

NWT

School Gardens

Garden Curriculum for Grade 3

Based upon a highly successful gardening program at Weledeh School

In Yellowknife, Northwest Territories



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Why Garden with Students?



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Why Garden with Students?

A school garden is a powerful educational tool. A school garden may consist of a few herb pots in a window or larger plots outside. Regardless of size, the real life experiences these living laboratories offer provide stronger lessons than those found in textbooks.

Research shows that gardening in schools can improve students' attitudes towards themselves, others and school; enhance their relationships, promote environmental awareness, improve test scores and encourage them to make nutritional food choices.¹

Finally, growing gardens with students can teach the skills they will need to be able to grow their own food and contribute to a local food system. In Northern Canada, where food availability is based upon large transportation distances, this may be especially beneficial in enhancing food security.

¹Reviewed online in: California School Garden Network, 2010. *Gardens for Learning*. Retrieved from: http://www.csgn.org/sites/csgn.org/files/CSGN_book_0.pdf

Growing Together at Weledah

Growing Together at Weledah is a highly successful gardening program that is a product of the partnerships between Weledah Catholic School (WCS) in Yellowknife, the Yellowknife Community Garden Collective (YCGC) and Ecology North. The program runs for 6 weeks in May and June, with a harvest celebration in early September. The partners coordinate key logistics together, with main tasks summarized as follows:

- WCS provides coordination of grade 3 classes, a space to garden in the onsite community garden and messaging to parents and other school staff. The school also takes a lead role in coordinating Garden Club
- YCGC coordinated the construction of the garden, provides tools and mentorship for students and cares for the student garden plots over summer.
- Ecology North facilitates six gardening lessons for all students (usually Grade 3), as well as coordination of overall communication between partners.

Time Line of the Growing Together Program at Weledah Catholic School

- i. 2010 – Principal Merrill Dean initiates the process for a school garden – Yellowknife Community Garden Collective (YCGC) begins process of building the garden.
- ii. 2011 – First year that the garden plots are ready and Ecology North, YCGC and WCS partner to provide on-site gardening instruction to Grade 3 students.
- iii. 2013 - Garden Club is created by Weledah teacher based on the desire of students to continue being involved with the Garden.
- iv. 2012 to 2016 - The Growing Together at Weledah program continues to thrive with support from Ecology North and YCGC.

The following information is meant to help replicate a similar experience at other schools in the NWT, with suggestions how to adapt if some of the same components are not available.

For more information on the Growing Together at Weledah, please refer to the Weledah Case Study.

How to Start a School Garden

Build Connections

The school administration is vital in generating support, clarifying policies and building connections. Seeking their partnership is an important part of having a successful garden.

A community garden or garden collective is an excellent partner as well, as they may be able to provide space for gardening, assistance in creating a garden, mentorship and summer care.

In communities without a community gardening group, elders, other local gardeners and nurseries can provide excellent advice, assistance and mentorship.

Decide on a Garden Style

a. Planter pot garden

Gardening in pots is an easy way for a school to introduce gardening to the classroom. All the lessons in this curriculum can be taught using pots as a medium for growing.

The pots will need an area with good lighting for growth. A South or West facing window in classroom, hallway or alcove would be suitable. Alternatively, pots may be grown in protected outdoor space like a courtyard.

Inexpensive pots – yoghurt or ice cream containers, Rubbermaid bins, commercial food grade buckets, newspaper pots, large cans

Pros: low initial investment, size can be varied, easy to start, can be moved indoors/outdoors, students can have their own to take home in the summer

Challenges: Pots can require a fair bit of watering and some plants need a fair bit of space (e.g. tomatoes, peppers), drainage may be affected by pot material (e.g. clay dries out faster). In addition the quality and availability of potting soil must be considered.



Photo: <https://schoolgardening.rhs.org.uk>



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How to Start a School Garden

Plants that grow well in pots include:

- Tomatoes – note these will need larger pots
- Beans and peas – note these benefit from something to climb
- Greens – lettuce, spinach, kale,
- Herbs – especially dill, basil, mint

b. Outdoor Raised Bed(s)

This type of planter is often used for community gardens as the raised bed format allows for clear definition of garden beds and earlier thaw of the soil. They are easy to construct – many designs can be found online.

Pros: Can be designed in sizes suitable to children and space, more permanent, can lead to community involvement (e.g. for summer watering or in partnership with a community group), can be partially filled with local soil/dirt, more space for planting and usually produces more yield.

Challenges: Need to be built, need to be watered over summer, usually need to purchase some gardening soil and replenish nutrients annually, certain plants may still need to be started indoors in pots in order to mature in short growing seasons. In addition, the plants do the majority of their growing while the students might be away on summer vacation.

Easy plants that grow well in raised beds:

- Bulbs/Tubers – Potatoes, green onions
- Greens – kale, spinach, salad, chard
- Beans and peas – note they benefit from something to climb such as netting or bamboo sticks
- Zucchini – note these will need to be started indoors
- Root vegetables – Carrots, beets



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How to Start a School Garden

c. Perennial Garden

This is a garden composed of trees, shrubs and sometimes herbaceous perennials that will grow year after year. Most of the edible plants in the north are berry plants but there are many medicinal plants as well.

