Food Miles:

Growing Local Food Connections

Grades K-8

Educational activities to teach your students about the food they eat and where it comes from.....

Produced by
Falls Brook Centre

Welcome Teacher!

This module aims to enlighten and inspire your students about where their food comes from, and the importance of a healthy diet. The program will aid to develop environmental citizenship and individual appeals to reduce food miles as a conscious contribution to long-term environmental health. It also aims to provide hands-on activities to explore simple, earth-and-people-friendly gardening practices.

Falls Brook Centre (FBC) is a sustainable community education centre located in Carleton County New Brunswick. FBC promotes sustainable practices through organic gardens, orchards, forest trails and promotion of ecological certification. Other on-site activities include solar and wind energy systems, a conference centre, herbarium, and tree nurseries which provide the basis for many outreach programs. We work on a range of regional and international programs that help support communities and organizations adapt to a sustainable future.

Acknowledgements

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Introduction

In this resource kit, you will find a number of activities and resources to assist you in guiding students through the web of the global food system. Students will explore where their food comes from, and use their insight to envision a sustainable food system in their own hometown.

These activities will hopefully create connections between local farmers and local schools, and increase experiential education materials for schools. Activities will calculate the economic, environmental and social costs associated with the transportation of food over great distances and how they manifest in the form of green house gases, energy costs and the loss of local economies.

This kit will also highlight specific actions individuals, families, communities, and schools can take to reduce their food miles.

Using this Manual

This manual is set-up with seven units, each with a background section designed to inform the teacher about important concepts, ideas and goals. The lessons in this kit can be facilitated consecutively, or can be completed independently.

Part One consists of five activity units to work-on in groups or individually within the classroom or for homework. Part Two: Hands on Solutions consists of two extensive science labs that take place over a multi-week period.

Each activity is designed to address specific curriculum outcomes set by provincial requirements as outlined in the Atlantic Canada Curriculum. These have been identified in each activity. Grade suitability is also listed at the start of each activity, and also in the table below:

Activity	Grade Suitability
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Background Information: What are Food Miles?

The Falls Brook Centre (FBC) has initiated a project called 'The Food Miles Challenge' within Carleton County and across New Brunswick with financial support from the New Brunswick agriculture council (NBAC). FBC supports organic agricultural practices, however, this manual focuses on the importance of reducing food miles and supporting local communities.
FBC recognizes that the average distance our food travels from field to feast is 2400km, and that transporting food such long distances requires a great deal of fossil fuels. This distance is called 'food miles', and by reducing these miles we are supporting local farms, reducing our dependency on fossil fuels and helping to strengthen the local economy and create more self-sufficient communities.

As our food system becomes increasingly globalized, our food miles are rapidly expanding. Exporting and importing can come with a high price; it can be environmentally destructive, harm regional economies, and hinder many aspects of communities.

The trend of importing and exporting foodstuffs has taken hold as countries and regions engage in a massive food swap – often importing and exporting the same product. For example, Industry Canada's figure for 2002 reports that New Brunswick imported 15 times as many apples as they exported. This trend is of particular concern because petroleum is the backbone of our globalized food system.

Here in New Brunswick, the need to support local food production is particularly important. Only 20% of our food is produced in the Maritimes compared to 50% only 35-years ago. The family farm is facing a crisis as net farm incomes continue to fall, making it not economically viable for small farms to compete. According to statistics Canada, there were 22% less farms in New Brunswick in 2006 compared to 1986. This represents a huge loss over a short period of time. Buying local food is crucial to support local farmers, create jobs, and ensure the vitality of our rural heritage. Dollars that are spent locally support our economy. According to the Conservations Council of New Brunswick, if every household in the province switched $20 of their weekly grocery bill to locally produced products, an additional $312 million would stay in our provincial economy yearly.

Buying local food is not only more sustainable, but also tastier, fresher, and more nutritious. A recent nutrition study proved that long distance travel and treatment decreases the amounts of vitamins C, A, E, and riboflavin that is found in produce. Furthermore, imported produce is often treated with waxes, fungicides, and irradiation. Local foods are picked at their peak and can often be found at market the same day. Buying locally is a good way to ensure that we are getting the best quality produce available.

The Food Miles Challenge will develop the capacity for teachers, cafeteria staff, students, farmers and the New Brunswick public to understand the interconnected issues of the environment as it relates to what they eat. It will also provide the tools to make responsible choices for a sustainable future.

