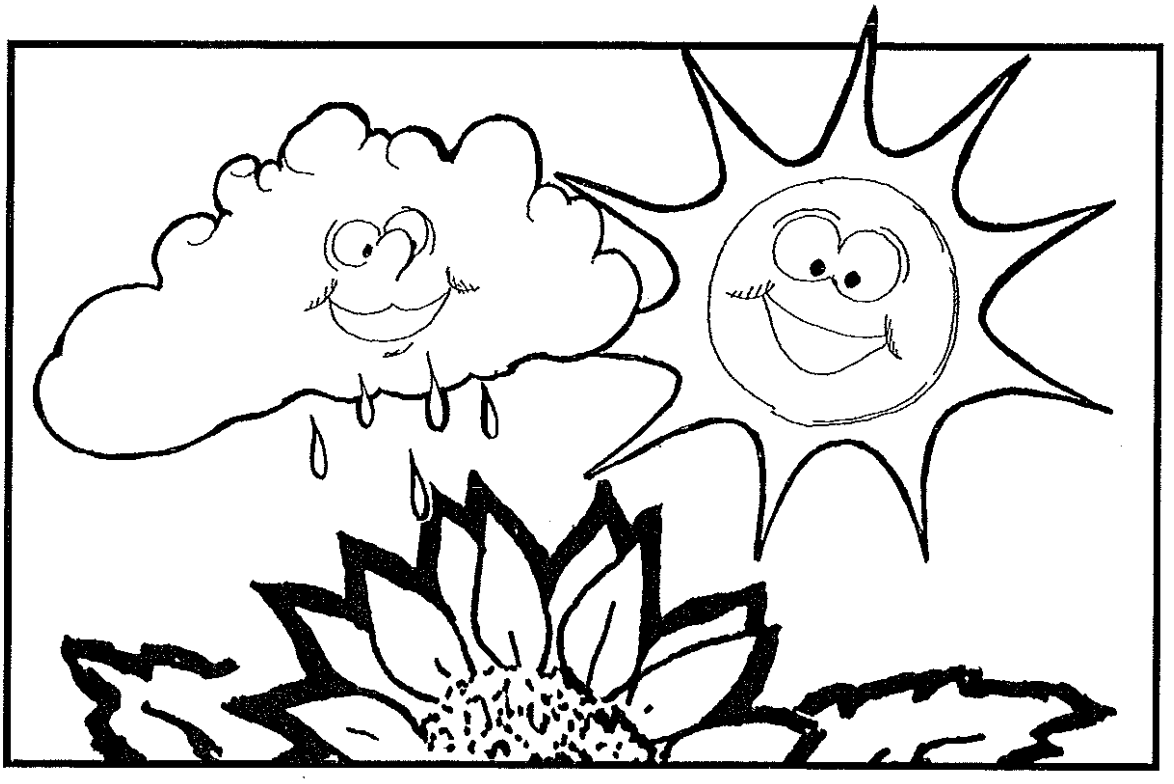
Plants, Seeds, and Soil

Prepared by Nancy Carl

British Columbia Agriculture in the Classroom Foundation
Summer Institute 1999 Unit Plan
An Integrated study for Grade Two



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Summer Institute for Educators

This document is the result of the author's participation in the BC Agriculture in the Classroom Foundations' Summer Institute for Educators. This third year level course in curriculum design is offered through the University of British Columbia's Office of Continuing Professional Education.

Participants (20 educators from Kindergarten to Grade 12) spend one week at the Montfort House Rural Resource Centre situated on UBC's Farm on Vancouver Island. Here they develop a number of practical teaching strategies for their classrooms using examples drawn from the agricultural, environmental, economic and nutritional concepts featured in the Bc Integrated Resource Packages for their particular grade or subject area.

The agricultural community sponsors participants for the costs of learning resources, tuition, meals and accommodation.

Participants taking the course for credit create teaching modules such as this to share with other educators from around the province.

Applications can be made on the BC AITC web site at www.aitc.ca/bc or directly at the AITC office. Contact Lindsay Babineau at 604-556-3088 for an application form.

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- BC Broiler Hatching Egg Commission
- BC Cattlemen's Assocation Public Affairs Committee
- BC Chicken Marketing Board
- BC Horticultural Coalition
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- BC Milk Producers Association
- BC Turkey Marketing Board
- Canadian Feed Industry Association
- Chilliwack Chamber of Commerce Agriculture Education Committee
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- First Heritage Savings Credit
- JR Appel Contracting
- Mainland Dairymen's Association
- Nechako Regional Cattlemen
- North Okanagan Livestock Association
- Royal Bank, Agriculture Division
- Upper North Thompson Livestock Association
- Whitta Farm

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Introduction

This unit was developed out of an interest inspired by the 1999 Summer Institute for teachers held at the U.B.C. Research Farm in Oyster River on Vancouver Island. This Agriculture in the Classroom course gave teachers from throughout the province the opportunity to gain first hand knowledge about the state of agriculture in B.C. We visited a working dairy farm, a fish processing plant and aquaculture farm, an organic farm and a hog farm. The organic farm held ideas for me that I felt could be tied into many learning outcomes at the grade 2 level and would allow many hands on, classroom based experiences.

The school that I teach at is in the suburbs of the lower mainland, and direct access to farms and farmers is limited. Therefore, the challenge was to give students (through hands on classroom based activities) a sense of understanding of some of the issues of feeding an ever growing population with less available land. The B.C. Hothouse concept seemed a logical way to do this.

Please note that lessons 8 and 12 are field trips to a greenhouse grower and a grocery store. These should be planned well in advance so that you are prepared to go at the desired time. Agriculture in the Classroom may be able to help with field trip information. They can be reached at (604) 556-3088. Some other lessons require materials to be collected in advance. Please see teacher information at the beginning of each lesson for more information.

These lessons could be extended to incorporate more of the learning outcomes from the IRP's. This would of course depend on the interests and needs of the teacher, students and even the school community.

I hope that you find this unit practical and teacher friendly. I have tried to include all needed blackline masters and to limit the amount of extra materials as much as possible.

Good luck and have fun with this unit!

Nancy Carl

Science I.R.P.
Overview of Applications, Instruction, and Assessment Strategies

Life Science

Plants in the Environment

- Through investigations and experimentation in a variety of environments, students determine the needs, structures, and adaptations of plants.
- Students can demonstrate their knowledge of plants and the environment by writing, drawing, and keeping scientific logs.
- Students demonstrate their scientific skills and processes by observing, conducting investigations, and communicating their observations to others.

Physical Science

Energy in our lives

- Through identification of common energy sources, students explore the many different devices in the home and school that require energy.
- Students can demonstrate their knowledge of energy in their lives by discussing how energy is used and by making choices about responsible energy use.
- Students demonstrate their scientific skills and processes when they make observations and identify patterns from collected information.

Prescribed Learning Outcomes

Science: Life Science (*Plants in the Environment*)

- demonstrate a knowledge of how plants take in water, nutrients, and light
- compare and contrast different types of plant life cycles
- describe structures that enable different plants to survive in different environments

Suggested Instructional and Assessment Strategies

- Organisms interact to create balance in the living environment. Through investigations and experimentation in a variety of environments, students determine the needs, structure, and adaptation of plants. Measuring and recording growth give students the opportunity to compare different life cycles.
- Students can demonstrate their knowledge of plants and the environment by writing, drawing, and keeping scientific logs. They demonstrate their scientific

skills and processes by observing, conducting investigations, and communicating their observations to others.

Science: Physical Science (*Energy in our Lives*)

- identify the sources of energy in a variety of devices found in the school and home
- describe ways energy is used in the school and home
- evaluate ways energy can be conserved in the school and home

Suggested Instructional and Assessment Strategies

- Energy is needed to get work done. Through identification of common energy sources, students explore the many different devices in the home and school that require energy. They make observations and act responsibly by suggesting ways that energy can be conserved in their community and by helping to conserve energy in the school.
- Students can demonstrate their knowledge of energy in their lives by discussing how energy is used and by making choices about responsible energy use. They demonstrate their scientific skills and processes when they make observations and identify patterns from collected information.

Mathematics I.R.P.

Overview of the Curriculum

Number: ***Number Operations***
Use a variety of strategies to apply a basic operation on whole numbers and use these operations in solving problems. Choose, use, and defend the appropriate calculation strategy or technology to solve problems.

Patterns and Relations: ***Patterns***
Investigate, establish, and communicate rules for numerical and non-numerical patterns that arise from daily and mathematical experiences, and use these rules to make predictions.

Shape and Space: ***Measurement***
Measure, estimate and compare, using whole numbers and non-standard and standard units of measure

Statistics and Probability: ***Data Analysis***
Collect data based on first and second hand information, display results in more than one way, interpret data, and make predictions.

