Government of Alberta

A Guide to Growing School Gardens *in Alberta*

"Get your children involved with the garden early: they will cherish the experience for the rest of their lives."

Lois Hole

Acknowledgements

Food is one of life's basic needs. Hands-on experience with a school garden is an important step in helping young people to understand and appreciate the industry that grows, processes, and delivers safe, abundant food to Albertans every day. The gardening process also encourages children to make healthy food choices. This manual is dedicated to the many teachers and students who helped shape its content, and to the many more who will benefit from the support it offers new school gardeners.

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Writing and development
Patricia Shields-Ramsay & Doug Ramsay
InPraxis Group Inc.

Design, layout, and illustrations
Perry Shulak
Critical Fusion Inc.

Editing
Virginia Durksen
Visible Ink Incorporated

Teacher review
Alannah van Bryce
St. Albert
Jennifer Parkinson
Lethbridge
Adina Belseth
Calgary

Content review
Robert Spencer
Alberta Ag-Info Centre
Shirzad Chunara
Alberta Agriculture and Forestry

Alberta Agriculture and Forestry coordination and review
Brent Andressen
Cherril Guennewig

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Get Growing!

School Gardens as Tools for Learning

School gardens are a growing trend across North America, although certainly not a new one. School gardens are used as a tool for integrating a number of "real-world," authentic, and personally meaningful concepts and connections for students. A garden provides a vehicle for integrating food and fibre concepts across different grade levels and subject areas. Many life skills are learned, such as research and the scientific method, problem solving, team building, cooperation, nutrition, gardening, and critical thinking.

School gardens can also provide effective models for nutritional and dietary choices. A garden can have a strong influence on the choices that students make about the food they eat on a daily basis.

- Gardens can encourage students to increase the variety of foods that they are willing to try and incorporate in their diet. Vegetables add essential vitamins and minerals, and some, such as beans, can add protein.
- Garden vegetables can encourage students to explore the range of tastes, colours, and smells that healthy and nutritious foods can provide in a diet.
- Students are encouraged to share their growing, eating, and learning experiences with their families. This can also encourage families to plant and/or include a range of vegetables in their diets.
- School garden projects can build a sense of community between students and classrooms. A garden can involve parents and community members as well.

This *Guide to School Gardens in Alberta* provides support for starting and maintaining a school garden, including the involvement of students and community members. This *Guide* also provides support for learning opportunities that can be integrated across the curriculum.

> ***"School gardens can help to provide healthy school meals and generate income for school funds, but they are primarily a platform for learning – learning how to grow food for a healthy diet, improve the soil, protect the environment, market food for profit, enjoy garden food and, not least, advocate it to others....***
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> ***The school garden should be mainly for learning: about life, better eating, livelihoods and the environment. "Garden lessons" therefore have enormous educational value. They bridge theory and practice, reinforcing classroom learning with hands-on experience and observation, and vice versa."***
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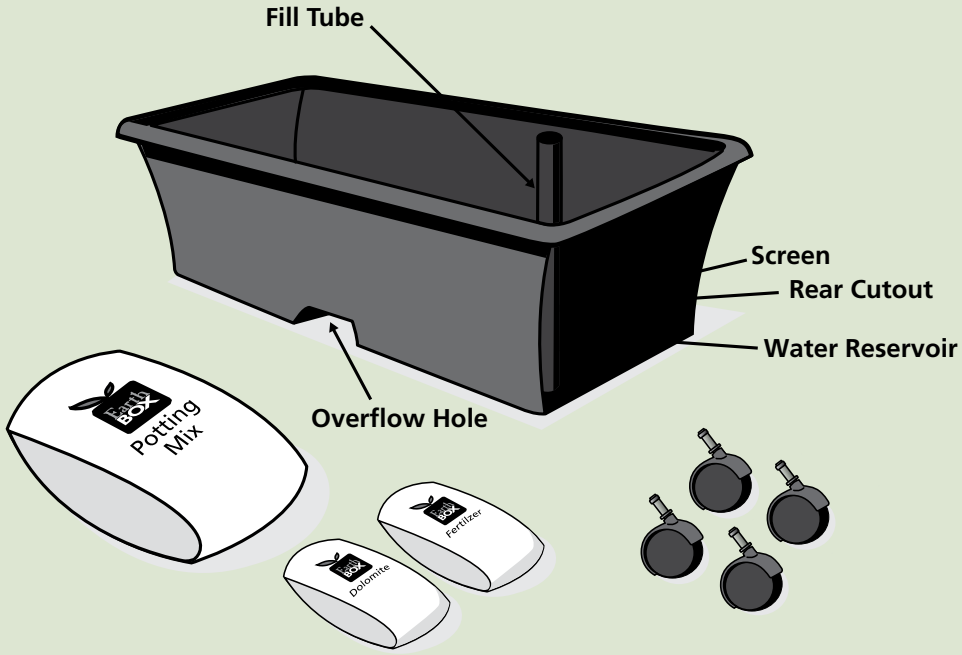
> *~Setting Up and Running a School Garden: Food and Agriculture Organization of the United Nations (2009)* **http://www.fao.org/3/a-i1118e.pdf.**

This *Guide to School Gardens in Alberta* is based on the use of EarthBox® containers. These self-contained, portable growing systems provide consistent and stable growing conditions.



Information, illustrations, and instructions specifically related to EarthBoxes® has been adapted with permission from resources available on the EarthBox® website at **www.earthbox.com**.

EarthBox® containers can be ordered online through Spectrum-Nasco at **www.spectrum-nasco.ca** *or Boreal Science at* **www.boreal.com**.

To obtain further information, contact Alberta Agriculture and Forestry's Ag Info Centre toll free at 310-FARM (3276) or from outside Alberta call 403-742-7901.

About EarthBox® Containers

EarthBoxes are a container gardening system that can grow a variety of different vegetables, herbs, and flowers. The components of each EarthBox container are designed to provide a supportive growing system that produces crops efficiently and easily in a small space. EarthBoxes also simplify fertilization and reduce the risk of excessive watering.

Plants in EarthBoxes are not watered the same way that plants in a garden are watered. Instead of receiving water from a hose, sprinkler, or rain, plants in an EarthBox draw water from a reservoir below. The reservoir gets its water through a watering tube. The watering tube protrudes from the top for easy access and leads directly to the reservoir in the bottom of the EarthBox. The overflow hole on the underside of the EarthBox prevents the addition of too much water.

When the water reaches a certain level in the reservoir, additional water flows out of the overflow hole. This makes it impossible to overwater plants in an EarthBox.

A black plastic aeration screen is another important component of the EarthBox. It is located towards the bottom and serves two important functions. First, it keeps the growing medium from falling into the water reservoir, except in areas beneath two designed, cut-out squares in the back corners of the screen. Second, its location above the water table of the EarthBox allows space for air that plants need for healthy root growth.

When the growing medium falls through the two cut-out squares in the aeration screen, it comes into contact with the water in the reservoir. When the growing medium comes into contact with the water, it acts as a wick. The fallen growing medium becomes saturated with water. When the growing medium is saturated, the water moves up into and through the dry growing medium by capillary action.

Water is continuously drawn from the reservoir until all of the growing medium in the EarthBox is moist. The water is absorbed by the plants. As long as the reservoir is kept full, capillary action will keep the growing medium wet and allow the plants to draw up the water they need.

The EarthBox uses a gradient system to supply fertilizer to plants. Fertilizer, like water, diffuses or moves from areas of high concentration to areas of low concentration. This diffusion occurs when the water, drawn up through capillary action, rolls over the fertilizer and draws it down into the roots. The plants take up the fertilizer as they need it, drawing up different amounts during the different stages of their growth. Dolomite, or hydrated lime, is mixed into the growing medium to make it less acidic, resulting in better growing conditions for many plants.

The mulch cover is an important component of the EarthBox. It helps prevent rainwater from accumulating on the growing medium, over-watering, and excessive soil drying in outdoor gardens. The cover helps regulate the release of fertilizer and helps prevent weeds and pests. It also prevents fertilizer run-off and groundwater pollution.

Further information on the use of EarthBox® containers is integrated throughout this guide and can be accessed on the EarthBox® website at www.earthbox.com. Detailed planting, watering, and fertilizing instructions are provided with each EarthBox® containers.

Connecting to Curriculum, Classroom, and Communities

School gardening projects provide numerous opportunities to build and strengthen connections between the school and broader community. The school garden also enables authentic and meaningful learning across curriculum and grade levels, encouraging students to develop and apply concepts, skills, and attitudes in real world contexts.

School Garden Programs in Alberta

Little Green Thumbss/Ag for Life provides training, classroom support and materials for indoor school gardens in Alberta. Contact: info@agricultureforlife.ca.

Nutrients for Life provides funding and support for school gardens with a focus on soil science. Information available at www.nutrientsforlife.ca.

The Classroom Agriculture Program (CAP) provides speakers active in the agriculture industry who can come to grade four classes and share their experience with students. Information available at www.classroomagriculture.com.

Across Communities

The development and maintenance of a school garden can build community throughout the school and with families, businesses, and organizations.

- Consider how parents could be involved with the school garden. Parent support is essential if an outdoor garden is established in the spring and harvested in the fall. A parent garden committee can assign "garden watch and water" days or weeks throughout the summer months.
- Think about ways that businesses in the community and the local media can be informed about the school garden. Discuss appropriate times to invite them to the school and classroom to find out what students are accomplishing with their garden.

Across Curriculum

School gardens can open a world of learning experiences, all connected to curriculum learning outcomes, and focusing on a range of topics such as ecosystems, plant growth and change, weather, environmental factors, soil, living things, communities, human activities, patterns, and measurement. Gardens also provide numerous experiences that develop and reinforce inquiry and critical thinking skills such as questioning, making comparisons, and data collection, analysis, and synthesis.

The chart that follows provides an overview of potential topics, themes, or areas of focus across different Alberta programs of study that can be supported by a school garden project. These potential themes and topics provide an initial starting point only, and should not limit involvement of other grade levels or the integration of learning into other subject areas. Teaching and Learning in the Garden, on pages 49 to 78, provides a number of activities that expand on and support many of these topics and themes.

	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Science	Exploring the Construction of an EarthBox® A Garden Season – Harmful and Helpful Insects	Recycling, Composting, and Mulching in the Garden Light for Growth Exploring Plant Growth and Changes	The Chemistry of Gardening Gardening Weather!		Elements of a Garden Ecosystem Plants for Food Thermal Energy for an Indoor Garden	The Science of the EarthBox® Plant Cell Structures
Health and Life Skills	Making Healthy Choices Making a Contribution	A Balanced Diet from a Garden Careers with Plants Volunteering with Plants	Healthy Eating and Eating Behaviours Careers with Plants Volunteering in the Garden	Personal Eating Behaviours Careers with Plants Volunteering in the Garden	Individual Food Choices and Nutritional Needs Careers with Plants Volunteering in the Garden	Personal Food Choices and Strategies Careers with Plants Volunteering and Leading in the Garden
Social Studies	School Gardens in Communities Around the World	Using Alberta's Environment and Natural Resources School Agriculture	Natural Resources and Agriculture The Concept of Urban Agriculture	Community Bylaws that Affect Urban Agriculture	Food Sources Then and Now	Food Sources Then and Now
Language Arts	Language development is continuous and recursive throughout a student's life. By learning and using language in a variety of contexts, students continue to develop language fluency and proficiency. A school garden provides a multitude of opportunities to link language learning and social communication skills with real life and authentic experiences in the garden.					
Mathematics	Mathematics provides a multitude of opportunities to support and extend learning with a school garden project. All four Mathematics Strands – Number, Patterns and Relations, Shape and Space, and Statistics and Probability – offer learning potential and real life application of mathematics concepts to the school garden.					
Art	Natural Forms and Designs in Nature		Shapes and Proportions in the Garden		Line, Texture, and Colour in the Garden	Space, Proportion, Pattern, and Light in the Garden

"Because I teach a group of high-energy hockey boys, balanced nutrition is imperative for keeping their active bodies energized, playing the game, and learning at school.

It's been our focus to be junk free. We read labels on the foods we eat to better understand exactly what we are putting into our bodies."

~Alannah Van Bryce, St. Albert

Across Grade Levels

Gardens are flexible and concrete learning environments that can provide effective settings for all learners.

- Consider ways to keep older students involved as leaders and mentors in yearly school garden projects. Inviting Grades 7 or 10 students to come back and share their expertise with younger grade level students in the school creates community and develops leadership.
- Consider partnering with another classroom at a different grade level. Negotiate gardening tasks with students, tying the tasks to areas of curriculum focus.
- Establish cross-grade leadership teams that share responsibility for gardening tasks.

Consider starting a garden journal as a way to help plan and organize. Use the journal to track your goals, progress, challenges, and results.

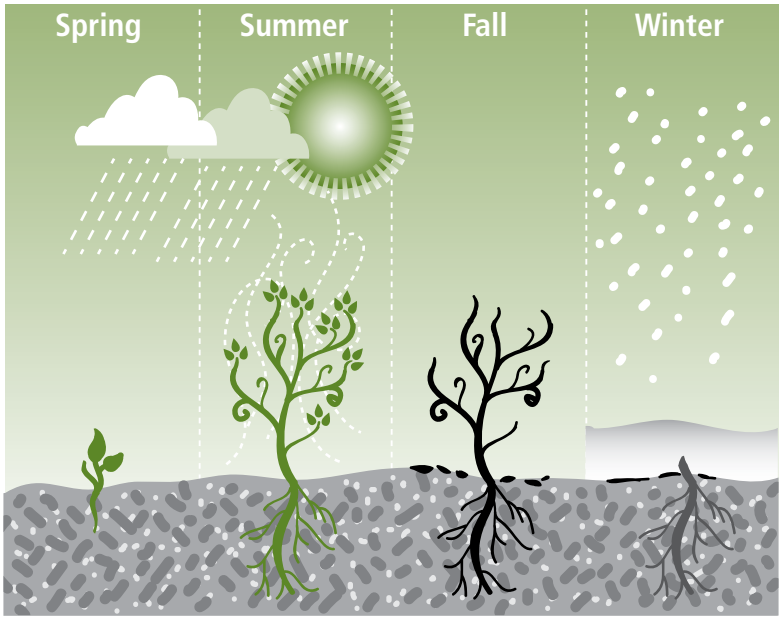
An Initial Planning List

The success of a school gardening project is dependent on careful planning. The following list can be used as an initial planning tool to consider how, what, and who will be involved with the garden. Each of the tasks in this list is supported by more detailed information in this resource. Making Your Garden Grow, on pages 19 to 23, provides cross references to information, forms, and templates.

Jot Notes	The Tasks	Who Will Take Responsibility or Be Involved	When to Start
	START THE PAPERWORK What permissions, cooperation, and support are necessary to start and maintain the garden?		
	PLAN THE FOCUS What meal can guide the type of garden grown in the EarthBox® containers? How can this meal help provide a focus for the gardening project?		
	IDENTIFY THE GARDEN LOCATION Where will the garden be located? What could be started in an indoor location? When can the EarthBoxes® be moved outdoors?		
	OBTAIN GARDEN SUPPLIES How will EarthBox® containers, gardening tools, and fencing materials be obtained?		
	ADDRESS FUNDRAISING What funds are needed to start and maintain the garden?		
	OBTAIN HORTICULTURAL SUPPLIES What will be planted? How will seeds and seedlings be obtained? What are the frost dates we need to be aware of?		
	INVOLVE PARENTS What support can parents provide? How will they be kept informed and involved? How can they provide help during the summer months? Who will be in charge of organizing parent support?		
	PLAN CURRICULUM LINKS How will the garden be integrated into the curriculum? What grade levels will be directly involved with the garden?		
	MONITOR SAFETY How will the garden be protected? When should students be taught about safety when harvesting and preparing foods?		

The Natural Resources of Healthy Eating

The natural resources used to provide Alberta's and Canada's food supply depend upon the same resources that are essential for school gardens.



Sunlight

Most vegetable plants need a minimum of 6 hours of full sun. The garden location should provide sun at different times of the day. Changing daylight hours throughout the spring, summer, and fall will also affect plant growth.

The following chart provides an overview of the light requirements of some common garden plants.

Best in Bright Sunlight		Do Well in Partial Shade
Beans	Peas	Carrots
Broccoli	Peppers	Lettuce
Cauliflower	Potatoes	Parsley
Cucumbers	Tomatoes	Radish
Onions		

Lighting up EarthBox® Gardens

EarthBox® gardens can be started and maintained indoors. If your classroom windows are non-UV protected, and have an east or south exposure with 8 or more hours of sunlight, you may not require additional lighting. However, grow lights can also be used to supplement or replace natural sunlight. Grow lights look like fluorescent bulbs, but provide light in the blue and red end of the visible spectrum. Metal halide lights produce a strong output of the blue spectrum, which will result in strong plant growth.

Metal halide and other types of grow lights can often be found at hardware stores and garden centres.

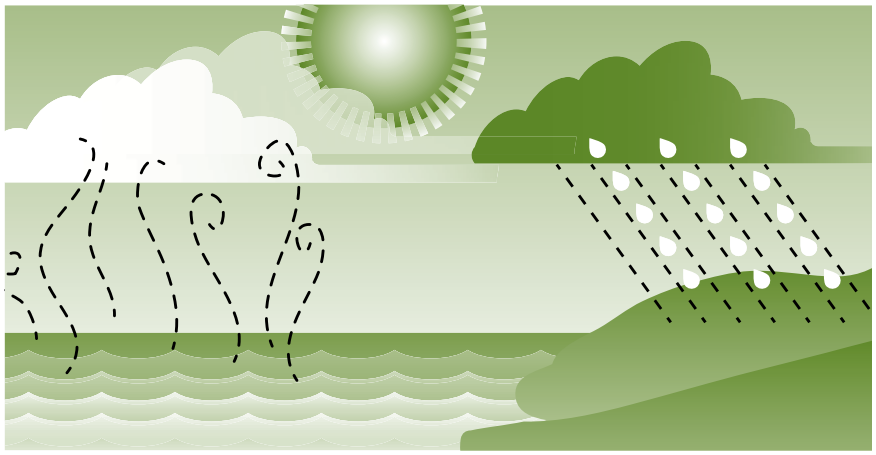
Light intensity decreases with distance, so grow lights should be kept close enough to the plants to provide the light and heat they need. However, placing the lights too close may burn the sensitive seedlings. EarthBox® recommends placing the lights from 8 to 10 cm away from the EarthBox® container, depending on the intensity of the light and the type of plant being grown. A fan can also help to disperse the heat transfer.

Grow lights should not be left on continuously. A timer can be used to control lights so they are on for 8 to 12 hours per day. A grow light can also be attached to the EarthBox® staking system.

Water

Regular water is important for a good harvest. Water should be of good quality, free from contaminants, and not high in salts. Watering systems can include watering cans, drip irrigation systems, or overhead watering. Increasing the organic matter in the soil can help it retain water.

EarthBox® reservoirs hold 12 litres of water. However, different watering requirements of plants during their growing season mean that the EarthBox® containers should be monitored on a regular basis. In warm weather, particularly during the summer months, water may need to be added to the EarthBox® reservoirs daily.



