



# LEARNING GARDENS

A Guide for Canadian educators



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2022 Edition

Nutrients for Life Foundation Canada

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# INTRODUCTION

The United Nations estimates that the human population will increase by approximately 2.2 billion people over the next 30 years. With the world population rapidly increasing to an estimated 9 billion people by 2050, adequate food production and food security is a growing issue.

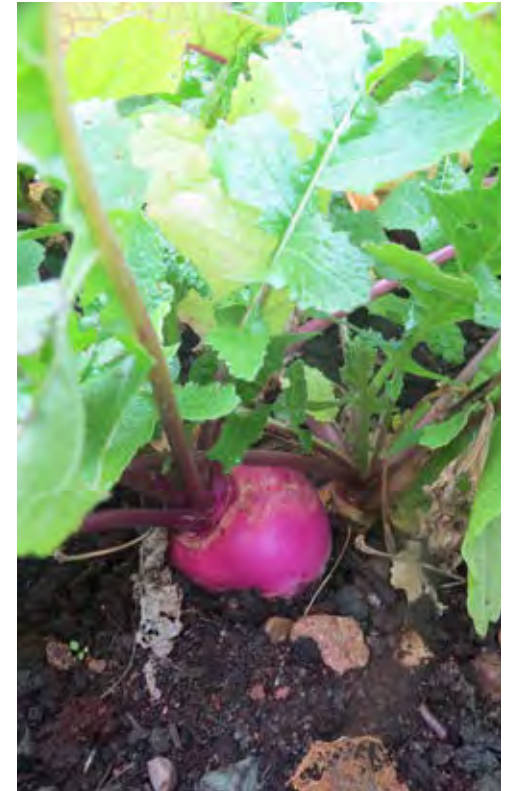
**Nutrients for Life (NFL) is working to address** this issue through its educational lessons, programming, and working with educators across Canada. Our desire is to ensure that educators have the resources they need to provide students with authentic, first-hand learning experiences about food production, and through these develop better appreciation for global food security. That understanding about food security begins locally, and so the focus of NFL Learning Gardens is students - and what they can do to make a difference in their community.



# PURPOSE OF THIS GUIDE

*The Nutrients for Life Learning Gardens: A Guide for Canadian educators* (hereafter, The Guide) is intended to assist educators from across Canada to establish NFL Learning Gardens at their schools and use these as a resource to teach students about soil science, the role of nutrients in plant growth, and the larger issues of agricultural sustainability. The Guide provides direction on how to build an NFL Learning Garden on the school grounds. Sample lesson plans on soil sampling, comparative studies, weed and pest identification, and the equipment required are also included.

The Guide aims to help educators enable students to learn about food security and modern agricultural practices through hands on, participatory learning. We see this as occurring when students and their educators work together to build a NFL Learning Garden and then use that garden as a learning setting across all school disciplines. These can include: science, mathematics, the language arts, the social sciences, the humanities and the arts. Enabling students in a NFL Learning Garden setting means providing opportunities for them to design and construct the gardens, plant the seeds, nurture the plants, add nutrients and water as required, and eventually address post-emergent issues related to pests and weeds. Students will take ownership of the gardens and participate in decisions on what they will learn and how they learn it. For instance, with respect to building and learning in the garden, this can involve students in collaborative goal setting, planning, building the garden, planting, harvesting, celebrating and sharing.



# OUR MISSION AND VISION

## MISSION

A leader in “teaching teachers” with science-based, curriculum-aligned plant nutrient resources, programs and initiatives. We work collaboratively with others to demonstrate the role of nutrients in plant production and promote solutions for sustainable agriculture and environmental stewardship.

## VISION

The soil beneath our feet is the foundation for world food security. By leading the development and delivery of plant nutrient educational programming we ensure Canadians are informed and contributing to solutions that sustainably grow healthy plants and protect our land, air and water for future generations.



# GUIDING PRINCIPLES of an Effective NFL Learning Garden

Creating a NFL Learning Garden and using that as a basis for education provides an opportunity for educators to involve students in educating for sustainability – a process of learning and living within both principles of ecology (i.e., principle of “carrying capacity” will ask, “how many plants can be grown in a NFL Learning Garden for best results?”) and principles of sustainability. The development of knowledge, values and attitudes related to sustainability leads to informed and involved students who are capable of creative decision making and innovative problem solving skills. Having students involved in NFL Learning Gardens prepares them for lives in the environmental, economic, political and cultural systems of which they are a part and helps them understand how these systems are interconnected. NFL Learning Gardens provide an ideal context within which to promote sustainability education and have the following characteristics:

- > **A strong, ongoing experiential component.** NFL Learning Gardens are used for experiential learning in the areas of: food production and security, lifecycles, plant nutrition, and biology studies. NFL Learning Gardens connect youth to modern agriculture and agricultural practices, and help to more clearly demonstrate where food comes from.
- > **A strong action component with a clear context for action.** A NFL Learning Garden allows educators and students to take part in hands-on science-based actions and discussions of plant nutrients at any grade level. Through the building of NFL Learning Gardens, children can improve their nutritional health, increase their food knowledge and have active participation in growing nutritious foods.
- > **A defined process of assessing, planning, acting, reflecting, communicating and celebrating; clear goals and objectives**  
The creation of NFL Learning Gardens provides students with opportunities to understand modern agriculture through scalable activities where there are opportunities for planned and unplanned teachable moments. Such moments could include: contact with nature, lifecycles, plants, seeds and soil health. NFL Learning Gardens provide opportunities to engage multiple classes/subjects in the design, construction, planting, maintaining and harvesting of the garden. Doing so will ensure optimal use of the NFL Learning Garden.



## GUIDING PRINCIPLES of an Effective NFL Learning Garden (continued)

- > **A long term range vision.** NFL Learning Gardens require planning and envisioning what the NFL Learning Garden will look like in the future. The action of creating NFL Learning Gardens beautifies the school grounds which reflect seasonal growth and changes. Students can turn their vision into action in concrete and beautiful ways. Students can reflect on their science-based results from their NFL Learning Garden that can guide future plant nutrition decisions and extend the long range vision further.
- > **A Strong partnership and collaboration** with agencies, institutions and volunteers. A NFL Learning Garden requires many partnerships and cooperation between parents and community groups, business in the community and peers and diverse student groups as they plan, plant, tend, and harvest together and celebrate their successes. A NFL Learning Garden connects your school to the community!
- > **A strong ecosystems approach.** Students can learn about natural ecosystems through a NFL Learning Garden, which is an ecosystem that is dependent on many factors (healthy soil, light, water) that work together to teach students about healthy ecosystems.
- > **A strong connection to outside organizations and tools and learning.** NFL Learning Gardens support teacher efforts to teach students the role of plant nutrients in agricultural sustainability and feeding the world's population. Nutrients for Life, founded by Fertilizer Canada formally known as the Canadian Fertilizer Institute in 2008, is comprised of educators, community groups, scientists and representatives from the agricultural sector including farmers, agricultural retailers and members of the agricultural industry. Together they produce and distribute educational materials on soil science and agricultural sustainability. In addition, they provide materials, resources, funding, and Regional Managers to assist educators in their efforts to help students understand how nutrients increase the health and quality of soil, improve production of nutritious foods and preserve green spaces.

A number of conditions are fundamental to the development of a NFL Learning Garden. Nutrients for Life encourages the development of the best garden conditions, grounds, and garden experience possible for school partners and their students. We encourage best garden/soil management practices, science-based decision making, and accessible grounds and beds. Best management practices should be led by testing, critical thinking, and reasoning. Even a lost crop has many lessons for gardening students. The garden is for all students to learn about healthy soil practices, best gardening practices, plant growth, water security, human nutrition, and food security.

### > **This is a new guiding principle with graphic.**

- Plants need a proper balance of nutrients to grow and stay healthy. In order to produce a successful crop and be able to fight off pests', proper plant nutrition and watering is necessary.
- Plant nutrients (fertilizer, compost, manures, or plant residues) ensures your plants have all the nutrients to produce a successful harvest.
- 4R Nutrient Stewardship works to increase production and profitability for farmers while enhancing environmental protection and improving sustainability. These same principals can be applied to gardening as well.

### > **4Rs incorporate the:**

- Right Source of plant nutrients that are in – or are easily converted to – compounds best used by the target crop.
- Apply the Right Rate of plant nutrients to match nutrient supply with plant requirements.
- Apply plant nutrients at the Right Time so nutrients will be available when plants demand is high.
- Apply or maintain plant nutrients in the Right Place where the crop can access the nutrients most effectively.