Statistics and Probability: ***Chance and Uncertainty***
Use simple experiments designed by others to illustrate and explain probability and chance

Prescribed Learning Outcomes

Math: Number ***(Number Operations)***
- calculate and justify the methods they used to find sums, differences, products, and quotients using estimation strategies, mental math techniques, manipulatives
- verify their solutions to problems by using inverse operations, estimation, and calculators

Suggested Instructional and Assessment Strategies
- Students develop an understanding of the basic operations by doing meaningful tasks. In addition to developing proficiency with the mechanics of the operations, they need to develop skills that extend beyond computational facility. These skills include analysing complex problem solving situations, knowing

when to select operations, and analysing the reasonableness of the solution. Students also need to be able to determine whether an exact or approximate answer is required and which method is the most appropriate in any given situation. Problem solving contexts motivate students to develop computational skills that they can apply in new situations.

- As teachers present problem situations to students, they can assess students ability to choose the appropriate operations as well as their ability to carry them out. Students who voluntarily introduce numbers into their other activities are generally confident of their developing skills.

Math: Patterns and Relations *(Patterns)*

- identify, create, and describe number and non-number patterns
- translate patterns from one mode to another using manipulative, diagrams, charts, calculators, spoken and written terms, and symbols
- explain the rule for a pattern and make predictions based on patterns using models and objects

Suggested Instructional and Assessment Strategies

- Through concrete experiences students develop habits of finding, inventing, and using patterns to solve problems. Once they become familiar with repeating and growing patterns, they begin to associate and record numbers for patterns. They develop strategies for analysing and communicating patterns, which then can be connected to other areas such as the graphing of outcomes in data analysis.
- Children vary greatly in their ability to recognize patterns intuitively. They need many opportunities to talk about the strategies they use and to hear about the approaches used by others. When children work on problems that lead them into new areas of thought and synthesis (rather than those problems that have a correct answer), they predict, test, and talk about their understanding.

Math: Shape and Space (*Measurement*)

- estimate, measure, record, compare, and order objects and containers using non-standard and standard units
- construct a shape, length, or object using a specific non-standard or standard unit
- select the most appropriate standard unit for measuring length (cm, m, km), mass (g, kg) volume (l) and time (minutes, hours, days)
- describe relationships among various standard units of measure
- relate the size of units to the number of units needed when measuring
- recognize that the size and shape of an object does not necessarily determine its mass

- make connections among manipulatives, diagrams, spoken terms and written symbols
- estimate and measure the passage of time in terms of seconds, minutes, hours, days, weeks, months and years and relate the various measures to each other
- read and write the date, including the days of the week and use the abbreviations and names of the months of the year in order
- read and write time to the nearest minute using 12 hour notation (use both a digital and an analog clock)
- estimate, read, and record temperature to the nearest degree Celsius
- relate temperature to real life situations

Suggested Instructional and Assessment Strategies

- The key to children's development of measurement concepts in concrete experience and practice. Through these experiences, students in the late primary years learn to select the appropriate standard units of measurement for specific applications. All students need to develop the ability to use measuring tools and to estimate with these tools.
- Childrens' talk and actions as they work with and measure objects in the classroom offer insights into their understanding about shape and space. As they work, the teachers' questioning and observing can elicit important feedback on whether students are selecting appropriate tools and if they are measuring with increasing accuracy.
- have the students' record the date, time (both digital and analog) and temperature as part of data collection. Use information to compare sets of data.
- What daily applications might help those students who seem to have difficulty with measures of time, temperature, and money?
- What activities might help students build connections to their activities outside the classroom?

Math: Statistics and Probability *(Data Analysis)*

- formulate questions and categories for data collection and actively collect first hand information
- use a variety of methods to collect and record data, including measuring devices, printed resources, and tallies
- sort and organize data by one or more attributes and by using graphic organizers such as lists and charts
- identify attributes and rules in pre sorted sets
- display data in more than one way, including graphs, pictographs, bar graphs, and rank ordering

- discuss data, communicate conclusions, and make predictions and inferences to solve similar problems
- generate new questions from displayed data
- obtain new information by performing arithmetic operations on the data

Suggested Instructional and Assessment Strategies

- Students' questions about the physical world can often be answered be collecting first hand information. This allows them to broaden their view of mathematics and its usefulness. As they learn how to collect, organize, display, and share information in the form of graphs, they develop critical thinking skills that allow them to make predictions, decisions, and conclusions about their information.
- The assessment of students' learning should describe their increasing ability to create and interpret graphs and charts. As students integrate their understanding of the procedures and purposes of data analysis, they will apply their knowledge in new situations, both within mathematics, and in other subject areas.

Math: Statistics and Probability *(Chance and Uncertainty)*

- describe the likeliness of an outcome using terms such as *likely, unlikely, fair chance, probable,* and *expected*
- conduct a probability experiment, choose an appropriate recording method, and draw conclusions and make predictions from the results

Suggested Instructional and Assessment Strategies

- by exploring probability and chance through games and experiments, students are encouraged to make predictions about events. They can adjust and adapt experiments to answer their own questions about why certain events happen. As they do these experiments, they can write or talk about their predictions, why they make such predictions, and what actually occurred. From this they begin to view their world as a combination events that they can understand, and sometimes influence, and others that are chance occurrences.
- watch for evidence of: students' interest in making predictions; their ability to tailor their responses to specific questions rather than, for example, making the same predictions again and again; whether or not they are exploring systematic ways of responding; the frequency of unreasonable answers; their willingness to speculate about ways to verify their predictions; their use of vocabulary (probable, expect, likely)

Personal Planning I.R.P.

Learning Outcomes

Personal Development *(Healthy Living)*

- perform activities that support a healthy lifestyle
- identify a variety of foods that will meet their nutritional needs
- give examples of the influences of family and media on their attitudes and values regarding healthy living

Suggested Instructional and Assessment Strategies

- have students make illustrations of personal activities that are healthy.
- have students brainstorm ways in which their families promote healthy living.
- have students discuss ways in which they can improve the health of their home or school environment.
- collect examples of persuasive print advertising that may or may not promote a healthy lifestyle and then have students put these in the appropriate categories.
- have students identify healthy food choices.
- have students collect and evaluate packaging and gimmicks that influence attitudes towards products
- have students create food mobiles to demonstrate healthy food choices
- have students use the "know, wonder, learn" approach, or web activities for foods that promote a healthy lifestyle.
- collect evidence of students ability to: identify advertisements that promote a healthy lifestyle; make appropriate choices for healthy living; visually represent activities that reflect healthy practice

Personal Development *(Mental Well Being)*

- demonstrate a willingness to participate in the development of a healthy school and community
- identify helpers in the family, the school, and the community who can support and nurture personal well being

Suggested Instructional and Assessment Strategies

- have students suggest ways in which their community or school is improving or may be improved. Have the class decide on one project to improve the classroom, the school, or the surrounding community.

Career Development *(Career Preparation)*

- identify and apply effective work habits

Suggested Instructional and Assessment Strategies

- look for evidence of students' ability to: work collaboratively; effectively allocate time to complete projects; identify the common characteristics of work and play and use this information to distinguish between the two
- construct a learning environment in which activities and learning situations allow students to develop effective work habits. For example: encourage students to accept responsibility by keeping track of materials needed to complete a group project; encourage socially appropriate behaviour; have students complete a self assessment activity in their daily journals listing the things they do to work effectively; make a chart of what on task behaviour looks like, sounds like, feels like

Plants in the Environment

Activities

- students grow plants under a variety of conditions and infer the best conditions for plant growth. The conditions they test could include:
- varying amounts of light
- various soils (e.g.. sand, grave, composted)
- varying amounts of water
- various liquids (e.g. water, food colouring and water)
- various pollutants (e.g. acid rain, oil, pesticides)
- students plant a variety of plant seeds (e.g. marigold, bean, sunflower), observe similarities and differences as they grow, and draw the life cycles of each
- students look at videos, pictures, and examples of plants living in a variety of ecological conditions, and compare and contrast their characteristics and requirements. Students create different ecological communities (e.g. cactus garden, rain forest, pond, forest) through models, drawings, or terrariums.

Skills and processes

- as the students test conditions for plant growth, the teacher looks for evidence that they are able to:
- notice changes
- pose questions about what they see
- use appropriate measuring instruments (e.g. rulers)

- describe their observations accurately using specific details
- share their findings with peers
- Note: These skills and processes can be observed as students participate in a variety of science investigations. The teacher may wish to make them part of an ongoing assessment record.

Knowledge

- teacher provides diagrams of plant life cycles; students label and order the stages.

Self Assessment

- students draw or write about something they learned that surprised them or changed their thinking.

Lesson #1 - Know, Wonder, Learn

Teacher Information

This lesson is intended to stimulate the students interest in the upcoming unit of study. The information the teacher collects from the students should be kept on display throughout the unit and added to as new information is acquired.

**Note:* Each lesson should include the teacher reading a book (fiction or non-fiction) about plants (see bibliography) to the students. The reading should include discussion time. This will help to continually increase the students knowledge base as well as focus their minds on the topic of study.

Books should be gathered before beginning the unit and kept on display at an interest centre area for students to browse during spare time and reading time, and use later for research based activities.