Pros: after 2-3 seasons plants no longer need watering as they are acclimatized to the area, can be used to teach about traditional plant use, will feed local wildlife, more permanent, shrubs and trees can be used for aesthetics and learning in all seasons

Challenges: Too slow to start as seed so need to purchase as a seedling or grown shrub. Students don't have the option to plant in successive years, the plant life cycle may not be completed annually or be easy to study, wildlife may eat young plants or all the fruits, do need to be watered 2-3 seasons in order to establish, need to find appropriate plants for your community and a supplier there-of

Plants to grow in a Northern perennial garden:

- Berry Bushes: haskaps, currants, crowberry, cranberry
- Herbaceous perennials: strawberries, mountain avens, wild mint
- Trees (depending on location): aspen poplar, larch, white spruce, paper birch

More perennial plants can be found at:

1. Wild and Wacky Plants of the NWT: http://nwtarts.com/sites/default/files/wild_and_wacky_plants_of_the_nwt.pdf
2. Plant Watch <https://www.naturewatch.ca/plantwatch/>
3. Local elders are an invaluable resource in regard to traditional plants, including medicinal and edible plants



Photo: <https://ykgardener.wordpress.com/tag/planters/>

How to Start a School Garden

Find Funders

There are many resources available to help start a gardening project.

Local nurseries and hardware stores may help you by donating tools and materials. Your district education authority may also have funds for such a project.

Other funders include:

- Tree Canada: The Edible Trees program provides up to \$4000 for communities planting edible trees and shrubs. The Greening Canada's School Grounds program provides up to \$3,000 for the creation of perennial plant gardens on school grounds. <https://treecanada.ca/en/programs/>
- Evergreen Canada: provides grants from \$3500 to \$10,000 for school and community gardening projects. <http://www.evergreen.ca/get-involved/funding-opportunities/green-grants/>
- GNWT Industry, Tourism and Investment: The Small Scale Foods Program provides funding to install and establish self-sufficient, community-based gardens and greenhouses in communities. Contact your local representative for more information. <http://www.iti.gov.nt.ca/programs-services/small-scale-foods-program>
- WWF: Go Wild School and Go Wild Community grants. Support gardens for wildlife and the celebration of nature. \$1000-10,000. <http://www.wwf.ca/takeaction/gowild/>
- TD Friends of the Environment: Environmental Grants. Usually about \$2,500 towards gardening and educational projects. <https://fef.td.com/funding/>



How to Start a School Garden

Further Information

A great resource for gardening in the North is the Northern Gardening Manual. This resource includes information about site selection, preparation and what to plant. http://www.farmnwt.com/sites/default/files/113854gardenmanual_press.pdf

If you would like some more information about planning and planting a vegetable garden a great basic guide can be found at: http://www.growarow.org/pdf/Pargar_Workbook_Final.pdf.

Ag in the Classroom NWT Educational Kits: The info material in these education kits include lesson plans, and guided activities, along with carefully selected hands on materials, literature and great experiments to teach kids about growing food in a very visual and tactile approach. These kits include cheese making kits, bee pollen, honey, beeswax, seed germination kits, grain mills, even a butter churn, and much more. <http://www.farmnwt.com/content/ag-classroom-education-kits>

Kit topics:

1. Where does food come from
2. Soil, composting and fungi
3. Seed germination
4. Gardening
5. Insects and Pollination
6. Livestock

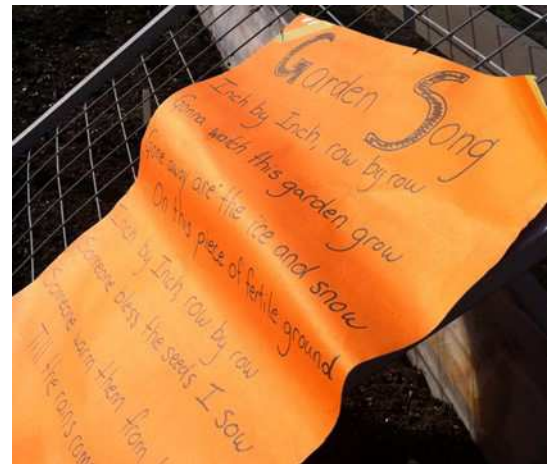
Schools and other education facilities can to borrow these kits (that come in a big box on wheels) from the TFA. To inquire please contact the office at (867) 874-4706.

Garden Routine

Garden Routine

Routines help focus the students on the task at hand. The garden routine is used to start each lesson and can be created with students and/or by volunteers. Some ideas are to start with a reflection, write a sentence in a garden journal, sing a song or say a poem or prayer. The start of a lesson is also a great time to review the garden rules.

- Sample routine components: Inch by Inch Garden Song
 - ◊ Video: <https://www.youtube.com/watch?v=D3FkaNOHQgs>
 - ◊ Lyrics: <http://www.azlyrics.com/lyrics/johndenver/gardensong.html>
- Sample poem: <http://www.dltk-holidays.com/spring/poem/my-spring-garden.htm>



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My Spring Garden

Here is my little garden,
Some seeds I'm going to sow.
Here is my rake to rake the ground,
Here is my handy hoe.

