

HYDROPONICS 101

Hydroponics is growing plants in nutrient-rich water, without soil.

Let's think about what plants need to grow:

All these requirements are provided in a controlled indoor environment, like Growcer's modular farm.



light



water

space



air (CO₂)

nutrients



time



temperature



light

Plants can't get up and go get their own food, so they make their own through a process called photosynthesis.

In a Growcer farm, you use high efficiency LED Grow Lights to replace sunlight and enable the plants to photosynthesize (make food). Grow lights are tailored to your specific crop, and you'll never have to worry about any cloudy days indoors!

water

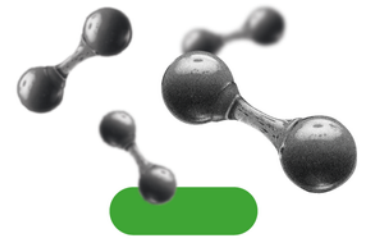
Water (H₂O) and hydrogen (H) influence important plant growth factors. The amount of hydrogen in water is measured as "pH" or "potential of hydrogen."

The pH level of water is how *acidic* or *basic* it is. pH influences the nutrient availability, bacterial activity, and toxicity of the growing environment.



non-mineral elements

Carbon, hydrogen, and oxygen are the building blocks of carbohydrates (which plants eat for energy) and make up a large part of the plant's cellulose (the plant cell walls that give the plant its structure and strength). Without food for energy or cellulose for structure, you don't have a plant!



mineral elements

Plants need 13 mineral elements to grow and thrive.



macronutrients are used in greater amounts by plants and your "big three" are nitrogen, phosphorus, and potassium (NPK). You might recognize NPK numbers on fertilizer products as the percentage of nitrogen, phosphorus, and potassium in the fertilizer.

micronutrients are needed by plants in only tiny amounts and include calcium, sulfur, magnesium, iron, copper, zinc, and boron. If you don't have enough mineral elements in your nutrient solution, the plants show signs of **deficiency**. If you have too much of one mineral element, the plants show signs of **toxicity**.

nutrient availability

Plants can be picky eaters. If the growing environment is not perfect, this leads to nutrient **deficiencies** or **toxicity** because plants are taking in too little, or too much, nutrients.

As good growers, we always monitor pH and E/C levels (fertilizer strength) to make sure nutrients are available to plants at the right amounts and check for

symptoms of deficiency or toxicity to correct the issue quickly. Ensuring the proper amount of nutrients minimizes damage and maximizes potential yield.

With hydroponics, nutrients are provided to the plant in a form they can use immediately. Nutrient availability levels are rebalanced through monitoring and adding stock nutrient solutions, or acids and bases (pH down or pH up products), to control pH levels and keep the growing environment healthy.

temperature

Plant processes such as photosynthesis (creating food/energy), transpiration (water loss), respiration (breathing), seed germination and flowering (bolting) are all influenced by temperature.

By controlling temperature, indoor plants can outperform their outdoor counterparts and grow bigger, faster.