Materials

chart paper
felt pens
*book about plants

Lesson

1. Read and discuss a plant book of your choice, with you students. Allow plenty of time for questions. *(approximately 15 minutes)*

2. On one piece of chart paper brainstorm and list all the things your students think they know about plants (e.g.. types, parts, care of, colour)
On a second piece of chart paper list all of the things your students wonder about plants. *Your students may need some direction such as: What do you wonder about papayas? Do you know where they come from? What they taste like? *(approximately 15 minutes)*

3. Label a third piece of chart paper "We Learned". There may be one or two items they learned from today's' story that you could put on the chart. Continue to add to this chart throughout the unit. *(approximately 5 minutes)*

Lesson #2 - Seeds

Teacher Information

Before the lesson a collection of seeds should be started (at least one week ahead of time). a) a letter could be sent home asking parents to send in a collection of seeds (e.g.: sunflower, pumpkin, peanut, watermelon, avocado, grapefruit, apple, orange, beans, peas etc.).

b) seeds can be collected at school from recess and lunch snacks (e.g.: oranges and grapes).

c) seeds can be collected on outdoor walks (wear an old sock over your shoe, seeds will stick to the sock).

Set up a seed table with paper plates or plastic bags to store the seeds in and a collection of magnifying glasses to examine the seeds with.

Students will use these seed collections for the next few lessons.

Materials

1 bag of mixed seeds for each group of students
BLM#1 Classification Graph: 1 per student
10 to 20 index cards
BLM#2 Seed Sort

Lesson

1. Read and discuss a book about seeds with your students. See bibliography and/or your school or public librarian for an appropriate title. (approximately *15 minutes)*

2. Discuss individual differences such as hair colour, height, types of shoes etc. Sort students in a few different ways and have them guess the sorting rule. Once the students seem to understand the concept of sorting by different attributes explain that this can also be done with seeds. *(approximately 10 to 15 minutes)*

3. Distribute one bag of seeds to each group of students (group size to be determined by the teacher based on the number of seeds available and the ability of students to work in co-operative groups).

Allow groups to free explore the seeds for a few minutes then ask them to sort and classify their seeds. The teacher stops the sorting after a few minutes and asks the students how they are sorting. Responses should be recorded on index cards and placed in a pocket chart or on the chalkboard. The students then try to sort again in a number of different ways. *(approximately 15 minutes)*

4. Students choose a method of classification and graph how many of each kind of seed they have on their "Classification Graph"
(approximately 10 minutes)

SEEDS

Lesson (1) Activity Sheet #1 CLASSIFICATION GRAPH

Name _____ I sorted the seeds by shape

round	O	O	O	O	O							
flat	O	O	O									
pointed	O	O										

5. Set up seed bags, classification cards and extra classification graphs at the seed table for students to use on their own time.

6. Add any new information to the "We Learned" chart. *(approximately 5 minutes)*

7. Extension
Using BLM#2 students could look at different fruits such as apples, oranges, pears etc. and predict, count and graph the number of seeds inside.

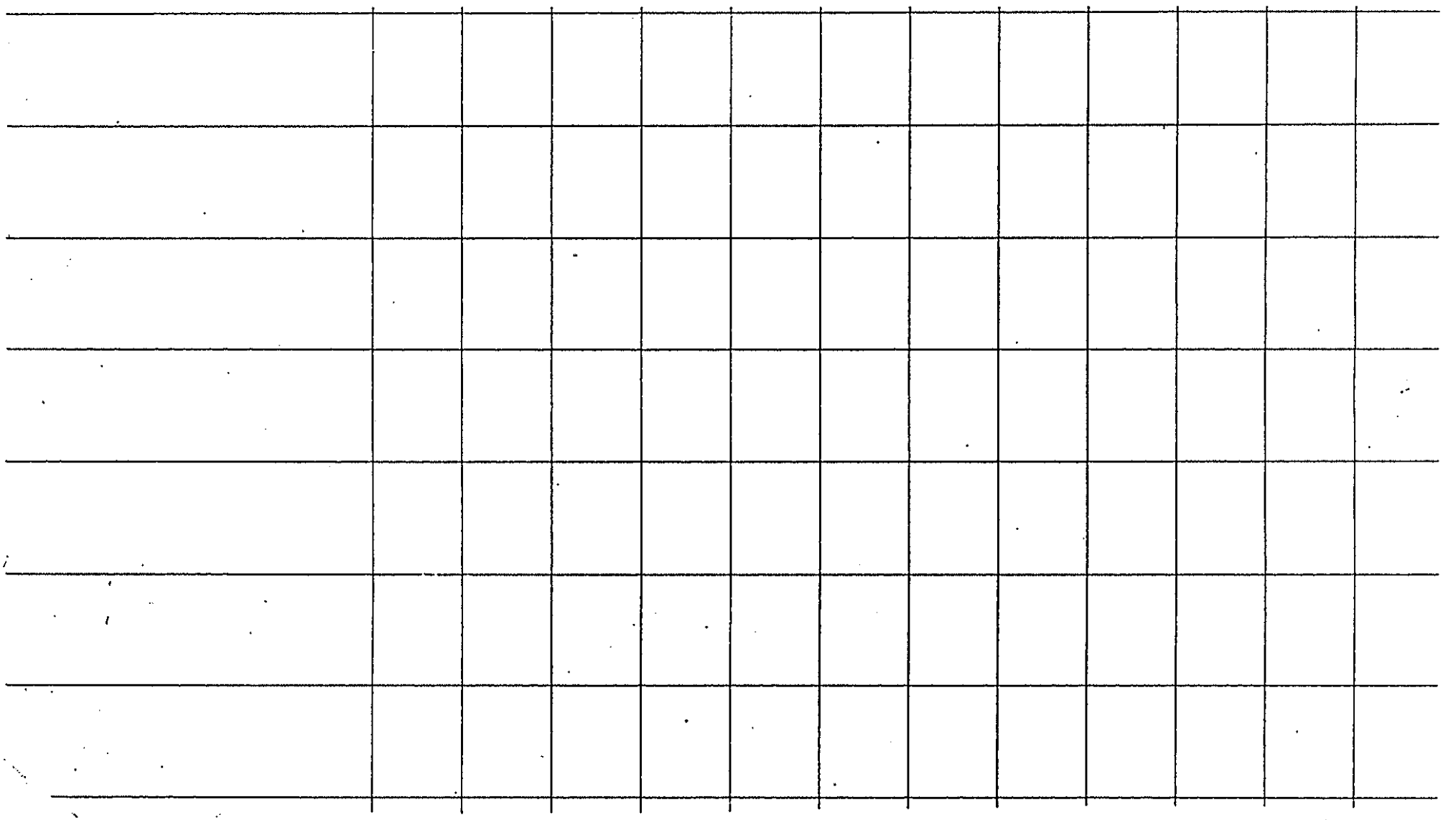
SEEDS

Lesson (1)

Activity Sheet #1 CLASSIFICATION GRAPH

Name _____

I sorted the seeds by _____



Name_____

Seed Sort

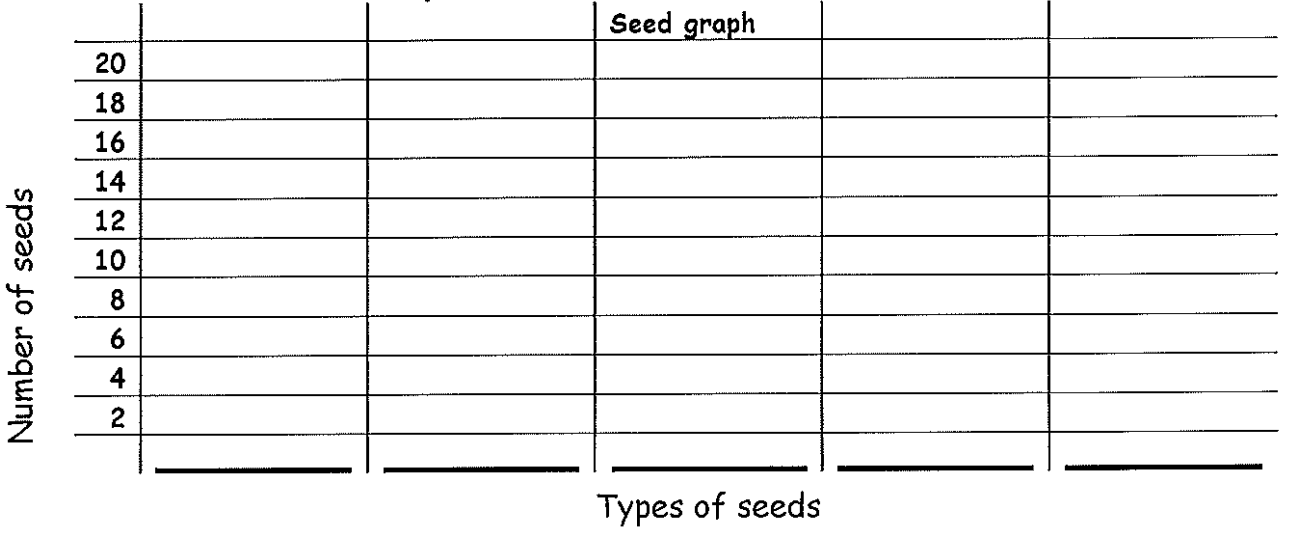
Data Table

Name the seed.	Draw the seed.	Predict the number of seeds.	Count the seeds.
1.			
2.			
3.			
4.			
5.			