Here is the big, round yellow sun;
The sun warms everything.
Here are the rain clouds in the sky;
The birds will start to sing.

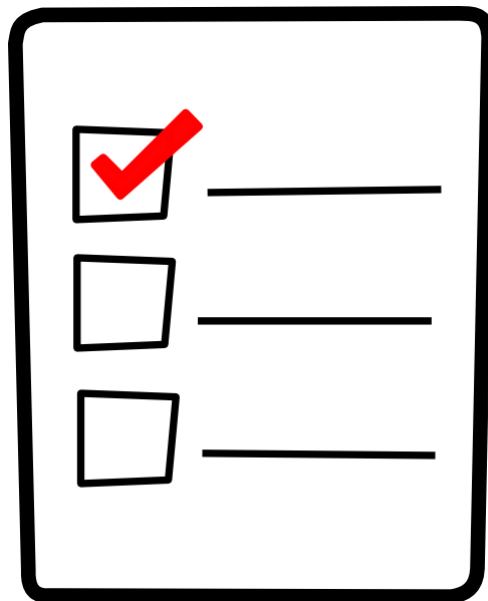
Little plants will wake up soon,
And lift their sleepy heads;
Little plants will grow and grow
In their little, warm earth beds.

Garden Rules

Regardless of the size and location of the garden it will be very important to establish some rules in order to protect the safety of plants and children and to avoid the garden becoming a distraction. Student involvement in creation of the rules will help with enforcement.

Here are some ideas to guide your class discussion:

- How will the rules be displayed or taught for all to see or hear?
 - ◊ Signs, or announcements over the school intercom
- Who needs to know these rules?
 - ◊ Students, staff, parents, the general population?
- What safety rules should we consider?
 - ◊ From tools to wild animals
- What rules are we bringing from the classroom?
 - ◊ Respect for self, others and property



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Garden Journals

A journal can be a powerful tool to help students develop their observational, writing and artistic skills. Incorporating the growing space/garden into a daily journal will help the students make detailed observations, reflect changes over time and utilize different skills (e.g. measurement). Some of the lesson plans in this resource will specifically use the journal for recording information but regular use of journals during other subject times will help build excitement for the garden.

Curriculum Connections

Language Arts: Read, write, view and represent in order to access and explore prior knowledge and experiences and to clarify and enhance communication

Visual Arts: Works of art related to the natural environment

Science – Growth and Change in Plants: vocabulary for describing investigations; recording relevant observations in a variety of forms

Materials

- Doughtang - students may want to decorate the outside
- Journal pages (see samples below)
- Pencils, pencil crayons
- Sheet protectors to use when it rains



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Garden Journals

1. Dates – When you seeded indoors or out, when you planted transplants, when things flower, how long it took the fruit to mature, when you harvested.
2. What was planted and where? Did it grow well or did the plant struggle in the location?
3. Weather – sun, rain, snow, temperature, wind, phases of the moon
4. Plant measurements – height, how many leaves, how much was harvested.
5. How do your plants look; healthy or nutrient deficiencies showing in the leaves, are there insects attacking, are there good bugs and bad bugs, are there signs of disease? Is someone or something eating your food?
6. What do you hear? What do you smell? What do you see? What time of day is it?
7. What do their plants remind them of (this may be a great starting point for creative writing)?

In addition to the students making notes, encourage sketches and/or photos. Time-lapse photos are neat - simply take a photo at the same location every time you are in your growing space. These photos can be used to introduce the garden to next year's students in the following winter.

Sample Gardening Journal pages:

- <http://sciencenetlinks.com/media/filer/2011/10/25/objjournal.pdf>
- <http://www.scholastic.com/teachers/sites/default/files/asset/file/seedsgrowthrecord.pdf>
- <http://extension.illinois.edu/firstgarden/fundamentals/journal.cfm>



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Lesson 1:

Introduction to Gardening

Materials

- Markers and board
- Computer and projector if you want to look at frost dates together
- Optional: Seed catalogues and/or print-outs of plant pages from the Northern Lights Gardening Manual http://www.farmnwt.com/sites/default/files/113854gardenmanual_press.pdf

Preparation

- If time permits, familiarize yourself with some of what can be planted in your community and the average first and last frost date (Lesson description 3b); you may choose to speak with elders, gardeners or a nursery and/or look at the Gardening Manual above. If time is short, refer to the information in the Lesson description (3c)
- Print Appendix 1 ("Traveling Tomato") and cut apart the roles
- Create a chart with 3 columns: Vegetables and fruits we can grow in our garden; Vegetables and fruits that can grow in a greenhouse or are started indoors; Vegetables and Fruits that grow well in other climates

Lesson

1. Introduce and discuss the garden with the class (5 mins)

Here are a few sample questions:

- Who eats fruits & Veggies?
- Who has grown veggies?
- What would you like to learn about growing food?
- Why plant a garden?