SECTION ONE

The Traveling Tomato

The Traveling Tomato game is an introductory activity to introduce students to the idea that our food travels great distances from field to feastand. There are many problems associated with importing food from far away, and this exercise hopes to give students an understanding of how their personal food choices have a global, environmental and personal impact.

Grade Suitability

This activity is designed for grades K-2 and 3-8. There are two sets of directions for each grouping that the teacher will choose from.

Teacher's Background

Canada's rural farm population has been in decline for years. In New Brunswick, the number of farms has reduced from 26, 430 in 1951 to 2,776 in 2006. With fewer farms and more intensive farming practices, there has been a dramatic reduction in the land area under crops.

As a result, many farmers have increased their use of chemical pesticides, fertilizers, and heavy equipment on the land. There are fewer small farms, and the remaining farms are stretching onto land that is in some cases unsuitable for agriculture. This overuse of land is very destructive to our soil and water. It is estimated that soil erosion alone costs Canada $1.3 billion a year. Over-reliance on chemical fertilizers and pesticides has been equally destructive; damaging drinking water on farms (when seeped into the water table), or threatening fish and wildlife (when run- off into streams or carried by the wind). There is also concern that overworked soils, lacking important trace elements, are growing food with a lower nutritional value. (*Thanks to the Conservation Council of New Brunswick for some of this information)*

Our cheap food policy and high subsidies lay at the root of the farm crisis. Farmers cannot make a decent living from farming, and are often resorting to finding a second job.

These issues lead to a downward spiral. Because there are fewer farms, there is a smaller amount of local produce for sale – not enough to meet the high demand from large grocery chains. These stores want to be stocked with a wide variety of produce all year. This desire cannot be fulfilled by local farmers at this point, and as a result grocers have to source much of their produce from warmer regions abroad.

By choosing to reduce our food miles, consumers would spend less time at large, chain grocery stores, and more time at locally owned stores, farmers markets, or directly with the producer. This act would help to support the local economy, healthful food practices, and help community integration. Farmer's markets are well known for being places not only of selling or trading goods but also as an occasion for socializing and networking. In this environment, venders and patrons are both inspired and actively involved in their communities. Decreasing food miles could then be seen as a way to build connections between individuals and to strengthen communities.

Did You Know?

Ethylene is a gas used to speed-up the ripening process of fruits and vegetables shipped from far away because they are often picked before they are ripe to last the long journey, they need to be ripened quickly once they reach their destination. Ethylene is the plant hormone responsible for changing tomatoes from pale green to pink to red. Ethylene is produced naturally in ripening fruits, and its presence stimulates further ripening, then aging.

1

The Traveling Tomato Game

Description

In this activity, your class will enact two short skits of a tomato's journey through the global food system. During the first enactment, students will follow the steps of a tomato grown in Mexico, and eventually sold to a consumer in New Brunswick. The second skit will follow the journey of a tomato grown and sold within New Brunswick. Photocopy page 10 and 11, and cut-out the various roles and three tomatoes. For grades 3-8 follow the directions of part one and two and for K-3 follow the separate set of directions on the following page.

Objective

To energize and excite the students, while introducing the idea that our food travels great distances from the earth's floor to the retail store. Also to explore the problems associated with importing food from far away, and to give the students an understanding of how their personal choices have a global and environmental impact.

Game Directions: **Grades 3-8**

Part One

1. Keep the class seated at their desks. Pass-out the first three role cards of 'Part One' to three students at the front of the class (or what will be the beginning of the tomato journey). Give the last three role cards to three students at the back of the class (or what will be the end of the tomato jouney. All students in the middle will be transporters.
2. The student with the 'Mexican Farmer' role card is the first person in the tomato journey. This person gets the green tomato cut-out, and follows the directions on the card, and reads their script.
3. The 'Mexican Farmer' will pass the tomato to the holder of card #2, the 'Company Owner'. After following the steps on the card, they will pass the tomato to the holder of card #3-The Truck Driver.
4. This 'Truck Driver' gets the tomato, and begins passing the green tomato to the student beside them. Each student should be passed the tomato once. Make it known that every time the tomato is passed from each 'Trucker' the student passing the tomato must say that the tomato has traveled 100 kilometers more, adding as they go. Tell the students that they must say the distance of the tomato when it reaches them (i.e.100km, pass tomato, 200km, pass tomato, 300km etc).