The water cycle is important to any type of gardening. The water cycle consists of processes of evaporation, condensation, precipitation, and collection. Plants depend on water for photosynthesis. Plants then return the water to the air as water vapour, through transpiration. In an EarthBox container, water is added to the reservoir. Precipitation is kept out of the EarthBox container by the fitted cover. Water in the EarthBox reservoir is absorbed by the growing medium through capillary action. As long as there is water in the reservoir, it keeps the growing medium wet.

Growing medium can have many different names or labels. The best growing medium for EarthBox® containers contain large amounts of organic matter, such as peat moss, bark fines, or coir (coconut fibre), with either vermiculite or perlite. Avoid products that contain soil, rock, or clay or those labelled as "partially composted" or a "byproduct." A growing medium that says it has "moisture control" or "water grabbing crystals" can be used. Avoid growing medium that contains full-year fertilizer; however, those with a seasonal or 3-month time release work. The quantity of growing medium required for each EarthBox® container is about 2 cubic feet.

Soil

Healthy soil is central to all living things. Soil provides plants with essential nutrients. Good soil is the basis of a successful garden and should provide enough organic matter to provide nutrients to growing plants, retain and drain water, and open up the soil to air. Soil also provides support, or an anchor, for the growing plant.

Fertilizer

Plant food is called fertilizer. It is important to follow EarthBox instructions for using and adding fertilizer when planting.

EarthBoxes include a strip of applied fertilizer, which should be sufficient for the growth of a crop. It should be replenished when starting a new crop. Fertilizers should not be added through the water reservoir.

What is compost? It is a rich mix of organic materials that are broken down or well-rotted, including weeds, leaves, kitchen scraps, grass clippings, and other items that can provide nutrients. Compost makes soil crumbly, is dark, and smells earthy. Compost can help improve soil structure and moisture retention. The compost improves soil aeration, the balance of air in and around plant roots. A compost pile requires:

- Organic material, such as dead leaves, manure, grass clippings, and kitchen plant waste
- Air
- Water
- Warmth
- Time

A compost pile can be a great school, home, or community project. However, it is important to follow the EarthBox® instructions for using and adding fertilizer when planting. The use of compost may be considered after the school garden has been established for a year or two, and informed decisions can be made about how to use compost in them.

The Weather and the Seasons[1]

Planting times depend on the needs of the plant – some vegetables are warm season plants that do not tolerate cold conditions and need hot, sunny days and warm nights. Warm season plants begin their growth once the soil warms. Other vegetables are cool season plants that can be planted either early or late in the planting season when the weather is cooler. Cool season plants are generally adapted to climates with precipitation during the winter and dry, hot periods in the summer. These plants grow early in the spring when moisture is present and go dormant when it gets hot and dry.

Many cool season vegetables are plant roots – carrots, radishes, turnips, and beets. Warm season vegetables are usually picked off the stems of plants – beans, cucumbers, squash, tomatoes, and sweet corn.

[1] Some information drawn from *See Them Sprout, Level A Gardening Youth Activity Guide*: 4-H Curriculum: p. 7.

Warm Season	Cool Season
Beans	Beets
Cucumbers	Broccoli
Eggplants	Brussels sprouts
Okra	Cabbage
Peppers	Cauliflower
Pumpkins	Kohlrabi
Squash	Parsnips
Sweet corn	Peas
Tomatoes	Potatoes
	Radishes
	Swiss chard
	Turnips
	Lettuce and other greens, such as endive, kale, and spinach
	Herbs

Many vegetables require several weeks to germinate and may not produce as much if they are planted directly into the garden as seeds. They do better if they are seeded indoors and then transplanted, as seedlings, into the EarthBox® containers.

If vegetables are started indoors, seeds can be planted as early as January and transplanted into indoor EarthBoxes® in March or April for a June harvest. However, some plants do better if they are planted directly into the EarthBox®.

Vegetable plants generally require about 8 hours of sunlight to grow. Growing lights and lamps should be used with EarthBox® containers to simulate ideal growing conditions and provide supplemental light. Refer to page 9 for additional information on indoor EarthBox® containers and lighting.

Plants such as tomatoes, peppers, and cucumbers prefer warmer weather and may not produce until later in the season. These types of plants can be seeded at least 60 days before being transplanted into an EarthBox® container. Some vegetables, such as peas and lettuce, grow well in cooler weather and may produce more if they are planted early in the growing season.

Most of these vegetables can be planted from late April to late June, depending on frost-free period and weather, as well as the time it takes for the plants to reach maturity. Some plants should be started indoors and transplanted into the garden.

The following calendar provides an example of how an indoor and outdoor planting schedule can be planned for the vegetables and herbs featured in this resource. The calendar dates reflect a Zone 3 planting schedule, which is based on a first frost-free date of approximately May 31.

Frost dates for your area can be found on the Government of Alberta Agriculture and Rural Development website at **http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex10**.

A Planting Calendar

The planting calendar that follows provides general guidelines for planting and growing different vegetables so that they are ready for harvest at the same approximate time. Seed varieties and seasonal weather will have an impact on growing rates and yields, and specific directions for seed varieties should be consulted before planting. The calendar has been created based on an outdoor planting schedule with a fall harvest.

The top row of the calendar has been left blank. Use the top row to adjust the months of the growing cycle for your garden. For example, if you plan to create an indoor EarthBox garden with a June harvest in mind, your calendar may start in January instead of March. It is important to track your first garden as it grows, as you may find that plants may germinate or grow at different rates in indoor conditions.

My Planting Timelines							
Planting Timelines	**March**	**April**	**May**	**June**	**July**	**August**	**September**
Broccoli		Start seed indoors	OR Plant seed directly into garden	Transplant seedlings into garden		Harvest	Harvest
Carrots			Plant seed directly into garden	Plant seed directly into garden		Harvest	Harvest
Celery		Start seed indoors		Transplant seedlings into garden			Harvest
Corn			Plant seed directly into garden depending on soil temperature				Harvest
Cucumbers			Start seed indoors	Transplant seedlings into garden		Harvest	Harvest
Leeks	Start seed indoors		Transplant seedlings into garden after risk of frost is past				Harvest
Lettuce Consider multiple plantings to spread out the harvest		Start seed indoors	OR Plant seed directly into garden	Transplant seedlings into garden	Harvest/ Thin	Harvest/ Thin	Harvest

My Planting Timelines							
Planting Timelines	**March**	**April**	**May**	**June**	**July**	**August**	**September**
Onions		Start seed indoors	Transplant seedlings or plant sets into garden			Stop watering	Harvest
Peas Many pea varieties are cold weather plants and can be planted 1 to 2 months before the last scheduled frost date		Plant seed directly into garden	Plant seed directly into garden			Harvest	Harvest
Peppers		Start seed indoors		Transplant seedlings into garden		Harvest	Harvest
Potatoes			Plant seed directly into garden	Hill plants		Harvest	Harvest
Radishes Consider multiple plantings to spread out the harvest			Plant seed directly into garden	Plant seed directly into garden			Harvest
Snap Beans			Plant seed directly into garden				Harvest
Tomatoes		Start seed indoors		Transplant seedlings into garden		Harvest	Harvest
Chives			Plant seed directly into garden				Harvest
Garlic		Plant seed directly into garden					Harvest
Oregano		Start seed indoors	Transplant seedlings into garden			Harvest	Harvest
Parsley		Start seed indoors	Plant seed directly into garden	Transplant seedlings into garden			Harvest

An outdoor garden, planned for harvest in early September, will require support from families over the summer. Daily watering checks may be necessary to ensure that the EarthBox reservoirs are kept at the correct levels. Some plants may need thinning or weeding, and checks for any garden pests that may appear. A summer schedule template, such as the one below, can be planned and established with family or parent groups as part of the planting and harvesting schedule.

"The EarthBox Gardening Project was an exciting and rewarding learning experience, not only for me as an educator and my grade 3 students, but for the students' families as well, who were drawn into the process from the very beginning! The project involved parents throughout - with setting up the EarthBoxes®, assistance with planting, and most importantly, with maintenance of the garden through the summer months."

-Jennifer Parkinson, Lethbridge

Summer Maintenance Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
July Week 1							
Week 2							
Week 3							
Week 4							
August Week 1							
Week 2							
Week 3							
Week 4							

Helpful and Harmful Insects

A vegetable and herb garden shares its space with other living things, particularly insects. Although there are a number of helpful insects that students will be familiar with, there are also many insect pests that can potentially damage vegetable plants and yields.

One of the first steps in dealing with potential insect pests is taking the time to identify them and find out what they are attracted to. Most insect pests can be grouped into three categories:

- Chewers
- Suckers
- Soil inhabitors

Pollination

Flowering vegetable plants must be pollinated. If you grow an indoor garden, model the pollination process with students and then have them pollinate the plants. Rub a Q-tip across the anther in the flower, and then rub the pollen-covered Q-tip across the stigma of either the same or a different flower on the plant.

Chewers include caterpillars and, depending on the type, can damage most plants. For example, cabbage loopers are light green caterpillars with white stripes that attack Brassica species, such as broccoli and cabbage. These insect pests can be removed by hand. Watch for adult moths or butterflies, which are cabbage worms, as an early warning sign. Molasses or vinegar sprays may also be used to help get rid of these insects.

Suckers include aphids, stink bugs, and thrips. These insect pests suck the plant sap from the leaves or damage plants during feeding. Spiders, wasps, ladybugs, and lacewings are their natural predators. A soap spray can also help eradicate these pests.

Soil inhabitors feed on the roots and bases of plants. They include corn rootworms, wireworms, white grubs, and cutworms. These pests can be removed by hand or sprayed with a soap or garlic spray.

There are a number of simple steps that can be implemented to try to minimize insect pests in the garden:

- Keep areas around the plants free of debris and make sure there is no standing water or puddles close to the garden.
- If necessary, nets or other pest prevention enclosures can be placed around the garden area.
- Ensure that plants are watered regularly and fertilized. This will increase their resistance to insect attacks.

Organic Pest Control

Garlic spray can be an effective deterrent to many insect pests. Start with a recipe such as the following. If it does not work as well, change the water dilution rate.

- 2-3 garlic bulbs
- 15 mL of hot chilli powder
- 15 mL of canola oil
- 3 squirts of liquid detergent
- 2 litres water

Place everything except 1 litre of water in a blender and blend well. Add the additional water. Strain through muslin or a coffee filter. Use in a spray bottle and store the rest in labelled jars with lids. Use carefully, as too much of the spray can also harm the plants.

Fish fertilizer can also deter pests such as butterflies and moths.

Molasses spray can work with moths and grubs. Mix 15 mL of molasses with a litre of hot water. Add 5 mL of liquid detergent and put in a spray bottle.

A basic oil spray can also be effective with insects such as aphids and thrips. Mix 250 mL of canola oil with 15 mL of liquid dishwashing detergent. Shake well before spraying and be careful to entirely cover the infected area. Use natural, not antibacterial, soap and do not spray on hot days as the soap can burn the leaves.

Cornmeal, sprinkled around the base of plants, can deter soil inhabitors such as cutworms.

The principles of crop rotation can also apply to EarthBox gardening. As the growing medium can be used for five to six seasons, rotate the plants that are planted in different EarthBoxes.

EarthBox® containers should not be moved inside after an outdoor season unless they are thoroughly cleaned out, as pests may come in with the soil.

Practise tolerance. Vegetables grown from seed do not always look perfect! Discard or cut away parts of the plant with insect damage and enjoy the rest!

Insects – Identification and Control provides an overview of insect pests and options for control, and can be accessed at **http://msucares.com/lawn/garden/vegetables/insects/insects.pdf**. Look for information provided on organic insecticides.

Making Your Garden Grow

School gardens create opportunities for students to discover fresh food, make healthier food choices, and become better nourished. Gardens also offer natural and continuously changing settings in which to integrate different subject area learning outcomes, including Science, Mathematics, Language Arts, Social Studies, and Health and Life Skills.

There are many types of plants that can be grown in a garden, including those that produce edible vegetables. One way to organize and get your garden off the ground is to plant vegetables to make a meal. The following process and steps can help you get started with a school garden feast celebration in the late spring or early fall![2]

> ***"The prospect of promoting healthy nutritional eating through "grow-it-yourself" vegetables was an exciting one for me as I believe strongly in good nutrition and also that children and plants go very well together! We planted 10 different types of vegetables with a view to having salad or salsa samplings at harvest time."***
>
> ~Jennifer Parkinson, Lethbridge

Organize Responsibilities

Obtain any necessary permissions before planning to plant a garden on school property. Talk to school administration and other staff about the garden plans. Establish learning goals and outcomes for student involvement with the garden.	USE THE CURRICULUM OVERVIEW CHART ON PAGE 5 TO OUTLINE LEARNING PLANS FOR THE GARDEN
Include administration, teachers, parents, school support staff, and students in the planning process. Send a letter home to parents to inform them about the garden project and request volunteers to help, including potential involvement over the summer months.	SEE APPENDIX A FOR A SAMPLE LETTER TO PARENTS
Visit successful school gardens to get ideas and ask questions.	
Outline the roles and responsibilities of different individuals involved with the school garden project. Create a written outline of these roles and have individuals commit to them.	SEE APPENDIX A FOR A SAMPLE TEMPLATE TO IDENTIFY ROLES AND RESPONSIBILITIES START TO FILL OUT THE MONTH-BY-MONTH PLANNING TEMPLATE ON PAGES 83 TO 85

[2] Some ideas adapted from *My Garden School Meals Resource*. Michigan Department of Education. **http://www.michigan.gov/documents/mde/My_Garden_FSM_master_copyfinal_313190_7.pdf**.

Identify a Garden Site

Select a garden site that is easily accessible, preferably south facing, receives direct sunlight for 6 to 8 hours daily, and has easy access to water. When selecting the site, consider how it provides protection or shelter from prevailing winds or other potentially damaging factors.

Ensure that the site can accommodate the EarthBox containers and any necessary fencing to contain and secure them.

Review instructions for setting up and planting vegetables and herbs in EarthBox containers.

Make sure the area for the garden is wheelchair accessible – at least 92 cm wide.

SEE APPENDIX B FOR INFORMATION ON EARTHBOXES®

Plan and Design the Garden

Establish a focus and purpose for the garden that will help to identify plants, planting requirements for the EarthBoxes, and the tools that will help plant and maintain the garden.

Hold a planning and brainstorming session with students to make decisions about the type of garden to plant. Consider the following factors:

- What theme will your garden be based on? Consider basing the garden on a concrete goal such as the creation of a "meal." Simple meals to plan a garden around include salad, salsa, or soup.
- How many EarthBox containers will this type of garden require? Where should it be fenced or partitioned?
- What types of vegetable and/or herb plants can be grown?

DETERMINE WHETHER YOUR GARDEN WILL BE A PLANTED FOR A SUMMER OR FALL HARVEST: CONSULT THE PLANTING SUGGESTIONS IN "THE NATURAL RESOURCES OF HEALTHY EATING" ON PAGES 9 TO 17

SEE APPENDIX B FOR INFORMATION ON EARTHBOXES®

CONSULT "THE NATURAL RESOURCES OF HEALTHY EATING" ON PAGES 9 TO 17 AND PLAN TO USE THE GROW CARDS ON PAGES 31 TO 40

Sketch a plan for the garden, including a planting plan, water sources, EarthBox locations, and tool storage. Specify each type of vegetable and herb plant. Consider having students research the types of plants that grow well together, plants that deter pests, and growing cycles and requirements.

PROVIDE STUDENTS WITH THE SALAD, SALSA, OR SOUP "PLANTING GUIDE" ON PAGE 41, 42, OR 43 TO HAVE THEM MAP THE GROWING REQUIREMENTS OF THE VEGETABLES IN EACH MEAL

GO TO "TEACHING AND LEARNING IN THE GARDEN" ON PAGES 49 TO 78

Develop a planting plan for each EarthBox container. Find a place to store tools.

SEE APPENDIX B FOR INFORMATION ON PLANTING AND SPACING DIFFERENT TYPES OF PLANTS IN EARTHBOXES®

Start with a small project with a limited number of vegetable choices to develop a general feel for initiating and maintaining a garden with students.

Simplify the recipes as appropriate for your garden plans.

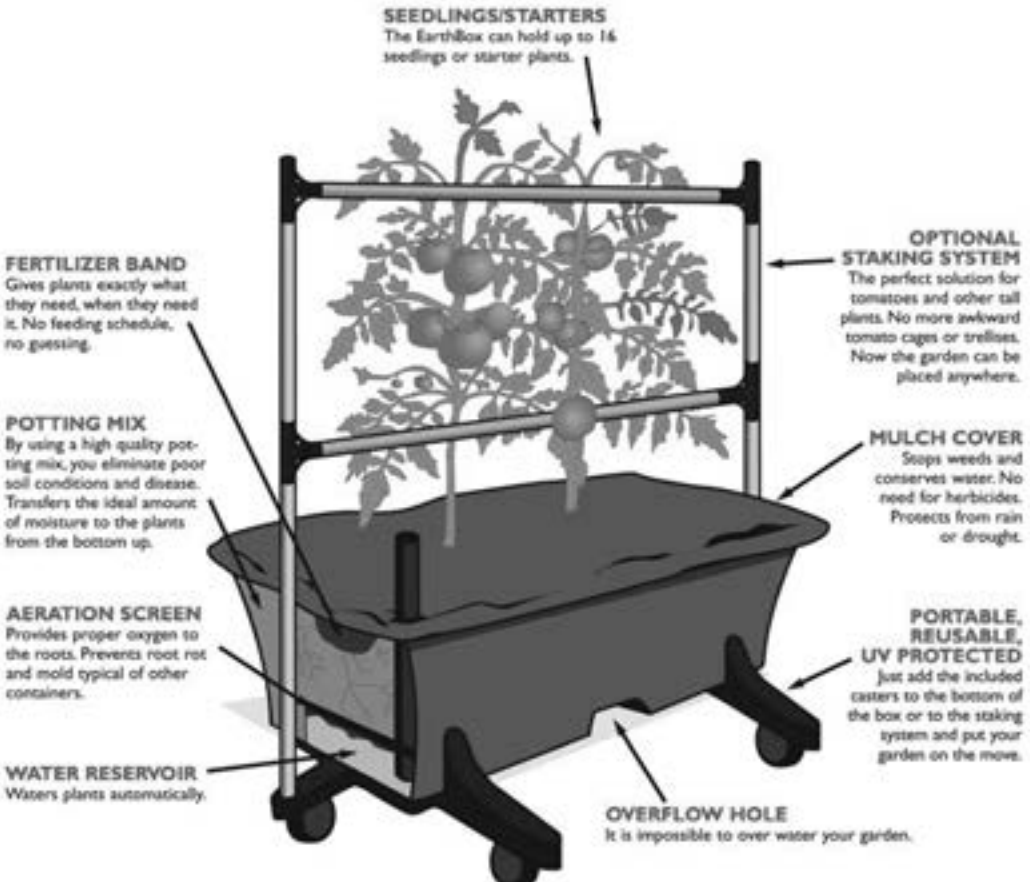


Illustration reproduced by permission of EarthBox®. EarthBox® containers can be ordered online through Spectrum-Nasco at **www.spectrum-nasco.ca** *or Boreal Science at* **www.boreal.com**.