Curriculum Connection

Science - Growth and Change in Plants:
needs of plants, plants used for food,
plants and the environment

Location

Classroom

Time of Year

Mid to Late May



Lesson 1:

Introduction to Gardening

2. Have students read out 'Travelling Tomato' from Appendix 1 (10 mins). Why is it better to grow our own vegetables?

3. Investigate growing in the NWT with students (5-15 mins)

a. Ask students what plants need to grow in general?
(air, nutrients in the soil, sun, warmth, water)

b. Introduce vocabulary:

Climate: weather patterns in an area over a long period of time

Growing Days: number of days that are warm enough for plants to grow

Frost-Free Days: number of days without frost (frost can kill certain plants)

Native plants: plants indigenous to an area (not farmed)

Greenhouse: glass or plastic structure that allows in light, traps some heat

Information on your specific climate, growing days and frost-free days can be accessed at:

http://climate.weather.gc.ca/climate_normals/stnselect_1981_2010_e.html?lang=e&province=NT&provSubmit=go

Lesson 1:

Introduction to Gardening

C. What type of fruits & vegetables will we be able to grow? (10 mins)

Have students help you fill in the following chart. Seed catalogues and print-outs from the garden manual may be helpful (In the table are vegetables that generally can be grown in the NWT but they may/may not be appropriate to all communities)

Vegetables and fruits we can grow in our garden	Vegetables and fruits that can grow in a greenhouse or are started indoors	Vegetables and Fruits that grow well in other climates
Kale Spinach Swiss Chard Lettuce Radishes Carrots Peas Beets Onions Potatoes Beans Zucchini	Other squash (includes pumpkins, acorn squash summer and winter squash) Cucumber Tomato Pepper	Apples Pears Bananas Oranges Grapes Cherries

d. Either as a class or in small groups have students make choices about their planting priorities (10 mins).



Lesson 2:

Starting Plants for Transplant



Materials

- 8-10 Newspaper sheets cut into thirds (enough so each student can have a piece of newspaper)
- Pop/6-ounce cans (1 for every 1-2 students)
- Potting soil
- Spray bottles for watering (6)
- Seeds – beans, squash, tomatoes for planting, other seeds for comparison (optional)
- Snack sized resealable plastic bags
- Whiteboard and/or flipchart for rules

Preparation

- Ask for volunteers to help you with the garden routine and planting. If none are available, you may need to create stations close together.
- You may choose to have your class create a garden routine and rules as part of a language arts block before doing this lesson
- Have students bring in newspaper and pop cans
- Place seeds in bags so that students can look at them without losing them
- (may ask a volunteer to do this)
- Set up planting stations (bins full of soil) or ask a volunteer to do so
- Divide students into groups (about 4-5 students/group)

Lesson

1. In the classroom introduce and/or create the garden routine and rules (10-20 mins).

Curriculum Connection

Science - Growth and Change in Plants: plant life cycle, plant parts, seed germination, needs of plants, plants used for food, caring for plants, ways in which plants and animals depend on each other, plant investigations

Location

Indoor start, outdoor for planting

Time of Year

Late May or early June. The ideal timing for starting seeds indoors can be researched at:

<http://www.rodalorganiclife.com/garden/seed-starting-chart>.

However 2 weeks before your last frost is an acceptable approximation.



Lesson 2:

Starting Plants for Transplant

2. Make newspaper pots (10 mins)

- a. Distribute sheets and cans to students. Have them lay down their newspaper and then put the can onto the newspaper so that about 2-3 cm hangs over the closed end. Then have them roll the paper around the can and tuck the overhanging pieces in.

For a visual on creating these pots see: <http://www.gardenbetty.com/2011/03/how-to-make-recycled-newspaper-pots-for-seed-starting/>



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b. Seed Investigation (5-10 mins):

- I. Pass around small bags with the different seeds available for planting (or at different seeds in packages). Ask the students:
- II. Why are some seeds bigger than others (Seed coatings of different size, energy to produce)?
- III. Why do some seeds have hairs (e.g. tomato seeds)? (To help them pass through an animals digestive system)
- IV. How do seeds travel? (Humans, other animals via consumption and excretion, attaching to fur/hair, wind, water)



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3. Planting (20 mins)

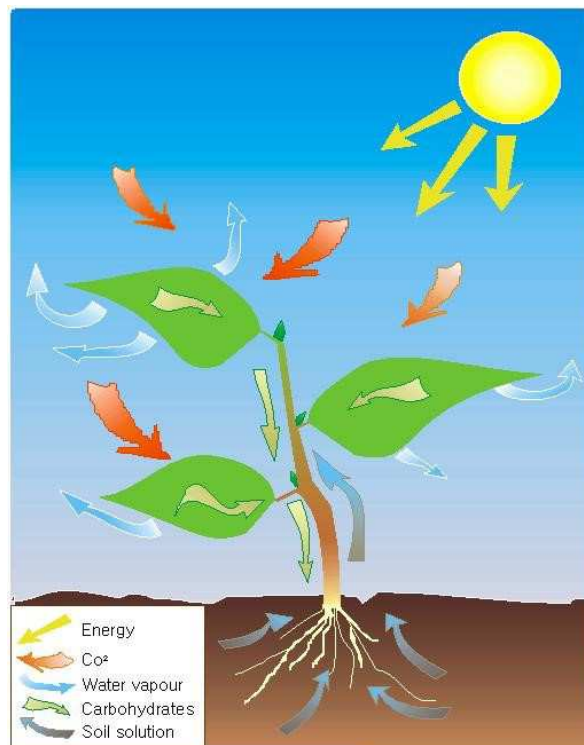
- a. Take the students outside with their pots, seeds and some filled spray bottles. This activity is best to do in an area that can get dirty (e.g. sandy area of playground).
- b. Divide students into groups. Send each group (with a volunteer) to the different soil containers.
- c. Have students take their containers and fill with soil.
- d. Have them water their containers with the spray bottles until soil is moist like a sponge (damp but not muddy).
- e. Have them poke their fingers into the soil to make a hole for their seed. The hole should go to about their middle knuckle on the index finger.
- f. Have students drop the seed in and loosely cover their seed with soil.
- g. Review how to care for a plant (water regularly without overwatering (e.g. making puddles), place in a sunny spot).
- h. Discuss germination (the process of the seed sprouting). Have students record the date of planting in a journal / science book and then predict when they think their seed will sprout. Discuss possible factors that may influence sprouting (water, temperature, the type of seed).
- i. Bring the pots back to the classroom and have the students place them in a sunny spot.