Sort seeds here

1.	2.	3.	4.	5.

Graph the number of seeds you found of each kind.



Lesson #3 - Seeds: Edible and Non-Edible

Teacher Information

Teachers should request a sampling of foods containing seeds be brought in on the day designated for this lesson. e.g.: apples, grapes beans, peas, corn, nuts, cucumbers, prunes, tomatoes, oranges, figs, strawberries, melon, sunflower, pumpkin, peanuts.

Materials

selection of foods containing seeds
chart paper and felt pens
magazines containing food pictures

Lesson

1. Read a story (fiction or non-fiction) in which foods containing seeds are eaten (e.g. Grandpa's Garden Lunch). Present and discuss the concept that seeds can be edible or non-edible. *(approximately 15 minutes)*

2. Brainstorm and record all the seeds that the students think are edible, using a chart similar to the following:

Edible	*Non-Edible*
seed and covering	
covering only	
seed only	

Together, discuss and decide where each of the items on the brainstormed list should go. *(approximately 15 minutes)*

3. Hand out magazines. Students cut out pictures of seeds and foods with seeds and glue them on a second class chart which is laid out the same as the first chart. Glue on collage style. *(15 to 20 minutes or as the students interest level dictates)*

4. Add any new information to the "We Learned" chart. *(approximately 5 minutes)*

Lesson #4 - Dissecting a Seed

Teacher Information

Purchase a collection of large bean seeds. Pre-soak them overnight or at least for a few hours before the scheduled lesson. You should have enough beans for each student to have their own, and a few spares in case of accidents. (Also pre-soak a variety of seeds from the previous lesson, if you wish to do the extension activity).

The students should explore and discover that a seed contains a baby plant or embryo. They should be able to label the seed coat, leaf, stem and embryo.

Materials

pre-soaked large bean seeds for each student
pre-soaked selection of seeds from the previous lesson (to be used for extension activity only)
hand magnifying lenses (preferably one for each student)
paper towels
BLM #3: What is Inside a Seed (taken from Beans and Their Buddies, p.37) 1 per student plus an overhead copy for the teacher

Lesson

1. Read a story such as "A Seed is a Promise" to the class. Discuss what the title might mean and why the author would choose this title. *(approximately 15 minutes)*

2. Brainstorm what students think is inside a seed. (*This may be done orally only or recorded on chart paper or on the chalkboard, if the teacher wishes.) Distribute materials (beans seeds, magnifying lenses and paper towels) to each student and encourage free and careful exploration. While they are examining their seeds encourage discussion about what each part might be and how it might be used by the plant. Were the students able to remove the seed coat, split the seed in half, compare the two halves, find the leaves, stem, root and food? *(approximately 10 to 15 minutes)*

3. Using an overhead of the BLM#3 guide students through examination and labelling of the seed parts. The students should find the corresponding part in their seed and then label their diagram. *(approximately 5 minutes)*

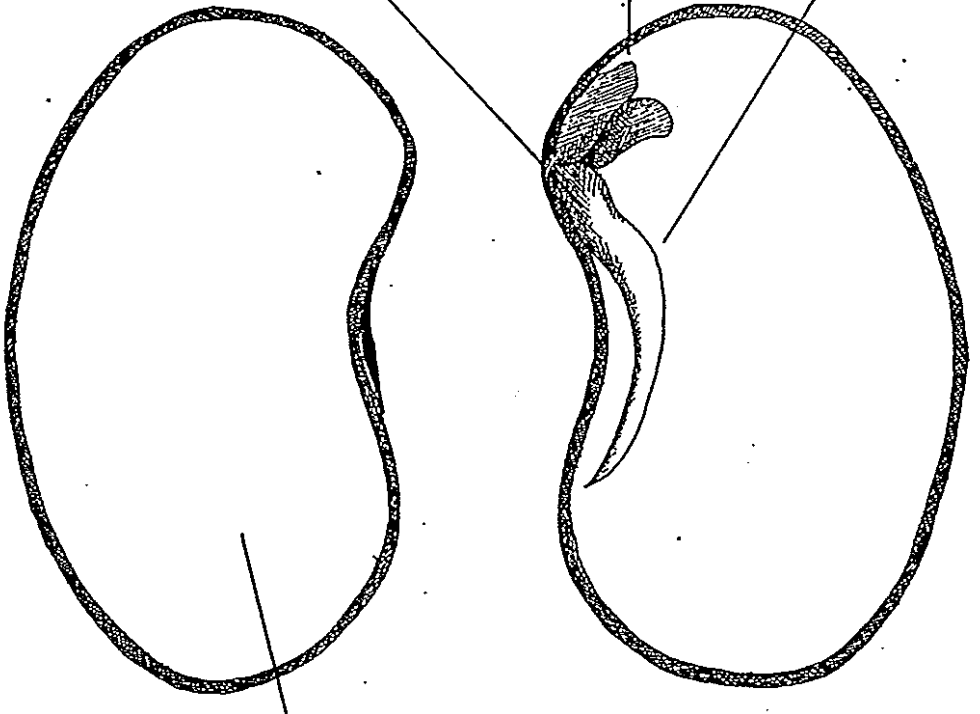
4. Add new information and vocabulary to the "We Learned" chart. *(approximately 5 minutes)*

Extension Activity

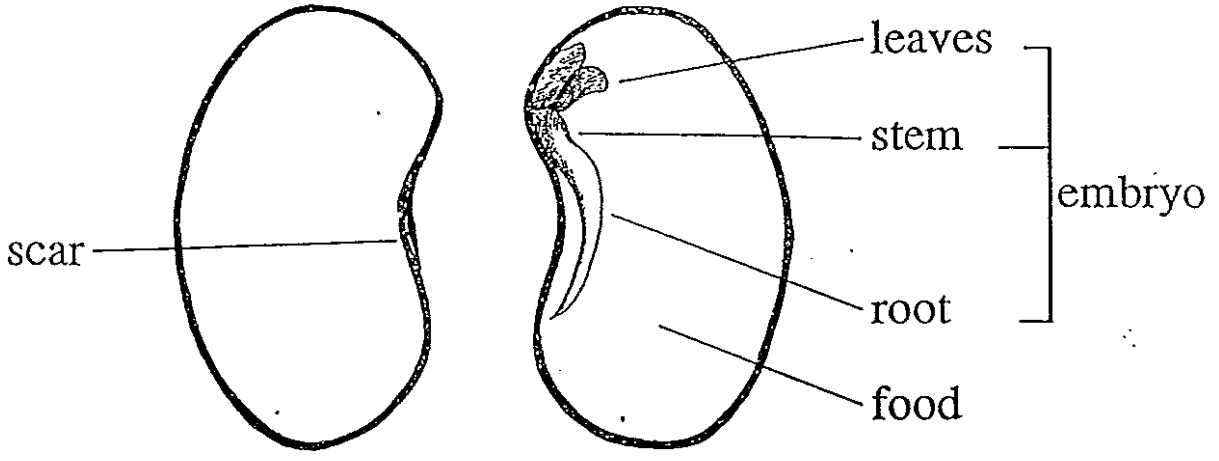
5. Distribute the pre-soaked seeds from the previous lesson. Encourage the students to carefully dissect these seeds to see if they can find all the parts they found in the bean seeds.

Name _____ Date _____

What is Inside a Seed?



Teacher's Reference



Here's what you can expect to find:

- There is a tiny scar where the seed was fastened to the plant. Note the shape of the bean.
- There are two layers of seed coat.
- The two consumable halves of the seed contain the initial food supply for the new plant.
- Nestled between these two halves is the embryo.
- At one end of the embryo, the two miniature leaves will be visible.
- The opposite end is the embryonic root.
- The material between the ends will become the stem.

Integrated Activities	
Math:	Count beans by 2's, record the total number required.
Fine Arts:	Singing game: Oats, Peas, Beans and Barley Grow
Language Arts:	Sentence Frame: I like seeds. (see portfolio pages in EXTENSION ACTIVITES)
Social Studies:	Invite someone from a local nursery to speak to the class.

Name _____ Date _____

Seed Dissection

A seed has a new plant in it and food for the new plant.

What we needed: (Draw the materials.)

What we did: (Show the steps.)

What we saw: (Label the parts.)

Lesson #5 - Let's Look at Soil

Teacher Information

Collect samples of different types of soil (best stored in plastic ice cream tubs with lids) such as sand, clay, garden soil, sterilized soil, peat etc. Label the buckets A, B, C, D etc. With a permanent marker label plastic baggies A, B, C, D, etc. Place a scoop in each bucket.