Organize Materials and Make a Workplan

With students and staff, explore and learn how the EarthBox containers work. The EarthBox diagram on page 21 illustrates the "science" that EarthBoxes are based on. EarthBox containers can be ordered from Greenland Garden Centre. See page 2 for contact information.

SEE APPENDIX B FOR INFORMATION ON EARTHBOXES®

CONTINUE PLANNING WITH THE MONTH-BY-MONTH PLANNING TEMPLATE

- Identify what type of growing medium will be used and how it will be obtained.

SEE APPENDIX B FOR INFORMATION ON EARTHBOXES®

CONSULT THE SOIL SUGGESTIONS IN "THE NATURAL RESOURCES OF HEALTHY EATING" ON PAGE 9 TO 17

- Decide where and how to obtain seeds or seedling plants.
- Make a list of the tools that are required. Suggested tools may include trowels, small hand shovels, hose and spray nozzles, or watering cans. You may also consider obtaining buckets, pails, or baskets to carry produce.
- Identify opportunities to publicize the school's and students' gardening efforts, activities, and results. Consider ways to involve the school and the community. Contact local media and have students involved in creating posters, public service announcements, and press releases.

GO TO "TEACHING AND LEARNING IN THE GARDEN" ON PAGES 49 TO 78

Budget

Create a budget, using a chart such as the example on the following page. Identify how funds and expenditures will be tracked and who will be responsible.

SEE APPENDIX A FOR A BUDGET TEMPLATE

Discuss options for fundraising or community support. Make a list of possible local resources, such as community businesses or groups that could provide "in-kind" or financial support.

Some businesses may donate supplies such as gardening tools, plants or seedlings, or growing medium. Other businesses may provide financial support for the purchase of EarthBox containers, grow lights, stakes, or other supplies. Local banks, such as the CIBC and TD Canada Trust, often have programs that support environmental education or school ground greening.

SEE APPENDIX A FOR A SAMPLE FUNDING REQUEST LETTER

Budgeting Template

Materials	Start-Up Costs	Maintenance Costs	Fundraising or Community Support Options
EarthBoxes®			
Growing Medium			
Plants and/or Seeds			
Tools			
Fencing			

Grow!

Schedule a garden "installation" day. Organize students by listing tasks and responsibilities. Solicit help, if needed, from parents or community members. Set up the EarthBoxes and any necessary fencing.

SEE APPENDIX A FOR A SAMPLE TEMPLATE TO IDENTIFY ROLES AND RESPONSIBILITIES

Address security issues. Consider the impact of potential vandalism. Many schools or community-based gardening projects report that vandalism actually decreases with the development of green spaces. However, consideration of the potential for damage when making location and structural decisions can sometimes be enough to avoid it.

Decide if fencing should be secured around the EarthBox containers and whether locks are needed to close off the fencing.

Have students plant according to the garden design they developed earlier. Plan to involve students in as many steps of the gardening process as possible.

CONSULT THE PLANTING GUIDELINES PROVIDED IN THE "GROW CARDS" ON PAGES 31 TO 40

CONTINUE PLANNING WITH THE MONTH-BY-MONTH PLANNING TEMPLATE

Schedule gardening days. Create a day-by-day garden calendar to record gardening responsibilities.

Make a plan for maintenance of the garden during the summer break. Identify individuals who can help water and weed plants.

SEE APPENDIX A FOR A SUMMER MAINTENANCE SCHEDULE TEMPLATE FOR THE EARTHBOXES®

Plan how harvesting will occur.

CONSULT THE "GROW CARDS" ON PAGES 31 TO 40 FOR INFORMATION ON HARVESTING

Grow a Meal

Planning a garden around a theme can provide students with a focus that is goal- and product-oriented. A "Grow a Meal" theme can also provide numerous opportunities for students to explore the idea of locally grown foods, the benefits of "eating fresh," and the potential of organic farming and growing.

Three meals are expanded into "Plan the Meal" pages. "Grow Cards" follow, providing information on planting, growing, and harvesting. These Grow Cards can be used in different ways to support your school, class, or students as they are immersed in the gardening experience:

- Provide the Grow Cards to students as a starting point for research on planting and growing requirements. Have students research additional information, such as other plants in the same family, pests and diseases, or different cultivars of this vegetable, and record their research on the back of each card. Keep the Grow Cards in a school or classroom "gardening" library.
- Organize the Grow Cards around different vegetable-based recipes, and use them to create a "garden-fresh" recipe book.
- Have the Grow Cards available as references while planning and designing the school or classroom garden. Student planning guides are also provided for each of the three recipes that follow on pages 26 to 29.

All vegetable plants are not the same! Plan to start a first garden with limited, easy plant selections. Consider the different seeding and maturity timelines for different plants when planning to harvest vegetables to make a class recipe. Consult A Planting Calendar on pages 13 to 14 as a starting point.

EarthBox® planting guidelines can be different from conventional garden plot planting. EarthBox® instructions provide detailed guidelines that are important to follow to ensure a successful yield.

Salad

Go to pages 26 to 27 for garden ingredients and a sample salad recipe

Find the Grow Cards on pages 31 to 40

Salsa

Go to page 28 for garden ingredients and a sample salsa recipe

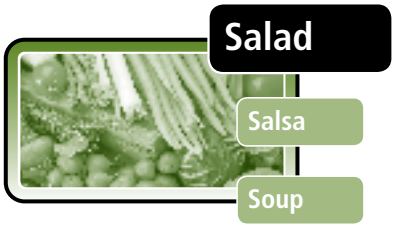
Find the Grow Cards on pages 31 to 40

Soup

Go to page 29 for garden ingredients and a sample vegetable soup recipe

Find the Grow Cards on pages 31 to 40

Plan for Salad



Garden salads can use a wide range of different fresh vegetables and herbs, including the following:

- Broccoli
- Carrots
- Cauliflower
- Celery
- Chives
- Cucumber
- Lettuces or other leafy vegetables, such as spinach
- Onions
- Peppers
- Radishes
- Green onions
- Snap peas
- Tomatoes

Make or use your own salad recipe, have students bring in family favourite recipes, or use a recipe such as the one that follows to select the vegetables and herbs you will plant.

Mixed Greens Salad

Ingredients

Mixed greens, such as romaine, red or green leaf lettuce, washed and dried

Bell peppers, seeded, halved, and thinly sliced

Snap peas

Broccoli florets, quartered

Cucumbers, sliced into rounds

Radishes, trimmed and quartered

Green onions, white and green parts, chopped

Carrots, sliced, chopped, or grated

Tomatoes, diced or cut into wedges

Optional seasonings

Salad dressing

Directions

In a large serving bowl, toss together the lettuce leaves, bell peppers, snap peas, broccoli, radish, green onions, and carrots. Lightly dress with salad dressing. Serve.

Alberta Canola Producers suggests "sprayable" salad dressings. Try one of the recipes below.

Raspberry Vinaigrette

1½ Tbsp raspberry syrup (can substitute other fruit syrups) 15 mL

2 tsp white vinegar 10 mL

1½ Tbsp water 22 mL

1 Tbsp canola oil 15 mL

Mix the syrup, vinegar, and water. Add the canola oil. Blend and spray from a small spray bottle.

Honey-Balsamic Vinaigrette

1½ tsp honey 8 mL

1½ tsp balsamic vinegar 8 mL

1½ Tbsp water 22 mL

1 drop mustard, optional

1 Tbsp canola oil 15 mL

Mix the honey, vinegar, water, and mustard. Add the canola oil. Blend and spray from a small spray bottle.

Orange Citrus Vinaigrette

1½ Tbsp orange juice 22 mL

2 tsp vinegar 10 mL

1 tsp lemon juice 5 mL

1 tsp honey 5 mL

1 Tbsp canola oil 15 mL

Mix the orange juice, vinegar, lemon juice, and honey. Add the canola oil. Blend and spray from a small spray bottle.

Salad Dressing

1 tsp canola-based mayonnaise 5 mL

2 tsp milk 10 mL

1 tsp white vinegar 5 mL

1 tsp lemon juice 5 mL

1 tsp sugar 5 mL

2 drops hot sauce, optional

Mix all ingredients. Pour into spritzer bottle and spray on salad greens.

Contact Alberta Canola Producers Commission to request other educational resources focused on agriculture or visit the Canola Info website at http://www.canolainfo.org/index.php *for more recipes.*

For further information, contact Simone Demers Collins at 1.800.551.6652

simone@canola.ab.ca, ***or*** web@canola.ab.ca.

Plan for Salsa

Salsa's main ingredient is tomatoes, but can also include many different vegetables and herbs such as:

- Onions, including red, white, yellow, or Spanish
- Peppers, including green, red, yellow, or orange
- Garlic
- Cilantro
- Celery
- Oregano
- Parsley
- Cucumber
- Optional: Jalapenos or other hot peppers

Make or use your own salsa recipe, have students bring in family favourite recipes, or use a recipe such as the one below to select the vegetables and herbs you will plant.

Garden Salsa

Ingredients

6 large ripe tomatoes, diced

2 yellow or white onions finely chopped

2-3 green onions

2-3 peppers, seeds and veins removed, minced

2 tablespoons red wine vinegar 30 mL

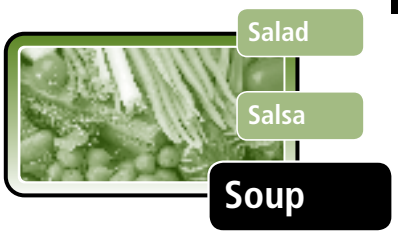
1 tablespoon canola oil 15 mL

1 clove garlic, minced

Directions

In a large glass bowl, combine all ingredients. Stir well, taste, and adjust quantities as needed. Keep covered and chilled before serving.

Plan for Soup



Vegetable soups can use a wide range of different fresh vegetables and herbs, including the following:

- Carrots
- Celery
- Corn
- Garlic
- Green beans
- Leeks
- Onions
- Oregano
- Parsley
- Potatoes
- Tomatoes

Make or use your own vegetable soup recipe, have students bring in family favourite recipes, or use a recipe such as the one below to select the vegetables and herbs you will plant.

Garden Vegetable Soup

Yield: 6 to 8 servings
Cook Time: 45 minutes

Ingredients

4 tablespoons canola oil 60 mL

2 tablespoons finely minced garlic 30 mL

8 cups chicken, beef, or vegetable broth 2 litres

3 medium leeks, chopped from white part

2 cups carrots, peeled and chopped 500 mL

2 cups celery, chopped 500 mL

2 cups peeled and diced potatoes 500 mL

2 cups fresh green beans, chopped 500 mL

4 cups chopped tomatoes 1 litre

Corn kernels from 4-6 ears of corn

1/4 cup chopped fresh parsley leaves 60 mL

Optional seasonings

Directions

Heat the canola oil in large, heavy-bottomed stockpot over medium-low heat. Add and sauté the leeks and garlic over a low heat until they begin to soften. Then, add the carrots, potatoes, celery, and green beans and continue to cook over a low heat for 4 to 5 more minutes, stirring occasionally.

Add the stock, increase the heat to high, and bring to a simmer. Once simmering, add the tomatoes, corn kernels, and peas. Reduce the heat to low, cover, and cook until the vegetables are tender, approximately 25 to 30 minutes. Remove from heat and add the parsley and any other seasonings. Serve immediately or refrigerate.

Grow Cards

The Grow Cards that follow on pages 32 to 40 are designed to be photocopied and cut out to make each card. The back of the cards can be used to record information that students research on each plant. The Grow Cards can also be folded in half and laminated to create a permanent classroom reference. Students can research and create additional cards on different plants to add to the classroom library.

"My students were each responsible for growing plants from both seeds and seedlings and they kept a personal log to chart and record the growth of their respective plants! This recording experience alone was invaluable in showing students the incredible transformation of a corn seed to the towering cornstalks bearing corncobs at harvest time! Our tomato crops were also amazing to track! From little seedlings, we harvested pounds and pounds of ripe tomatoes that were then turned into salsa that every student and staff member in our school could sample."

~Jennifer Parkinson, Lethbridge

Did You know?

Broccoli does best in cool weather.

Broccoli

Nutrients

One stalk of cooked broccoli provides vitamin C, beta carotene, protein, and dietary fibre.

Edible Parts

The crown, greens, and stems can all be used.

How to Grow

Timing
Direct seed in summer for fall crop, or start transplants in late April and transplant in June or July.

Seeding Depth
0.5 cm–2 cm

Spacing
15 cm–45 cm between plants
45 cm–60 cm between rows

Growing
To direct seed, place 3 to 4 seeds in each spot. After a few weeks, thin to the strongest plant.

To grow transplants, plant seeds in sterile potting mix, either in separate pots or as a group. If grouped, carefully separate seedlings into individual 8 cm pots after 3 weeks. When plants have 4 to 8 true leaves (5 to 8 weeks old), plant in the garden. Set plants 3–4 cm deeper in the soil than they were in pots, right down to the healthiest big leaves.

How to Harvest

Cut the crown portion of the broccoli along with 12 to 15 cm of stem.

Broccoli is fully developed when the floret or head is well formed, but before it begins to loosen and separate and the individual flowers start to develop into bright yellow blooms. Heads can move from almost ready to bolted (flowering) rapidly in high temperatures.

Removing the central head stimulates re-growth to develop for later harvests. The secondary heads are smaller. Cutting the head lower on the stem will encourage fewer, but larger, side-shoots.

Broccoli has a maturity of 60 to 85 days, or 45 to 50 days from transplants.

Did You know?

Carrot tops can be added to salads or soups because they are nutritious, with high phosphorus.

Carrots

Nutrients

Carrots are high in beta carotene and minerals. Many of the nutrients are actually in the peel or just under it.

Edible Parts

The roots are most commonly used.

How to Grow

Timing
Direct seed only, do not raise transplants. Sow at 3-week intervals for a continuous harvest, starting April to mid-July.

Seeding Depth
1 cm

Spacing
4 cm–10 cm (final) between plants
22 cm between rows

Growing
To plant, create a narrow trench about 2 cm deep, and sprinkle about 4 seeds per 10 cm. The carrot seeds will sprout in 2 to 3 weeks.

Keep the soil weeded and watered. Thin the carrots to give the roots room to develop properly, or space the seeding so there is less need to thin. Thin when the plants are 5cm tall. Use wider spacing to get larger roots.

For container gardening, thin to 3 or 4 strong carrots, each spaced equally apart from the others. Keep well watered during the growing season.

How to Harvest

Carrots can be harvested from July through the fall. They can be harvested at any size, but flavour is best when the carrot has turned bright orange.

The size of the root when it is mature varies, depending on the type of carrot.

Carrots can be harvested after frost, provided the crowns and roots have not been frozen.

Carrots have a maturity of at least 65 to 75 days.

Did You know?

Celery was originally grown and used for healing.

Celery

Nutrients

Celery provides an excellent source of vitamin C and fibre. It is a very good source of folic acid, potassium, and vitamins B1 and B6.

Edible Parts

The whole celery plant is edible, from the roots to the seeds.

How to Grow

Timing
Start seeds indoors about 10 to 12 weeks before the last frost. Place several seeds per cell.

Seeding Depth
Light is required for the seeds to germinate, so plant the seed in shallow soil.

Spacing
15 cm–20 cm between plants
50 cm–90 cm between rows

Growing
Keep the soil moist and warm until seeds germinate in 2 to 3 weeks.

After germination, grow indoors at room temperature (20–22°C). Thin plants to one per cell. Keep transplants very moist.

Plant transplants in the garden after the last frost. Exposure to low or cold temperatures will cause plants to bolt.

How to Harvest

For best flavour and longer storage, water plants the day before harvest.

The entire plant may be harvested once the desired size is reached.

Stalks on the outside of the plant can be harvested at any time.

Celery has a maturity of 100 to 120 days.

Did You know?

The maturity of corn cobs is affected most by the heat the plant gets while it grows – not by the size of the plant, hours of sunlight, or soil conditions.

Lettuce can be grown in the shade of the corn plant. Corn can also provide a stalk for plants such as snap or pole beans.

Corn

Nutrients

Corn supplies carbohydrates, protein, potassium, and fibre. Other nutrients include thiamin (vitamin B1), pantothenic acid (vitamin B5), folate, vitamin C, phosphorous, and manganese. Corn also contains beta carotene, and is a useful source of protein.

Edible Parts

The cobs, or ears, of the corn plant are eaten.

How to Grow

Timing
Corn is typically grown from seed. The plant will not germinate below 10°C. It will take 4 to 7 days for seeds to sprout.

Seeding Depth
2.5 cm–5 cm

Spacing
15 cm–30 cm (final) between plants
55 cm–105 cm between rows

Growing
Corn will grow in almost any soil. However, the cobs may not always mature.

Create a furrow (a slight depression in the soil) for each row. Plant 4 seeds per 30 cm. Thin seedlings to final spacing once they are sufficiently developed. Corn is wind pollinated, and should be planted, if possible, in a block of at least 4 rows.

Keep the plants free of weeds until they are knee-high, then do not disturb the delicate roots.

Corn seed can also be started indoors in large containers, such as the EarthBoxes®, and transplanted out carefully in late May.

How to Harvest

Corn cobs should be harvested when the silks at the top of an ear are a dry brown, the cob seems to start to droop, and the kernels release milky juice when cut.

Corn has a maturity of 70 to 100 days. There are a number of different varieties of corn, and should be selected carefully for suitability of EarthBoxes®.

Did You know?

Cucumbers are insect pollinated; therefore, any covers must be removed from the plants once they begin to flower. Any fruit that have not been properly pollinated will be shrunken and shrivelled at the flower end. Remove these from the plant so it may flower again.

Cucumber

Nutrients

Cucumbers are a good source of potassium, beta carotene vitamin C, and vitamin A. Cucumber peel is a good source of dietary fibre.

Edible Parts

The fruit of the cucumber plant is the part normally eaten.

How to Grow

Timing
Cucumbers can be planted by direct-seed or transplant. For a continuous harvest, make successive plantings every 2 to 3 weeks until about 3 months before first fall frost date.

Transplant when the third true leaf is expanding, about 3 to 4 weeks after planting.

Seeding Depth
1.3 cm–2.5 cm

Spacing
7.5 cm–30 cm between plants (depending on variety)
120 cm–180 cm between rows

Growing
All types of cucumbers need warmer soil (at least 16°C) to germinate. If starting indoors, use individual peat pots or plugs to minimize root disturbance when transplanting.

How to Harvest

Cucumbers should be picked regularly. If they get too big, the plant will stop producing fruit. About 1 month before first frost, start pinching off new flowers so plants concentrate their energy into ripening the existing fruit.

Cucumbers have a maturity of about 50 days.

Did You know?

Leeks are very mild, and can be used in many recipes. They are sometimes used to replace strong onions.

Leek

Nutrients

Leeks are good sources of vitamin C, vitamin B6, folate, calcium, iron, and manganese.

Edible Parts

The main edible portion of the leek is the white onion bulb. The stem or the stalk, which is a bundle of leaf sheaths, is also edible.

How to Grow

Timing
Leeks can be started from seed, but it is best to use transplants. If they are seeded, they should be started at the end of March to mid-June, and kept well watered.

