Nourish
Nova Scotia

Grow Eat Learn
Nourish Nova Scotia

Getting Started

with Hydroponics

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Climate Connections

Water Stewardship

Food Security & Sovereignty

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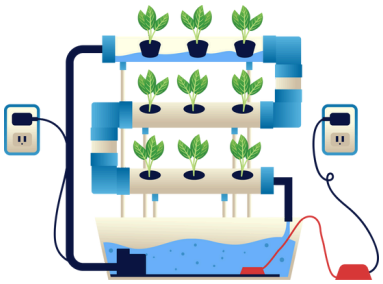


Why Hydroponics?

For Student Health and Well-being

Stress Reduction: Interacting with plants and has been shown to reduce stress and anxiety, promoting a calmer learning environment while boosting student focus and moods.

Encourages Eating Fresh Foods: Growing their own food will increase access and interest in herbs and vegetables.

Enhances Responsibility and Patience: Caring for plants teaches responsibility, patience, and mindfulness- building emotional resilience.

Social Connection: Collaborative growing projects foster teamwork and communication, strengthening social skills and classroom bonds.

For Classroom Learning

Space Efficient & Easy to Use: Hydroponic systems can fit in small spaces, ideal for classrooms. They don't require expertise to use.

Hands-On Learning: Students can directly observe and manage plant growth, gaining practical knowledge of science and agriculture.

Year-Round Growth: Hydroponics isn't limited by seasons, allowing year-round experimentation and harvesting.

For Climate Change Adaptation

Water Stewardship: Without soil, this style of growing is all about understanding and working with water. Great for spaces where access to soil is challenging or non-existent.

Resource Efficient: Optimizes nutrient and water delivery, reducing need for fertilizers and pesticides. Hydroponics uses far less water than conventional agriculture and ideal for drought-prone areas.

Resilient to Climate Variability: Controlled environments protect crops from extreme weather, allowing for consistent growth.

Tips & Tricks For Hydroponics

Set Up

- Plan the indoor garden by making a plant map
- Use a waterproof mat (or winter shoe mats) to catch any spills while watering.
- You will usually need 2 electrical plugs, for the grow light and the air pump.
- Use a growing medium like peat pellets, clay pebbles or rockwool to hold the seeds as they sprout and take root in the water.
- Fruiting plants like tomatoes create pollen; if your space has an air filter, that will help with any allergies.

Harvest

- On harvest day, ask students to bring sandwiches. Have each student pick some greens for their sandwich.
- Harvest regularly to keep plants from growing too big
- Make sure large plants don't block the light from other plants
- After pruning, consider a craft like flower pressing the cuttings.

Maintenance

- Keep your equipment clean by using citric acid to remove mineral buildup
- Check your pH and water levels weekly
- Use gloves to handle nutrients
- Use a pH reader to ensure the pH is between 5.5 - 6.5
- Add Up / Down chemical to balance pH
- Make sure to use nutrient combinations chemical A and B
- Pollinate manually if you are growing things like tomatoes or peppers – remember the bees aren't there to help you indoors!

Hydroponics

Weekly Checklist

Harvest

Are there any big leaves that should be harvested? Harvest from larger plants to give the smaller ones access to the light and space to grow.

Prune

Are there any dead or yellowing leaves? Greens ready for harvest? If so, trim to make room and create air flow.

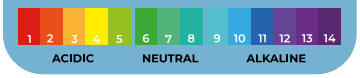
Check Water levels

The bigger the plants, the more often you will have to top up and test the water reservoir.

Test the PH

Yellowing leaves may mean the PH is off and needs to be adjusted.

Ideal PH is between 5.5- 6.5.



Monthly Checklist

Succession Planting

Are some of your plants flowering or no longer fruiting? Decide whether or not to start some new seedlings or try to save seed from any of the plants that have bloomed.