CURRICULUM CONNECTION

Subject: Health
Grades: K-8

Outcomes: To evaluate eating habits, and to help apply the principles of healthy eating to student's daily lives.

5. Keep passing the green tomato up and down the rows until it reaches the 'Warehouse Owner'. This student takes the tomato, stands up, and puts the tomato on a desk at the front of the classroom and follows the directions on their card. This is when the teacher exchanges the green tomato with a red one. 'Warehouse Owner' passes red tomato to 'Grocery Store Owner.'

Part Two

Do the exercises again, however, there are only two roles to fill. The 'Local Organic Farmer' begins the exercise with a red tomato. Part two is short because the Farmer lives very close to the grocery store and sells directly to the grocery store owner. The farmer also only picks his tomatoes when they are ripe for harvest.

1. 'Local Organic Farmer' begins with the red tomato and reads their script.
2. The Farmer passes the tomato to the 'Consumer,' and they read their script.

Game Directions: **Grades K-2**

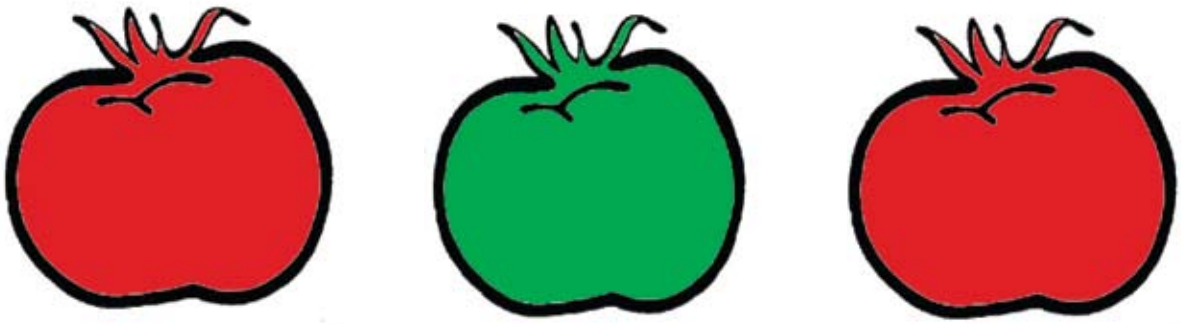
This activity is a very short, simple demonstration of how far food can travel before it reaches us in New Brunswick. **Part One:** First, the teacher can choose two students: one to be a farmer from Mexico, and one to be a consumer in New Brunswick. The farmer will start with a green tomato, and begin passing it to a student beside them, who will continue passing the tomato until everyone has held it, and it reaches the consumer (at this point the teacher trades the green tomato for a red one). Each time the tomato is passed it represents 100km of travel. **Part Two:** The exercise is then repeated with two new students who act as a NB farmer and a consumer. They are the only students who have to be involved in this round. The farmer begins with a red tomato and with an explanation from the teacher, they pass it to the local consumer.

Materials

- Green tomato and two red tomatoes
- Role cards for grades 3-8

Questions/Points of Discussion

- If the students are not familiar with how far away Mexico is, show them on a large map
- Ask the class which of the two production systems is healthier for the environment?
- Ask the class if they've been to a local farmer's market?
- Explain that if they were to buy local organic produce it would only travel around 100-200km, and the exchange would happen directly between the local farmer and the consumer.
- Explain why food costs are so low, and why grocery stores most often choose to import their produce.



Role Cards

Part One

#1 Mexican Farmer (Carlos)

"Look at all these green tomatoes I have to pick today. They're not ripe yet, but I have to pick them anyway. But first I need to spray them with pesticides to keep the bugs away."

PASS TO STUDENT WITH CARD #2

#2 Boss (Juan)

"Thank you for the tomatoes Carlos. Keep working hard, we have lots of deliveries to make. These tomatoes have to be in Canada by next week."

PASS TO STUDENT WITH CARD #3

#3 Truck Driver (Mark)

It's a long drive to Canada. These tomatoes have thousands of kilometres to travel."

PASS TO STUDENTS WITH NO CARDS (OTHER TRUCK DRIVERS)

#4 Warehouse Owner (Jim)

"These tomatoes are still green. Before I can deliver them I need to gas them for 24 hours to help them ripen."