# KEY CONDITIONS

## For an NFL Learning Garden

- > The garden should be an area large enough to **engage a whole class of students** simultaneously in meaningful learning.
- > The location should be **widely visible to the public/school community** during school and after school hours. This visibility promotes safety and reduces unwanted behaviours.
- > The plots or raised beds must be **easily accessible to students** (i.e., two arms width across, or about 1.2 m to 2.0 m, and adjusted for height), sufficient walking paths, etc.
- > The project should foster strong **relationships with the community** as volunteers, participants and co-stewards of the space. Volunteers will be responsible for planting, weeding, and maintaining the garden during the summer months.
- > The garden **should utilize garden space effectively** through methods such as companion planting (i.e., 3 sisters), square foot gardening, rotation gardening and other small-scale management practices.
- > Students should **lead in the design, construction, care, and maintenance** of a NFL Learning Garden. This teaches practical skills, builds pride, and fosters a sense of belonging in the garden space.
- > The project should **utilize site-appropriate** mulches, covers, and composting to minimize resource use and waste while sharing these conservation skills with participating students.
- > Educators should incorporate lessons on the sustainable use of plant nutrients based on current scientific research, and consult the **Nutrients for Life Curriculum - *Nourishing the Planet in the 21st Century*** – into the garden-based learning. This is available online at: <https://nutrientsforlife.ca/en/classroom-lessons/nourishing-the-planet>
- > Link lesson plans to **feeding your local school, community and the growing world population** by using nutrients and other plant nutrients and emphasize general garden and food themes.
- > **Keep it simple, watch it grow, care for the NFL Learning Garden, and have fun!**

# DEFINITIONS

## NFL LEARNING GARDENS (\$3,000.00 grant)

- > A Nutrients for Life (NFL) Learning Garden is an outdoor working garden for students in middle or high school that complements the Nutrients for Life resources. NFL Learning Gardens support science-based decision making, and learning specific to nutrients' role in food production, health and sustainability through inquiry based learning. A NFL Learning Garden acts as an outdoor classroom for all students to learn about gardening, plant growth and nutrition including human nutrition and food security. Indoor growing units can also be used to help compliment the outdoor space.

NFL Learning Gardens can start small and grow. Initially, the project can start with one class/one subject/one group and then can expand to more than one subject/class or group.

## SCHOOL GARDENS (\$500.00 grant)

- > A school garden is a small scale garden for students in middle or high school that serves as a school yard naturalization initiative that students, educators and the community enjoy. Educators are not required to use the school garden site as an outdoor classroom and educators do not require integration of the school garden into curriculum and instruction. Rather, it may be a place that is beautiful to look at and enjoyed by all. Indoor growing units can also be used to grow plants Throughout the school year or to help compliment the outdoor space.

## REGIONAL MANAGERS

- > Regional Managers provide a presence (in-person or virtually) in the local community by visiting local schools, interacting with educators, promoting NFL's resources to the provincial education ministries and holding local professional development days in partnership with local school divisions.

Regional Managers inspire and teach the educators in the areas of plant nutrition, modern food production, and food security and provide a vital source of factual information to educators and their students.

Please refer to the [Nutrients for Life](#) website for a listing of Regional Managers in your jurisdiction.

# AN INTERDISCIPLINARY FRAMEWORK

A curriculum becomes interdisciplinary when two or more related subjects/disciplines are coordinated from a higher level for some purpose. Interdisciplinary approaches are holistic. Two or more educators with expertise in different subject areas work together with their students to plan, design and create the NFL Learning Garden. Educators address the focus through their respective subject area. For example, the science educator would address science-related concepts (scientific inquiry, comparative studies, soil sampling, pest/weed identification, etc.); the mathematics educator, mathematical concepts. Cooperation and communication are strong between educators and students.

NFL Learning Gardens focus on a broad range of topics such as ecosystems, soil, living things, human activities, communities, environmental factors, plant growth and change, weather, patterns, measurement. The source of knowledge can be found within existing provincial curricula including science, social studies, mathematics, language arts, dramatic arts, human ecology and other disciplines such as business and marketing and technology. As NFL Learning Gardens contain many interrelated concepts, students require a wide knowledge base to understand the many issues that will emerge such as food production, food security, sustainable agriculture – all these require an interdisciplinary knowledge base.

Educators that engage their students in learning related to the NFL Learning Garden Initiative will provide students with systems thinking (linkage between environmental, economic and social issues) and the opportunity to engage in learning about agriculture and food which naturally deals with the economic viability of agriculture, management of land for production and processing and safety of food. From an environmental perspective, topics such as land use, biodiversity, water quality, energy use, waste management (composting) emerge. From an economic perspective, the value-added economic activity emerges particularly if the students decide to use their harvest for the local food economy. Social issues also emerge through the learning process regarding such topics as human health, community sustainability, quality of life.

Although an *interdisciplinary approach* is preferred by the representative educators at Nutrients for Life, it is also a reality that it is not always possible to plan, design and deliver on a NFL Learning Garden with such sophistication. It is also a reality that there may not be time available to work with other educators in your school. In situations where different educators are responsible for different subjects, time, organization and planning will be required in order to coordinate teaching and learning. More often than not, a lone “champion” takes the initiative to create a NFL Learning Garden in the hopes of getting “buy in” from other educators. There is often not enough time to plan, design and implement a NFL Learning Garden and its associated curriculum, or time to communicate and coordinate this initiative with colleagues at the planning and delivery stages.

If you are a teacher interested in creating a NFL Learning Garden, consider connecting with one of our Nutrients For Life Regional Manager and with the NFL community. We can provide you with all the support you need to plan, design and deliver your NFL Learning Garden effectively. Other educators will come once they witness how engaged the students are in living, learning and achieving at the NFL Learning Garden.

# LINKING NFL Learning Gardens to Provincial Outcomes

A world of food which is grown sustainably for all, 'ripened' through rich educational experiences to nurture caring citizens, is a goal that schools can address in important ways. NFL Learning Gardens are a vital learning environment in which to pursue goals such as: getting students outdoors and engaging in physical activities, learning about nutrition, health and food security, building environmental awareness and stewardship skills, and fostering collaboration, teamwork and leadership in the community. These varied focus areas are the heart of learning about feeding the world for the 21<sup>st</sup> century and well beyond.



Provincial curricula contain a vast number of learning outcomes that can be explored through the context of gardens, soil and food. An NFL Learning Garden can become, then, the primary learning environment.

# DESIGN AND CONSTRUCTION Of The NFL Learning Garden

Like schools, NFL Learning Gardens are unique spaces that reflect the experiences, environment, location, and dreams of the school and wider community.

From our friends from the Compost Council of Canada have developed a [vegetable gardening guide](#) with great information on vegetable gardening in Canada.

The following guide (adapted from *the Community Garden Start-up Guide* by Rachel Surls of the University of California Cooperative Extension) may be used to help plan and design your NFL Learning Garden.

## 1. Get your colleagues and students involved.

Find out who is interested and would participate in creating a NFL Learning Garden. Hold formal meetings of all interested colleagues and students to develop and initiate plans. Keep everyone posted on the garden's progress and keep them all involved in the process. Invite a Regional Manager to hold a brain-storming session on what would work best in your school.

## 2. Form a NFL Learning Garden Club.

Use the club to make decisions and divide work between the participants. Everyone involved should contribute to the design, development and ongoing maintenance of your NFL Learning Garden.

## 3. Site the Garden.

Determine where the best outdoor location is for the NFL Learning Garden. Having ease of access to water is important when siting your garden.



## Guide to Vegetable Gardening

Guide created by and generously offered by the **Compost Council of Canada**.



[Download - English](#)

[Download - French](#)

## DESIGN AND CONSTRUCTION Of The NFL Learning Garden (continued)

### 4. Planning the Garden.

Club members should all be involved in the planning, design and set up of the garden. Before the design process begins, measure the site and make a simple, to-scale map. Hold two or three meetings and have someone take notes so that decision can be communicated effectively. A great way to generate ideas and visualize the design of the garden is to use simple drawing or photos cut from gardening magazines representing different garden components (flower bed, vegetable bed, compost bins, pathways, etc.) that can be moved around on the map as the group discusses the layout of the garden site.



### 5. Basic Elements of a NFL Learning Garden:

- a. Ensure ample sunlight.
- b. If designing raised bed plots, they should be no more than 4 feet wide (to facilitate access to plants from the sides without stepping on beds) and between 8 and 12 feet long (if using lumber, it is advisable to construct raised beds in sizes that are found in readily-available lumber, or that can be cut without too much waste). In-ground plots can be from 10 x 10 up to 20 x 20 feet. Pathways between beds and plots should be at least 3 to 4 feet wide to allow space for wheelbarrows and/ wheelchairs. The soil in both raised bed and in-ground plots should be tested to ensure proper composition.
- c. Consider using mulch between the raised beds and on pathways. This will look great and reduce mud, weeds from growing on pathways.
- d. A simple irrigation system with one hose bib or faucet for every four plots. Hand watering with a hose is the most practical and affordable for individual plots (and it's almost a necessity when you start plants from seed). Drip and soaker-hose irrigation can be used in all areas of the garden for transplanted and established plants, but especially for deep-rooted fruit trees and ornamentals. If no one in your group is knowledgeable about irrigation, you might need some assistance in designing your irrigation system. Seek out a landscape contractor or nursery or garden center professional to help you develop a basic layout and materials list.