Seeding Depth
3 cm–5 cm

Spacing
10 cm–15 cm between plants
45 cm between rows

Growing
When they are about 20 cm tall, seedlings should be transplanted into a deep trench, being careful not to cover with soil above the first leaf joint. Soil should gradually be filled in the trench as the leeks grow.

How to Harvest

Dig anytime the leeks are 2 cm in diameter or larger.

It is important to completely and thoroughly clean leeks before cooking. This is vital to remove any forms of dust or dirt that might have accumulated in the different overlapping layers of the stem.

Leeks have a maturity of about 120 days.

Did You know?

Lettuce grows best in cool weather, during the spring and fall.

Romaine lettuce tolerates warmer temperatures somewhat better than other types of lettuce.

Lettuce

Nutrients

Lettuces provide a good source of vitamin A, vitamin K and vitamin C. They are also a good source of thiamin, vitamin B6, and folate.

Edible Parts

The edible portions of lettuce are its leaves.

How to Grow

Timing
Lettuce can be direct seeded, or started indoors and raised as transplants. Start in April, and plant every 2 to 3 weeks for a continuous harvest.

Seeding Depth
Plant seeds on the surface of the soil and gently pat them into the soil.

Spacing
20 cm–25 cm between plants (final)
30 cm–60 cm between rows

Growing
Direct seed 2.5 cm apart in short rows, and thin to the final spacing.

Seeds sprout in 2 to 15 days, depending on soil temperature. Lettuce will germinate at low temperatures.

It is important to water regularly to prevent leaves from getting bitter.

How to Harvest

Lettuce can be harvested from the garden from late spring to the late fall.

Pick individual leaves or wait and harvest full heads, depending on the type of lettuce planted.

Summer lettuce is fresh for only a short time, so harvest it promptly and keep planting. In fall, the plants stay in good eating condition for a longer period of time.

Lettuces have a maturity of 40 to 85 days.

Did You know?

There are many different types of onions that can be planted, including scallions, red, white, yellow, and Spanish.

Onion

Nutrients

Onions are a very good source of vitamins B6 and C, fibre, folic acid, and vitamins B1 and K. Onions also have sulphur compound, which gives them their smell, flavonoids, and chromium.

Edible Parts

All parts of the onion are edible, but they are most often grown for the bulb and leaves.

How to Grow

Timing
Start the transplants by sowing 3 seeds in each cell of a 72-cell tray and transplant as a clump. Seedlings will emerge in 6 to 12 days depending on soil temperature.

These transplants should be planted as early as possible in the spring. Onions can also be started in sets (small onions) that are planted directly in the soil. Press sets into the soil until the tip is just peeking out.

Seeding Depth
1 cm–2 cm

Spacing
5 cm–10 cm between plants

Growing
The size of the onion depends on the size of the tops. The bigger the green tops, the bigger the bulbs. A high nitrogen fertilizer, loose soil, and a lot of water are very important. Most of the onion bulbs should form on the surface of the soil, so don't plant too deeply.

How to Harvest

Stop watering in the beginning of August to mature the bulbs in dry soil. After half the tops have fallen, push over the remainder, wait a week and lift the bulbs.

Bulbs can be left to dry outside, but should not be allowed to freeze. Cure bulbs for 10 to 14 days at 32–35°C. After curing, outer skins and necks should be dry.

Onion bulbs should be stored in cool (0–1°C) and dry (65–70% relative humidity) conditions.

Onions have a maturity of 100 to 120 days.

Did You know?

Peas in the pod taste sweetest right after they have been picked.

Peas

Nutrients

Green peas are a very good source of vitamins B1, B6, B2, and B3 as well as iron and vitamins K and C.

Edible Parts

All parts of the pea plant are edible, including the pods, leaves, stems, shoots, and tendrils.

How to Grow

Timing
Peas prefer cool weather. They can be planted in spring as early as the soil can be worked. These plantings can be covered to keep the soil warm and dry.

Seeding Depth
2 cm–4 cm
Sow seeds deeper if planted later in the season

Spacing
2 cm–5 cm between plants
15 cm–60 cm between rows

Growing
Peas can be sowed thickly, with several seeds in each row. Seeds will sprout in 6 to 14 days, depending on the soil temperature (10–20°C is best).

Peas climb using tendrils and require netting for support that the tendrils can link onto easily. Modern dwarf varieties do not climb and are bred for a once over harvest.

How to Harvest

Pick when pods fill out and peas are bright green. Make multiple sowings or grow several varieties to extend the harvest season.

Peas have a maturity of 55 to 70 days.

Did You know?

The sweetness and vitamin C content of peppers goes up as the fruit changes colour.

Peppers

Nutrients

Peppers are a good source of vitamin C, thiamine, vitamin B6, beta carotene, and folic acid.

Edible Parts

Peppers are grown for their fruit.

How to Grow

Timing
Start seeds indoors 5 to 8 weeks before the last frost. Transplant in early June.

Seeding Depth
0.5 cm (in individual cells or small pots)

Spacing
30 cm–45 cm between plants
45 cm–75 cm between rows

Growing
Peppers are warm season plants that need heat and attention to detail when starting them. The hot peppers often do better in a cool summer than the large bell peppers.

Transplant into the garden, being careful not to bury the stem. Peppers need the warmth and shelter. They also need regular watering to ensure even growth and nutrient uptake.

How to Harvest

When the pepper fruit is firm, it is ready to pick. The fruit will ripen further when it fully turns a colour – red, yellow, brown, or purple.

If peppers are picked when they are green, the total harvest will increase.

Fruit that sets after mid-August will not usually develop or ripen. Pull out the entire bush just before the first frost and hang it upside down in a warm, dry place to ripen hot peppers. Expect 5 to 10 large bell peppers per well-grown plant, 20 to 50 hot peppers per plant.

Peppers have a maturity of 60 to 85 days.

Did You know?

Almost any root vegetable can be grown in the EarthBox®, but its soil depth is about 20-21 cm. While it can be fun to experiment with root vegetables, they may not provide a substantial yield like aboveground vegetables, such as tomatoes, eggplant, and peppers, normally would provide.

Potato

Nutrients

Potatoes are a source of vitamin C, the B vitamins, potassium, and fibre.

Edible Parts

The edible part of the potato is the tuber, or the end of an underground stem. This underground stem is called a stolon. The ends of the stolens swell, or get larger, and form tubers.

How to Grow

Timing
When planted and before they emerge, potatoes can be tolerant of cool soils and moderate frost. Potatoes are generally planted in early to mid spring.

Small potatoes can be planted whole. Larger potatoes can be cut so that there are at least a few "eyes" in each 2.5 cm–3 cm diameter piece.

Seeding Depth
7 cm–10 cm

Spacing
30 cm between plants, 60 cm between rows. Well-grown potato plants can spread up to 120 cm, so they need plenty of room.

Growing
Plants will emerge around 2 to 3 weeks after planting. Just before the plants emerge or when they are 30 cm tall, "hill-up" soil 15–20 cm around the base of the plants. A few of the leaves can be covered. Straw or grass mulch can also be used.

It is important to water the plants regularly to ensure that the soil does not become dried out.

How to Harvest

"New" potatoes can be harvested about 7 to 8 weeks after planting. Flowering is an early indicator of the start of tuber formation. Potatoes grown for late summer and fall "fresh" use can be dug when tubers are full size or when foliage begins to die.

Potatoes have a maturity of 55 to 70 days.

Did You know?

The outside colour of the radish root can be white, pink, red, purple, or black.

Radish

Nutrients

Radishes provide a good source of vitamin C, potassium, magnesium, and folic acid.

Edible Parts

Every part of the radish is edible. However, the roots are most commonly eaten.

How to Grow

Timing
Radish should be planted a week apart for a longer harvest period.

Seeding Depth
2 cm

Spacing
25 seeds per 30 cm row
20 cm between rows

Growing
Radishes do well when they are planted when the weather is cool. They should be thinned to 10 to 12 plants per row.

Radish plants should be well weeded without disturbing the roots.

How to Harvest

Harvest when radishes are the size of large marbles and before the roots get woody and bitter.

Radishes have a maturity of 21 to 28 days.

Did You know?

Snap, or pole, beans are a good choice for small gardens because they use vertical space. Many people feel that snap beans have a richer bean flavour than bush beans.

Bush beans can be used if there is quite a bit of space or if you want to have a definite end to the crop.

Snap Bean

Nutrients

Green snap beans are good sources of vitamins A and C. They also provide dietary fibre and folate.

Edible Parts

The edible parts of the snap bean include the leaves, pods, and fruit. However, the pod is most commonly eaten.

How to Grow

Timing
Seeds can be started indoors, or sowed directly.

Seeds will germinate in soils warmer than 15° C. Seeds will sprout in 8-16 days depending on soil temperature.

Seeding Depth
3 cm–5 cm

Spacing
3 cm–5 cm between plants
60 cm–90 cm between rows

Growing
Seed plants in rows or at the base of a support. Plants will climb by twining around almost anything, including poles, posts, or trellises. Regular watering will increase the yield.

How to Harvest

Snap beans climb as they grow, so there are always beans at different stages of maturity. It is important to keep picking regularly so the plant does not grow to maturity and stop producing new pods. If pods get fat with seed, the plant will stop flowering. The smaller the bean, the more tender they are.

Bush beans have a definite lifespan and may not require constant picking, but can be planted in succession and picked in single harvests.

Snap beans have a maturity of 48 to 70 days.

Did You know?

Tomatoes need a lot of water, but the soil should be allowed to dry out between watering. They should be planted in the sunniest, warmest location in the garden.

Tomato

Nutrients

Tomatoes are a good source of vitamin C, vitamin A, potassium, and iron.

Edible Parts

The fruit of the tomato is edible. However, the leaves and stems are NOT.

How to Grow

Timing
Tomatoes are a warm season crop that should be started from seed 6 to 8 weeks before planting out. Seedlings should be transplanted after the risk of spring frosts is over.

Seeding Depth
0.5 cm–1 cm

Spacing
30 cm–70 cm between plants
60 cm–180 cm between rows

Growing
Seeds take 6 to 14 days to germinate in warm soil before germinating. Grow seedlings at 20–25°C during the day and 15–18°C at night, with plenty of light. Cut back on heat, water, and fertilizer close to field planting, to toughen transplants.

Tomatoes can be transplanted when the night-time temperature is above 7°C and after all risk of frost is past. Transplant seedlings deep to provide extra support.

How to Harvest

Tomatoes should be harvested when the fruit is the desired colour. Green tomatoes can be ripened indoors at a cool temperature when they are blemish free. Very dark green tomatoes are unlikely to ripen fully.

Longer ripening times on the vine will improve the flavour and sweetness.

Tomatoes have a maturity of 75 to 95 days.

Did You know?

Chives are the smallest species of the onion family.

Chives

Nutrients

Chives are rich in calcium, phosphorus, sulphur (a natural antibiotic), iron, vitamin A, and vitamin C.

Edible Parts

The leaves or stalks are used in salads, soups, and on baked potatoes. The flowers can be used in salads or to flavour vinegars.

How to Grow

Timing
Chive seeds need heat to sprout, so wait until the soil is warm and sow small clumps of seeds.

Seeding Depth
1.25 cm between plants
30 cm between rows

Spacing
Clumps of chives should be divided after sprouting and replanted to stand 30 cm apart.

Growing
Chives are a perennial and can be wintered in pots. They can tolerate some frost.

How to Harvest

The whole plant can be cut down to 4 cm from the ground. Use scissors and take as much as needed.

Chives don't dehydrate well, so use fresh portions regularly.

Chives have a maturity of 75 to 90 days.

Did You know?

Garlic, as well as other alliums (chives, onions, and leeks), produces an odour that is offensive to many garden pests. Crushed garlic, combined with mineral oil and fish emulsion, can be effective as a spray against leaf insects and fungus.

Garlic

Nutrients

Garlic provides a number of nutrients, including calcium, folate, iron, magnesium, manganese, phosphorus, potassium, selenium, vitamin B1, vitamin B2, vitamin B3, vitamin C, and zinc.

Edible Parts

The edible part of garlic is found in the bulb of the plant.

How to Grow

Timing
Plant garlic in October or as early as possible in spring. Garlic matures between the end of July to early August.

Seeding Depth
2 cm–5 cm

Spacing
7 cm–15 cm between plants
20 cm–60 cm between rows

Growing
Garlic is grown from bulbs. Separate the bulbs into individual segments (cloves) to plant. Do not skin the clove.

Remove the flower stalks (called scapes) before they open and as they emerge. This will keep energy in the bulb.

Plants can be kept for a second year of growth to get larger bulbs. Plants may need to be covered with a light layer of straw to protect them in winter.

How to Harvest

When the tops begin to dry, pull and air-dry like onions. Harvest when half to three-quarters of the leaves have turned yellow. Try to avoid puncturing the bulbs when digging them out. Cure the bulbs in a single layer in a warm spot for a week to 10 days.

Store in a cool, dry, well-ventilated space. Do not store garlic in the refrigerator, as this will induce sprouting, changing the garlic's texture and flavour. Use any damaged bulbs first, while storing the best. Set aside the best bulbs for replanting in the fall.

Garlic has a maturity of 100 to 120 days.

Did You know?

Oregano plants have tiny white flowers above fuzzy greyish-green leaves. They are a perennial plant.

Oregano

Nutrients

Oregano is a good source of vitamin K, and is also rich in manganese, iron, calcium, and vitamins A and C. It contains omega-3 fatty acids and fibre.

Edible Parts

The edible parts of the oregano plant include the leaves and flowers.

How to Grow

Timing
After planting seeds, the soil should be kept warm and not overwatered. Germination will occur in 7 to 14 days.

When the plants are about 5 to 10 cm tall, set them in the garden.

Seeding Depth
Oregano seeds are very tiny. Seeds can be sprinkled very lightly on the surface of the soil.

Spacing
45 cm between plants

Growing
Oregano seedlings can be transplanted in clumps.

How to Harvest

Pick the leaves whenever available for use. Oregano leaves can be dried or frozen.

Oregano has a maturity of about 58 days.

Did You know?

Parsley attracts beneficial insects. For example, its small white flowers attract wasps that lay eggs on harmful aphids and caterpillars.

Parsley

Nutrients

Parsley contains high levels of beta carotene, vitamin B12, folate, chlorophyll, calcium, and vitamin C.

Edible Parts

The edible parts of the parsley plant are its leaves and stem.

How to Grow

Timing
Parsley seeds germinate slowly (up to 3 weeks) and the soil must be kept moist during this time. Soak the seeds overnight to hasten germination.

Seeds can be planted in May if the soil can be kept moist during this time. Otherwise, it is best to raise transplants. Because parsley has a very long taproot, it is more effective to transplant with young plants.

Seeding Depth
1 cm–1.3 cm

Spacing
15 cm–20 cm between plants (final)
30 cm–45 cm between rows

Growing
Parsley can survive temperatures as low as -12°C. Even when the tops die off, the plant can regrow from the roots.

How to Harvest

Cut individual sprigs from the outside of the plant or the whole plant as needed. Sprigs can be dried or frozen. To freeze, place sprigs of parsley into an ice cube tray and cover with water. Place the frozen cubes into a bag and store. This keeps the parsley fresh for months.

Parsley has a maturity of 70 to 90 days.

Salad Planting Guide

Use this planting guide to help you plan your garden.

Growing Stage	Questions	Vegetable or Herb	Vegetable or Herb	Vegetable or Herb
Sowing	When should we plant the seeds? How deep? How far apart should the rows of seeds be planted?			
Transplanting	Should we grow seedlings for this plant? When should they be started? When should the seedlings be planted in the garden?			
Germinating	How long does it take for the seeds to germinate? What do we have to do to make sure the seedlings grow (provide light, water, thin out, pinch)?			
Growing	What do we have to do to look after this plant while it grows? How often do we have to look after this plant?			
Harvesting	How long does it take before this plant is ready to harvest? When is the best time to harvest the plant? What part of the plant will we use?			

Salsa Planting Guide

Use this planting guide to help you plan your garden.

Growing Stage	Questions	Vegetable or Herb	Vegetable or Herb	Vegetable or Herb
Sowing	When should we plant the seeds? How deep? How far apart should the rows of seeds be planted?			
Transplanting	Should we grow seedlings for this plant? When should they be started? When should the seedlings be planted in the garden?			
Germinating	How long does it take for the seeds to germinate? What do we have to do to make sure the seedlings grow (provide light, water, thin out, pinch)?			
Growing	What do we have to do to look after this plant while it grows? How often do we have to look after this plant?			
Harvesting	How long does it take before this plant is ready to harvest? When is the best time to harvest the plant? What part of the plant will we use?			

Vegetable Soup Planting Guide

Use this planting guide to help you plan your garden.

Growing Stage	Questions	Vegetable or Herb	Vegetable or Herb	Vegetable or Herb
Sowing	When should we plant the seeds? How deep? How far apart should the rows of seeds be planted?			
Transplanting	Should we grow seedlings for this plant? When should they be started? When should the seedlings be planted in the garden?			
Germinating	How long does it take for the seeds to germinate? What do we have to do to make sure the seedlings grow (provide light, water, thin out, pinch)?			
Growing	What do we have to do to look after this plant while it grows? How often do we have to look after this plant?			
Harvesting	How long does it take before this plant is ready to harvest? When is the best time to harvest the plant? What part of the plant will we use?			

Harvest and Prepare

One of the greatest rewards of growing a garden is the harvest. The challenge is in the timing! Most vegetable seed varieties will provide guidelines for harvesting. Additionally, encourage students to use their senses as they check and monitor the vegetables in their gardens.

Teach students to use strategies for harvesting:

- Check the Grow Cards on pages 31 to 40 for harvesting techniques and timing. Inspect the plants for changes in colour, texture, density, and size.
- Discuss how to harvest different types of vegetables. For example, root vegetables are harvested by loosening the soil and pulling the root up carefully. Leaf vegetables are harvested by pulling off the larger outer leaves so young smaller leaves have a chance to grow more.

Teach students to clean and prepare vegetables that have been harvested:

- Shake the dirt off roots or leaves carefully. Root vegetables can be rubbed with an old towel.
- Trim vegetables. Cut off the roots of greens, and remove any wilted or discoloured outer leaves. Trim off small roots and leaves from any root vegetables.
- Wash vegetables thoroughly. Make sure all greens are clean and scrub root vegetables with a vegetable brush or old toothbrush. Rinse vegetables and drain them in a colander or on a paper towel.

While my students are working in our indoor and outdoor gardens, we often have opportunities for tasting. They tasted young basil plants at the two-leaf stage and were astounded to taste the rich basil in so small a plant. They asked to munch on carrots as we were thinning them out. They would wash them under the hose and eat them straight away. "These are the best carrots I've ever eaten."

~Alannah Van Bryce, St. Albert

The preparation of simple, garden vegetable foods can provide valuable lessons and opportunities to discuss nutrition, food choices, and food preferences. **Eating Well with Canada's Food Guide** *provides a number of resources on healthy eating choices and can be accessed at* http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php. *The Food Guide provides recommendations for serving sizes and amounts for children and youth. Appendix C, on pages 95 to 97, provides additional information on nutrition.*

Fresh vegetables already have a wonderful taste. Encourage students to try different raw vegetables, including carrots, peppers, peas, salad, young spinach, and tomatoes.