PASS TO STUDENT WITH CARD #5

#5 Grocery Store Owner

"Wow, these tomatoes have traveled more than I have! It seems strange to buy a product from far away that we could have grown in our own country."

PASS TO STUDENT WITH CARD #6

#6 Consumer

"Here I am in the grocery store. I need to find some tomatoes to make spaghetti sauce. Here's one...it's kind of hard, and from far away...but it's the only tomato available."

END

Part Two

#1 Local Organic Farmer (Sylvia)

"I've been taking care of this tomato since I planted it in the spring. Now it's red and ripe to pick. Tomorrow I'll take it to the local market and sell it to someone from the community."

PASS TO STUDENT WITH CARD #2

#2 Consumer

"I love coming to the farmer's market...look at all this beautiful produce! I also get to see friends, and meet new people from the community. Hi Sylvia, your tomatoes look great, I think I'll buy some for lunch."

END

SECTION TWO

2

Where in the World Does Our Food Come From?

This activity will demonstrate to students that a large portion of the produce in grocery stores comes from countries far away. Students will map where certain produce comes from, and calculate approximately how many green house gases were emitted during that produce's journey to New Brunswick. This exercise should highlight that as consumers we have the choice to buy foods grown locally or abroad.

Grade Suitability

This activity begins with a mapping exercise. This portion is suitable for grades 3-8. The next part involves calculations meant for more advanced interpretation skills – for grades 6-8. However, this section is useful information for younger grades, and the teacher may choose to demonstrate a few simple calculations on the board.

Teacher's Reference

The food we find at our grocery stores comes from all over the world. Lemons from Argentina, apples form New Zealand, lettuce from the United States – our food is more travelled than we are.

In Canada, many of us take food for granted. Our supermarkets are full of food, and prices are largely affordable. On average, New Brunswick families spend only 11.4% of their income on food. Many people have become dependent on a system that we have little control over.

Most of the food we now eat is no longer locally grown. Only 35-years ago, 50% of our food was produced in the Maritimes, now that figure is less than 20%. The rapid expansion of international trade in food, made possible by the availability of cheap oil has given Canadians access to the global market and an almost endless choice of food items. The benefits to consumers is lower food prices and a great variety of foods to choose from, but adversely affects the quality of our food, our environment and our farming communities. As consumers in the "global market", we tend to look for the best buys, with little thought of the true nutritional, environmental and social costs of what we purchase.

The average piece of food travels 2400km to reach us, spending days, even weeks between harvest and consumption, losing taste and nutritional value along the way. In fact, 30% of all trucks on the highways carry food products. There are ecological and economic problems with this kind of food system. It relies on a network of production, processing and distribution that for the most part is energy intensive and environmentally harmful.

Truck transportation adds to air pollution, wastes energy and contributes to global climate change. As well, long-distance transportation and handling require that fruit and vegetables be harvested before they are fully ripe. By the time produce reaches our table, its quality is lower than that of field-ripened produce.

Even produce from Ontario has a long way to travel to reach New Brunswick. Leamington, Ontario is Canada's greenhouse tomato capital, and is 1,584 kilometres away. That is why it is best to buy as locally as possible, ideally within a 200 kilometre radius.

Consumers need to take more responsibility in the food choices they make. Weighing the cost of the food against the environmental, social and economic cost should be a major part of all food purchases. We can start by buying local foods – encouraging our favorite food stores to carry food produced locally.

How can we be more involved in farmer's harvest?

Community Shared Agriculture (CSA) is one way that producers and consumers can work together to share the bounty of the land.

Individuals from the community can support a local farm operation, and be a part of the growing process by joining a CSA. The garden or farm becomes a shared space, with the growers and consumers providing mutual support and sharing the risks and benefits of food production. Members of the community pay a weekly or monthly fee, and in return they receive shares in the farm's harvest throughout the growing season.

When you join a CSA - a Community Supported Agriculture program - and buy a share in the harvest of a local or regional farm, you cross a threshold of discovery. You discover where your food comes from, who your farmer is, and who is in your community

Where in the World is Your Food Coming From?

Description

In this activity, your class will examine the labels on a selection of grocery items from Carleton County, NB for information on the food's origin. They will map out their findings on a large world map and calculate the total food miles of their grocery selection.

Objective

To explore where our food comes from, map out the distance it travels to reach us, and to gain a sense that food can be grown close to home, rather than imported from a great distance.