## DESIGN AND CONSTRUCTION

### Of The NFL Learning Garden (continued)

- e. A tool shed or other structure for storing tools, supplies, and materials.
- f. A bench or picnic table where gardeners can sit, relax, and take a break-- preferably in shade. If there are no shade trees on the site, a simple arbor can be constructed from wood or pipe, and planted with squash, grapes, or some other vine.
- g. A sign with the garden's name, sponsors, and a contact person's phone number for more information. If your community is bilingual, include information in this language.
- h. A shared composting area within the NFL Learning Garden site.

#### 6. Creating a Garden Budget.

Use your design to develop a materials list and cost-out the project. You will need to call around to get prices. You might be surprised at the cost. A NFL Learning Garden - with just the basics - typically costs between \$2,500 and \$5,000. At this point, your group/club might decide to scale back your initial plans and save some design ideas for a "Phase Two" of the garden.

#### 7. Reach out to the Community.

While Nutrients for Life will provide start-up funds required for your NFL Learning Garden, you can also start making connections with community businesses that might assist providing anything from fencing, if needed, to lumber, soil, seeds and plants. It is important to ask, and businesses often want to be connected to the school environment in their area. Take students with you when you go to businesses to request donations. Be sure to thank key supporters and recognize them on garden signs, at the gardening grand opening and other special events such as harvest feasts.





## DESIGN AND CONSTRUCTION

### Of The NFL Learning Garden (continued)

#### 8. Plant!

Stake out beds and pathways by marking them with stakes and twine. You can plant shade and fruit trees and begin to landscape the site early on in the process. Continue to plant/seed as soon as possible in the growing season.

#### 9. Weeds!

Keep weeds to a minimum by maintaining the garden plot and weed often. At the end of the season, it is important to clean up the garden area and ensure that everyone involved maintains the garden free from decaying weeds (and their seeds) after the harvest. It may be a good idea to apply a thick layer of mulch or hay to the garden beds and paths to reduce weed proliferation in the off season.

#### 10. Celebrate!

Have a grand opening, barbeque or some other fun event to make this a special time for everyone that participated in the development of the NFL Learning Garden. This is also a time to thank those that made donations of materials or time with a special certificate or other form of recognition.



## DESIGN AND CONSTRUCTION Of The NFL Learning Garden (continued)

The internet is a great place to start looking for photos, images and drawings for NFL Learning Garden plans and designs. Check out our Youtube page to see how schools across Canada are growing and learning together.



# LEARNING ACTIVITIES

NFL Learning Garden provides naturally-engaging ways for students to achieve successful science-based learning outcomes as well as practical life skills and attitudes. Once the physical space has been constructed, it is the activities within the NFL Learning Garden space that will achieve the highest possible learning outcomes and goals of our partnership. Activities should promote extended knowledge on plant nutrients and food security.

## CORE ACTIVITIES

The following activities would be core to the NFL Learning Garden. Bearing in mind curricular outcomes, it would be to the discretion of the school staff which groups of students within their school would best benefit from these learning experiences. Sample activities presented here – using activating questions as a guide to students' inquiry - provide the basis for more structured activities at the middle grades in your school.

There are also select activities that are aimed at secondary level students (or those who are operating at this level of sophistication). These activities focus on investigative skill sets involving the use of controls, manipulation of variables, analysis techniques for nutrient availability, and the design of new inquiries.

Nutrients for Life NFL Learning Garden partners will:

**Test the soil** in three to five different locations that are to be used for growing each spring (and ideally each fall) to determine nitrogen, phosphorus, and potassium levels. Qualitative means or quantitative analysis can be used, with a preference for quantitative analysis for older, capable students.

Schedule a Regional Manager (where possible) hold a soil testing lab and learn about all of the nutrients require for plants to complete their life cycle. The Regional Mangers will bring all of the necessary science supplies to conduct this group activity.



## LEARNING ACTIVITIES (continued)

Provide opportunity for a minimum of three structured experiments or comparisons involving germination, plant growth, soil fertility, and yield, based on scientific principles. Proper research and inquiry methods should be used explicitly with students to generate questions, techniques and report conclusions. Some suggestions for these inquiries include:

- > **Germination** – how well do seeds of a group/age/variety germinate? How do they compare to seeds of a different origin? (i.e., germination of saved seed).
- > **Plant growth** – how do plants under condition(s) X grow compared to condition(s) Y? Emergent growth observations.
- > **Soil fertility** (based on soil test kit results); what predictions and observations can be made knowing a soil's fertility for types of produce or plants to be planted?
- > **Yield** – what is the range of yields for plants under similar conditions and what sort of yields would be expected for scaled, larger crops – i.e. corn or wheat. Calculations of the school or community crop needs (i.e., how many kilograms of tomatoes would be needed to feed our school for one week?) would be a strong introduction to food security.
- > **Genetics** (For Grades 11/12 students) – discussion/study of plant inheritance could be explored through variety crossings (replicating historic Mendel experiments with peas), studying hybrid development (corn) or crossing F1 siblings to study F2 characteristics. Novel types of vegetables, preferably with unique color characteristics, would suit this well.
- > **Recording and analysis** of any soil amendments used. If nutrients/manure/compost is added, quantitative measures should be used to record how much (per unit area or per plant) and written observations made as to the effectiveness of the products.

### Germination Prediction

#### Grades 4 to 7

Have students germinate different types of plants and watch the various stages that the plants go through. Seeds that are suitable for germination include broccoli, celery, corn, peas, and beans. Explore questions such as:

- > When did the seed start to “grow?”
- > Where did the leaves come out?
- > What plant part came first?
- > What happened to the seed cover?
- > When did leaves start to show?

Alternatively, provide the questions to students as “prediction” questions and have students compare the answers they predicted to what they observe.

Create germination diagrams, showing the different stages of plant growth and change. Display the diagrams and compare different plants.

**Source:** *A Guide to Growing School Gardens in Alberta*. Alberta Agriculture and Rural Development (2011).

## LEARNING ACTIVITIES (continued)

> **Observations of soil life** – in various areas of the garden at three or more different times of the year and different conditions (wet, dry) using simple tools (magnifying glass, field microscopes, trowels, shovel, square foot studies). This would have curricular ties to areas of study in science and biology around the diversity of life, microorganisms. This could also include good (and bad) garden bugs.

## ENCOURAGED ACTIVITIES

A number of other rewarding activities would benefit the NFL Learning Garden and add opportunities to enrich student learning. Consider choosing four from among the following projects as a desired indicator of success. Partner schools are welcomed to take on more and thereby achieve more.

- > Inclusion of FNMI (First Nations/Metis/Inuit) perspectives and plant varieties or other cultural varieties when/where appropriate. Visits by elders or other respected community members would be greatly encouraged.
- > Planting flowers, grains and fruit trees/shrubs add visual benefits and additional learning opportunities. NPK (Nitrogen-Phosphorus-Potassium) testing can be used to maximize their progress as well. For example, growing wheat can provide an opportunity to produce flour and baked goods or bannock while fruit trees/shrubs can add quick seasonal snacks to students in the school yard.
- > Observations of macro life (including people). Students can observe how the NFL Learning Garden has changed the people and larger area around it (more/less wildlife, birds, bees, deer) student traffic/play in area, number of student visits at recess or after hours, etc.

- > Student journals/reflections on how their views of plants/ food have changed; this should fit their curricular goals for their grade, and perhaps correspond to English Language Arts curriculum outcomes/objectives.
- > Utilization of the garden space to achieve curriculum objectives in the Fine Arts (Art, Drama, Music and dance)

### Growing Zones

#### Grades 4 and 5

Have students compare the growing zones in Alberta to the province's eco-zone regions and geographic regions. Ask students to find a map of Alberta's growing zones by searching the Internet, and create their own map that identifies the growing zone in which they live.

Canadian plant hardiness zones can be found on Agriculture and Agri-Food Canada's [website](#).

**Source:** *A Guide to Growing School Gardens in Alberta*. Alberta Agriculture and Rural Development (2011).

- > Students engage in seed catalogue selection of heirloom, novel or unique species and compare their growth/characteristics to common varieties.
- > Exploration of food security issues through local media, Nutrients For Life's has many online games like *Humanity Against Hunger* and *Nutrients for Life*. The Foundation's [online videos](#) can be used to better understand the growing challenge of feeding the world.