Materials

approximately 2 dozen labelled zip style sandwich sized plastic bags
4 labelled buckets of soil samples with one scoop in each bucket
magnifying lenses (at least 1 for each group of 4 students)
recording sheet (1 for each group)
chart paper and markers

Lesson

1. Read a story or poem to the students to generate discussion about soil or mud or sand. How does it feel and look? Record some of the describing words (on chart paper or on the chalkboard) the students come up with to help with the next activity. *(approximately 15 to 20 minutes).*

2. Divide the students into groups of 4. Give each student in the group a different labelled bag. The students will then put one scoop of the soil sample into their bag. (Make sure the sample for bag A comes from the bucket also labelled A) and return to their group.

Students examine each sample (magnifying lenses should be used) and record words to describe them on their group recording sheet. *(approximately 15 to 20 minutes)*

A	B	C	D

3. As a class discuss the observations and collate the answers onto a class chart. Compare the similarities and differences between the soils. *(approximately 15 minutes)*

4. Add new information and vocabulary to the "We Learned" chart. *(approximately 5 minutes)*

Lesson #6 - Soil Soak

Teacher Information

Rich soil contains a combination of organic matter and ground rock (sand). Soil absorbs, or holds water. If the soil can hold the water the roots of the plants have time to absorb and use the water. Water flows through sand quickly, not allowing the roots of plants time to absorb the water. Soils that allow water to percolate through are said to be more permeable than those that absorb water.

Materials

water
12 measuring cups
soil samples from the previous lesson
24 safety pins
2 dozen clear plastic cups (labelled A, B, C, D)
BLM #4: Recording Sheet (1 per group)

Lesson

1. Read a books such as "Rocks and Soil". Initiate a discussion about where students have seen fruits and vegetables growing. Do they grow on the beach? Why not? Let's find out. *(approximately 15 minutes)*

2. Distribute the materials to each group of 4 students (4 plastic cups, 2 measuring cups, 4 safety pins, 4 soil samples, water, Recording Sheet)

Each student in the group should poke eight pin holes in the bottom of one cup and then measure out 200ml of a soil sample into the matching labelled cup (make sure sample A goes into cup A)

One at a time measure 150 ml of water and pour it into the soil. Place the cup with the soil and water in it, over the second measuring cup. Record how much water drains into the measuring cup, using the group Recording Sheet (BLM#4). Allow 2 to 5 minutes per sample for draining. *(approximately 15 to 20 minutes)*

3. Discuss the results the students obtained. Lead into a discussion of which soil the students think would be best for growing plants and why. *(approximately 10 minutes)*

4. Add new information and vocabulary to the "We Learned" chart. *(approximately 5 minutes)*

Name_____

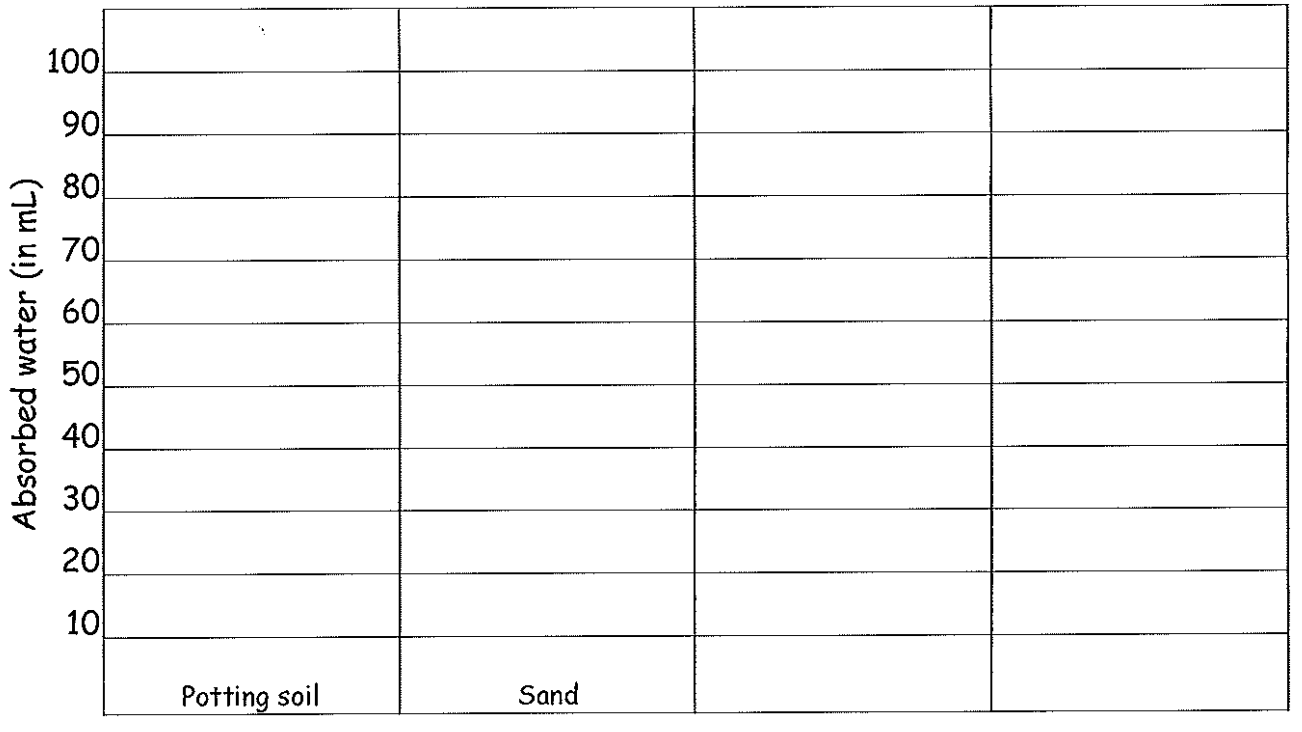
Soil Soak

Measure 200 mL of sand and potting soil into the cups. Pour 150 mL of water into each soil. Watch the water drain into a second set of cups or bowl.

Measure the water collected in the second set of cups.

sand_____mL potting soil_____mL

Make a bar graph of the amount of water absorbed by each soil. (Subtract the amount of water collected from the amount of water you started with.)



Which soil absorbs the most water?_____

Lesson #7 - Do Plants Need Soil?

Teacher Information

The purpose of this lesson is to lead students into the introduction of B.C. Hothouse growing and how their plants are grown hydroponically (without soil). How can that be? What about the nutrients found in soil that are needed to help plants grow? These are fed to the plants on a regular basis in their water.

Materials

1 clear plastic cup
paper towel
4 medium sized pots for planting in (labelled by soil type and letter from previous lessons)
4 soils from previous lessons
a package of quick growing seeds such as radishes or nasturtiums (make sure to pre-soak the seeds overnight)

BLM #5 - Plant Log Cover
BLM #6 - Daily Learning Log
BLM #7 - Daily Growth Recording Sheet (height and number of leaves)

Lesson

1. Read a story about growing plants, such as "Jack and the Beanstalk". Discuss what the beans were planted in and how fast it grew. *(approximately 15 minutes)*

2. Explain that the seeds will be used to find out how soil aids in plant growth.

The teacher plants seeds in each of the types of soil used in the previous lesson. (Do this in front of the class and talk to them about what you are doing)

On a class graph, have students predict which soil they think will produce the hardiest plant. Class graphs could also be made for predicting how tall each plant will get and how many leaves each plant will produce. Compare these predictions as the plants grow. (BLM #8 - Daily Growth Recording Sheet)

To find out if plants really need soil to grow, plant a few seeds in a clear plastic cup lined with paper towel (The seeds should be placed between the wall of the plastic cup and the paper towel.) Add enough water to dampen the paper towel.

Students record growth (measurement) and observations on a regular basis in their plant logs. (BLM #8 - Daily Growth Recording Sheet)