Materials

- Photocopies of a world map - one for each group
- Food cut outs with labels- one set for each group
- Food miles calculator chart-one per group
- Pencil and paper to record findings

Game Directions

1. Divide your class into groups of four-five.
2. Give each group a world map, food cut-outs, food miles calculator and food distance chart.
3. Identify the different food items with the class, and have students volunteer to read where each one came from.
4. Locate on the map the province or country the food comes from – sticking a paper cutout onto the map for visual reference.
5. Repeat, until all items in the bag have been addressed.
6. CALCULATION SECTION (For 6-8, or led by teacher). Have the students refer to the food miles calculator to calculate the total food miles it took to deliver the produce to NB.
7. As a class, consult the table, and compare the emissions from food from abroad to some food items that could have been purchased locally.
8. Review the Questions/ Points of Discussion.

CURRICULUM CONNECTION

Subject: Math and Health
Grades: 3-8
Outcomes: To understand that personal behaviours and choices may affect safety of self and others.
To solve and create relevant addition, subtraction, multiplication, and division problems involving decimals.
To record and/or calculate real data.

Food Miles Calculator

Transporting food long distances guzzles fossil fuels and emits greenhouse gases that contribute to climate change. We challenge you to do the math and figure out exactly how approximately how many greenhouse gas emissions are produced as your food travels to make it to your plate.

Here are four simple steps to calculate the environmental impact of your food miles.

Step 1: Check the label- where did your product come from?

Step 2: Look it up on the chart- how many kilometers did your food travel from its origin to your house (use the distance chart)

Step 3: Which method of transportation did your food use to get here?
Plane, boat, train, truck?

Step 4: Now you are ready to do the calculations:
Km travelled multiplied by ghg emissions (see table below)

Grams of GHG emissions per km traveled for each kg of food

PLANE	1.1010
BOAT	0.1303
TRAIN	0.0212
TRUCK	0.2699

(Environment Canada 2002)

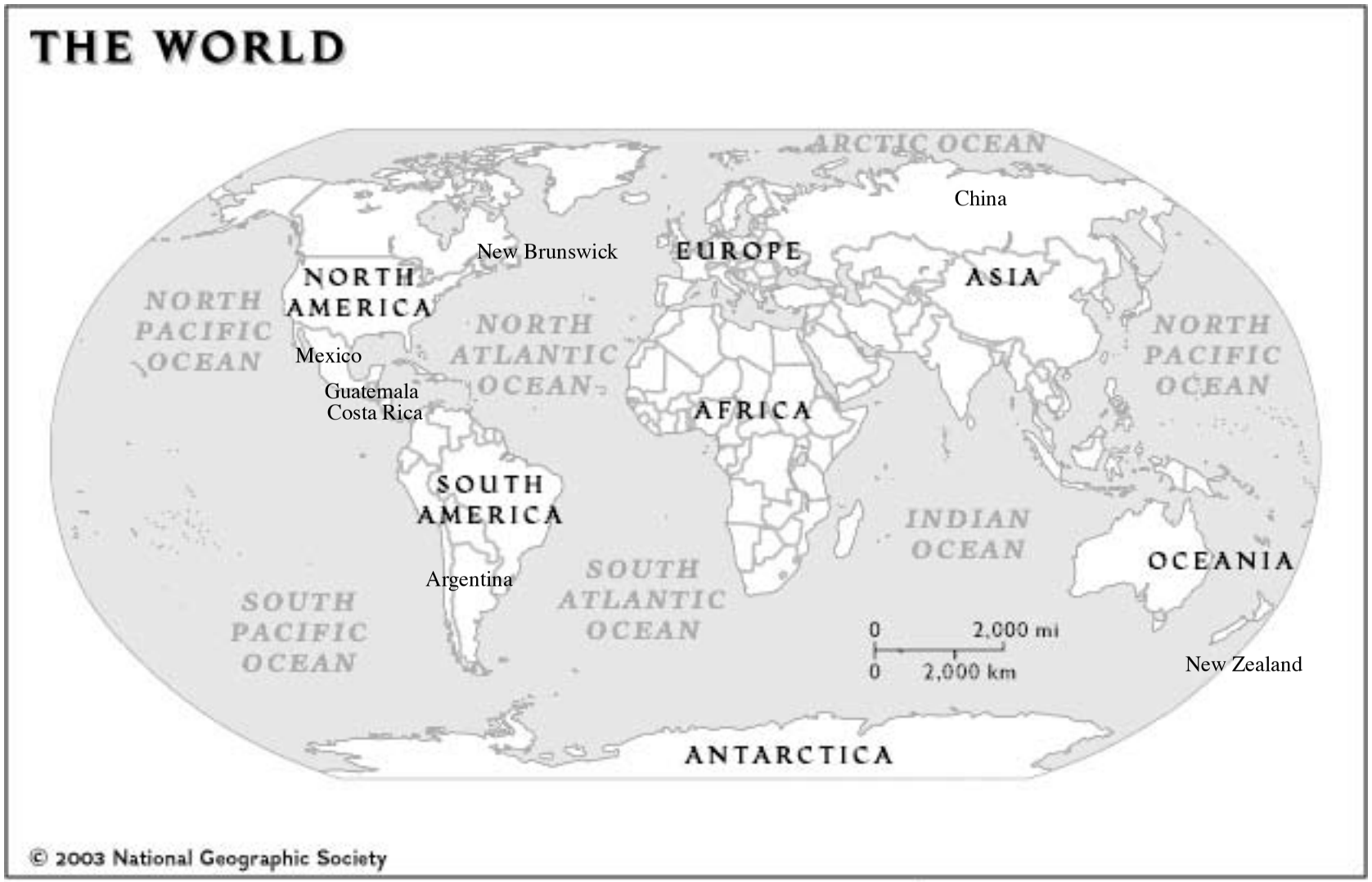
For example:
If a kilogram of tomatoes from Mexico travels 4200 km to reach New Brunswick. Since it travels by truck we multiply the distance traveled by 0.2699.