## LEARNING ACTIVITIES (continued)

- > Exploration of pollinators, learn how important these insects are to a successful garden. Possibly incorporate some pollinator habitats or houses. Please consult with your schools administration to make sure there are no student allergies to pollinators.
- > Quantitative soil analysis by an independent lab to create an historical data set.
- > Soil texturing - soil should be classified by using a hand texturing technique and water separation (the pop bottle test) to determine the relative composition (silt/sand/clay/organic material) of the soil on site. Soils from other areas would be a good addition to this experiment.
- > Environmental land management issues, including best management practices for adding plant nutrients.
- > Further exploration of soil properties in the garden – for instance pH, light measurements (which require a light meter, soil temp and require a soil thermometer), negative charge of soil, and soil temperature testing could be explored.
- > Introduction to climate zones and new data showing variance in these regions.
- > Exploration of how soils are formed, with note of regional geologic events.
- > Composting of vegetable and fruit scraps from school lunches, cafeterias or environmental awareness days.
- > Seed selection and saving of unique, vigorous or otherwise desirable plants.

### Connecting with Other School Gardens

#### Grades 3 and 5

Encourage students to do an Internet search to find out about different types of school gardens in other communities across Canada or in other countries.

Some communities or schools welcome communication with other school gardens. Visit our [school learning garden map](#) to learn about what other Canadian NFL Gardens across the country.

### Plant Signposts

#### Grades 3 to 8

Have students make signposts for their vegetable plants and herbs. Encourage students to design the signposts with information about the plant, its name, and an illustration. Emphasize the importance of ensuring that the signposts clearly identify the plant.

Colour, shape, and texture are all part of every food item. Have students explore and compare the colour shape and texture of different vegetables. Represent them in the signposts that are added to the garden.

**Source:** *A Guide to Growing School Gardens in Alberta.*

## LEARNING ACTIVITIES (continued)



### Working with Nutrient Regimes and Comparing Results – the “Experimental Learning Garden”

#### Grades 9 to 12

A key component of scientific inquiry with a NFL Learning Garden is to engage students in having comparative plots – for instance, Plot A - no added nutrients at all; Plot B – organic (e.g., composted) nutrient load; and Plot C - application of commercial-grade chemical nutrients.

All other variables such as soil type, hours of sunlight, added water, cultivation techniques, etc. should be held consistent throughout the comparative study.

What follows is a typical CONTROLLED NUTRIENT SUPPLY comparison test that can be conducted in your Learning Garden.....to see what mineral nutrients do!

# INVESTIGATIONS

## HANDS-ON EXPERIMENTS

This section is where students get their hands dirty. In order to successfully grow a garden there are many variables that students need to understand and control, and the best way to understand these variables is to mix some soil and seeds together and monitor the results.

There are three separate investigations on the following pages that are targeted at different grade levels.

- > For Grade 7 and up: Nutrient Supply and Plant Growth
- > For Grade 7 and up: Seed Germination and Controlling Variables
- > For Grade 11 and 12 (advanced level; Biology/Chemistry): Soil Fertility and the Nitrogen Content





# INVESTIGATIONS

## Nutrient Supply And Plant Growth

### GRADES 7 AND UP

If we are trying to improve soil fertility to maximize food crops, we need to make sure that all essential nutrient minerals are present in adequate quantities in the soil. Adding nitrogen alone, or potassium alone for instance, will not provide the soil with sufficient nutrients to ensure good root growth and healthy leaves and maximum yield.

In this investigation, you will set up an experiment to which you will refer again over several weeks. The aim will be to demonstrate why plants need certain mineral elements as nutrients, also known as **inorganic ions**. This experiment could very well be used as a way to investigate the effects of environmental variation on plants, or, determine what nutrient mix provides the optimum growth of your experimental plants.

This is another example of a **control experiment**, in which you will attempt to find out the effect of a single factor, which usually works in connection with others.



## INVESTIGATIONS

### Nutrient Supply And Plant Growth (continued)

#### SCIENTIFIC DESIGN:

You will select sections of your NFL Learning Garden that will grow the SAME plants but be exposed to different mineral nutrients. Each liquid nutrient you mix up will contain an almost balanced mixture of elements, but some solutions will lack one specific element, as shown in the table below. The “controls” will either have all the mineral nutrients listed, or none of them at all.

Your class experiment could also include different plants in different sections of the NFL Learning Garden, as long as each gets the same 6 treatments. Each “team” of 6 students will manage an experiment involving a single plant type.

After allowing the plants to grow for some period of time to get established, you should be able to see the effects of each element, by making comparisons between the plants grown with and without it.



Divide a section of your NFL Learning Garden into six zones. Each zone will get a different nutrient treatment.

#### NUTRIENTS PREPARATION:

Here is a list of reagents to prepare Long Ashton water culture, or Sach's water culture solutions to be used with the plants. It can be cheaper, and is certainly much easier to buy the ready-prepared nutrient solutions if not all the chemicals are available in-house.

Sach's culture solution (complete recipe): Dissolve the following salts in 1 litre of distilled water. Solution prepared by students under careful watch of the teacher (ideally).

- > 0.25 g of calcium sulfate(VI)-2-water
- > 0.25 g of calcium phosphate(V)-2-water  $\text{CaH}_4(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$
- > 0.25 g of magnesium sulfate(VI)-7-water
- > 0.08 g of sodium chloride
- > 0.70 g of potassium nitrate(V)
- > 0.005 g of iron(III) chloride-6-water

For Sach's culture solution with mineral deficiencies, make the following changes.

- > Deficient in **Nitrogen (-N)**: 0.52 g of potassium chloride replaces potassium nitrate (V).
- > Deficient in **Phosphorus (-P)**: 0.16 g of calcium nitrate (V)-4-water replaces calcium phosphate (V).
- > Deficient in **Potassium (-K)**: 0.59 g of sodium nitrate(V) replaces potassium nitrate (V).
- > Deficient in **Magnesium (-Mg)**: 0.17 g of potassium sulfate(VI) replaces magnesium sulfate(VI).

## INVESTIGATIONS

### Nutrient Supply And Plant Growth (continued)

Experimental Treatments	Components of Mixture			
	Nitrate	Phosphate	Potassium	Magnesium
Lacking Nitrogen (-N)	No	Yes	Yes	Yes
Lacking Phosphorus (-P)	Yes	No	Yes	Yes
Lacking Potassium (-K)	Yes	Yes	No	Yes
Lacking Magnesium (-Mg)	Yes	Yes	Yes	No
Lacking ALL (no minerals)	No	No	No	No
“COMPLETE” (all minerals)	Yes	Yes	Yes	Yes

What is the liquid that is used in the “lacking all” treatment no minerals)?

What other substances could (or should) be added to every treatment?

Why is it important that each experiment is confined to a single type of plant?

Why do you think we are using plants that are the SAME kind and are growing under very similar conditions?



### SUGGESTED PROCEDURE:

1. Take note of two very similar sections of the plant that you are interested in watching, and label TWO stems in some way with a letter or a number (perhaps with a small paper tag of some kind). Maybe a label such as A1 and A2

**ALWAYS HANDLE YOUR PLANT TISSUES WITH GREAT CARE.** Ensure that you note the **name of the plant**.

2. Each member of the team should standardize their selection of a plant section preparation, so that each plant in the team experiment ends up looking very similar.

3. **Measure** (and record) the **length of the stem** up to the point where it branches off into leaves.

4. **Count** (and record) the **number of leaves** that are easily visible on the stem branches.

5. In conjunction with others in your team, decide on which **mineral nutrient treatment** you will perform on the plant (see the table above), and mark the stem label appropriately with the treatment. Say, A1-N, A2-N, B1-P, B2-P, etc.

6. Each day, add the SAME amount of nutrient solution around the base of the plant. At the same time – using a small paintbrush – apply the same nutrient solution to ONE of the two stems and all of its leaves (e.g., A2-N).

7. At regular intervals during the next 3-6 weeks, perform the same procedure, **but keep to a minimum any disturbing of the plant** if at all possible while you are working with it.

## INVESTIGATIONS

### Nutrient Supply And Plant Growth (continued)

#### SUGGESTED PROCEDURE (continued):

- Note (in your experimental LOGBOOK) any changes you see such as growth of the stem and leaves, loss of leaves, flowering, insect pests, signs of plant disease, etc.
- You will also want to MEASURE the length of the stem area you are watching, the approximate diameter of the widest part of the leaves, and record all data in a table in your logbook or on a spreadsheet.

At the conclusion of the experiment (say, after Week 6), you will count the number of leaves and measure the stem length once again, then all the teams' results will be collected together for comparison.



How would you change the experimental procedure if you wanted to obtain more precise information about the effect of these minerals on leaf or even root growth?



# INVESTIGATION

## Seed Germination and Controlling Variables

### GRADES 7 AND UP

**Purpose:** To collect and interpret data collected from a series of seed germination experiments in your NFL Learning Garden. In these situations, you will control certain variables (e.g., temperature of soil and/or planting depth) and make measurements of the **plant response** that is **germination**.

### Part 1 - Soil Temperature:

In this part, you will be looking at the possible relationship between the temperature of the soil and the time it takes for seeds of a certain plant to germinate (sprout).