Lesson 2:

Starting Plants for Transplant

Additional Lesson Ideas

1. Growing Sprouts with the class. Sprouts are plant shoots with high nutrition value and only take a few days to start to grow. They can be grown in jars with minimal light. See: http://farmnwt.com/sites/default/files/how_to_grow_sprouts_.pdf
2. Seeds and Sprouts lesson plan – Appendix 2
3. Create an experiment in which four identical seeds are planted but one is watered appropriately, another is overwatered, another is watered initially and covered in plastic and the last is not watered.
4. Further investigate transpiration (movement of water) in plants. The following interactive website shows the movement of water throughout the different plant parts: <https://passel.unl.edu/pages/animation.php?a=transpiration.swf>



<http://www.windowtothegarden.com/General%20Images/Water%20movement.jpg>

Lesson 3:

Soil Nutrients / Feeding the Soil

Materials

- Journals
- If you are preparing a large planter box for the classroom or outdoors:
 - ◇ Soil for containers
 - ◇ Shovels
 - ◇ Manure or Compost
 - ◇ Blood Meal
 - ◇ Bone Meal
 - ◇ Kelp (potassium)
- If you have smaller containers you may want to have
 - ◇ Soil for your containers (check to see if there are already added nutrients)
 - ◇ Compost
 - ◇ Organic Fertilizer

Preparation

- Recruit/volunteers for nutrient addition portion
- Familiarize yourself with the Lesson Plan details
- Print out the nutrient skit from Appendix 2 and cut apart

Lesson

1. Take students outdoors / to the garden. Start with garden routine and rules (5-10 mins).

Curriculum Connection

Science - Growth and Changes in Plants: needs of plants, caring for plants, Soils in the Environment: organic materials in soil

Health - Growth and Development, Nutrition

Location

In the garden

Time of Year

Early June for an outdoor garden, depending on the workability of the soil. Flexible for an indoor garden.



Lesson 3:

Soil Nutrients / Feeding the Soil

2. Gather students in a group to discuss nutrients (20 mins):

- a. What is a nutrient? (A Chemical/particle that organisms need to grow/live)
 - i. Vitamins: help turn food into energy
 - ii. Minerals: growth/ maintenance
- b. What are some nutrients that people need?
 - i. Calcium: muscle contraction/bones
 - ii. Iron: blood
 - iii. Potassium: growth/maintenance
 - iv. Phosphorus: bones/teeth
- c. Where can we find these? How do we get these nutrients?
 - i. Calcium: broccoli, beans, bokchoy, squash, celery, lettuce
 - ii. Iron: meat, soy milk, peas, broccoli, lettuce, spinach
 - iii. Potassium: avocado, pumpkin, sweet potato, parsnips
 - iv. Phosphorus: corn, potatoes, peas, brussel sprouts
- d. What nutrients do plants need?
 - i. Nutrient skit – Appendix 2
 - ii. Nutrient discussion/summary:
 - NITROGEN
 - i. Helps plant parts (leaves/stems) grow green/ strong
 - ii. Main component of chlorophyll. . . absorbs light, converts to energy
 - iii. Lots in air, but most plants take it through roots



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Lesson 3:

Soil Nutrients / Feeding the Soil

- PHOSPHORUS
 - i. Important in creating energy from the sun
 - ii. Helps flowers/roots/ fruits grow

- POTASSIUM
 - i. Regulation of growth/ reproduction
 - ii. Helps grow root tips/buds

3. Add Nutrients to your soil (15 minutes). Send students with their groups and volunteers and have them add in the additives / fertilizers as directed on the containers to your raised beds or to containers.