It is extremely important to be aware of proper food handling and safety. The Canadian Partnership for Consumer Food Safety recommends keeping food safe by:

- *Cleaning – Wash hands and surfaces often with hot, soapy water. Rinse all fruits and vegetables under cool running water and use a vegetable brush to clean them.*
- *Separating – Avoid cross-contamination by keeping vegetables and meats separated and washing preparation surfaces and tools thoroughly.*
- *Chill – Refrigerate foods promptly.*
- *Cook – Ensure that foods are cooked to proper temperatures. Use a food thermometer to measure the internal temperatures of foods.*

The Canadian Partnership for Consumer Food Safety provides information and resources for students on their website at www.canfightbac.org.

Health Canada also provides information and an interactive guide on safe food handling at http://www.hc-sc.gc.ca/fn-an/securit/kitchen-cuisine/index-eng.php.

Be EXTREMELY careful when handling implements used to harvest and prepare foods. Teach students the SAFE way to handle knives and other sharp objects, clippers, and hot places or items.

Cooking with Vegetables

Many vegetables can be simply cooked with a little canola oil and salt to bring out the flavour and the food value. Good food combinations can also enhance the flavour of vegetables. Challenge students to find new food combinations that they like.

The appearance and presentation of food also enhances taste. Plan time to explore and discuss how food combinations and meal plans can be prepared to look appealing.

To get best value from cooked vegetables, consider the following tips:

- Don't overcook - cook as lightly as possible.
- Go for steaming rather than boiling.
- Cook "conservatively," using very little water.
- If you boil vegetables, use the water for soup.
- Make dishes like soups and stews where the cooking water is part of the dish.
- Put fruit and vegetable peels on the compost heap.
- Make sure there is access to clean water for washing foods, and soap for washing hands, dishes, and work surfaces.

EarthBox® Storage

After harvest, follow these steps to store and replant the EarthBox containers:

- Pull out the old plants or cut them off at the base.
- Remove the fitted cover and discard.
- Use a cup to carefully scoop out what remains of the fertilizer strip. Dispose of the fertilizer in a compost pile or other outdoor location.
- Place a new fitted cover on the EarthBox container.
- Drain the reservoir. This allows the EarthBox container to be stored outdoors during the winter months.

If storage space or time is limited after the fall harvest, empty the EarthBox containers into school flower beds. The EarthBox containers can then be washed and easily stacked for storage. Do not leave soil in the EarthBox containers, as it will likely not dry and may be moldy by spring. Washing out the EarthBox containers also deter pests from wintering in them. Plan to start the new season with fresh planting materials.

"We had our fair share of challenges, which included having the fence surrounding the Garden reconfigured to facilitate roofers working on the school roof; weather issues (with wind and rain being the main culprits), and a resident gopher who decided to help herself to the carrots, reducing the stems to mere sticks! My resourceful parent-in-charge solved this problem by raising the EarthBoxes onto 5 gallon buckets, out of reach of the freeloader! The carrots rebounded extremely well and were delicious at harvest time! Though I initially thought most of our seeds would be sprouting in Medicine Hat, because of the famous Lethbridge winds, our EarthBox Garden Project proved to be a tremendous success and will definitely be continued!"

~Jennifer Parkinson, Lethbridge

To replant:

- If you did not pull the old plants out, you will need to remove the plants and use a garden tool to break up any large root masses that remain.
- Top up the EarthBox container with fresh growing medium.
- Add 500 mL of fertilizer strip. Cover the box with a new fitted cover. If you plant tomatoes, add new dolomite to the top 7 to 10 cm of growing medium. Otherwise, add dolomite every other planting.

Teaching and Learning in the Garden

A school garden should be focused on the learning process and provide students with opportunities to explore connections between the food they eat, the environment, the communities and industries that are involved with food production, and their personal development and growth. This resource provides support for learning across the Alberta curriculum, and emphasizes the following key themes:

1. Healthy food and activity choices are strengthened by involvement in the gardening and food growing process.
2. The ways that people meet their need for food affects their environment. Students should be encouraged to explore the connection between the natural world and the choices they make about food.
3. Food production is centred in a variety of communities, from rural and agriculturally based communities to urban producers and consumers. Students should develop an appreciation for the activities that comprise agricultural ways of life, farmers' contributions to all communities, and the range of occupations involved with food production.
4. As students take responsibility for tending and growing vegetables, they should also be encouraged to consider the personal decisions they make about the food they eat and what influences those choices.

The following section outlines a number of examples of learning activities that are correlated with the Alberta programs of study from grades 3 to 8. School gardens can provide a number of authentic and meaningful opportunities to develop, reinforce, or extend learning in Science, Social Studies, Health and Life Skills, Mathematics, Language Arts, and Art. Outdoor learning also provides numerous opportunities for students to practise and apply cooperative and collaborative learning skills, citizenship principles and practices, and media literacy.

There are many different learning opportunities that can be drawn from a classroom or school garden project. The suggested themes or topics, curriculum connections, and learning activities that follow are provided as examples only. Many more activities can be developed and added to each of the three learning focus questions across all grade levels.

Each learning focus question can provide the central inquiry point for experiences that emphasize learning about personal well being, the environment, and life choices.

A teaching resource such as **Setting Up and Running a School Garden**, *from the Food and Agriculture Organization of the United Nations, can also be used to explore and supplement learning activities. This resource can be accessed at* http://www.fao.org/docrep/012/i1118e/i1118e00.htm.

EarthBox® provides educational resources with detailed lesson plans, primarily focused on Science, Mathematics, and Health and Life Skills concepts and skills. Lessons are correlated with U.S. National Standards in these and other subject areas. Information on these resources can be found at http://earthbox.com/edu-curricula-guides. *Resources can be ordered online through Spectrum-Nasco at* www.spectrum-nasco.ca *or Boreal Science at* www.boreal.com.

Clusters of activities are organized around three learning focus questions, including:

- **What does it mean to make healthy food choices?**
- **How does our garden grow?**
- **What messages can be found in a garden?**

A focus on healthy food choices and good nutrition supports and develops learning outcomes in the Health and Life Skills curriculum. However, there are also numerous opportunities to integrate Health and Life Skills activities with learning in Language Arts and Art curricula.

What does it mean to make healthy food choices?

The school garden can provide numerous opportunities to encourage students to discuss and explore the benefits of making healthy food choices, particularly the benefits of vegetables. Students also have a number of opportunities to practise leadership and volunteerism skills. These learning opportunities develop and support outcomes in the Health and Life Skills program of study.

	Potential Topics	HEALTH AND LIFE SKILLS Learning Outcomes
Grade 3	**Making Healthy Choices** **Making a Contribution**	❑ W–3.5 apply guidelines from Canada's Food Guide to Healthy Eating to individual nutritional circumstances; e.g., active children eat/drink more ❑ L–3.7 assess how individual contributions can have a positive influence upon the family, school and community ❑ L–3.8 select and perform volunteer tasks as a class or as a group
Grade 4	**A Balanced Diet from a Garden** **Careers with Plants** **Volunteering in the Garden**	❑ W–4.5 analyze the need for variety and moderation in a balanced diet; e.g., role of protein, fats, carbohydrates, minerals, water, vitamins ❑ L–4.7 describe the impact of service contributions on self; e.g., increase in self-worth, confidence and understanding of others ❑ L–4.8 select, perform as a class and analyze volunteer accomplishments; e.g., participate in spring cleanup, collect used eyeglasses ❑ L–4.5 relate personal interests to various occupations
Grade 5	**Healthy Eating and Eating Behaviours** **Careers with Plants** **Volunteering in the Garden**	❑ W–5.5 examine ways in which healthy eating can accommodate a broad range of eating behaviours; e.g., individual preferences, vegetarianism, cultural food patterns, allergies/medical conditions, diabetes ❑ L–5.7 identify, within the school, the volunteer service accomplishments of staff and students ❑ L–5.8 develop strategies for showing appreciation for volunteer contributions; e.g., use communication technologies ❑ L–5.5 relate personal skills to various occupations

	Potential Topics	HEALTH AND LIFE SKILLS Learning Outcomes
Grade 6	**Personal Eating Behaviours** **Careers with Plants** **Volunteering in the Garden**	❑ W–6.5 analyze personal eating behaviours—food and fluids—in a variety of settings; e.g., home, school, restaurants ❑ L–6.7 identify the volunteer accomplishments of the community, and communicate information and appreciation ❑ L–6.8 analyze and assess the impact of volunteerism in the school and community ❑ L–6.5 relate knowledge, skills and attitudes of a successful student to those of successful workers
Grade 7	**Individual Food Choices and Nutritional Needs** **Careers with Plants** **Volunteering in the Garden**	❑ W–7.4 analyze the messages and approaches used by the media to promote certain body images and lifestyle choices ❑ W–7.5 relate the factors that influence individual food choices to nutritional needs of adolescents; e.g., finances, media, peer pressure, hunger, body image, activity ❑ L–7.7 determine and use knowledge and skills of the class to promote school and community health ❑ L–7.8 apply effective group skills to design and implement a school–community health enhancement plan; e.g., plant trees in playgrounds to provide future shade ❑ L–7.5 create a personal portfolio showing evidence of interests, assets and skills; e.g., certificates of participation
Grade 8	**Personal Food Choices and Strategies** **Careers with Plants** **Volunteering and Leading in the Garden**	❑ W–8.4 develop personal strategies to deal with pressures to have a certain look/lifestyle; e.g., accept individual look ❑ W–8.5 evaluate personal food choices, and identify strategies to maintain optimal nutrition when eating away from home; e.g., eating healthy fast foods ❑ L–8.7 relate personal knowledge and skills to potential opportunities for volunteering and providing service to others in the community ❑ L–8.8 investigate the characteristics of a mentor, and practise mentorship in a group setting ❑ L–8.5 update a personal portfolio to show evidence of a range of interests, assets and skills; and relate evidence to knowledge and skills required by various career paths

Activity One

Food Garden Nutrition Labels Grades 3 to 6

Have students create "illustrated" food labels for each of the vegetables in the garden. Ask students to work individually or with a partner to create a label that includes:

- Calories
- Carbohydrates
- Fibre
- Protein
- Potassium
- Vitamins A and C
- Calcium
- Iron

Encourage students to create their own "icons" or pictures to represent each of these nutrients and include them on their food label.

Extend this activity by having students work in groups to calculate the nutrient value of a salad, salsa, or soup recipe. Model the steps involved in calculating the value:

- Specify how many servings of each vegetable will go into the salad, salsa, or soup recipe. For example, a soup recipe may call for 3 leeks.
- Calculate the nutrient value of vegetables in the entire recipe. For the soup recipe, each medium leek has 50 calories, 13 grams of carbohydrates, 2 grams of fibre, and 1 gram of protein. To obtain the nutrient value of leeks in the entire soup recipe, multiply by 3 and record the amount.
- Repeat the calculation for each vegetable in the recipe. Add any additional items, such as olive oil, lemon juice, or salad dressing.
- Point out that the total nutrient value of the recipe can be calculated by adding the nutrient totals of all ingredients together. Provide students with a graphic organizer, such as a multiple column chart, in which to record and total values.
- To calculate the nutrient value per serving, divide each vegetable's nutrient totals by the yield, or number of servings. Or divide the total nutrient value of the recipe by the yield.

Nutrition Facts in Vegetables provides a tabulated nutrient chart for many raw vegetables at **http://www.fatfreekitchen.com/nutrition/food-nutrition.html**.

Extend

Provide students with additional opportunities to explore the benefits of healthy food choices, including:

- ***A field study at a vegetable farm or market***
- ***A guest speaker who works at a grocery store or farmer's market***
- ***The creation of a brochure, focused on healthy meal choices***
- ***Research into additional recipes that are vegetarian***
- ***The creation of a day's menu that includes a vegetable in every meal***
- ***The creation of a "garden-health" classroom or school cookbook, including nutritional information for each recipe***

Share examples of different food labels with students. Discuss the type of information that food labels provide and how they are used. *Eating Well with Canada's Food Guide* provides an interactive nutrition label and quiz at **http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php**. These Flash-based applications can be used with a Smartboard to explore and discuss food labelling and nutritional values with the class.

Have students work in small groups to compare the nutrient values of their vegetables and/or recipes to the recommended amounts in *Eating Well with Canada's Food Guide.* Younger students can complete sentence stems, such as:

- If I have _____ servings of soup/salad/salsa, I would get nutrients like _____
- I can get _____ servings of vegetables if I eat _____ servings of soup/salad/salsa.
- If I ate _____, I would be getting my daily servings of vegetables.

An Alphabetical Vegetables List of the Most Nutritious Vegetables can be accessed on the website **http://commonsensehealth.com/Diet-and-Nutrition/Alphabetical_Vegetables_List_of_the_Most_Nutritious_Vegetables.shtml**. Reproduce the A, B, and C lists on poster paper. Have students use their nutrient value calculations to analyze the vegetables on each list. Assign groups of students to the different A, B, and C lists. Have each group calculate the nutrient value of two or three vegetables on their list. Compare values and discuss whether and why there are different types of vegetables. Point out that corn is not actually a vegetable, but a grain. How is this reflected in its nutrient values?

> ***"As my students became more knowledgeable and familiar with different vegetables, the more likely they were to crave them. I couldn't keep them out of my carrots at lunch time, especially when they were from the garden!"***
>
> ~Adina Belseth, Calgary

Activity Two

Vegetable Ads Grades 6 to 8

Ask students to work with a partner or in a small group to do a media search through various forms of media for any advertisements that include references to food and eating choices. Students can be asked to focus on different types of advertisements, such as:

- Those targeted at youth or teens
- Restaurant or fast food advertisements
- Those that focus on daily eating and meal choices
- Those that focus on snack food advertising

Have students recreate the advertisements, using fresh vegetables from the garden. Provide opportunities for students to share their advertisements. Discuss how and

why the "messaging" of the advertisement changed when different food items or examples were replaced with "garden-fresh" vegetables. Encourage students to analyze the messages in these advertisements that are related to self and body image, peer and media pressure, and other factors that relate to daily food choices.

Provide time for students to also research and compare the nutrient values of foods pictured in food advertisements. Suggest that students select those advertisements for the restaurants or fast food places that they like to eat at. Analyze and compare nutrient values of a typical meal they might order compared to nutrient values of one that uses primarily vegetables from the garden. Have students focus on a question such as, "When fast food is so readily available, why should people cook meals at home?"

Activity Three

Career Fields Grades 4 to 8

Horticulture is a career field that involves how plants grow, develop, are used, and distributed. Horticulture deals with:

- *Edible crops (vegetables, fruits, nuts, etc.)*
- *Ornamental plants*
- *Landscaping and recreational land use (golf courses, parks, etc.)*

Horticulture also involves the science of finding new ways to grow plants and developing new and better varieties, called cultivars, for the garden, orchard, or nursery. Encourage students to explore careers and occupations related to the horticulture field.

Provide students with opportunities to research and share information about different careers related to horticulture, food production, nutrition, and agriculture. Encourage students to use the Internet to search each of these career clusters. Ask students to identify specific careers that are part of these clusters and create posters that illustrate the tasks, roles, and responsibilities associated with each. This activity can be made more grade-specific by:

- Asking Grade 4 and 5 students to link their personal interests and skills to two or three of the specific careers. Encourage them to include the skills they have gained by carrying out their responsibilities in the school garden.
- Having Grade 6 students create a role comparison between their responsibilities as a student and those that are required for one or two of the specific careers that they identify.
- Having Grade 7 and 8 students work as groups to create a portfolio or a web page that highlights the skills, roles, aptitudes, and interests connected to a career cluster.
- Have Grade 8 students create a quiz that determines whether they or their peers have the skills, aptitudes, and interests necessary for a career in horticulture.

Activity Four

Volunteering in the Garden Grades 3 to 8

Have students create an individually customized certificate of participation to add to their portfolios or journals that recognize the contributions they made to the school garden project, the skills they gained, what they learned about healthy eating, and what they gained from working on a class or school project. This activity can be made more grade-specific by:

- Guiding Grade 3 students to develop their certificate of participation around the contributions they made to the school or classroom garden.
- Asking Grade 4 and 5 students to identify the contributions the school or classroom garden made to the school community.
- Having Grade 6 students focus on their role with others in their classroom, school and/or community who were involved with the school or classroom garden project.
- Having Grade 7 students develop their certificate of participation around the contribution they and the garden have made to community health and how urban gardens promote positive messages for everyone in the community.
- Having Grade 8 students develop their certificates to recognize their roles as mentors and leaders in the school garden project.

Ask students to create a poster or wall mural that includes pictures or photographs of the garden, students' contributions to it, community involvement, and its challenges and successes. Display the poster in the school.

Spotlight on Physical Activity

Gardening can provide students with opportunities to be physically active on a daily basis. Examples of some physical benefits include:

- ***Digging involves weight lifting, abdominal stressing, and partial squatting***
- ***Pruning can exercise arm muscles***
- ***Weeding involves squats and forearm stretches***
- ***Planting requires many muscles to be used to dig, mix soil, lift, and carry***

Encourage students to make up their own sequence of "daily garden activities" that accompany garden tasks such as:

- ***Weeding***
- ***Watering***
- ***Digging and planting***
- ***Moving soil***
- ***Spreading mulch***
- ***Harvesting***
- ***Cleaning EarthBox® containers***

Students can invent movements, including those that involve stretching, resistance activities, walking, and pantomimes that they share with others in the class or school as part of Daily Physical Activity.

A school garden provides a natural focus on environmental and scientific topics and themes – these develop and support learning in Science and Social Studies. Gardening skills – measuring, calculating, and predicting – also lend themselves to authentic applications of Mathematics. To this end, learning outcome charts are provided for these three subject areas. Potential topics provide a point of integration between them.

Knowledge and Understanding learning outcomes have been provided for Science and Social Studies programs of study. Skills and Processes as well as Attitudes and Values outcomes should be added as specific activities are selected.

How does our garden grow?

The school garden can offer numerous opportunities for students to experience authentic, real-world applications of what they are learning in the classroom. Inquiry-based activities involve students in active exploration and critical thinking, as they use their senses, reasoning, critical thinking, and communication skills to find answers to questions. A classroom or school garden project can provide students with a multitude of opportunities to explore the "science" of gardening, and apply mathematical reasoning, calculating, and problem solving. These learning opportunities develop and support outcomes in the Science, Mathematics, and Social Studies programs of study.

	Potential Topics	SCIENCE Learning Outcomes
Grade 3	**Exploring the Construction of an EarthBox®** **A Garden Season – Harmful and Helpful Insects**	**B: Building with a Variety of Materials** ❑ 1. Using a variety of materials and techniques, design, construct and test structures that are intended to: • support objects • span gaps • serve as containers • serve as models of particular living things, objects or buildings ❑ 5. Identify the intended purpose and use of structures to be built, and explain how knowing the intended purpose and use helps guide decisions regarding materials and design. **E: Animal Life Cycles** ❑ 6. Demonstrate awareness that animals require different habitats in order to meet their basic needs of food, water, shelter and space.
Grade 4	**Recycling, Composting, and Mulching in the Garden** **Light for Growth** **Exploring Plant Growth and Changes**	**A: Waste and Our World** ❑ 1. Identify plant and animal wastes, and describe how they are recycled in nature. For example, plant leaves serve as a source of food for soil insects, worms and other creatures. The wastes of these animals may then be further broken down by molds, fungi and bacteria. ❑ 2. Identify and classify wastes that result from human activity. **D: Light and Shadows** ❑ 2. Identify a wide range of sources of light, including the Sun, various forms of electric lights, flames, and materials that glow (luminescent materials).

