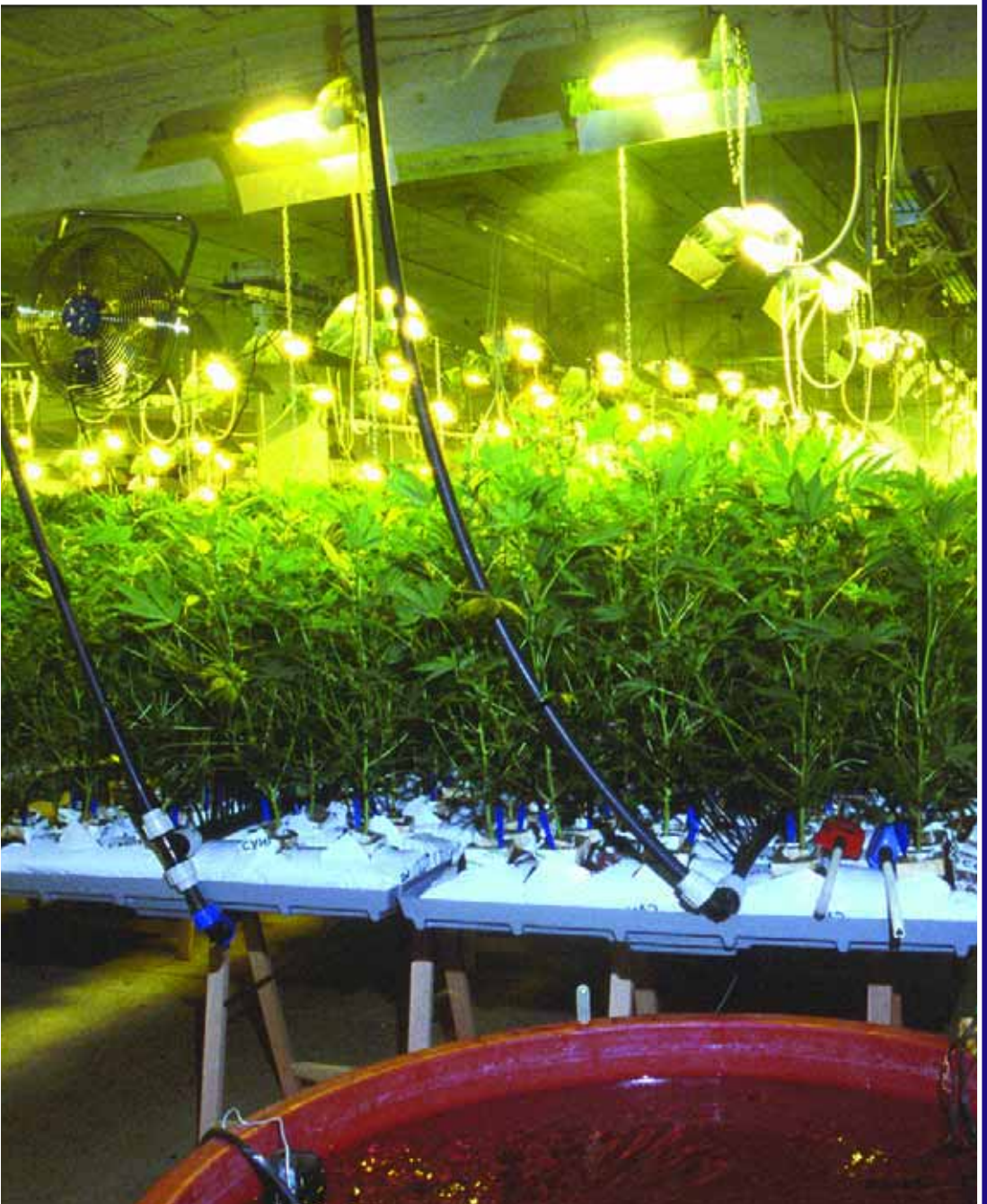


Chapter TWELVE HYDROPONIC GARDENING



This Swiss hydroponic setup is simple, efficient, and economical.

Introduction

Hydroponics is the science of growing plants without soil, most often in a soilless mix. In fact, many growers are already cultivating hydroponically. Cultivating clones in rockwool, peat moss, and coconut fiber is growing hydroponically. Growing mature plants in soilless Sunshine Mix or Terra-Lite, even when watered by hand, is hydroponic gardening. With hydroponics, nutrient uptake and grow medium oxygen content can be controlled easily. Manage these two factors, along with a few other requirements, to grow a bumper crop of buds with every harvest.

The inert soilless hydroponic medium contains essentially no nutrients. All the nutrients are supplied via the nutrient solution—fertilizer diluted in water. This solution passes over or floods around roots at regular intervals, later draining off. The extra oxygen trapped in the soilless medium and around the roots speeds nutrient uptake by tiny root hairs. Cannabis grows fast hydroponically, because it is able to take in food as fast as it can be used. In soil, as in hydroponics, the roots absorb nutrients and water. Even the best soil rarely has as much oxygen in it as a soilless hydroponic medium.