Additional Lesson Ideas:

Earth as an apple – learn how much soil is available for growing food:

- <http://www.iupui.edu/~ghw/lessons/materials/EarthAppleFarmlandNov02.pdf>
- <https://www.youtube.com/watch?v=0uvwzZs4W6Q>

Lesson 4:

Planting and Caring for Our Garden

Materials

- Seeds: e.g. greens, radishes, carrots
- Ziploc Bags
- Student plants (lesson 2)
- Popsicle sticks
- Permanent markers
- Rulers (30cm)
- Optional:
 - Companion Planting posters (one per 2-4 students) – see resources
 - Square Foot gardening posters (one per 2-4 students) – see resources

Preparation

- Recruit/confirm volunteers to help with planting
- Prepare or have a volunteer prepare bags of seeds, popsicle sticks, rulers and markers for each group
- Print posters from resources if you want your students to use these

Lesson

1. Take students outside and go over the garden routine and rules (5-10 mins).
2. Water plot or planters (5 mins). Discuss how watering a bigger planter is the same/different than their newspaper pots. Remind students how important water is for plants. Just like us they need to drink!
3. Create a planting plan (10-20 mins). Have students look at the companion planting posters and square foot gardening posters (if applicable) to determine what they will plant where. Remind them that 1 square foot is about 30 cm or the length of their ruler. Remind them they need space for their transplant plants.

Curriculum Connection

Science - Growth and Change in Plants: needs of plants, caring for plants, plant parts, observations about growth of plants and environment, plants used in food preparation

Math - patterns, measurement

Location

Outdoors

Time of Year

Early to mid-June depending on frost dates and soil thaw



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Lesson 4:

Planting and Caring for Our Garden

4. Have students plant with their group (10-15 mins)

- a. Newspaper pots into garden boxes or larger containers if frost dates permit.
- b. Direct sow plants greens, radishes and carrots are planted directly. Depth of seed planting can be found on the seed package or you can use the following guideline: If seeds are large (e.g. peas) make it 2 cm deep, if they are mid-sized (e.g. beets) have them make the hole 1 cm deep and if they are tiny (e.g. tomatoes) have them place their seed on top of the soil.
- c. Label garden using popsicle sticks.

5. Have students journal about what they planted and where and what care these plants will need (10 mins). Have them observe conditions in the garden using all their senses - touch, sight, smell, and hearing.



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Resources

Companion Planting Posters: <http://afristarfoundation.org/wp-content/uploads/2012/09/Companion-Planting.jpg>

Square Foot Gardening Posters: <http://www.vegetable-gardening-online.com/square-foot-garden.html>

Lesson 5:

Garden Biology



Materials

- Picture of soil life (*see resources*)
- Trowels or other digging tools
- Guides to soil life if available

Preparation

- Print soil life pictures
- Recruit/confirm volunteers to help students explore
- If you have an indoor garden, try to find an outdoor space with plantings (bushes, flowers, gardens etc.) to visit
- If necessary for the visit, send out field trip forms
- Familiarize yourself with the resources if you want more information about what you might find

Lesson

1. Take students outside and go through routine and rules (5-10 mins).
2. Ask students what they think lives in and around an outdoor garden (5 mins).
3. Display a picture of soil life (*see resources*). Ask students to discuss what they think the roles and relationships of different organisms are (10 mins)
 - a. Microbes – produce nutrients, provide oxygen, build soil structure, plants provide organic materials for them to eat
 - b. Fungi – create a relationship with plant roots and trade nutrients (to plants) and sugars (to fungi)
 - c. Burrowing animals – create space to allow oxygen to plant roots
 - d. Insects – pollinate, eat plant parts, recycle organic matter
 - e. Worms – recycle organic matter, create space for oxygen

Curriculum Connection

Science - Growth and Changes in Plants:

The ways in which plants and animals depend on each other

Soils in the Environment: Dependence of living things on soil

Location

Outdoors, in your garden or another space with plantings.

Time of Year

Mid June



Lesson 5:

Garden Biology

4. Brainstorm which animals may depend on the above for life — e.g. birds, other insects, humans (5 mins).

5. Talk about pollinators and their role in creating food (5 mins):

- a. Pollination: the transfer of pollen between plants so that fruits and seeds can be created
- b. Pollinators: Wind, water, bees, bats, butterflies, beetles, birds, wasps

6. Look for living organisms in and around your garden, carefully using the trowels to turn over soil away from the seeds you planted. Have students create a diagram of a soil food web in their journals (10-15 mins).

Resources

- Soil life: <http://www.johnandbobs.com/blogs/news/16705404-save-your-microbes-and-your-back-make-lasagna-in-the-soil>
- Soil food web: <http://www.soilfoodweb.ca/concepts-of-the-soil-foodweb>
- Microorganisms explained: <http://www.childrensuniversity.manchester.ac.uk/interactives/science/microorganisms/>
- Video of pollinators in action: <https://www.youtube.com/watch?v=jWC2NfXpbTQ>
- Pollination overview: <https://www.boundless.com/biology/textbooks/boundless-biology-textbook/plant-reproduction-32/pollination-and-fertilization-190/pollination-by-bats-birds-wind-and-water-723-11949/>

Lesson 6:

Weeding, Thinning, and Harvest

Materials

- Rulers (for measuring plants and thinning)
- Flip chart to write down vocabulary
- Seed packages from your planted seeds to find out how much to thin plants.
- Student journals

Preparation

- Recruit / confirm volunteers
- Familiarize yourself or ask volunteers to familiarize themselves with thinning requirements for what was planting
- You may choose to have students make predictions about plant growth in their journals
- You may want to review measurement with the students

Lesson

1. Take the students to the garden and go through garden routine and rules (5-10 mins).
2. Introduce new vocabulary (5 mins):
 - i. Weed: A plant out of place (Some are edible, used to eat and then lost habit of eating them).
 - ii. Thinning: the act of diluting something, picking out crowded seedlings, to make better growing conditions for the rest. Allows more space for the remaining plants to grow.
 - iii. Harvest: Season for gathering ripe crops
3. Break into groups and have them observe their plants and journal about their plants (10 mins). Have them use their rulers to measure the plant growth and have them describe leaf and stem shape/texture as well.