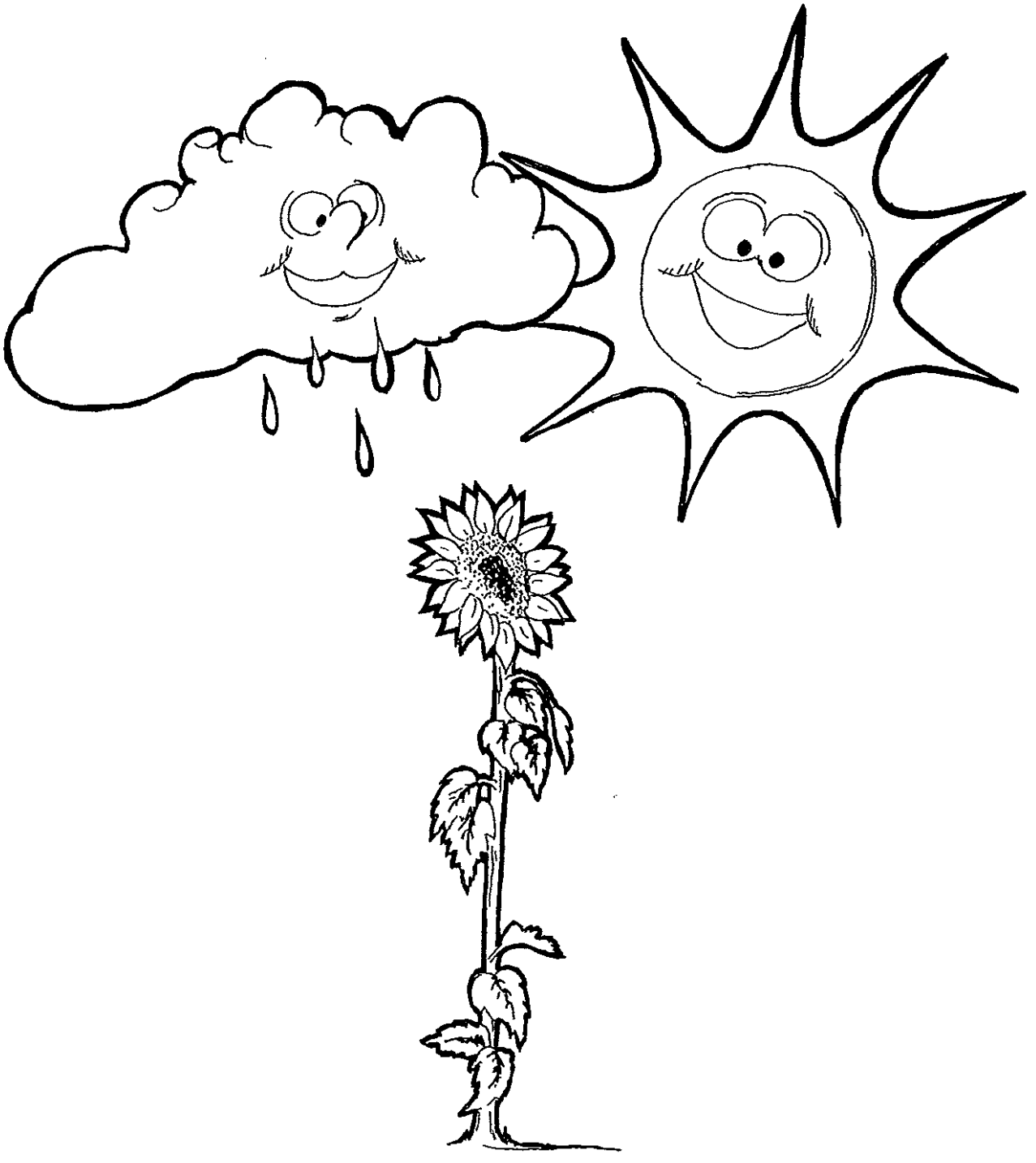
After several days compare the seed growth in the different types of soil. Talk about the role of the soil in the growth of the seeds. What is in soil that plants

need? Can a plant get these nutrients another way? Plants in B.C. Hothouses mainly grow above ground (very little root structure) and are fed their nutrients in the water they are grown in. Rock wool is often used instead of soil as it holds the water well and is less of an attraction to certain kinds of pests. *If there is no visible growth above the soil, gently uncover the seeds to see if they have started to grow. *(approximately 10 minutes)*

3. Hand out Plant Log cover (BLM #6) for the students to colour. Hand out (BLM #7) Daily Learning Log sheet and discuss some ideas for the students to write about what they have learned today. For example: the students could make predictions about what they think will happen in each one of the pots and the clear plastic cup. *(approximately 20 minutes)*

4. Add new information and vocabulary to the "We Learned" chart. *(approximately 5 minutes)*

5. Extension Activity
Leftover seeds could be used in art to make seed mosaic pictures.



_____'s

Plant Log

Daily Learning Log

Name _____

Investigation: _____

What we did:

_____

_____

_____

What we saw:

_____

_____

_____

What we learned:

_____

_____

_____

Daily Growth Recording

Name _____ Date _____

Height _____

Number of Leaves _____

Comments:

_____

_____

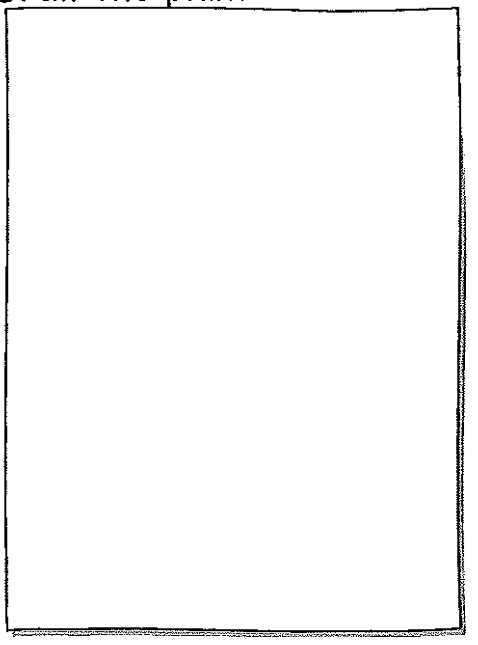
_____

_____

_____

_____

Draw the plant



Name _____ Date _____

Height _____

Number of Leaves _____

Comments:

_____

_____

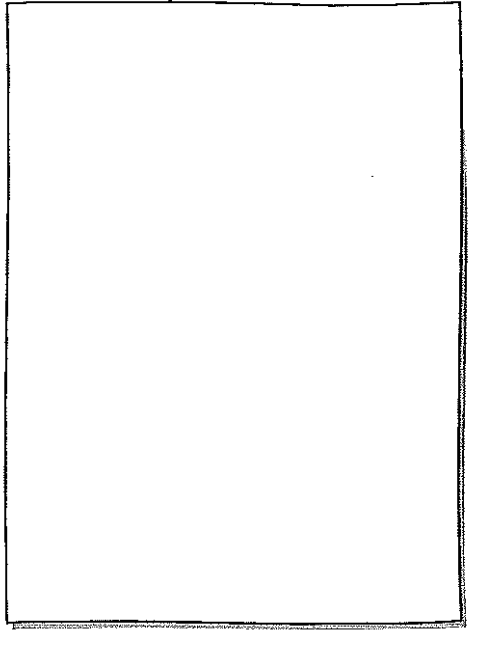
_____

_____

_____

_____

Draw the plant



Lesson #8 - Greenhouse Field Trip

Teacher Information

The teacher should book the field trip well in advance. A personal pre-view of the facility would help in forming pre-visit activities as well as questions to ask the tour guide.

A visit to the farm is one of the best ways for students to gather first hand information and talk to people working in the industry.

For information on locations that offer a field trip experience in the lower mainland, contact Lindsay Babineau at Agriculture in the Classroom. (Lindsay.Babineau@gems9.gov.bc.ca **OR** Phone: (604) 556-3088 **OR** Fax: (604) 556-3030)

Materials

BLM #9 - Field Trip
potting soil
2 litre plastic pop bottles (1 for each student)
variety of seeds

Lesson

1. Pre-visit activity

Have students make a mini-greenhouse out of a clear, 2 litre plastic pop bottle. Cut the bottom third off and fill with potting soil and pre-soaked seeds of the students choice (preferably something with small roots and fast growing; ask at the garden store). Water the seed and then replace the top piece of the pop bottle and tape it to the bottom piece as a dome style lid. Make some ventilation holes with a safety pin.

Observe growth over time. How often does the plant need watering? What is the temperature inside the "greenhouse"? What might the advantages be to growing this way?

Students record their thoughts and measurements on (BLM #7) daily learning log sheets and place in their Plant Learning Logs. *(approximately 30 to 40 minutes)*

2. Help the students to generate a list of questions to be answered at the greenhouse.

For example: How long is your planting season?
How do you water your plants?
How and what do you feed your plants?
What do your plants grow in?

Do you ever use soil?
What crops do you grow?
How do you control pests?
Why did you choose this type of farming?
How do your plants get to the store?
What stores sell your plants?
What makes these plants better than regular field grown?
What machines do you use on your farm?
What temperature do you keep your greenhouse at?
How do you heat your greenhouse?
How did you decide which plants to grow?

Write up your students questions on a sheet that they can take with them on the field trip. *(approximately 5 to 10 minutes)*

3. Students answer their prepared question sheets while on tour of the farm. They should ensure that they have answers to all of their questions before they leave the farm. They may also want to make sketches of some of the things they see, so be sure to leave room on the sheet for drawing.