**Variables:** Planting Depth (cm below soil surface), Germination Time (in days), Temperature (degrees C). Which of these variables HAVE to be controlled?

**Scientific Design:** Design an experiment for your NFL Learning Garden that will allow you to collect some data about how temperature of the soil surrounding the seeds affects the time to germination. Here are some things to think about:

- > How will you be able to see your seeds as they germinate?
- > What variable is the CONTROL (does not change), what variable is the INDEPENDENT (MANIPULATED) one, and what variable is the DEPENDENT (RESPONDING) one?
- > What kitchen instrument would be good for measuring temperature?



**Table 1 - Soil Temperature Data:**

Seed Sample Number	Soil Temperature (C)	Germination Time (days)
1		
2		
3		
4		
5		
6		

## INVESTIGATIONS

### Seed Germination and Controlling Variables (continued)

#### Part 2 – Planting Depth:

In this second part, you will be looking at the possible relationship between the planting depth of the seeds in the soil and the time it takes for seeds of a certain plant you are experimenting with to germinate (sprout).

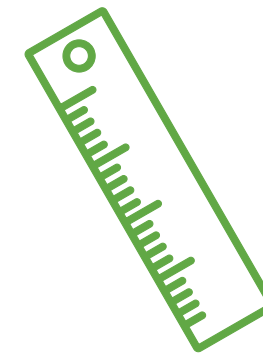
**Variables:** Planting Depth (cm below soil surface), Germination Time (in days), Temperature (degrees C).

**Scientific Design:** Design an experiment for your NFL Learning Garden that will allow you to collect some data about how planting depth in the soil surrounding the seeds affects the time to germination. Here are some things to think about:

- > Recall, how will you be able to see your seeds as they germinate?
- > What variable is the CONTROL (does not change), what variable is the MANIPULATED one, and what variable is the RESPONDING one?

Table 2 – Planting Depth Data:

Seed Sample Number(s)	Planting Depth (cm)	Germination Time (days)
1	1	
2	2	
3	3	
4	4	
5	5	
6	6	





## INVESTIGATIONS

### Seed Germination and Controlling Variables (continued)

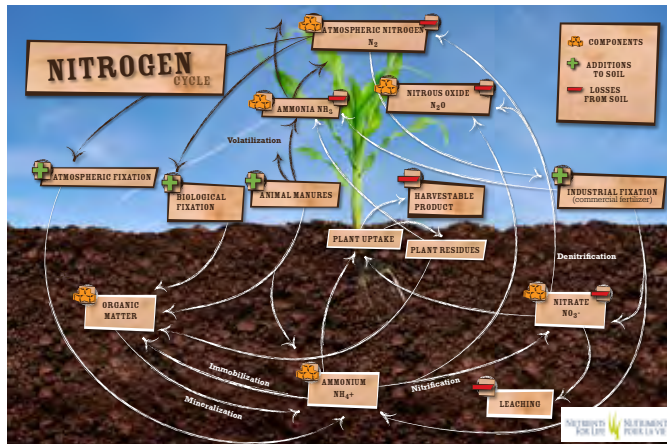
**Some Research:** Now it's time to determine what the best nitrogen content is for your soil based on what sort of plants you are to grow and conduct further experiments with. From there, you will be able to set up a portion of your NFL Learning Garden to experiment with different amounts of added nutrients (like nitrogen).

### Nitrogen Cycle Challenge

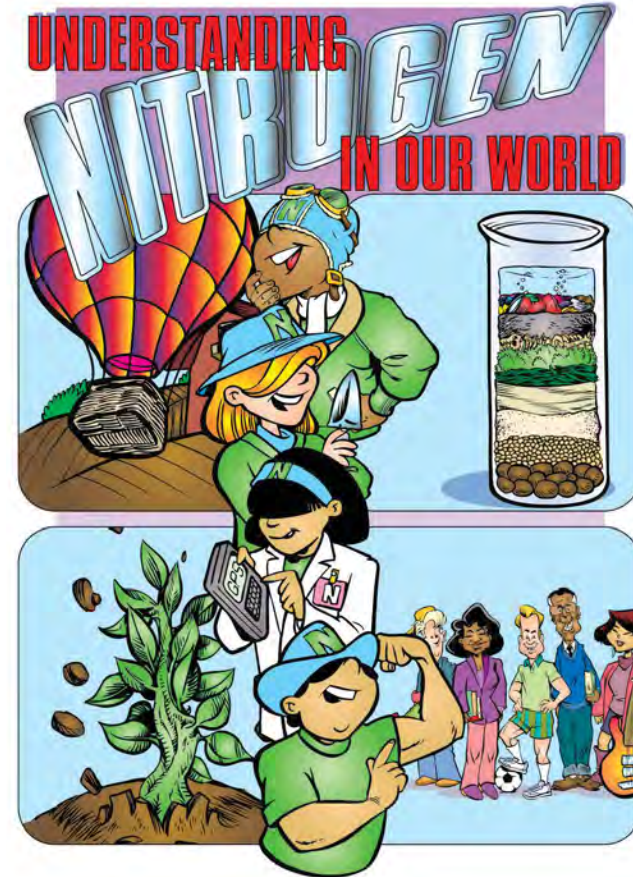
Choose your adventure



In the Nitrogen Cycle Challenge online game, students will work their way through one of two scenarios, filling in the Nitrogen Cycle and learning and how it matters to our crops and gardens.



Download our [Nitrogen Cycle Poster](#)

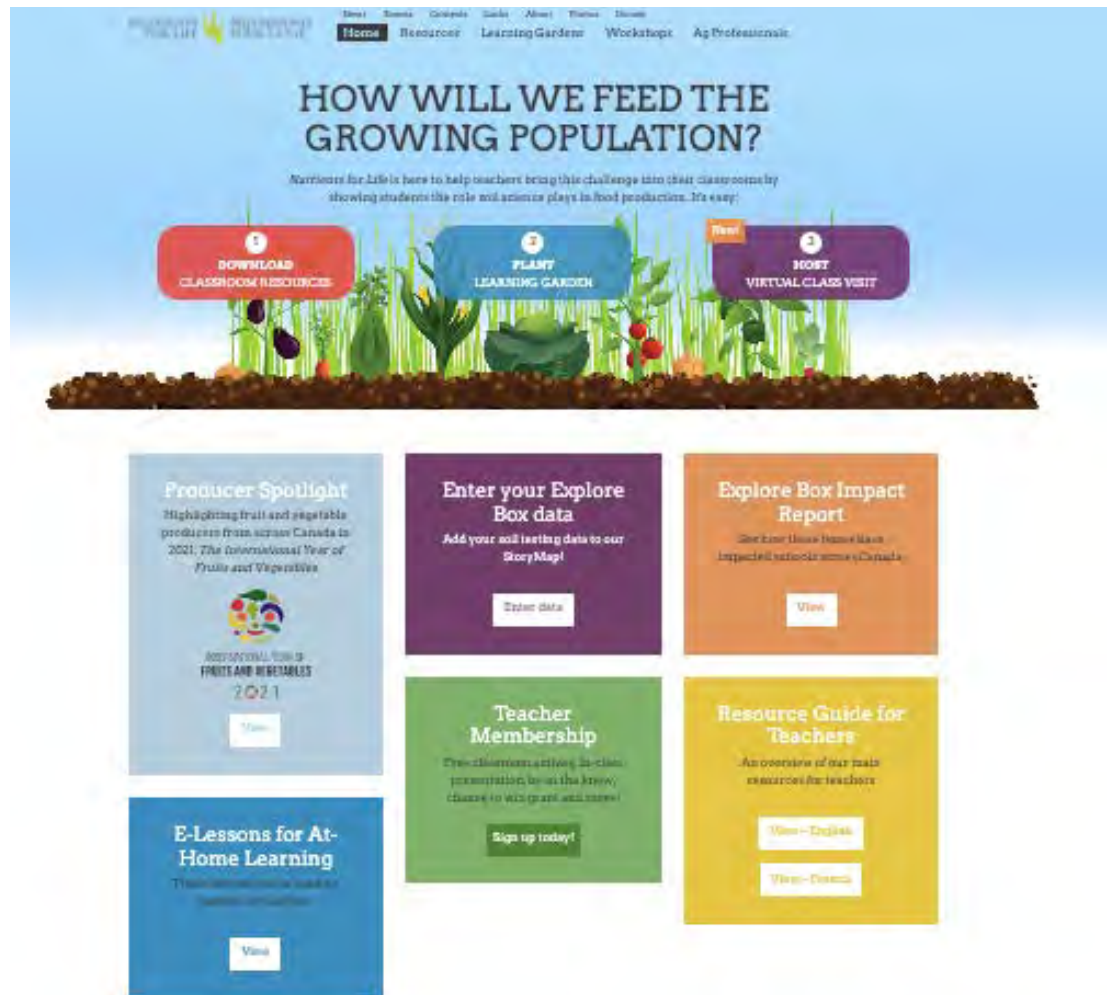


Download our [Understanding Nitrogen in Our World](#) booklet to learn more about N



# THE NUTRIENTS FOR LIFE Website

The Canadian Nutrients for Life [website](#) features great resources for educators and students alike!