Curriculum Connection

Science — Growth and Changes in Plants: needs of plants, caring for plants, plant parts, observations about growth of plants and environment, plants used in food preparation, plant adaptations, traits that remain constant in plants with growth

Soils in the Environment: describe the effects of moving water on soils

Math - measurement

Location

Indoors or outdoors depending on where your garden is.

Time of Year

Late June, once garden is growing.



Lesson 6:

Weeding, Thinning, and Harvest

4. Have groups water, weed and thin as adults are available to help (10 mins). You can do this during journaling time. Have students observe how the water moves through the garden. Have students look at the seed package for thinning instructions before thinning or read the chart.

5. Have volunteers discuss harvesting with the group and harvest if possible (10-15 mins).

a. Are any plants ready for harvest?

- Greens can be harvested as long as there are more than 4 little leaves,
- Carrots and radishes need to show their tops through the soil
- Beans and peas need to full-bodied
- Potatoes are only ready to be dug up in late summer or fall, usually after death of the plant above ground

b. How should they be harvested?

- Greens can often be cut at the base of the leaf so they grow again
- Carrots and radishes can be pulled out once they are ready
- Beans and peas are gently broken off the main plant
- Potatoes will need to be dug up

c. When do they predict the other plants will be ready? They may want to journal these predictions

6. Gather students together again to discuss compost (10mins).

- What were the nutrients we learned about in lesson 3? (Nitrogen, Potassium, Phosphorus)
- What did we add to get these nutrients in our soil? (Bone meal, blood meal, manure & compost)
- How do you make compost? (Putting organic food scraps in a compost pile. In the pile we want to alternate greens (e.g. food scraps, fresh grass clippings) and browns (dry leaves, dry grass, newspaper)).
- Do students compost in the school? At home?



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7. Optional: Play compost game in Appendix 4 (15-20 mins).

Lesson 6:

Weeding, Thinning, and Harvest

8) Wrap-up Skits (20 mins)



- a. Review the main themes: Growing in our climate, starting seeds, feeding soil, planting our garden, garden biology, harvest and compost.
- b. Ask students to create a skit about something they learned in one of the themes.

Additional Lesson Ideas

- Compost in a bag lesson plan: http://sfenvironment.org/sites/default/files/fliers/files/sfe_se_compost_in_a_bag_3-5.pdf
- Compost word search
- <http://www.mansfieldct.org/mms-compost/wordsearch.PDF>
- Back yard compost fun facts
- http://eco-schools.saferoutestoschools.com/sites/eco-schools.saferoutestoschools.com/uploads/files/CS2249_Compost_School_Activity_sheet.pdf
- Plant Pressing (to further the study of plant parts): <http://store.msuextension.org/publications/AgandNaturalResources/MT198359AG.pdf>

Appendices:

Appendix 1: The Traveling Tomato

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1. Carlos, The farmer in Mexico — I am a farmer in Mexico and I have been growing this tomato. I know I have to grow a lot to meet demand so, to ensure it grows, I spray the tomato with pesticides. Once it's grown, I hand the tomato over to the Eduardo.
 2. Eduardo, Picker in Mexico — I am the picker and I know the tomato isn't ripe yet, but I have to pick the tomato while it is still green so it will survive its long trip! Once it is picked, I hand it over to Gabriela.
 3. Gabriela, Mexican Truck Driver — It's a long way to Canada! These tomatoes have to travel thousands of kilometers. . . I'll take them to the American border and hand them off to Jimmy.
 4. Jimmy, American Truck Driver — I have even farther to go than Gabriela! I'll make sure I drink some coffee to stay awake. . . all the way to the Canadian border where I give the tomatoes to Jeffrey.
 5. Jeffrey, Canadian Truck Driver — I'll drive this load of tomatoes from the American border to Edmonton. I'll stop and have a BLT at a diner, and then I'll hand these tomatoes over to Wanda.
 5. Wanda, Food Services Warehouse Owner — I am the food importer warehouse owner. These tomatoes I received are still green, so I have to gas them with Ethylene for 24 hours to make them turn red. Once they're red, I'll give them to Fred to drive north. Give red tomato.
 6. Fred, Northern Truck Driver — I'll drive these all the way up to (your community), they took a whole week to get here, hope everyone enjoys them! I'll deliver them to Janet at the grocery store.
 7. Janet, Grocery Store Owner — I'm the grocery store owner and I finally got my shipment! These tomatoes have travelled further than I have! They're a little banged up, but people will still buy them. Hand to Donald.
 8. Donald, Shopper — Just shopping for my groceries, some of these tomatoes are a little hard and some of them have spots already, but oh well! They travelled a long way, but I'll buy them anyways.
 9. Sylvia, Yellowknife Gardener — I've been taking care of this tomato plant since the spring. Now it's full of ripe, red tomatoes. Tomorrow I will pick some to make a salad for my family.
 10. Billy, Sylvia's Son — Mmmm! These are delicious Mom! They are so juicy and fresh! Much better than the ones we bought at the grocery store and we grew them ourselves!