	Potential Topics	SCIENCE Learning Outcomes
		E: Plant Growth and Changes ❑ 1. Describe the importance of plants to humans and their importance to the natural environment. Students who meet this expectation should be able to give examples of plants being used as a source of food or shelter, and be aware of the role plants play in the environment; e.g., preventing erosion, maintaining oxygen. ❑ 2. Identify and describe the general purpose of plant roots, stems, leaves and flowers. ❑ 3. Describe common plants, and classify them on the basis of their characteristics and uses. ❑ 4. Recognize that plant requirements for growth – i.e., air, light energy, water, nutrients and space – vary from plant to plant and that other conditions; e.g., temperature and humidity; may also be important to the growth of particular plants. ❑ 5. Identify examples of plants that have special needs. ❑ 7. Recognize that plants of the same kind have a common life cycle and produce new plants that are similar, but not identical, to the parent plants. ❑ 8. Describe ways that various flowering plants can be propagated, including from seed, from cuttings, from bulbs and by runners. ❑ 9. Nurture a plant through one complete life cycle—from seed to seed. ❑ 10. Describe the care and growth of a plant that students have nurtured, in particular: • identify the light, temperature, water and growing medium requirements of the plant • identify the life stages of the plant • identify the reproductive structures of the plant
Grade 5	**The Chemistry of Gardening** **Gardening Weather!**	**C: Classroom Chemistry** ❑ 5. Recognize that the surface of water has distinctive properties, and describe the interaction of water with other liquids and solids. **D: Weather Watch** ❑ 6. Measure at least four different kinds of weather phenomena. Either student-constructed or standard instruments may be used. ❑ 7. Record weather over a period of time. ❑ 8. Identify some common types of clouds, and relate them to weather patterns. ❑ 9. Describe the effects of the Sun's energy on daily and seasonal changes in temperature—24-hour and yearly cycles of change. ❑ 11. Understand that climate refers to long term weather trends in a particular region and that climate varies throughout the world.

	Potential Topics	SCIENCE Learning Outcomes
Grade 7	**Elements of a Garden Ecosystem** **Plants for Food** **Thermal Energy for an Indoor Garden**	**A: Interactions and Ecosystems** ❑ 1. Investigate and describe relationships between humans and their environments, and identify related issues and scientific questions • illustrate how life-supporting environments meet the needs of living things for nutrients, energy sources, moisture, suitable habitat, and exchange of gases ❑ 2. Trace and interpret the flow of energy and materials within an ecosystem • analyze an ecosystem to identify biotic and abiotic components, and describe interactions among these components • analyze ecosystems to identify producers, consumers and decomposers; and describe how energy is supplied to and flows through a food web ❑ 3. Monitor a local environment, and assess the impacts of environmental factors on the growth, health and reproduction of organisms in that environment **B: Plants for Food and Fibre** ❑ 1. Investigate plant uses; and identify links among needs, technologies, products and impacts ❑ 2. Investigate life processes and structures of plants, and interpret related characteristics and needs of plants in a local environment ❑ 3. Analyze plant environments, and identify impacts of specific factors and controls ❑ 4. Identify and interpret relationships among human needs, technologies, environments, and the culture and use of living things as sources of food and fibre **C: Heat and Temperature** ❑ 1. Illustrate and explain how human needs have led to technologies for obtaining and controlling thermal energy and to increased use of energy resources ❑ 3. Apply an understanding of heat and temperature in interpreting natural phenomena and technological devices
Grade 8	**The Science of the EarthBox®** **Plant Cell Structures**	**A: Mix and Flow of Matter** ❑ 2. Investigate and describe the composition of fluids, and interpret the behaviour of materials in solution **B: Cells and Systems** ❑ 1. Investigate living things; and identify and apply scientific ideas used to interpret their general structure, function and organization ❑ 2. Investigate and describe the role of cells within living things

	Potential Topics	MATHEMATICS Learning Outcomes
	Mathematics also provides a multitude of opportunities to support and extend learning with a school garden project. All four Mathematics Strands – Number, Patterns and Relations, Shape and Space, and Statistics and Probability – offer learning potential and real life application of mathematics concepts to the school garden. The following learning outcomes are provided as examples that are supported by the activities that follow.	
Grade 3	**Exploring the Construction of an EarthBox®** **A Garden Season – Harmful and Helpful Insects**	**Shape and Space** ❑ 1. Relate the passage of time to common activities, using nonstandard and standard units (minutes, hours, days, weeks, months, years). [CN, ME, R] ❑ 5. Demonstrate an understanding of perimeter of regular and irregular shapes by: • estimating perimeter, using referents for cm or m • measuring and recording perimeter (cm, m) • constructing different shapes for a given perimeter (cm, m) to demonstrate that many shapes are possible for a perimeter. [C, ME, PS, R, V] **Statistics and Probability** ❑ 1. Collect first-hand data and organize it using: • tally marks • line plots • charts • lists to answer questions. [C, CN, PS, V] [ICT: C4–1.3] ❑ 2. Construct, label and interpret bar graphs to solve problems. [C, PS, R, V] [ICT: C4–1.3, C7–1.3, C7–1.4]
Grade 4	**Exploring Plant Growth and Changes**	**Shape and Space** ❑ 2. Read and record calendar dates in a variety of formats. [C, V] ❑ 3. Demonstrate an understanding of area of regular and irregular 2-D shapes by: • recognizing that area is measured in square units • selecting and justifying referents for the units cm2 or m2 • estimating area, using referents for cm2 or m2 • determining and recording area (cm2 or m2). **Statistics and Probability** ❑ 2. Construct and interpret pictographs and bar graphs involving many-to-one correspondence to draw conclusions. [C, PS, R, V]
Grade 5	**The Chemistry of Gardening**	**Shape and Space** ❑ 3. Demonstrate an understanding of measuring length (mm) by: • selecting and justifying referents for the unit mm • modelling and describing the relationship between mm and cm units, and between mm and m units. [C, CN, ME, PS, R, V] ❑ 4. Demonstrate an understanding of volume by: • selecting and justifying referents for cm^3 or m^3 units • estimating volume, using referents for cm^3 or m^3 • measuring and recording volume (cm^3 or m^3) • constructing right rectangular prisms for a given volume. [C, CN, ME, PS, R, V]

	Potential Topics	MATHEMATICS Learning Outcomes
Grade 6	**Garden Watch**	**Statistics and Probability** ❑ 3. Graph collected data, and analyze the graph to solve problems. [C, CN, PS, R, T] [ICT: C6–2.5, C7–2.1, P2–2.1, P2–2.2]
Grade 7	**Elements of a Garden Ecosystem** **Thermal Energy for an Indoor Garden**	**Statistics and Probability** ❑ 1. Demonstrate an understanding of central tendency and range by: • determining the measures of central tendency (mean, median, mode) and range • determining the most appropriate measures of central tendency to report findings. [C, PS, R, T] [ICT: P2–3.4] ❑ 3. Construct, label and interpret circle graphs to solve problems. [C, CN, PS, R, T, V] [ICT: P2–3.3]
Grade 8	**The Science of the EarthBox®**	**Statistics and Probability** ❑ 1. Critique ways in which data is presented in circle graphs, line graphs, bar graphs and pictographs. [C, R, T, V] [ICT: C7–3.1, C7–3.2, F4–3.3]

	Potential Topics	SOCIAL STUDIES Learning Outcomes
Grade 3	**School Gardens in Communities around the World**	❑ 3.1.2 examine the social, cultural and linguistic characteristics that affect quality of life in communities in other parts of the world by exploring and reflecting upon the following questions for inquiry: • (3) How does access to public services affect the communities? (e.g., schools, hospitals, libraries, transportation systems)? (ER, GC, PADM) • (9) How do the individuals and groups in the communities cooperate and share with other group members? (C, CC) ❑ 3.1.3 examine the geographic characteristics that shape communities in other parts of the world by exploring and reflecting upon the following questions for inquiry: • (3) In what ways do the communities show concern for their natural environment? (GC, LPP)
Grade 4	**Using Alberta's Environment and Natural Resources** **School Agriculture**	❑ 4.1.1 value Alberta's physical geography and natural environment: • (5) appreciate how land sustains communities and quality of life (ER, LPP) • (6) demonstrate care and concern for the environment through their choices and actions (LPP) ❑ 4.1.4 analyze how Albertans interact with their environment by exploring and reflecting upon the following questions and issues: • How are natural resources used by Albertans (i.e., agriculture, oil and natural gas, forests, coal)? (ER, LPP)

	Potential Topics	SOCIAL STUDIES Learning Outcomes
Grade 5	**The Concept of Urban Agriculture**	❑ 5.1.1 value Canada's physical geography and natural environment: • (4) appreciate how the land sustains communities and the diverse ways that people have of living with the land (GC, LPP) • (6) demonstrate care and concern for the environment through their choices and actions (GC, LPP) ❑ 5.1.3 analyze how people in Canada interact with the environment by exploring and reflecting upon the following questions and issues: • (2) How are natural resources used, exchanged and conserved in Canada? (ER, LPP)
Grade 6	**Community Bylaws that Affect Urban Agriculture**	❑ 6.1.4 analyze the structure and functions of local governments in Alberta by exploring and reflecting upon the following questions and issues: • What are the responsibilities of local governments (i.e., bylaws, taxes services)? (PADM)
Grades 7 - 8	**Food Sources Then and Now**	Although there are no specific learner outcomes that directly link to food production or a school garden, these grade levels provide opportunities to draw comparisons between food production and meeting daily needs in historical societies.

Activity One

Garden Check-Ins Grades 3 to 8

Use bi-weekly or weekly statistics "check-ins" to have students measure, record, and graph the growth of their plants. Provide students with a weekly check-in template that includes space to record the following observations and measurements:

- Observations
- What has Changed
- Jobs Completed
- Challenges
- Measurements

Have students use their measurements to maintain a graph that shows the bi-weekly or weekly growth of their plant. This activity can be made more grade-specific by:

- Guiding Grade 3 students to fill in a tally chart to record growth.
- Having Grades 4 and 5 students fill in bar or double bar graphs to record and make comparisons over set time periods.
- Having Grade 6 students graph and analyze weekly growth.
- Asking Grade 7 and 8 students to use different types of graphs to make comparative analyses of the rates of growth of different plants.

Activity Two

Calendar Grades 3 to 4

Have students use a calendar template to record the growth of their gardens. Consider establishing a calendar template for each EarthBox and ask students to use pictures and icons to show the growth stage that each plant is at.

Activity Three

Classroom Garden Portfolio Grades 3 to 8

Start a classroom garden journal or portfolio. With students, discuss what documentary records, observation data, and artifacts mean. With students, negotiate the documents and artifacts that will be included in the journal or portfolio. Items can be grouped around topics such as the following, and include examples such as:

- Background (the beginning of the garden, first activities)

Extend

Provide students with additional opportunities to investigate and explore their gardens, plant life cycles, characteristics, and growth, including:

- ***Calculating weights and volumes of soil and vegetable yields***
- ***A comparison of the cost of growing and buying vegetables***
- ***Measurements that are applied when planting vegetables and preparing recipes***
- ***Research into additional recipes that are vegetarian***
- ***Simulating the water cycle with an indoor garden by covering growing seedlings with a plastic dome, and observing transpiration, evaporation, and condensation of water***
- ***Creating a map of the schoolyard and garden area, noting important features. Use graph paper to plot the main features and create a legend and compass rose.***

- Planning the Garden (sketches, diagrams, plans, student research, community involvement)
- Plants ("profiles" of the gardens and herbs)
- People (students, school and community involvements, funders and supporters)
- Growing the Garden (schedules, responsibilities, photographs)
- Growth Cycles (diagrams, photographs)
- Research (types of plants, experiments, weather data and records)
- Harvests (results, successes and challenges, meals prepared and shared, celebrations)
- Communication (media releases, community events, summer support)

Spotlight on Cooperative Learning

The creation and maintenance of a school or classroom garden provides numerous opportunities to introduce, reinforce, practise, and experience cooperative learning structures and skills.

Use a grouping strategy based on different groups of garden vegetable plants. Have students select a plant or group of plants for which they will take daily or weekly responsibility.

Provide opportunities for students to work together to make decisions about how the garden should be looked after.

The classroom journals or portfolios can also be modeled on other formats, such as a yearbook, photo essay, or journal. Ensure that the journals or portfolios are kept accessible to students. Consider how documentation and artifacts will be placed and stored in the portfolio – artifact box, three-ring binder with plastic sleeves, "pizza box" portfolio, an e-portfolio, or other ideas that students may have.

Activity Four

Plant Life Cycles Grades 4

Have students observe and track the stages that different plants go through as they grow. Create plant life cycle diagrams of each different vegetable. Use the plant life cycle diagrams to compare the plant growth to information on the Grow Cards on pages 31 to 40.

Have students find examples of other plants at various stages of growth in the school yard or at home. Create a plant life cycle diagram template on the Smartboard or on poster paper. Invite students to sketch the plants they've observed at a stage of growth, and sketch it in the appropriate place in the life cycle diagram. For example, students can be guided to find seeds, seedlings, young plants, flowering plants, fruit forms, and seed heads. Encourage students to discuss similarities and differences.

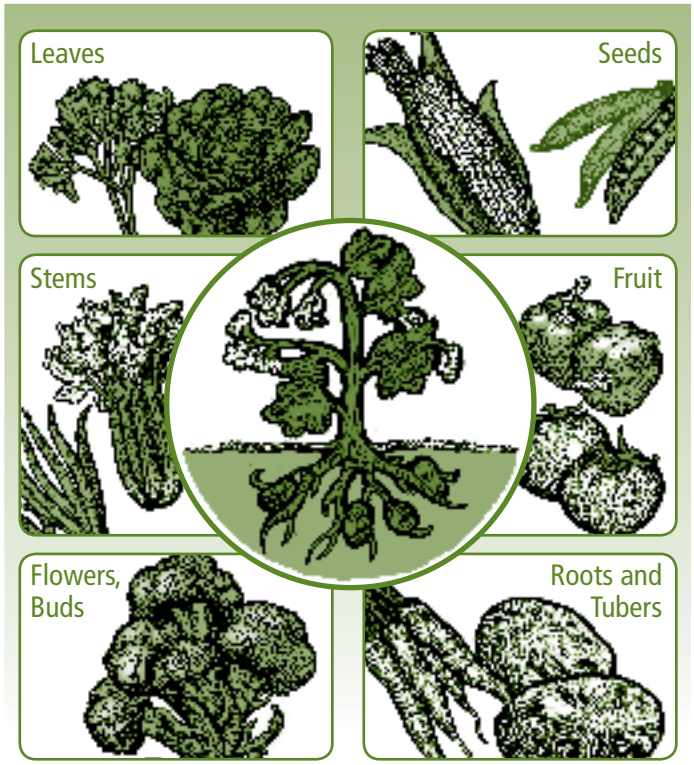


Diagram adapted from *Setting Up and Running a School Garden Teaching Toolkit*. Food and Agriculture Organization of the United Nations (FAO): Lessons Set D4-Growing Food.

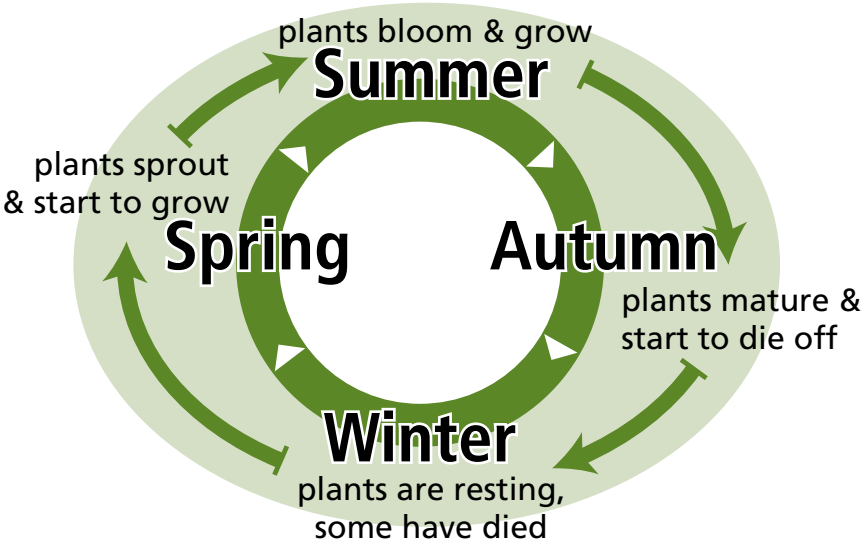
Have students explore the characteristics and functions of different plant structures, including:

- Cotyledons
- Roots
- Stems
- Leaves
- Flowers
- Fruits
- Seeds

Use a diagram such as the one provided to explore the relationship of plant parts to the foods we eat. Use poster paper or a Smartboard to create the wheel chart. Place an illustration of a plant similar to the one pictured in the middle circle. Discuss the parts of the plant, adding examples of foods that come from these parts.

The Supermarket Botany website, at **http://www.mbgnet.net/bioplants/supermkt.html**, provides an activity that reinforces the relationship of foods to plant parts.

Compare life cycles of plants to other natural cycles, such as weather and climate. Have students use a cycle diagram such as the one below and the Grow Cards to expand this cycle diagram into a poster that provides a range of examples from the plants that are part of the garden. Extend this activity by having students add average weather conditions to the cycle. Discuss the relationship between environmental factors, such as weather, and plant growth.



What do all plants need to grow? Investigate what happens when plants are exposed to different amounts of water, sunlight, space, and nutrients. Have students work in groups to create their own experiments that investigate what happens to plants when conditions are varied. Develop these experiments around variable conditions that include:

- Light
- Water
- Heat

Have students work with a partner or in small groups to display conclusions about the importance of water, sunlight, nutrients, soil, and temperature in a visual format, such as the poster below.

Elements of Soil

air

organic matter

roots

animal life

bacteria and fungi

water

soil texture

soil composition

Functions

Aerate soil

Absorb and drain water

Provide nutrients for plants

Support root structures

Support other living things, such as bacteria and animals

Break down plant debris and parts

Encourage students to try *The Dirt on Soil* game on the Wonderville website at **http://www.wonderville.ca/asset/kelvin-adventures-the-dirt-on-soil** to learn more about nutrients and soil.

Activity Five

Germination Predictions 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, potatoes, and beans. Explore questions such as:

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

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.

Activity Six

Garden Weather Station Grades 5 to 8

Work with students to create a garden weather station. Discuss and research the tools that are needed to create the weather station. Encourage students to find out what information each of the following instruments can provide:

- Thermometer
- Wind vane
- Rain gauge
- Barometer
- Anemometer
- Hygrometer
- Compass

Have students work with a partner or group to take responsibility for recording weather data over an established period of time. Develop a classroom weather journal, with a chart for data.