## THE NUTRIENTS FOR LIFE

Website (continued)

### RESOURCE CENTRE

Need classroom resources? The **resource page** of the site provides educators with a wide variety of activities and resources. Great provincial, lessons, activities, field trips and videos are located on the resource page. All Nutrients for Life resources are linked to all provincial science, social studies, and health outcomes for every grade level.

The screenshot shows the 'RESOURCES' page of the Nutrients for Life website. At the top, there is a navigation menu with links for Home, Resources (highlighted), Learning Gardens, Workshops, and Ag Professionals. Below the navigation is a large green banner with the word 'RESOURCES' in white. Underneath the banner is a search bar and a list of resource categories: Classroom Lessons, Games, Videos, Print, Readers, Magnets, E-Lessons, and Search Provincial Standards. A promotional banner for membership is visible, stating 'Become a member and receive free shipping! Join now for free.' Below this, there are two resource cards. The first card is titled 'Nourishing the Planet in the 21st Century' and features an image of people in a field. The second card is titled '4R Nutrient Stewardship' and features an image of a field with a 'View resource' button. Below the cards, there is a detailed description of the 'Nourishing the Planet in the 21st Century' resource.

**Nourishing the Planet in the 21st Century**  
*Soil science and sustainability*

**4R Nutrient Stewardship**  
*Introduces the 4R framework*

**View resource**

**View resource**

A classroom resource on soil science and agricultural sustainability. This resource targets middle- and high-school students in Canada with engaging learning materials on the important role plant nutrients play in global food security and the creation and maintenance of green spaces.

Introduces students to sustainable agriculture, more specifically 4R Nutrient Stewardship and its framework including using the 4Rs (Right Source at Right Rate, Right Time, Right Place).

## THE NUTRIENTS FOR LIFE Website (continued)

### Also on the Foundations website:

- > The ability to book an in-person or virtual classroom presentation
- > Become a teacher member and order all classroom resources
- > Sign up for a Journey 2050 presentation
- > Learn about our partnership with other organizations across the country
- > Learn about which teacher conventions NFL staff will be attending in our events section
- > For Industry members the ability to order presentation kits and other classroom materials
- > Sign up for our newsletters
- > View past and present contests

Nutrients for Life continues to add more resources and activities, so, check back with us often for new materials!



## THE NUTRIENTS FOR LIFE

Website (continued)



**Kent Lewarne** | *Manitoba*

“Regional Managers are the link between teachers, students and the wealth of valuable soil science / nutrient resources that NFL has to offer.”

- **Kent Lewarne**



**Ray Cochrane** | *Saskatchewan*

“NFL provides me with the opportunity to assist teachers and their students to gain an insight into the areas of agriculture and environment.”

- **Ray Cochrane**



**Cheryl Boguski**

“I enjoy connecting teachers with engaging resources and activities that allow their students to experience the real world of soil science, plant growth, 4R Nutrient Stewardship and Watershed health.”

- **Cheryl Boguski**



**Tamara Sealy** | *Atlantic & Ontario*

“Coming from an agricultural background, I feel that the majority of the population do not understand how their foods are produced. Agriculture is exciting!”

- **Tamara Sealy**



### WANT A NFL LEARNING GARDEN?

JOIN! Do you want a NFL Learning Garden? Join the growing number of schools that want their own garden by downloading some useful information to take your first steps toward a NFL Learning Garden. <https://nutrientsforlife.ca/learning-gardens/grant-application>

Another option is to contact one of our [Regional Managers](#) for advice on how to get started.

Education is at the roots of understanding the living world around us. Learning Gardens are outdoor, educational environments where students discover soil science and agricultural sustainability through hands-on practice. With Learning Gardens, students explore how modern agriculture, gardening, and plant growth play a valuable role in food production, health, and sustainability. Learning Gardens have the added benefit of physical activity, building environmental awareness and stewardship skills, and fostering collaboration, teamwork, and leadership in the community.

## THE NUTRIENTS FOR LIFE

Website (continued)

### FIND A NFL LEARNING GARDEN IN CANADA!

Need to know what other schools in Canada are doing? The SCHOOL PROFILE area allows educators to FIND a NFL Learning Garden in their province or any other region in Canada. All schools that have partnered with Nutrients for Life have a profile listed on the site. The profiles provide information on each NFL Learning Garden including the location, when they started gardening and the number of students that are involved, information about their garden and what plants were grown there.

On the following page is a School Profile for West Riverview School, Riverview, New Brunswick.



NFL School Learning Garden Map



## THE NUTRIENTS FOR LIFE Website (continued)

### SCHOOL PROFILE

#### About our Garden

Please describe your garden, is it raised beds, in the ground, do you have a greenhouse?

We have 6 raised garden beds that are 3 m x 1 m.

What vegetables/fruits do you grow in your garden? What do you have a difficult time growing in your school garden?

We grew all sorts of vegetables this year:

- Successful vegetables: potatoes, carrots, tomatoes, pumpkins, beans, corn, cucumbers, zucchini.
- Not so successful: eggplant, peas.

Why did you school decide to add a school garden?

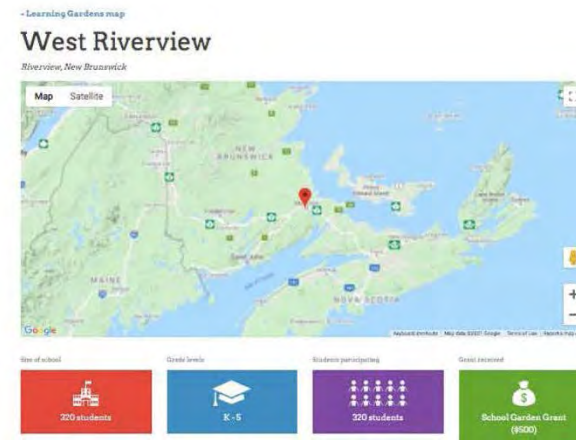
We decided to add a school garden to have a hands-on learning experience for our students. We wanted to demonstrate that vegetables come from a garden or farm and not just the grocery store. We wanted our students to think globally, but act locally.

What classes participate in the garden, what subjects are taught in the garden?

All classes participated in our garden. Topics touched on were lifecycles, pollination, vegetable types, indigenous planting practices among other things.

Who manages the garden day to day? Who manages the garden over the Summer break?

School staff and volunteers managed the garden throughout the summer. Many community members helped with the set up.



What do you do with the harvest from your garden? Do you have a harvest celebration? Do you use it in the cafeteria, or culinary classes? Do you donate some of the produce?

We decided to have a school soup luncheon with our vegetables. We connected with the New Brunswick Community College, culinary classes to help make the soup. We fed over 320 students and guests.

Do you have community involvement? Do you have parents and volunteers? Have you been able to source other funding to help your garden grow?

We had lots of parent volunteers. We also had help from Ayles Landscaping, Home Hardware, Kent Building Supplies, the Co-op Feed Store and the New Brunswick Community College.

What are your future plans for the school garden?

We would like to expand our garden with more boxes, for pollination purposes. We want to start composting and using grow lights to start our plants in the spring.

Any words of encouragements/tips for a school starting a school garden?

Go after local businesses for help. Many businesses want to help schools and don't know how. This is a great way for them to contribute.

## THE NUTRIENTS FOR LIFE

### Website (continued)

#### Nourishing the Planet in the 21st Century

One of the featured resources on the Nutrients for Life website is:

Nourishing the Planet in the 21st Century! Available [online](#) at: Nourishing the Planet in the 21st Century is THE full curriculum resource module on soil science and agricultural sustainability available from Nutrients for Life. And it is available to educators and the Canadian public. The modules target middle and high school students in Canada with engaging learning materials on the important role plant nutrients play in global food security and the creation and maintenance of green spaces.

All materials are free to download order on the Nutrients for Life website. The module contains six lessons:

1. In Search of Essential Nutrients
2. Properties of Soil
3. Plant-Soil Interactions
4. Plant Nutrient Deficiencies
5. Plant Nutrients and the Environment, and
6. Nourishing the Planet in the 21<sup>st</sup> Century

Each lesson is designed to work collectively or as a standalone and includes an overview of objectives, major concepts, student handouts, instructional background and teaching guides.

All curriculum materials can be downloaded and teacher lesson guides are including with the module.