Appendices:

Appendix 2: Seeds and Sprouts

(an Educational Game by Susana Wollner – March 2011, Ecology North and Local Food Learning and Leadership)

Seeds – a matching game

Outcomes:

- Become familiar with different seeds: sizes, shapes, familiar, unfamiliar
- Make the connection between plants and their seeds – specifically vegetables and fruits, but can include any you like or have.
- Talk about food provenance – i.e. which of these grow here and which do not.

Materials:

- Seeds
- Fruits, vegetables etc. to match
- Seed packages, to match
- Name of each fruit or vegetable written on a piece of paper
- Tape and masking tape (to label seeds)

Preparation:

Sandwich seeds between packing tape, with or without the name of the seed

Directions:

- 1) Arrange the desks or tables so participants can travel around them in a sort of loop. Put all the small stuff (seeds, names, seed packages) mixed up in a big bowl and the larger things on the table beside you. Cover it up.
- 2) Get the children to form a line and tell them they are going to play a game and it has two parts. The first part will be done without talking, just using their eyes and their ears. The second part will have lots of talking. Tell them you are going to give them something and they should take it, look at it and put it down somewhere on the tables as they make a circle around them and then they should get back in line to pick up something else. Hold the bowl up high so they can't see what's in it. Once they get started make sure they move along quickly. Hand the stuff out randomly so they are not sure initially what the pattern is.
- 3) When everything is handed out you can assign partners or let them pick their own. Now they get to match things up. Let them know they are going to create a set of seeds, labels, packages, and plants. You can make it a sort of competition or you can get everyone to work together and help each other.

Appendices:

Appendix 2: Seeds and Sprouts

Have them bring a complete set to a table near the front.

4) Discuss:

- Which things grow here and which don't
- Look at the labels on the stuff from the store and where/what country it comes from
- Look at the seeds more closely and how they are in the fruits
- Look at the seed packages more closely and when to plant, how to plant, days to germinate, where to plant etc.

Sprouts

Outcomes:

For students to become familiar with how seeds sprout into plants

Materials:

- Bean seeds (enough for the class or small groups)
- Picture of seed parts e.g. <http://www.myteamexplore.com/scgtest/team-explore/uploads/images/parts-of-seed.jpg>

Preparation:

Presoak the bean seeds: first for a couple hours in water and then between some blue shop cloth (very, very wet) overnight ☒ until the coating got soft and they started to have little tails.

Directions:

1) Get the students to line up, handing one to each of them/group and have them sit down and look at them very carefully.

2) Peel off the coating and carefully open the seed in half. You can then see the

first two leaves very small and what will be the root/tail.

3) Talk about the seed coat, the embryo and the endosperm etc. I got a nice picture of "parts of the seed" so they could see what they were looking for.

Appendices:

Appendix 3: Nutrient Skit

NITROGEN: Hi everyone, I'm Nitrogen! I help the plants grow GREEN stems and leaves. I help make the plants strong! (flexes muscles)

PHOSPHORUS: Hey all, I'm Phosphorus! I help the plants develop fff-fruits and fff-flowers. I'm fff-Phosphorus! Together with Nitrogen, we help capture the sunlight and turn it into energy that the plant can use!

POTASSIUM: Howdy partners, I'm potassium. I help the plants grow root tips and buds. I also help fight those nasty diseases out there and regulate growth and reproduction!

NITROGEN: Together, we help the plants grow and stay healthy!

Appendices:

Appendix 4: Compost Game

Materials:

- Pictures or words of compostable materials (e.g. banana peel, dry leaves, shredded paper etc.). Students can create this themselves. Ideally there would be ½ browns and ½ greens. A great reference can be found at:

http://www.compost.org/English/PDF/GreenPlanetMay1_sm.pdf

Directions:

1. Tape or have students tape words onto each others' backs without having the student see what is on their back
2. Have students ask yes or no questions to guess what they are
3. Have students arrange themselves into layers of green and brown – while student layers are vertical, these would be horizontal in the composter.
4. Explain that every 2-3 weeks if compost is not frozen it will be mixed and watered – have them shuffle themselves to represent this and pretend to water them.
5. Explain the lower layers will be ready for fall or next spring – have students at one end move to the garden to represent this.



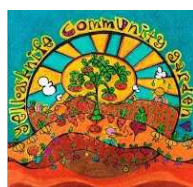
http://www.techlifemag.ca/images/content/BackyardComposter_rdax_620x349.jpg

A school garden is a powerful educational tool. Regardless of size, the real life experiences these living laboratories offer provide stronger lessons than those found in textbooks.

Growing Together at Weledeh is a highly successful gardening program that is a product of the partnerships between Weledeh Catholic School (WCS) in Yellowknife, the Yellowknife Community Garden Collective (YCGC) and Ecology North.

The program runs for 6 weeks in May and June, with a harvest celebration in early September.

The information in this book is meant to help replicate a similar experience at other schools in the NWT, with suggestions how to adapt if some of the same components are not available.



Weledeh Catholic School