Contrary to popular belief, hydroponic gardens often require more care than soil gardens. If growing hydroponically, expect to spend more time in the garden. Extra maintenance is necessary because plants grow faster, there are more things to check, and more can go wrong. In fact, some growers do not like hydroponic gardening, because it requires too much additional care.

Hydroponic gardening is productive, but exacting—not as forgiving as soil gardening. Soil works as a buffer for nutrients and holds them longer than inert hydroponic growing mediums. In fact, advanced aeroponic systems do not use a soilless mix; they use nothing at all!

In hydroponics, the nutrient solution can be controlled, so plants grow less leafy foliage and more dense flower buds. The stepped-up nutrient control makes plants flower faster and be ready for harvest a few days earlier than soil-grown cannabis.

Small flowering plants grow well in small hydroponic containers and horizontal tubes. Mother plants grow longer and are best suited to a large bucket system, which allows room for root development. The mother plants' root system is easily contained in the bucket, and she is able to produce



Good looking buds are grown hydroponically in expanded clay pellets, an inert soilless medium. Plants can take in all the nutrients they need.

thousands of clones during her lifetime. Mother plants must have a huge root system to take in lots of nutrients to keep up with the heavy growth and clone production schedule.

Most grow rooms have two limiting factors: the number of plants in the garden and the electrical consumption expressed in watts. For example, if growing 12 large plants in a five-gallon (19 L) bucket hydroponic system, you will need about ten clones and one mother plant. The flowering room could be illuminated with two 600-watt HP sodium lamps. A 40-watt fluorescent fixture could be used to root clones, and a 175-watt metal halide will keep the mother and vegetative plants growing. This is a total of 1415 watts that cost about \$35 to \$60 monthly. That's a bargain, considering the garden will yield at least a pound (450 gm) of beautiful hydroponic buds every month!

If flowering is induced when clones are six to eight inches (15-20 cm) tall, they will be two to three feet (60-80 cm) tall when they finish flowering. You can pack short plants tightly together in a "sea of green" (SOG) or a "screen of green" (SCROG) to maximize yield. It is easy to grow 60,

four-inch (10 cm) rockwool cubes on a flood and drain table or in three-gallon (11 L) grow bags full of soilless medium. To get the maximum yield, a plant or two is harvested every day or two. When a ripe plant is harvested, two small clones take its place. The weaker clone is culled out after two weeks.

Different Systems

Hydroponic systems are distinguished by the way the nutrient solution is applied. The first distinction is whether the nutrient solution is applied in an "active" or "passive" manner.

Passive systems rely on capillary action to transfer the nutrient solution from the reservoir to the growing medium. Nutrient solution is passively absorbed by a wick or growing medium and transported to the roots. Absorbent growing mediums such as vermiculite, sawdust, peat moss, etc., are ideal for passive systems. The growing medium can stay very wet in passive systems, and substrate selection is important. Soggy substrates hold less air and deprive roots of rapid nutrient uptake. Although passive gardens are not considered "high



This flood hydroponic garden, fertilized with Bio-Green, uses a soilless mix heavy in coco peat. All nutrients are supplied by the nutrient solution.



Classic wick gardens use cloth wicks that absorb nutrient solution and transport it to the growing medium.



This passive wick system uses a soilless mix heavy in coco peat to wick up the nutrient solution. Such low-tech gardens are very productive.

performance," the Dutch have managed to perfect them and achieve amazing results. Wick systems have no moving parts. Seldom does anything break or malfunction. Low initial cost and low maintenance enhance wick systems' popularity.

Dutch growers line the floor of a room with heavy plastic or pond liner. They fill three-gallon (3 L) pots with an absorbent soilless mix that holds plenty of air. They flood the garden with two to three inches (6-9 cm) of nutrient solution. Roots absorb the nutrient solution in two to five days. No nutrient solution is drained off; it is all absorbed by plants!

One Spanish grower uses passive irrigation to water his garden. He drives a delivery truck and is away from home five days a week. He keeps his indoor garden under a 400-watt HPS lamp. The plants are in a rich potting soil, and the pots are in a large tray with four-inch (12 cm) sides. Every Monday morning he fills the tray with mild nutrient solution. When he returns on Friday, the plants are strong and happy!

Active hydroponic systems "actively" move the nutrient solution. Examples of active systems are: flood and drain, and top feed. Cannabis is a fast-growing plant and very well suited to active hydroponic systems.

Active hydroponic gardens are considered a "recovery" system if the nutrient solution is recovered and reused after irrigation. A "non-recovery" system applies the nutrient solution once, then it runs to waste. The solution is not reused. Non-recovery systems have few complications but are not practical for most cannabis hydroponic gardens. The commercial growers "run-to-waste" systems are avoided, because they pollute ground water with high levels of nitrates, phosphates, and other elements. Indoor growers seldom use non-recovery systems, because they require disposing of so much nutrient solution into the local sewer system.

Active recovery hydroponic systems such as the flood and drain (ebb and flow), top feed, and nutrient film technique (NFT) are the most popular and productive available today. All three systems cycle reused nutrient solution into contact with roots. Recovering and reusing the nutrient solution