4. After the Field Trip

Using their completed question sheets as a guide, students write a newspaper article, letter or speech to explain what they learned about greenhouse farming. These could be displayed in the school, read at an assembly, published in a class newspaper, submitted to a local paper, etc. BLM#9 Field Trip form could be used for writing activity or even for assessment purposes. (at *least half an hour)*

5. Students' should write thank you cards or letters to the greenhouse grower to thank them for their time. Brainstorm ideas first with the class and decide on a format that can be easily mailed. Be creative! *(at least half an hour)*

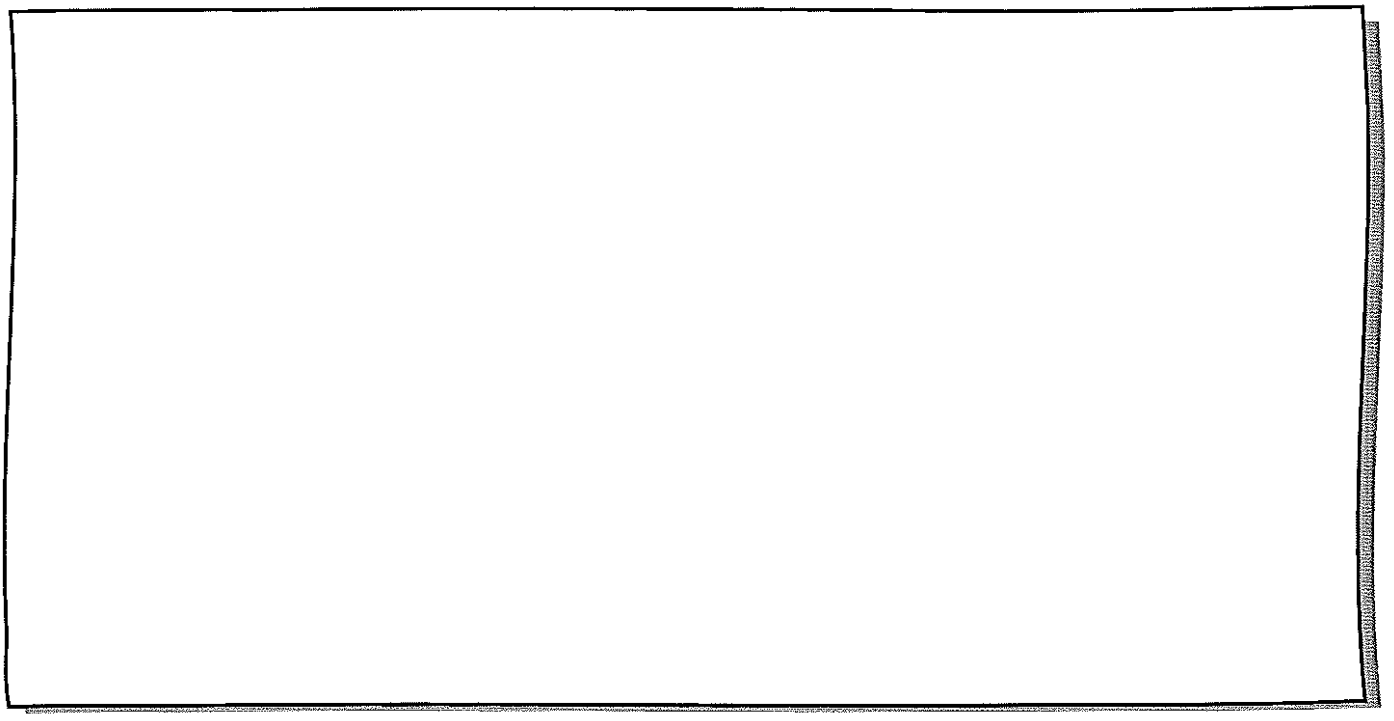
6. Add new information to the "We Learned" chart. *(approximately 10 to 15 minutes)*

Name _____

Field Trip

We went on a trip to _____.

We saw:



We learned:

_____

_____

_____

_____

_____

Lesson #9 – Do Plants Need Water and Light to Grow?

Teacher Information

All living things need water to survive. At the seed stage plants require water to soften the seed coat and start the germination process. Once the seed coat is softened it will split open and allow water inside. This will trigger the formation of roots and the development of seed leaves. All parts of the plant will be made up high percentage of water.

Water will move the first nutrients from the seed leaves throughout the plant. Once the roots and leaves are established water will continue to move nutrients both up from the roots to the leaves and from the leaves down to the roots. In the leaves the nutrients will be combined with sunlight and water to make food for the plant. Excess food will be stored in the plants' roots.

Water can be supplied to the plant by rain (precipitation) or by artificial means (irrigation).

Plants need light to create their own food. During photosynthesis water is combined with carbon dioxide to make carbohydrates and oxygen. The process is fueled by the energy produced when sunlight combines with chlorophyll, a pigment found in all green plants.

Materials:

BLM # Do Plants Need Water?
BLM# Do Plants Need Light?
Pre-soaked bean seeds and dry bean seeds
8 clear plastic cups
Paper towels

Lesson:

1) Start the lesson with a story about water or light. Lead this into a discussion about their importance to living things on earth. (approximately 15 minutes)
2) The teacher lines each of the cups with paper towel. Place 2-4 seeds around the outside of the cup between the paper towel and the cup. In four of the cups the seeds are pre soaked. In four of the cups the seeds are dry.
3) Hand out "Do Plants Need Water" and "Do Plants Need Light". Have students place these sheets in their Plant LogBooks.
4) Divide the cups into two groups.
   Group A – given as much light as possible – in a south facing window. Group A will be indicating whether or not water is needed for the plant to start to grow. The paper towel should be kept moist and not allowed to dry out.
   Group B – given as little light as possible – in a closet. Groups B will be indicating whether or not the plant will need light to continue to grow. The paper toweling should be kept moist in two of the four cups.
5) Complete "Daily Learning Log" to explain what was done today and make predictions what will happen to each plant.
6) Revisit plant growth/change over the nest 7-10 days and record observations.

Name _____

Do Plants Need Water?

List some of the uses of water.

_____

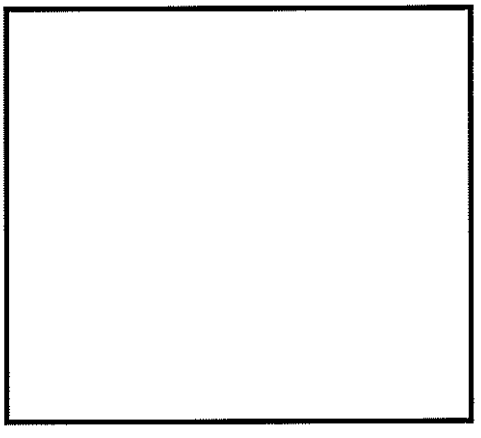
_____

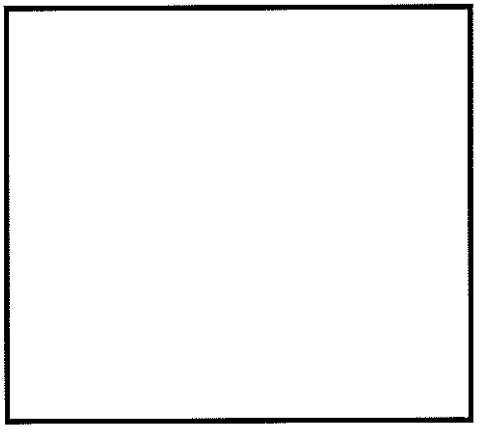
Do you think that a plant can grow without water? _____

After you have planted your beans, record each day what you do and observe.

	Bean with water	Bean without water
Day 1	Plant the bean and add water.	Plant the bean.
Day 2		
Day 3		
Day 4		
Day 5		
Day 6		
Day 7		
Day 8		
Day 9		
Day 10		

Which plant grew better, the plant with water or the plant without? Draw and label each plant.





Lesson #10 - How Much Soil is in the Earth?

Teacher Information

This lesson introduces the topic of sustainability at a level appropriate for grade 2 students.

A discussion of world hunger, shrinking of available farmland and waste would be appropriate here.

Materials

1 apple, 1 knife and 1 cutting board (or paper towel) for each student in your class and 1 of each for the teacher as well
chart paper and markers
BLM #7 - Daily Learning Log

Lesson

1. Read a story about vegetable gardening. Discuss how long it takes to grow vegetables. What happens to the fields in winter? Where does our fresh food come from in winter? *(approximately 10 to 15 minutes)*

2. Distribute materials. Each student completes the following activity.
How Much Topsoil is there for Farming?
An apple represents the earth. Cut the apple into 4 equal parts. 3/4 represents large bodies of water. Put these to one side.
Cut the remaining 1/4 in half. 1/2 represents deserts and swamps. Put this 1/2 to one side.
Cut the other half into 3 equal parts. One piece represents mountains, one piece represents cities, blacktop etc. The last piece (minus the skin and core) represents topsoil for farming and food production. *(approximately 5 minutes)*

3. Discuss the implications of this discovery for feeding the people of the world. Record the students ideas on chart paper. For example: increasing use of technology in farming, more use of greenhouses and more frequent crop turnover due to longer growing seasons (no soil use), use of fertilizers etc.
(approximately 10 minutes)

4. Add information to the "We Learned" chart and then students complete (BLM#7) - Daily Learning Log to tell about what was important that they learned in today's lesson and what they think they could do to help solve the problem of world hunger. *(approximately 15 minutes)*

Name _____

Do Plants Need Light?

Plants need food, water, and sunlight to grow. Will a seed sprout, grow, and produce leaves in the dark?

Make a prediction.

_____

_____

Plant seeds in two cups. Place one in the light and one in the dark.

Treat both cups exactly alike except for the amount of light. Keep track of what you do and observe for a week.