Extend this activity by having students use that data to graph and compare weather statistics with the growth rate of plants in their gardens.

Challenge students to link their data on the weather to the rate of plant growth. List weather factors that influence plant growth – temperature, precipitation, wind, humidity.

A complete lesson on the process of creating a weather station with students can be found on the CIESE Real Time Data Projects website at **http://www.ciese.org/curriculum/weatherproj2/en/lesson1.shtml**. Note that this website references U.S. sources.

The Discovery Education website, at **http://school.discoveryeducation.com/lessonplans/activities/weatherstation/**, also provides similar information.

Have students compare their data to the predictions made by weather forecasters and meteorologists. Discuss how weather prediction and forecasting affects daily decision-making for people involved with agriculture, including urban gardeners! Current conditions and forecasts for Alberta can be accessed on Environment Canada's website at **http://www.weatheroffice.gc.ca/forecast/canada/index_e.html?id=AB**.

Current weather information can also be found on The Weather Network website at **http://www.theweathernetwork.com/**.

Compare weather patterns to information on climate provided by Environment Canada. A wealth of climate information can be accessed on the National Climate Data and Information Archive at **http://climate.weatheroffice.gc.ca/Welcome_e.html**.

Activity Seven

Analyze It Grades 5 to 8

Have students discuss and identify the types of data that a school garden can provide. Encourage students to apply and practise their analytical skills, using graphs and other visual organizers to make comparisons and analyze the data.

- Have Grade 5 students track, measure, and analyze the water consumption of the EarthBoxes in their school garden.
- Have Grade 8 students use a cycle diagram to trace and analyze the transfer of energy in the garden. Ask students to work with a partner and illustrate the energy cycle diagram with examples from the school garden.
- Have Grades 7 and 8 students track and average growth rates and yields in the garden.
- Have Grade 7 students track the effects of light on the growth rate of plants in an indoor garden. Establish a control area that has exposure to natural sunlight for at least 8 hours of the day. Compare results with plants grown with a grow light.

Activity Eight

Plants Have Families Too[3] Grades 5 to 8

Vegetables are botanically classified into families based on genetic similarities and a general tendency to grow similarly. At the same time, plants may be grouped using the following criteria:

- They need similar growing conditions.
- They are planted at the same time of year or number of days after the last frost.
- They need similar amounts of plant food or fertilizer.
- They attract similar insects and diseases.

Plants affect soil and are affected by soil in different ways. Some plants use more nutrients in the soil than others. Sometimes a disease or certain insect that infects one type of plant can overwinter in a garden and cause bigger problems the following year if a related or the same vegetable is planted in the same place.

[3] Activity idea adapted from *Let's Get Growing, Level B Gardening Youth Activity Guide:* 4-H Curriculum.

Have students research the following vegetable families by completing a chart such as the example below. Find the common vegetables that belong to each family and describe their main characteristics.

Family	Common Vegetables	Characteristics
Brassicaceae	Broccoli, Brussel sprouts, cabbage, kale, cauliflower, radishes, turnips, kohlrabi	Cool season vegetables All genetically similar
Curcurbitaceae		
Fabaceae		
Liliaceae		
Solanaceae		
Apiaceae		

Have Grade 8 students examine vegetable families as an example of the organization and classification of living things.

Extend this activity by researching the scientific names of specific vegetables. Scientific names of some vegetables can be found on the Better Homes and Gardens website at **http://www.bhg.com/gardening/plant-dictionary/vegetable/**. The history and nomenclature of some specific vegetables can be found by using search terms such as "history of..." or "name of..." and a search engine. For example, a website that discusses the history of carrots can be found at **http://www.carrotmuseum.co.uk/history.html**.

What are heritage seeds? Ask students to research why some seed producers are selling heritage seeds by exploring the Seeds of Diversity website at **http://www.seeds.ca/en.php**.

The West Coast Seeds website at **http://www.westcoastseeds.com/** provides detailed information on vegetable plants, herb seeds, sprouting seeds, and flower seeds.

Activity Nine

Growing Zones Grades 4 and 5

Have students compare the growing zones in Alberta to the province's ecozone 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 at **http://www.planthardiness.gc.ca/**.

Activity Ten

Illustrated Guide Grades 4 to 7

Have students create an illustrated guide to harvesting and preparing vegetables for eating. Ask students to select a vegetable, and work individually or with a partner to create a sequence of steps that shows how to harvest, clean, and prepare the vegetable.

Activity Eleven

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.

A school garden offers a multitude of possibilities to develop, reinforce, and extend language learning and apply skills of artistic expression. Many of these learning opportunities meet specific outcomes in Language Arts and Art, but can be integrated across many other subject areas as well.

What messages can be found in a garden?

The school garden can offer students the opportunity to share concrete examples of their accomplishments and learning.

	Potential Topics	LANGUAGE ARTS Learning Outcomes
	Language development is continuous and recursive throughout a student's life. By learning and using language in a variety of contexts, students continue to develop language fluency and proficiency. A school garden provides a multitude of opportunities to link language learning and social communication skills with real life and authentic experiences in the garden. The following learning outcomes are provided as examples that are supported by the activities that follow.	
Grade 3		❑ Express ideas and develop understanding • explain understanding of new concepts in own words ❑ Generate ideas • experiment with ways of generating and organizing ideas prior to creating oral, print and other media texts ❑ Record information • list significant ideas and information from oral, print and other media texts ❑ Share ideas and information • organize and share ideas and information on topics to engage familiar audiences • use titles, headings and visuals to add interest and highlight important points of presentation ❑ Enhance artistry • choose words, language patterns, illustrations or sounds to add detail and create desired effects in oral, print and other media texts ❑ Present information • present ideas and information on a topic, using a pre-established plan ❑ Enhance presentation • use print and nonprint aids to illustrate ideas and information in oral, print and other media texts
Grade 4		❑ Express ideas and develop understanding • ask questions, paraphrase and discuss to explore ideas and understand new concepts ❑ Generate ideas • use a variety of strategies for generating and organizing ideas and experiences in oral, print and other media texts

	Potential Topics	LANGUAGE ARTS Learning Outcomes
		❑ Record information • list significant ideas and information from oral, print and other media texts ❑ Share ideas and information • communicate ideas and information in a variety of oral, print and other media texts, such as short reports, talks and posters • select visuals, print and/or other media to add interest and to engage the audience ❑ Enhance artistry • experiment with combining detail, voice-over, music and dialogue with sequence of events ❑ Present information • present to peers ideas and information on a topic of interest, in a well-organized form ❑ Enhance presentation • add interest to presentations through the use of props, such as pictures, overheads and artifacts
Grade 5		❑ Express ideas and develop understanding • read, write, represent and talk to explore personal understandings of new ideas and information ❑ Generate ideas • use texts from listening, reading and viewing experiences as models for producing own oral, print and other media texts ❑ Structure texts • use own experience as a starting point a source of information for fictional oral, print and other media texts ❑ Record information • combine ideas and information from several sources • record ideas and information in relevant categories, according to a research plan ❑ Share ideas and information • communicate ideas and information in a variety of oral, print and other media texts, such as illustrated reports, charts, graphic displays and travelogues • select visuals, print and/or other media to inform and engage the audience ❑ Enhance artistry • experiment with words, phrases, sentences and multimedia effects to enhance meaning and emphasis

	Potential Topics	LANGUAGE ARTS Learning Outcomes
		❑ Present information • organize ideas and information in presentations to maintain a clear focus and engage the audience ❑ Enhance presentation • use effective openings and closings that attract and sustain reader or audience interest
Grade 6		❑ Express ideas and develop understanding • read, write, represent and talk to explore and explain connections between prior knowledge and new information in oral, print and other media texts ❑ Generate ideas • choose life themes encountered in reading, listening and viewing activities, and in own experiences, for creating oral, print and other media texts ❑ Structure texts • express the same ideas in different forms and genres; compare and explain the effectiveness of each for audience and purpose ❑ Record information • make notes on a topic, combining information from more than one source; use reference sources appropriately • use outlines, thought webs and summaries to show the relationships among ideas and information and to clarify meaning ❑ Share ideas and information • communicate ideas and information in a variety of oral, print and other media texts, such as multiparagraph reports, question and answer formats and graphs • select appropriate visuals, print and/or other media to inform and engage the audience ❑ Enhance artistry • experiment with several options, such as sentence structures, figurative language and multimedia effects, to choose the most appropriate way of communicating ideas or information ❑ Present information • use various styles and forms of presentations, depending on content, audience and purpose ❑ Enhance presentation • emphasize key ideas and information to enhance audience understanding and enjoyment

	Potential Topics	LANGUAGE ARTS Learning Outcomes
Grade 7		❑ Express ideas and develop understanding • express personal understandings of ideas and information based on prior knowledge, experiences with others and a variety of oral, print and other media texts • reflect on own observations and experiences to understand and develop oral, print and other media texts ❑ Generate ideas • choose appropriate strategies for generating ideas and focusing topics for oral, print and other media texts ❑ Structure texts • create a variety of oral, print and other media texts to explore ideas related to particular topics or themes ❑ Record information • compare, contrast and combine ideas and information from several sources ❑ Share ideas and information • communicate ideas and information in a variety of oral, print and other media texts, such as reports, autobiographies, brochures and video presentations • use appropriate visual, print and/or other media effectively to inform and engage the audience ❑ Enhance artistry • experiment with figurative language, illustrations and video effects to create visual images, provide emphasis or express emotion ❑ Present information • present ideas and opinions confidently, but without dominating the discussion, during small group activities and short, whole class sessions ❑ Enhance presentation • clarify and support ideas or opinions with details, visuals or media techniques
Grade 8		❑ Express ideas and develop understanding • seek out and consider diverse ideas, opinions and experiences to develop and extend own ideas, opinions and experiences ❑ Generate ideas • create oral, print and other media texts related to issues encountered in texts and in own life ❑ Structure texts • choose forms or genres of oral, print or other media texts for the particular affects they will have on audiences and purposes

	Potential Topics	LANGUAGE ARTS Learning Outcomes
		❑ Record information • make notes in point form, summarizing major ideas and supporting details; reference sources ❑ Share ideas and information • communicate ideas and information in a variety of oral, print and other media texts, such as interviews, minilessons and documentaries • integrate appropriate visual, print and/or other media to inform and engage the audience ❑ Enhance artistry • experiment with figurative language, voice, sentence patterns, camera angle and music to create an impression or mood ❑ Present information • plan and facilitate small group and short, whole class presentations to share information ❑ Enhance presentation • present information to achieve a particular purpose and to appeal to interest and background knowledge of reader or audience

	Potential Topics	ART Learning Outcomes
	The school garden provides a natural starting point for a number of learning opportunities in Art. Many products can integrate skills and attitudes in Art. The following outcomes represent only some examples.	
Grades 3 - 4	**Natural Forms and Designs in Nature**	❑ Component 1 ANALYSIS: Students will make distinctions within classes of natural objects or forms. ❑ Component 2 ASSESSMENT: Students will assess the visual qualities of objects. ❑ Component 10 (i) PURPOSE 1: Students will record or document activities, people and discoveries. ❑ Component 10 (ii) SUBJECT MATTER: Students will develop themes, with an emphasis on social concerns, based on: • A. Plants and animals • B. Environments and places.

	Potential Topics	ART Learning Outcomes
Grades 5 - 6	**Shapes and Proportions in the Garden**	❑ Component 1 ANALYSIS: Students will study and analyze the individual character of natural objects or forms. ❑ Component 2 ASSESSMENT: Students will impose standards on designed objects and invent improved versions. ❑ Component 10 (i) PURPOSE 1: Students will record or document activities, people and discoveries. ❑ Component 10 (ii) SUBJECT MATTER: Students will develop themes, with an emphasis on global awareness, based on: • A. Plants and animals • B. Environments and places.
Grade 7	**Line, Texture, and Colour in the Garden**	❑ Investigate: Students will select and identify line, value and texture in the natural and man-made environment for image making.
Grade 8	**Space, Proportion, Pattern, and Light in the Garden**	❑ Investigate: Students will employ space, proportion and relationships for image making. ❑ Sources of Images: Students will investigate form and structure of natural and man-made objects as sources of images.

Spotlight on Media Literacy

Sharing accomplishments and results from the garden can also provide an opportunity to reinforce media literacy skills. Media literacy refers to an understanding of media, including information technology, television, and various print forms, and its use as a source of information, communication, and entertainment.

Encourage students to analyze media messages about food and meal choices as well as the production and marketing of food.

Activity One

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.

Activity Two

Media Releases Grades 3 to 8

Have students work in small groups to create press releases that inform the media and the community about the "meals" they are growing. Work with students to identify the elements that should be present in their press releases as well as the media to which their releases should be sent. Discuss elements such as:

- Information about the garden
- Why the class or school is growing a garden
- What the benefits or results will be
- Who to contact for more information

Explore other forms of media that can be used to share information about the garden with others. Look for examples of advertisements of different foods. How many of these advertisements include vegetables? Have students create their own advertisements for the meals they are "growing" in the garden. Post the advertisements in the school or community.

Create public service announcements that keep the school and/or community informed about the progress of the garden and the benefits of growing fresh vegetables.

Extend this activity by asking students to create a job advertisement for volunteers who can help look after the garden during the summer months. Students can also be asked to use the Funding Template in Appendix A as a starting point for sending letters to request support for the garden. Have students design and add a letterhead, as well as illustrations and additional information about their garden.

Activity Three

Personal Journals Grades 3 to 8

Encourage students to keep a journal of the plants for which they are responsible in the garden. Work with students to create a template for their garden journals, or provide them with one that includes daily or weekly observation points such as:

- Picture of the plant
- What it looks like
- Soil condition
- Weather
- What was done
- Questions I have

Have students also include information about harvesting their vegetables and foods that can be prepared using their vegetable. A guide to harvesting specific vegetables can be accessed at **http://www.gardening.cornell.edu/factsheets/vegetables/harvestguide.pdf**.

Extend this activity by encouraging students to experiment with different templates and graphic organizers in their journals. Have students add a calendar format to track gardening experiences.

Activity Four

Literature Grades 3 to 8

Use a number of picture books to explore images and sensory language relating to gardening. Have students explore how the science of gardening, as well as the benefits and rewards, are represented in these stories. Challenge students to work individually or with a partner to create their own picture book. Use a storyboard graphic organizer to plan the storyline and plan illustrations to support it. Share the picture books with younger students in the school.

Have students look for examples of similes, metaphors, and analogies represented in the stories. For example, the book *Mrs. Spritzer's Garden* uses an analogy of a garden to tell the story of a teacher. *The Imaginary Garden* uses the visual imagery of a garden to represent the power of art to enrich relationships and life.

Older students can also use picture books. Have them create picture books about their gardens to share with younger students. Encourage them to analyze the picture books for artistic and literary elements.

Examples of some picture books that celebrate gardening include:

Sarah Stewart. *The Gardner.* ISBN: 0374425183

Judi Barrett. *Old MacDonald Had an Apartment House*. ISBN: 0689817576

Additional resources are available from Alberta Agriculture and Forestry at http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agic7623.

Extend

Provide students with additional opportunities to apply and share their learning, including:

- ***Negotiating garden rules and guidelines for behaviour while working in the garden***
- ***Creating a poster advertisement to show the path that a vegetable grown on a farm would take to get from seed to table***
- ***Designing a garden for a family meal and sharing it with parents and classmates***
- ***Researching Alberta companies that produce and sell specific vegetables***
- ***Writing letters or creating brochures to share information about the school garden with community members, local businesses, and organizations***
- ***Creating a mural with a collage of botanical illustrations contributed by students, based on the garden plants and herbs***
- ***Experimenting with different forms of poetry related to school gardens and gardening***

Henry Cole. *Jack's Garden.* ISBN: 068815283X

Steve Tomecek. *Dirt.* ISBN: 0792282043

Janet Stevens. *Tops and Bottoms.* ISBN: 0152928510

Deborah Kogan-Ray. *Lily's Garden.* ISBN: 0761315934

Edith Hope Fine and Angela Halpin. *Water, Weed and Wait.* ISBN: 1582463204

Ruth Kraus. *The Carrot Seed.* HarperCollins, 1945. ISBN: 0064432106

David Small. *The Gardener.* Farrar, Straus & Giroux, 1997. ISBN: 0374425183

DyAnne DiSalvo-Ryan. *City Green.* HarperCollins, 1994. ISBN: 068812786X

Zoe Hall. Illustrated by Shari Halpern. *The Surprise Garden.* Scholastic, 1999. ISBN: 0590100769

Lois Ehlert. *Growing Vegetable Soup.* Voyager Books, 1990. ISBN: 0152325808

Kathy Henderson. *And the Good Brown Earth.* Candlewick Press, 2003. ISBN: 0763623016

Edith Pattou. Illustrated by Tricia Tusa. *Mrs. Spitzer's Garden.* Harcourt Inc., 2001. ISBN: 0152019782

Andrew Larsen. Illustrated by Irene Luxbacher. *The Imaginary Garden.* Kids Can Press, 2009. ISBN: 9781554532797

Appendix A

Sample Letters & Templates

Customize this letter according to your garden plans and schedule. An indoor garden, with harvesting plans for the spring, may require different types of volunteer parent help.

1 Sample Letter to Parents

This spring, our class will be participating in the creation of a school garden. We will be using EarthBox® containers obtained with the support of Alberta Agriculture and Rural Development, and planting a variety of different vegetable plants and herbs. We will plan our garden around one of the following three meals:

- Garden Salad
- Salsa
- Vegetable Soup

When we harvest our vegetables in the fall, we will be involving students who participated in the garden project this school year, as well as students who will join the project next year. The experience of planning, planting, and growing a garden will enrich and reinforce students' learning across many different subject areas. Seeing the garden through to harvest will provide a valuable sense of accomplishment and community for our students.

If you are interested in supporting our students' gardening project, please complete and return the form below. Our students will be doing most of the gardening, but we'll need help in the following areas:

- Maintaining the garden over the summer months
  a. July – 1 week
  b. August – 1 week
- Supervision of students
- Donation of materials
- Planting

The summer maintenance schedule is extremely important to us. Your involvement would entail sharing a week in July or August with another parent volunteer and checking the water levels in the EarthBox® reservoirs daily.

Student's Name _____

Please be aware of the following food allergies that my child _____has:

- ❑ I can help with:
  - ❑ Maintaining the garden over the summer months
    - ❑ July – 1 week
    - ❑ August – 1 week
  - ❑ Supervision of students
  - ❑ Donation of materials
  - ❑ Planting

2 Sample Funding Request Letter

This spring, our class will be participating in the creation of a school garden. We will be starting with some EarthBox® containers, and planting a variety of different vegetable plants and herbs. As we start our gardening plans, students will be provided with the opportunity to select one of three "meals" around which to plan their gardens:

- Garden Salad
- Salsa
- Vegetable Soup

This project promotes powerful learning for students, healthy nutritional and positive environmental messages, and builds a sense of community between the school and our community. The experience of planning, planting, growing, and harvesting a garden will enrich and reinforce students' learning across many different subject areas.