It is also available in French

# Nourishing the Planet in the 21st Century



NUTRIENTS  FOR LIFE

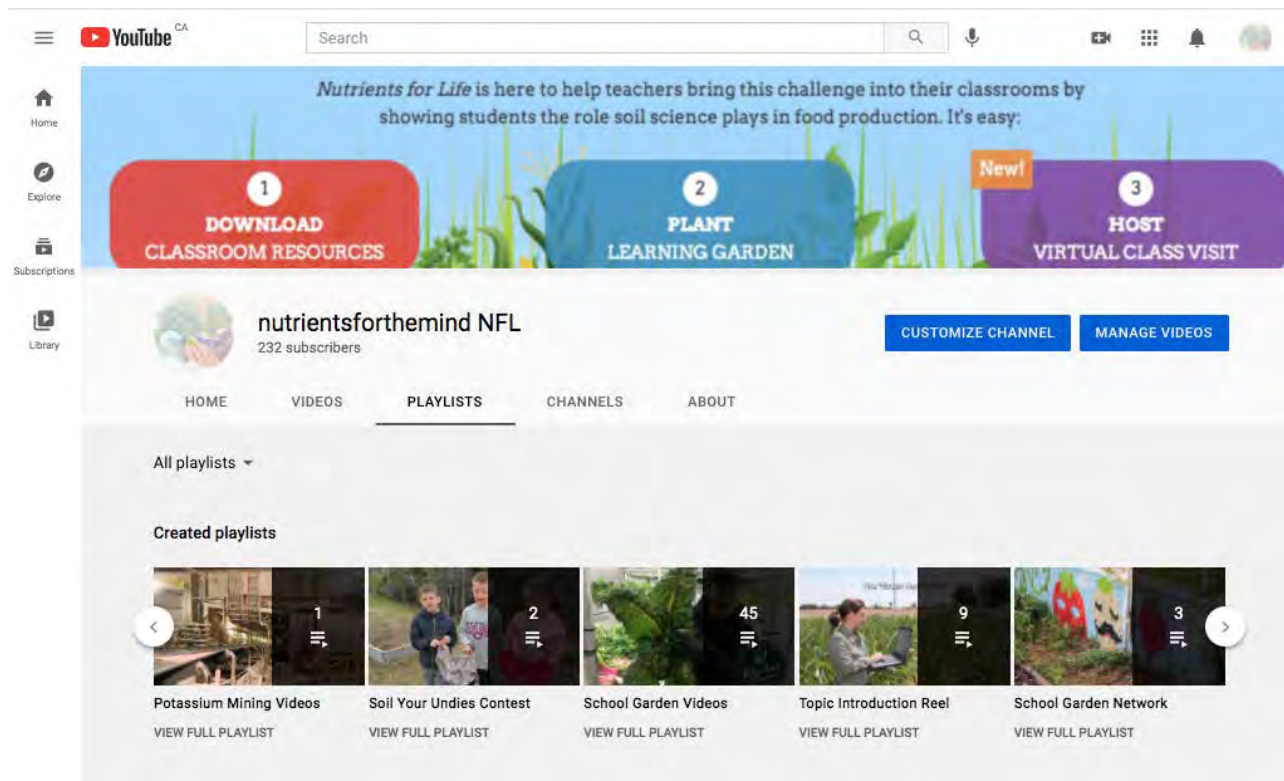
# THE NUTRIENTS FOR LIFE

## Website (continued)

### Additional Resource Materials

In addition to our curriculum resources above, Nutrients for Life has developed a YouTube page that houses many of our videos and school garden video submissions.

Check our Nutrients For Life Foundation channel by clicking [here](#).





# SEE THE WORLD As Your Classroom!

Educators would view the NFL Learning Garden as a natural extension of their classroom and use the community as the classroom!

NFL Learning Gardens provides opportunities to strengthen relationships between the school and the community. Create linkages between your school and your community by involving local businesses and their representatives in activities related to your NFL Learning Garden.

Consider how parents could be involved with your NFL Learning Garden. Perhaps a group of parents can assist in tending to the garden over the summer months.

Consider linking after school programs such as 4H clubs, Boy Scouts, Girl Guides to NFL Learning Gardens.

Consider how businesses within the community can assist with the NFL Learning Garden. Perhaps a business can “sponsor” a school for the year. If there is a greenhouse business near your school, encourage staff to work with the school however they wish to participate. Participation could include anything from providing tools to advice to providing lumber for the building of composters near the NFL Learning Garden. Businesses could also be invited into the school during assemblies or for student presentations that highlight the NFL Learning Garden and their contributions towards making it a success.

Consider creating linkages between your school and the surrounding community through excursions that involve local organizations. Visit museums that focus on agriculture, gardening, soil science and agricultural sustainability. The Canadian Agricultural Museum, for example, has over 170,000 visitors annually learning about the 13 essential nutrients that are found in soil, the three most important to soil health and food production – Nitrogen, Phosphorus and Potassium. The Museum features a hydroponic and living wall lab for education programs. There may be similar organizations in your area that can bring the world to your classroom!

## Consider this

There are a number of questions that emerge as a teacher or group of educators embark on the creating of a NFL Learning Garden that will need to be answered over time.

Questions such as:

- > Who will take care of your garden over the summer months? Consider developing a maintenance plan for the summer.
- > Who will clean up the garden? Consider developing a multi- year NFL Learning Garden plan for the school.
- > Where will you store supplies/produce/ equipment? Consider constructing a storage shed.

# HARVEST AND CELEBRATE!

Harvest and related celebrations are an important component of NFL Learning Gardens and human cultures. Some key components to a successful harvest celebration would include:

- > A celebration assembly and sharing of the harvest with the broader school and community in a meal or snack. (additional food can be added to ensure all are fed). Student preparation and cooking of produce grown is an important element and should be included when and where possible.
  - > Calculations of the total produce grown by the project - by plant, class, or by area (if comparative zones are used). Production can be converted to “field scale” using scales to convert to pounds per acre.
  - > Recognition of volunteers, sponsors and lead school staff in a public forum (ex., newsletter, website, assembly) to model commitment to the project to students.
  - > Introduction of the “next generation” (next grade, next group) to bounty of the garden. This creates anticipation and sense of belonging in students new to the program.
  - > Teacher professional development days. Use the time of year for harvest and celebration by inviting other educators from other schools to come to your school to share and celebrate with your school. Consider it a teacher professional development day and encourage your colleagues to create a NFL Learning Garden at their school!
- Include us! Please invite representatives of Green Manitoba and Nutrients for Life to your celebration events along with media and local newspaper representatives. We would appreciate receiving photos, newspaper clippings or anything concrete related to your celebration event.
- Consider these ideas on how to celebrate and showcase your NFL Learning Garden!
- > Salad Bar! Set up a salad bar and have students run the program over the course of the harvest or for the entire school year.
  - > Garden Harvest! Celebrate your garden harvest with your community. Invite them in to celebrate and taste the many fruits of your labour.
  - > Donate! Share the school garden harvest with a local food bank or family.
  - > Giving to the less fortunate! Woodlawn Early Years School in Steinbach, Manitoba holds a garden
  - > Harvest Feast! In September when students come back from summer vacation, celebrate with a harvest feast, have the students set up a harvest display where students show off the produce that they've been caring for as a harvest feast where they make food using the produce.

# NFL LEARNING GARDEN Support Program

## PROGRAM HIGHLIGHTS

Incentive Payments:

- > The NFL Learning Garden Support Program will support schools at a funding level of \$3,000 over two years (\$2,500.00 upon signing of Contribution Agreement); After YR1 \$500.00 to establish NFL Learning Gardens at K- 12 schools across Canada.
- > The NFL School Garden Support Program will support schools at a one-time contribution funding level of \$500.00
- > School garden applications are accepted throughout the year on the website with a deadline to apply of March 31 every year.
- > Successful schools are contacted in April each year by a Regional Manager.

Teacher Training: Regional Managers are available either in person or virtually to connect with teachers to provide pedagogical assistance or to conduct professional development workshops with NFL Learning Garden schools.



## NFL LEARNING GARDEN Support Program (continued)

### School Learning Garden Program

Schools can apply online at:

<https://nutrientsforlife.ca/learning-gardens/grant-application>

#### Gather your information

On the application form, you'll be asked for the following.

- > School name and contact info
- > List of colleagues that will be assisting
- > What type of garden you'd like to plant (vegetable, flower, combination vegetable- flower, other)
- > Who will be using the Learning Garden (single class, multiple classes, entire school)
- > Approximately how many students will use the garden per year
- > What grades will be participating
- > How you will involve your students (Options: planning, preparing the soil, choosing plants, watering, weeding, fertilizing, observations, experiments, lessons)
- > The subjects you'll be incorporating (Options: science, health & life skills, phys ed, career education, language arts, math, environmental education, aboriginal skills, fine arts)
- > Which grant you're applying for (\$500 or \$3,000 or either)
- > What will the money be used for (Options: Building supplies and tools, plants and soils, garden maintenance supplies, contractor time and support)

- > You'll have a chance to upload photos, sketches and plans to see your space and ideas
- > Whether the grant is the sole funding source or if you'll be augmenting it with other funding
- > What your plan will be for maintaining the garden during the summer break

ALL SUCCESSFUL APPLICANTS WILL BE NOTIFIED BY A REGIONAL MANAGER IN APRIL

A contract will be sent for authorization by teacher leads and administration to confirm the details and reporting requirements.