Plant 1 In the light	Amount Of water	**Observations (colour, height, width, shape)**
Day 1		
Day 2		
Day 3		
Day 4		
Day 5		
Day 6		
Day 7		
Plant 2 In the dark	Amount Of water	**Observation**
Day 1		
Day 2		
Day 3		
Day 4		
Day 5		
Day 6		
Day 7		

Lesson #11- B.C. Hothouse Industry

Teacher Information

Plant each of the 4 hothouse vegetables in potting soil in an old aquarium or root view garden. The aim is to show students why these particular vegetables may have been chosen as good hydroponic plants (small root systems).

Materials

computers hooked up to the internet - Seeds of Change Garden http://www.nmnh.si.edu/garden/
collection of library books about vegetables
promotional material from B.C. Hothouse (*phone, write or fax for free material)

Lesson

1. Read a story about making salad or salsa or soup (eg: Growing Vegetable Soup). Talk about what vegetables are the students favourites.

2. Discuss how the greenhouse industry helps to address the problems of increased population and decreased available farmland. (Longer growing season in the hothouse, and little or no use of soil)

Introduce the 4 B.C. Hothouse vegetables.

Tomatoes: beefsteak and on-the-vine
Cucumbers: long english
Sweet peppers: red and yellow
Living lettuce: butter

Students choose one of the above vegetables to research (Make sure all are covered close to equally). Students should discover the country of origin, how the vegetable made its' way to B.C., uses for the vegetable, needed growing conditions, length of growing season etc. Teacher and/or students to choose how the information is to be conveyed to others (e.g.: poster booklet, speech, video etc.). Teachers can also decide if this is to be a group or individual project and how or if it is to be assessed.

Students should also write up two recipes (with the help of their parents). One recipe should include the vegetable they have been researching and should be from the vegetables country of origin. The second recipe should use the same

vegetable and be from the students' own cultural background (if possible). If this isn't possible a recipe they enjoy, using this vegetable, could be substituted. Have the students neatly print up each recipe on a separate sheet.

The recipes can be compiled into a recipe book and a copy sent home with each student.

3. Extension Activity

Have each child bring in a sample of their recipe large enough to share with everyone in the class, **OR** have a few willing parents from different ethnic backgrounds come in and prepare their recipe with the students and talk to them about the types of food they eat, and what it is like in their country. They could also talk about farming in their country if they have knowledge of it.

Graph: Where in the World the recipes came from (on a large world map).
New and familiar recipes.
Favourite B.C. Hothouse vegetable.

4. Art Extension

Make and paint papier mache vegetables.

Lesson #12 - Grocery Store Field Trip or Buy B.C.

Teacher Information

Make sure to book your field trip well in advance of the date you wish to go. Inform the tour operator of your main focus so that they will spend more time in the produce section and be prepared to answer your questions.

The purpose of this exercise is to teach the students to be good consumers. They will learn to base their choices not only on price but on quality, flavour and origin of products.

The teacher should take a camera (preferably a Polaroid) to take pictures of how hothouse and field vegetables are displayed, where they are located and their prices. (Make sure to ask the managers permission before you start taking pictures).

Materials

grocery store flyers containing sales on vegetables
BLM #7 - Daily Learning Log

Lesson

1. Pre-Visit Activity

Collect pictures and prices of tomatoes, peppers, cucumbers and lettuce from as many flyers as possible. Compare. Ask the students where they would shop and why, based on the information from the flyers only. Do the flyers say where the vegetables came from? Why would imported vegetables be cheaper than locally grown vegetables? *(approximately 20 minutes)*

2. Although you may have a complete tour of your local grocery store (and you may wish to extend it by working it into a nutrition unit) ask your students to focus on the 4 B.C. Hothouse vegetables and the field varieties of the same produce.

3. After the Field Trip

Purchase both B.C. Hothouse and field varieties of each of the 4 vegetables. Do blind tasting in class upon return from the field trip. Graph and discuss the results. Note* Students may prefer the field varieties because that is what their taste buds are familiar with. *(approximately 15 to 20 minutes)*

4. Discuss the information the students discovered on their tour and compare it with the results of the taste test. Look at the pictures taken at the store. How were the items displayed? Was there any difference in display based on price?

Ask the students what factors should determine what they buy (price, taste, where grown). Add this information to the "We Learned" chart and in the Plant Logs using BLM #7 - Daily Learning Log. *(approximately one half hour)*

5. Be sure to have the students send thank you cards to the grocer for the informative tour. Remember to be creative and use a format that fits easily in the mail. *(at least one half hour)*

Ask the grocer where they get their produce:

What do you notice about where B.C. Hothouse vegetables are displayed compared to where the other varieties are displayed?

Ask the grocer which they sell more of?

	B.C. Hothouse	Other
Tomatoes		
Lettuce		
Cucumber		
Peppers		

Ask the grocer what he/she thinks the consumer looks for in produce that they purchase? Are freshness and price the only factors?

What do you notice about the difference in price between B.C. Hothouse and other varieties? Why do you think there is a difference?

Lesson #13 - World Hunger and Farming in B.C.

Teacher Information

For one week prior to this lesson, ask the students to place any food they didn't want in one particular garbage can. Don't tell them why, just that excess food now goes in this particular container. Request that your custodian not collect this garbage until after your lesson.

Materials

food waste collected over a week (from recess and lunch)
something such as an apple for the teacher to eat
poster board (1 per student)
magazines and flyers containing pictures of food and farming

Lesson

1. Start the lesson by reading a story or non-fiction book that deals with hunger or children in the third world. Discuss why these people are going hungry and brainstorm and record ways in which we could help. While this discussion is going on the teacher should take a bite or two of the apple (or other food of choice). "Accidentally" drop the rest on the floor and then throw it in the garbage because its' "dirty". Discuss how the students felt when you ate in front of them and didn't offer them any. Also discuss how they felt watching you waste food.

Bring out the "garbage" you have been collecting for the past week. Show how much the students throw away on a regular basis. Explain that tens of thousands of people die every day from hunger and hunger related diseases. If we don't buy B.C. and support our farmers, soon we may be out of food too and relying on other countries to feed us.*(approximately 1/2 hour)*

2. Students design posters to encourage people to buy food products made in B.C. Display throughout the school. A few students could share their posters and ideas at a school wide assembly. A reporter from a local paper could be invited to come and interview a few students about their posters and take pictures of them with their posters. *(2 or 3 class periods depending on interest)*

3. Continue to monitor food waste in the class by doing a daily weigh in. Graph change over time.

4. Return to the "We Learned" chart and add any new ideas. Review everything the students have learned during the unit. *(approximately 1/2 hour)*

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Buy B.C. and save farmland

LETTER TO THE EDITOR:
Farms have value beyond tax potential

The Editor:

Re: City of Port Coquitlam supports removal of PoCo farmland from the ALR. What is good farmland? I guess that depends on what you want to do with it. If you want to subdivide and make a large profit, the farmland in the northeastern corner of Port Coquitlam is marginal.

What makes this land so much different from the farms on the north side of De Bouville Slough in Coquitlam, where they have been clearing more and more acreage for blueberry and cranberry farms, or the farms on the other side of the Pitt River, I'm not sure. All originate from the same flood plain; all receive high amounts of rainfall and have drainage problems to deal with.

To the mayor, I say that taking farmland out of the ALR is not about waiting your turn or how valuable that farmland is as residential land and as additional tax base for the city. The ALR is about preserving this province's agricultural land base. In every city and municipality in the Lower Mainland and the Fraser Valley, farmland is being besieged. I would like to commend Coun. Scott Young for having the foresight and fortitude to vote against removal or this farmland from the ALR.

Once the fill is brought in, the houses built and the roads paved, the land is almost impossible to reclaim. Day by day, we become more dependent on imports, losing control over our food and the quality of its production. Buy B.C. and support those farmers who want to farm the land.

David Mounteney
Port Coquitlam

Hot air over hothouses

THE ISSUE:
Greenhouses in agricultural areas

OUR VIEW:
Delta's going against regional growth plans

Delta council is concerned about the proliferation of vegetable gardens under glass, and is pondering some kind of controls.

What does this have to do with the view from the 18th floor of Casa Lac Lafarge?

Everything.

In a Herculean effort to preserve remaining flat, fertile land, communities backing onto mountainsides agreed to take a disproportionate share of residential growth. This has changed Coquitlam, Port Coquitlam and Port Moody substantially and forever.

Gentle slopes that once would have been diced into 4,000-square foot lots for traditional suburban housing were, instead, sliced for townhouses and suites.

The funky bungalows that circled Port Coquitlam's downtown have almost all been replaced by four-storey apartment buildings. The consequences of the bitter fight over Port Moody's north shore will reverberate at least through the next election.

Over time, these cities would have densified but the Livable Region Plan – the farmland-protection plan – hastened the demise of the single-family home for people without good jobs or inter-generational cash infusions.

Greenhouse growing does not fit with the urbanite's vision of farming, which should, in no particular order: be pastoral, include baby goats, chicks or cows, and not include manure or the smell of it.

But greenhouses are 20th century farming and that is what Delta's flat land was saved for, and why Tri-City's mountain slopes were developed.

To tinker now on the excuse of "environmental concern" is at best a breach and at worst a betrayal.