Clean Up

Clean around unit, sweeping up dried plant bits, removing any mineral or algae build up. Occasionally take the air pump out and rinse it thoroughly.

Peek at the Plant Roots

If roots grow toward the pump, trim them back to avoid the roots interfering with the pump.

Elements of Hydroponics

Climate Connection

Water Stewardship

Hydroponics is a style of growing plants in water instead of soil. Plant roots either live in water or nutrient-dense water trickles over the roots ensuring they stay wet.

Air

Hydroponic plant roots need oxygen to survive. Air pumps ensure that the water stays oxygenated. Water is partly made of oxygen (the O in H2O), but the plants consume it. Water can't replenish oxygen when still.

Water

Light

Most seeds don't need light to germinate, but once they sprout, plants need sun or special lights to complete photosynthesis and grow.

Hydroponic plants can't get what they need from soil, so special chemical blends provide exactly what the plants need. Other sources for nutrient water are liquid plant fertilizers and even fish tank water.

Nutrients

Medium

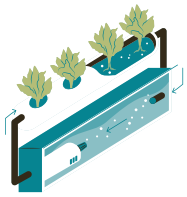
Soil has lots of jobs and one is to hold seeds in place. Hydroponics growing mediums give somewhere for the seeds and roots to grow. Growing mediums are porous and hold moisture well.

Planning a Hydroponic Garden

For a vertical hydroponics garden

Top row: Smaller plants like greens, lettuce, strawberries, chard, herbs.
Middle: Mid-sized plants like peppers, beans, kale, collards, eggplant.
Bottom: Large and bushy plants like tomatoes, squash, zucchini, cucumber.

For a horizontal hydroponics garden



Outside Rows: Large and bushy plants like tomatoes, squash, zucchini, cucumber.
Inside Rows: Smaller plants like greens, lettuce, strawberries, chard, herbs.

Ways to Explore

Ask learners if they are there any cultural dishes or traditions in their family where they use and enjoy herbs in the garden?

Guide students through a mindful taste testing experience.

Look

Colour, Shape, Size

Feel

Texture, Firmness

Smell

Noticeable scent

Taste

Sweetness, Bitterness etc.

Herbs for Hydroponics

Hydroponically-grown herbs bring flavours from around the world into your classroom. They can provide a sensory escape to help ground youth and inspire cooking ideas. Herbs are highly perishable and expensive, so a great choice for an indoor hydroponics garden.

Parsley **Rosemary** **Basil** **Mint**
Cilantro **Oregano** **Stevia** **Dill**
Lemongrass **Borage** **Sage**
Chives **Lemon Balm** **Thyme**

What are Chemicals A and B?

Hydroponic plants can't get what they need from soil, so special chemical blends A & B provide exactly what the plants need. Some of these elements can't be mixed together when they are undiluted- that's why we have to mix two into water separately.

Mineral Blend A
(Macronutrients – Mainly Calcium & Micronutrients)

Calcium (Ca) – Essential for strong cell walls and overall plant structure.

Nitrate (NO_3^-) – A primary source of nitrogen for leafy growth.

Iron (Fe) – Supports chlorophyll production and enzyme function.

Micronutrients (e.g., Boron (B), Manganese (Mn), Zinc (Zn)) – Aid in enzyme activity, growth regulation, and nutrient uptake.

Mineral Blend B
(Macronutrients – N, P, K & Magnesium)

Nitrogen (N) (as Ammonium or Nitrate) – Crucial for leaf and stem growth.

Phosphorus (P) – Supports root development, flowering, and energy transfer.

Potassium (K) – Regulates water movement, enzyme activation, and overall plant health.

Magnesium (Mg) – Central to chlorophyll production and photosynthesis.

Sulfur (S) – Important for amino acids, proteins, and enzyme function.

What's the difference between growing mediums?

Rockwool Plugs

Made from Lava and Chalk melted to 3000F and then spun into fibres and crushed to make the foamy material also used for building insulation.