Your support of our garden project will help promote these positive messages to our students, their families, and the community. It will also allow us to continue the gardening project on a long-term basis and help you foster relationships and awareness with students who will become active members of our community and its businesses.

We need support for our garden project in one of the following ways:

- ❑ Sponsorship of an EarthBox® container purchase
- ❑ Help with, or donation of, gardening tools
- ❑ Donation of growing medium
- ❑ Donation of plants or seeds

Please get in touch using the following contact information. I would be pleased to answer any questions you may have or provide additional information.

Customize this letter according to the request you would like to make of the business or community organization. Details should be provided with each option that you are asking sponsorship for, depending on your needs and the type of donation businesses may be able to make.

Customize and use this template to organize and display student responsibilities. For example, checking the water level and adding water to the reservoir is a daily responsibility that would be filled in at the top of the chart. Planting or seeding a particular vegetable may be a responsibility that is filled in on planting day and posted on each EarthBox® container. Details about the specific tasks associated with the responsibility are filled in under the What column.

3 Roles and Responsibilities Template

This responsibility is			
Who	**What**	**When**	**Done** Place a check mark and your initials when the responsibility has been completed.

4 Month by Month Planning Template

Sample Activities	January						
• Begin planning • Talk to your classroom or group about the project • Gather supplies • Confirm a budget • Talk to school administrators	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Sample Activities	February						
• Gather volunteers • Get parental support • Determine garden locations • Order seeds	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Sample Activities	March						
• Order EarthBox® containers • Research planting requirements • Build a calendar for planned activities, such as planting and estimated harvest dates • Start seedlings indoors	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Sample Activities	April						
• Design garden layout with students • Start seedlings indoors	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Sample Activities	May						
• Plant • Garden maintenance	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Sample Activities	June						
• Plant • Transplant • Garden maintenance • Mid-season taste test • Celebrate	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Sample Activities	July						
• Garden maintenance	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Sample Activities	August						
• Garden maintenance	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Sample Activities	September						
• Garden maintenance • Harvest • Prepare a Meal! • Celebrate	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

5 Budgeting Template

Materials	Start-Up Costs	Maintenance Costs	Fundraising or Community Support Options
EarthBox® Containers			
Growing Medium			
Plants and/or Seeds			
Tools			
Fencing and Security			

6 Summer Maintenance Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
July Week 1							
Week 2							
Week 3							
Week 4							
August Week 1							
Week 2							
Week 3							
Week 4							

Appendix B

EarthBox® Containers

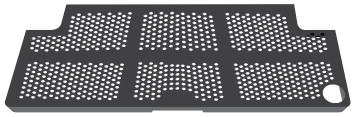
Information in this appendix is reproduced with permission from EarthBox®.

Using EarthBox® Containers

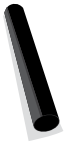
Your EarthBox® package will include the following supplies:

EarthBox®

Aeration Screen



Fill Tube



Mulch Covers

EarthBoxes® recommends the following steps to start a garden. It is important that these steps be followed in order to have a successful yield.

STEP 1 | Get Organized

Determine what type, and how many plants you need. Have an EarthBox®, casters (optional), a 2 cubic foot bag of growing media, a water source (minimum of 3 or 4 gallons), a knife or scissors, dolomite, and fertilizer ready. Choose a location for your EarthBox®. Select a sunny spot with a minimum of 8 hours of daily sunshine for warm season crops such as tomatoes, peppers, eggplant; select partial shade for cool season crops such as lettuce, spinach, arugula.

Growing/Potting Media

Almost any brand of growing media designated for containers or hanging plants will work. Preferably, this media will be peat or coir-based and containing perlite and/or vermiculite. You'll need the big bag – 2 cubic feet or 60 dry quarts per EarthBox®. Much of today's growing media has a water-soluble or 3-month time release fertilizer added; this is OK to use, but does not replace the fertilizer application. Do NOT use compost or growing media that contains rock, clay, sand, or topsoil.

Dolomite

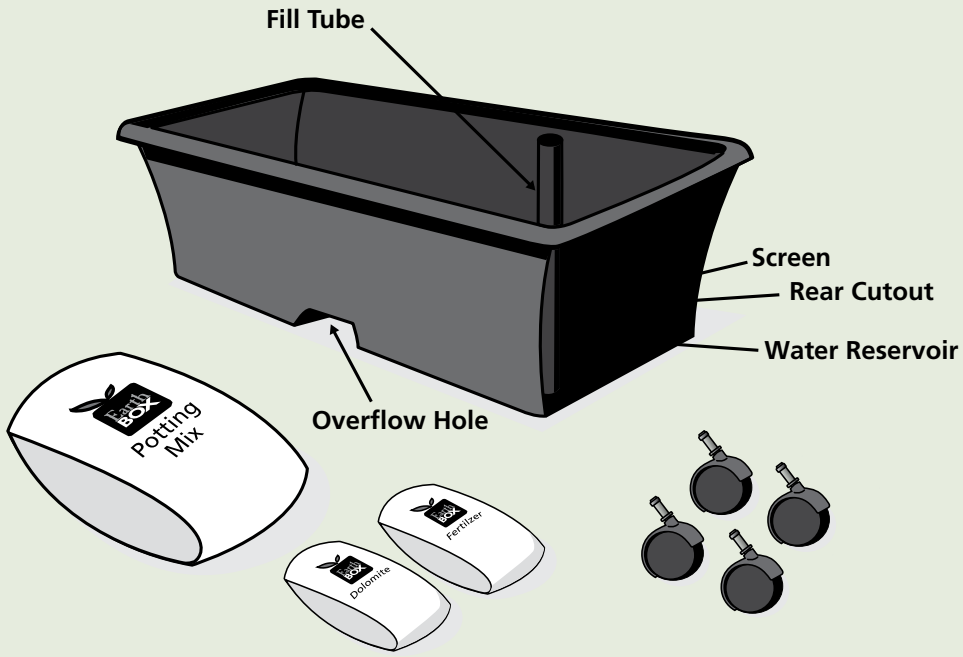
Dolomite is lime that contains calcium and magnesium. Incorporate 1 lb. of dolomite during the initial planting and each year when replanting your EarthBox®. When replanting, mix the dolomite in the top 3–4" of the growing media before planting. Do NOT substitute dolomite with hydrated lime.

Fertilizer

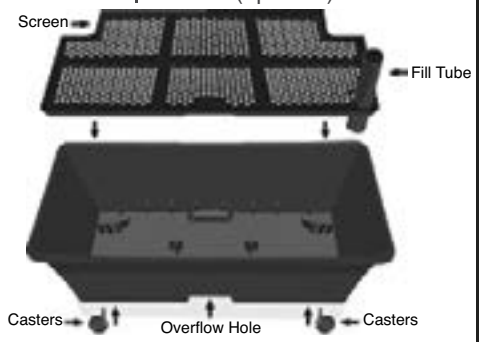
The EarthBox® is designed to be used with a strip of common dry, granular fertilizer or plant food for vegetables. Almost any brand of fertilizer will work, as long as it is NOT designed to be mixed with water (water-soluble), and that is NOT a time-released or slow-released product. Each of the three numbers on the label should be between 5 and 15. You can choose a synthetic fertilizer or an organic fertilizer. If you prefer a synthetic fertilizer, use 2 cups. If you prefer an organic fertilizer, use 3 cups. Do not add any additional fertilizer during the growing season. Both regular and organic versions of the EarthBox Ready-to-Grow Kit, and the EarthBox Garden Kit (available at retailers) include a pre-measured, balanced fertilizer great for growing vegetables, herbs, or flowers.

Plant Selection

Try everything! Whatever is available at your local nursery will grow in our EarthBox®. You can use the smaller 5–7" seedlings available in 2" pots, or larger seedlings. You can do some direct seeding with things that are normally easy to grow from seed like cucumbers, squash, and beans. Do not overcrowd the EarthBox®. Pay close attention to the recommended plant amounts in the Plant & Fertilizer Placement Chart.

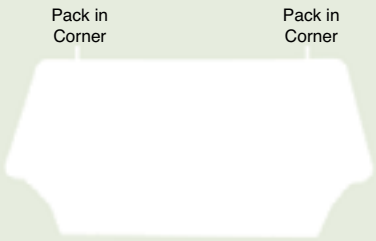


STEP 2 | Add Screen, Fill Tube and Casters (optional) to EarthBox



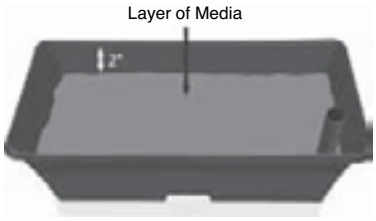
NOTE: Make sure the screen is firmly set in the box and the fill tube is placed through the hole in the screen and pushed to the bottom of the box.

STEP 3 | Pack Corners with Moist Growing Media

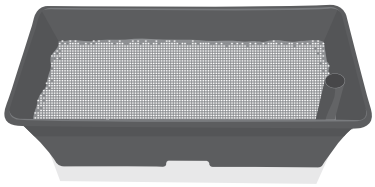


IMPORTANT: Packing the corners with moist growing media will ensure proper wicking throughout the box.

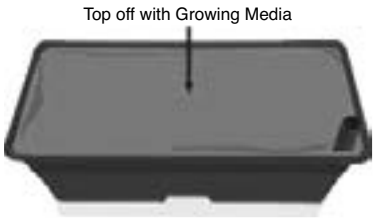
STEP 4 | Add Layer of Moist Growing Media



STEP 5 | Spread Dolomite Evenly



STEP 6 | Level Growing Media With Top of EarthBox

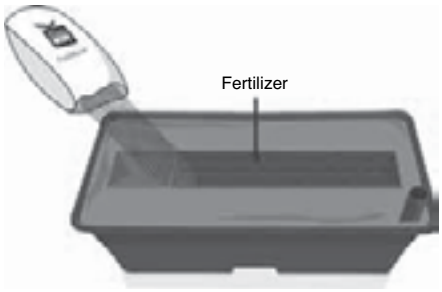


NOTE: Mix the dolomite, previously spread, in the top 3-4" of the growing media.

STEP 7 | Create a Trough

IMPORTANT: Refer to Plant & Fertilizer Placement chart to determine location of trough.

STEP 8 | Place Fertilizer in Trough



STEP 9 | Top Off With Remaining Growing Media

IMPORTANT: Create a 2" mound of growing media over the fertilizer strip.

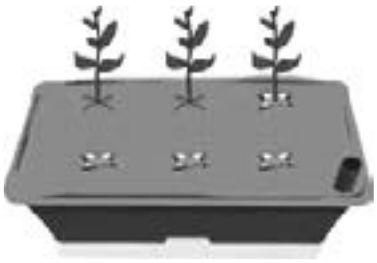
STEP 10 | Place Cover on EarthBox

NOTE: Place cover black side up. If growing in hot desert climate during summer, use cover white side up.

STEP 11 | Cut Holes in the Cover

IMPORTANT: Refer to Plant & Fertilizer Placement chart to determine the number and location of plants. Cut the holes the same size as the root ball of your plant.

STEP 12 | Plant Seeds or Seedlings



NOTE: Follow recommended planting instructions that come with your seeds or seedlings.

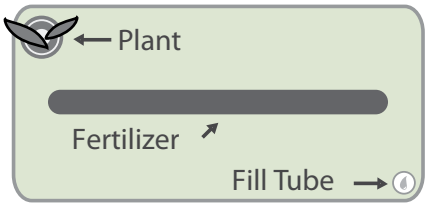
STEP 13 | Fill Reservoir and Water Regularly

NOTE: Use the fill tube to keep the water reservoir full. You'll know the reservoir is full when water flows from the overflow hole. Don't try to regulate the water level. Add water every few days when the plants are young, and at least once every day when your plants are mature.

Plant & Fertilizer Placement Chart

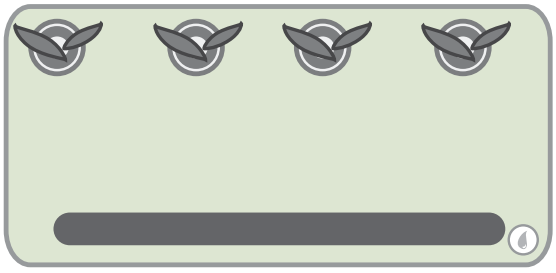
Try Anything!
Here are some suggestions:

Legend:



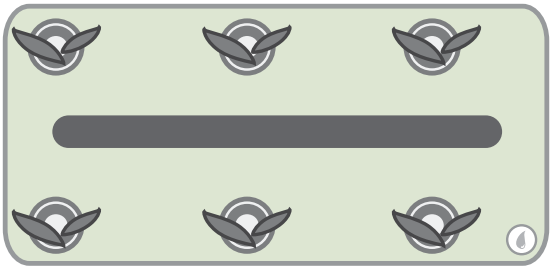
2 seedlings (2 per row)

Artichokes, Eggplants, Tomatoes, Zucchini



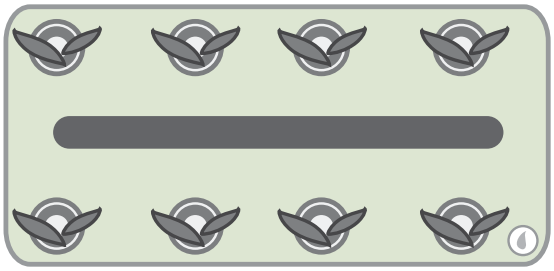
4 seedlings (4 per row)

Cucumbers, Melons, Squash (vining)



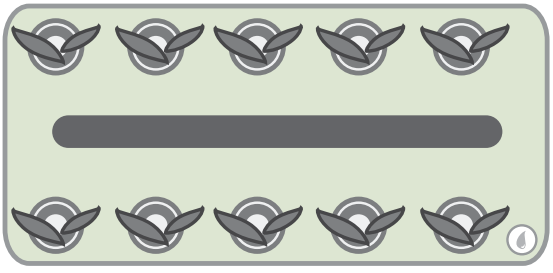
6 seedlings (3 per row)

Bell Peppers, Broccoli, Brussels Sprouts, Cabbage, Cauliflower, Celery, Chard, Greens, Herbs, Hot Peppers, Strawberries



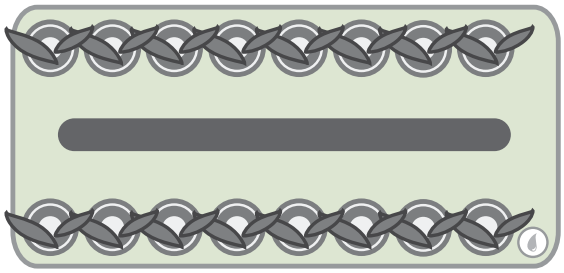
8 seedlings (4 per row)

Beans (bush), Flowers, Kohlrabi, Leeks, Lettuce, Okra, Salad Greens



10 seedlings (5 per row)

Beets, Onions, Spinach, Turnips



16 seedlings (8 per row)

Beans (pole), Carrots, Corn, Garlic Peas, Radishes

Appendix C

Nutrition Notes

Teaching about Nutrition

Every day, the average person makes over 200 decisions about food. They make choices about what food to eat, how much, where, when, why, and with whom. Many factors shape this decision-making process.[4]

School gardens are an excellent way to teach students about the foods they eat. Students have the opportunity to grow vegetables, and they learn first-hand about different foods. A school garden provides an effective way to educate students, as well as their families, about the nutritious advantages of fresh, locally grown food while helping students make balanced nutritional decisions. Gardening programs can also provide students with insights into concepts related to sustainable agriculture and the daily activities of farmers and their families.

Studies have shown that students who have been involved with school gardens increase their knowledge of nutrition as well as their preference for vegetables. Increasing motivation to taste vegetables is a first step in developing healthier eating patterns. An evaluation of The Edible Schoolyard program shows similar results. Students who made the greatest gains in overall understanding of ecological principles made significantly greater gains in the numbers of serving of fruits and vegetables they reported eating.[5]

Eating Well with Canada's Food Guide describes the amount and types of foods that are part of a healthy eating pattern.The Vegetables and Fruit group is an important food group.

Eating Well with Canada's Food Guide makes the following recommendations for the Vegetables and Fruit food group:

- Eat at least one dark green and one orange vegetable each day.
- Choose vegetables and fruit prepared with little or no added fat, sugar or salt.
- Have vegetables and fruit more often than juice.

Vegetables and fruit have important nutrients such as vitamins, minerals, and fibre. They usually are low in fat and calories. A healthy diet rich in vegetables and fruit may help reduce the risk of cardiovascular disease and some types of cancer.

Nutrients provided by vegetables and fruit include carbohydrates, vitamins A and C, potassium, magnesium, and some B vitamins such as folate. The individual nutrients may explain some of the health benefits of eating vegetables and fruit. It is more likely, however, that the nutrients work together with other naturally occurring components in vegetables and fruit to provide the overall health benefit.

[4] From *Nutrition Matters: Trends Affecting Food Choices* (June 2010). Nutrition File for Health Educators: Alberta Milk.

[5] California Department of Education. School Garden Program Overview. **http://www.cde.ca.gov/ls/nu/he/gardenoverview.asp**.

The Vegetables and Fruit food group is the most prominent arc in the rainbow on *Canada's Food Guide*, emphasizing the important role these foods play in a healthy eating pattern. This food group makes up the largest proportion of the Food Guide Servings in the healthy eating pattern and includes vegetables and fruit in many forms: fresh, frozen, as juice, canned, and dried.

Some products with "vegetable" or "fruit" in their names or on their packaging are composed mainly of fat or sugar or are very high in salt. Fruit candies, vegetable chips, fruit jams or spreads, ketchup, as well as vegetable or fruit drinks or punches do not belong in the Vegetables and Fruit food group. People should choose 100% vegetable or fruit juices. Vegetable or fruit "drinks" or "beverages" may contain only a small amount of real vegetable or fruit juice.[6]

FOOD GUIDE SERVINGS FOR VEGETABLES AND FRUIT

What is one Food Guide Serving?

In general, one medium fresh vegetable or fruit or 125 mL (1/2 cup) cut-up is equivalent to one Food Guide Serving. One Food Guide Serving of salad or raw leafy greens is 250 mL (1 cup) and 125 mL (1/2 cup) of cooked leafy green vegetables. A Food Guide Serving of dried fruit is 60 mL (1/4 cup). A Food Guide Serving of juice is equivalent to 125 mL (1/2 cup).

RECOMMENDED NUMBER OF FOOD GUIDE SERVINGS PER DAY

	Children			Teens		Adults			
	2-3	4-8	9-13	14-18 Years		19- 50 years		51+ Years	
	Girls and Boys			Females	Males	Females	Males	Females	Males
Vegetables and Fruit	4	5	6	7	8	7-8	8-10	7	7
Grain Products	3	4	6	6	7	6-7	8	6	7
Grain Products	2	4	3-4	3-4	3-4	2	2	3	3
Meat and Alternatives	1	1	1-2	2	3	2	3	2	3

The eating pattern also includes a small amount (30 to 45 mL or about 2 to 3 tablespoons(s) of unsaturated fat each day.

[6] From "Tips for Vegetables and Fruit." *Eating Well with Canada's Food Guide:* Health Canada. **http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/choose-choix/fruit/tips-trucs-eng.php**.