Once NFL has received the signed contract the cheque will be issued to the school and mailed to the lead teacher

#### Reporting

A video or compilation of photos in a PowerPoint will need to be submitted to [info@nutrientsforlife.ca](mailto:info@nutrientsforlife.ca) or a Regional Manager by October 31st. This video can be 2-4 minutes in length and showcase how the funds were used to engage students and school community.

Each school will be required to submit an online form (Your Regional Manager will provide the link) to add your school to our Nutrients for Life School Learning Garden Map. This form will also collect data on school metrics and engagement. This form is due October 31<sup>st</sup> of the year the grant was given.

In the case of a Learning Garden Grant (\$3000), two videos will need to be submitted, one on October 31<sup>st</sup> of grant year, and one on October 31<sup>st</sup> of second year.

## NFL LEARNING GARDEN Support Program (continued)

### Make the Most Out of Your School Learning Garden

**Utilize NFL Resources:** Educators use the NFL Learning Garden as a site for student learning using some of the resources developed by NFL. Use 4R Nutrient Stewardship: Right Source, Right Rate, Right Time, Right Place. Record nutrient use using the source, rate, time, placement of nutrients. Lessons should be linked to sustainability – looking at the economic, social and environmental global impact.

Invite us to Celebration Events! Educators are encouraged to invite Regional Managers to their celebration and harvesting events. Also feel free to invite local media/newspapers to your celebration events. Include NFL in Communications about the NFL Learning Garden!

Acknowledge the Nutrients for Life NFL Learning Garden Support Program in all communications that related to your schools' NFL Learning Garden.

**NFL Project Debrief.** Educators can debrief Nutrients for Life Regional Managers in the fall to outline the site development, programs and activities undertaken in the NFL Learning Garden, harvest celebrations, and community impact. This would include discussion on the implementation of the program and areas for further refinement. Parts or all of this discussion would be shared with the public through Nutrients for Life Events/Media.

**Hold Teacher Workshops** at your NFL Learning Garden site! Educators invite NFL Regional Managers to their school to conduct a Teacher Professional Development Workshop using the NFL Learning Garden Site and share their experiences with other educators. Soil testing kits will be provided.

**Share the NFL Learning Garden Manual** for Educator with others! Educators are encouraged to share this Educators'

Guide with their colleagues.

For More Information Contact: E-mail: [info@nutrientsforlife.ca](mailto:info@nutrientsforlife.ca)



# REFERENCES

NFL Learning Garden Network [Website](#)

Alberta Agriculture and Rural Development (2011). [A Guide to Growing School Gardens in Alberta](#).

Plant, Grow, Share a Row (Compost Council of Canada): [Grow Your Veggie Garden Guide](#) - English

[Community Garden Start-up Guide](#) by Rachel Surls of the University of California Cooperative Extension



# CURRICULAR CONNECTIONS

## **CropLife Canada**

Thanks to our friends at CropLife Canada for developing and sharing their resources. Learn more about them at [croplife.ca](http://croplife.ca)

### **Real Farm Lives**

Real farms. Real families. Real crops. Real challenges. A selection of videos highlight real Canadian farmers.

### **Plant Science 101**

Plant science is the study of any plant system. Two ongoing areas of innovation are: creating tools that protect crops from insects, weeds and diseases; and developing stronger, healthier, more useful varieties of crops. Both help farmers sustainably grow healthy foods – for Canadians and for other countries around the world, driving economic growth in the process.

### **Facts and Figures**

Learn about plant science innovations, modern agriculture and why they matter with these facts, figures and statistics.

## **AG Careers.com**

Thanks to our friends at Ag Careers for developing and sharing the following resources. Learn more about them at [agcareers.ca](http://agcareers.ca).

### **Career Profiles**

Browse more than 250 career profiles and select a pathway of interest to you.

### **Education Profiles**

Explore profiles for agricultural education.

## **Other Resources**

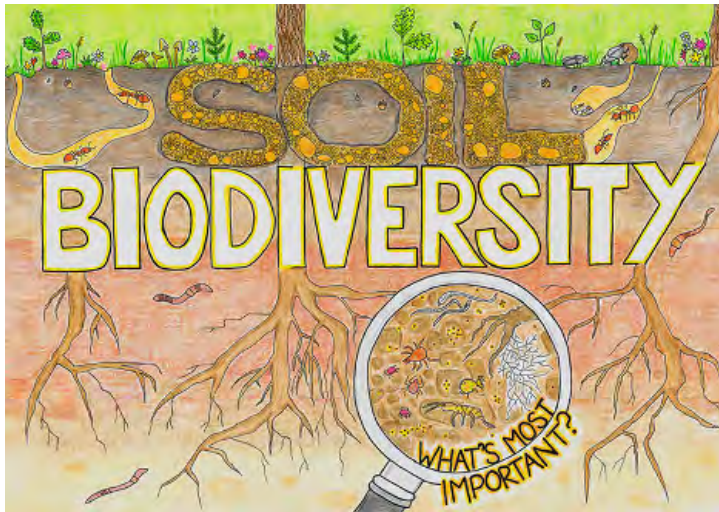
### **Utensil Guide**

Your easy-to-search plain language guide to food and farming. Terms, acronyms and jargon put into everyday words, all in one place. This isn't a search engine with millions of words, or a technical reference to write a best management practice. It's meant for real people and real conversations, from kitchens to boardrooms to fields.

## CURRICULAR CONNECTIONS (continued)

### Soil Biodiversity: What's More Important? – online book

Online Book by Dr. Katelyn Lutes and Dr. Benjamin Ellert, Agriculture & Agri-Food Canada.



### Gardening at USask

Gardening advice for local area.

### Hope is Growing

In partnership with [Communities in Bloom](#). Plant a Hope Garden in 2021.

### C:N and decomposition demonstration

This demonstration by Dr. Caley Gasch illustrates how organic residues are broken down in the soil by microbes. We'll see how the carbon and nitrogen content of plant residues influences cycling rates and nitrogen availability, and how the nutritional needs of microbes drives this process. You'll learn about decomposition at a molecular level and how it relates to residue management and carbon storage in your soils.

### Ag More Than Ever

### Nutrien Resources

### IPNI

### 4R Nutrient Stewardship

### Canada's plant health hero challenge



## **CURRICULAR CONNECTIONS** (continued)

### **Events**

**Garden Days Canada**

**Ag Day In Canada**

### **Organizations**

**Nutrients for Life USA**

**Communities in Bloom**

**Inside Education**

**Encounters with Canada**

**Canada Wide Science Fair**

**PEI Agriculture Sector Council**

**Farmer's Edge**

**4H**

**Soil Conservation Council of Canada**

**Canadian Centre for Health and Safety in Agriculture**

**World Soil Day - Food & Agriculture Organization of the United Nations**

**World Soil Day - United Nations**

**Journey North Tulip Test Gardens**

# Vegetable gardening 101

Planting your own vegetable garden has many benefits – fresh, seasonal veggies right outside your door, outdoor physical activity, and a boost to your mental health. Here are some tips to get you started.

## Plan

- Choose a spot with plenty of sunlight.
- Make sure you have easy access to water.
- Use loose, well-drained soil.
- Map your garden. Plant tall crops like corn north or west of short crops. Peas, green beans and cucumbers can be planted together. Tomatoes grow well in pots.
- Add a few companion flowers in your garden like marigolds or sunflowers.



**Marigolds and sunflowers naturally discourage bugs from invading your garden.**

## Plant

- Start your seeds for tomatoes, peppers and broccoli early indoors.
- Wait until after the last spring frost to start planting outdoors.
- Check with your garden supply retailer for high-quality seeds and plants.
- Plant in straight rows to make cultivating, harvesting and insect control easier.
- Space seeds uniformly to give your veggies room to grow to their full size and best flavor.
- Plant at 1-2 week intervals for a continuous supply of vegetables.
- Follow the directions for applying a good quality fertilizer (plant food).
- Water plants regularly, especially in the early stages. Try to water early in the morning.



**Remove the leaves on the bottom third of tomato plants to help prevent mold and rot.**

## Protect

- Monitor regularly for insects, weeds and diseases. Catching the problem early is key!
- Remove weeds and insect-ravaged plants.
- Cultivate (work the soil) and mulch to keep weeds at bay.
- Encourage beneficial insects like spiders that eat unwanted intruders in your garden.
- There are times when you may need to apply a pesticide to control your specific pest problem and keep your garden healthy.



**All pesticides available in stores have been reviewed and approved by Health Canada and are safe for people, pets and the environment. Just follow the label directions.**



**You are now set for success – happy growing and healthy eating!**