Pro: holds nutrients and water well.
Con: Not reusable.

Clay Pebbles

Made from tiny balls of clay heated to 2000 F. When they are heated they expand and become porous.

Pros: long term reusable; roots come out easier when transplanting.
Cons: Lower water retaining capacity.

Peat Pellets

Peat is composted plants from wetland areas.

Pro: the pellets are easy to find at a local garden center and it's good at holding water as well as allowing for good airflow to keep plants healthy.
Con: overharvesting risks hurting vital landscapes.

pH

pH is a way to measure how acidic or basic something is.
The pH scale goes from 0 to 14.

0-6 **Acids (sour):**


Lemon Juice

Vinegar


Soda

7 **Neutral:**


Water

8-14 **Bases (soapy):**

Baking Soda

Soap


Bleach

What Does "pH" Stand For?

pH stands for the "power of Hydrogen."
It measures how many hydrogen ions (H^+) are in a substance.

Substances with **more H^+ ions are acidic**.
Substances with **fewer H^+ ions (or more hydroxide ions, OH^-) are basic**.
The more H^+ ions there are in water, the lower the pH.

Acidic (ph 0-6) ←


Lemon Juice

H+ ions ↑

Basic (ph 8-14) →

Baking Soda

H+ ions ↓

OH- ions ↑

Vocabulary & Activity Ideas

Activity Ideas

- **Plant Map**
  - Whether you plant a garden inside or outside, keeping track of what you planted and where can be very helpful.

- **Seed Saving**
  - Try letting some of the plants go to seed. Harvest, dry, and store seeds to share or for future use.

- **Herb Guessing Game**
  - Chop herbs and either hide them in a cup or use a blindfold.
  - Have them sniff the herb and see if they can guess what it is called.
  - If guessing is a challenge, read off names so youth have to match the smell with the name read aloud rather than guess.

- **Transplant** small hydroponics plants to pots and soil, grow them or have a seedling sale to fundraise for the school or a project.

- **Experiment** by testing the pH of different possible Nutrient Waters. Make sure to filter water through a fine sieve or cheesecloth before adding it to a hydroponics system. Try testing the following:
  - Lake or pond water
  - Fish tank water
  - Liquid Plant or Seaweed Fertilizer

Vocabulary

Hydroponics | **pH (Power of Hydrogen)** | **Net pot**

Growing Medium | **Nutrient Water** | **Mineral Blends A & B**

Pollination | **Germinate** | **Photosynthesis**

FAQ

What are nutrients (Mineral Blends) A and B?

They are essential plant nutrients. "A" contains calcium and nitrates, while "B" contains nitrogen, phosphorus. Together, they help plants grow.

Why do we need to check pH?

pH affects how well plants absorb nutrients. If it’s too high or too low, plants can’t grow properly.

What is pH?

pH measures how acidic or basic the water is. A good range for hydroponics is 5.5–6.5.

Why can’t we grow root vegetables?

Most root vegetables need soil to develop properly. They also need more space than hydroponic setups allow.

How do we grow tomatoes and other fruiting plants that need pollination when there are no pollinator bugs inside?

You can hand-pollinate by gently shaking flowers, dabbing them all with fingers to or by using a small brush to move pollen between the flowers.

How often do we need to add nutrient water to the reservoir?

Check the water levels every week to ensure the plant roots are touching water and that the pump is covered under water.

Does the amount of added water change from week to week?

It can change week to week. When the plants are small, they absorb less nutrient water. The bigger the plants get, the more frequently you will need to top up the water.

Do I add Nutrients A & B every time I add water to the unit?

Yes, every time you add water, you will pre-mix it with the appropriate amount of Nutrients A & B. Check the pH every time and make adjustments as necessary.

How can I adjust the pH?

Some units have pH adjustment chemicals to add. You can also use vinegar and baking soda mixed in water to lower or raise the pH, respectively.