1 kg x 4200 km x 0.2699 = 1129.8 grams of GHG emissions

That means that 1.1298 kg of GHGs are emitted to the atmosphere, the same amount as going for a 3.6 km drive in an average Canadian car.

Questions/ Points of Discussion

- On average, the food we eat travels 2400 km before it reaches our plate.
- Which foods that we looked at during this activity could have been bought locally?
- What could we do during the winter months to still use local produce?
- Do we need to eat all these imported products?
- It is important to understand that we have the CHOICE to buy food that is grown locally or internationally. As consumers, we can make educated decisions about what we buy, and where we buy it.


THE WORLD
ARCTIC OCEAN
China
New Brunswick
EUROPE
ASIA
NORTH AMERICA
NORTH PACIFIC OCEAN
NORTH ATLANTIC OCEAN
NORTH PACIFIC OCEAN
Mexico
Guatemala
Costa Rica
AFRICA
SOUTH AMERICA
INDIAN OCEAN
OCEANIA
Argentina
SOUTH PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
0 2,000 mi
0 2,000 km
New Zealand
ANTARCTICA
© 2003 National Geographic Society

What's In My Grocery Bag? Cut-Outs

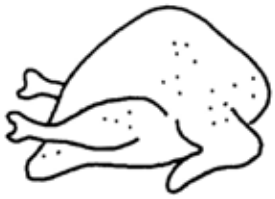
Use tape or glue to paste these onto the world map.

New Zealand

Costa Rica

California, USA

USA

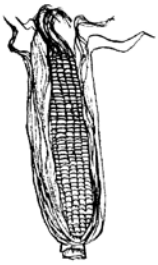


Alberta

Saskatchewan

Mexico

PEI



Nova Scotia

USA

USA

New Brunswick

USA

Nova Scotia

Argentina

Guatemala

Product	Imported Distance (Km)	Method of Transport	Local Distance (Km)
Apple	New Zealand: 9453	Plane	40
Banana	Costa Rica: 2965	Plane	Not grown locally
Grapes	California, USA: 5500	Truck	30
Corn	Ontario: 1241	Truck	35
Beans	China: 7788	Plane	20
Potatoes	PEI: 480	Truck	22
Tomatoes	New Mexico, USA: 4137	Truck	36
Onions	Idaho, USA: 4659	Truck	55
Lemon	Argentina: 5522	Plane	Not grown locally
Lettuce	California, USA: 5592	Truck	42
Flour	Saskatchewan: 4000	Rail	50
Milk	Nova Scotia: 574	Truck	80
Chicken	Maine, USA: 459	Truck	90
Beef	Alberta: 3434	Truck	67
Watermelon	Guatemala: 2558	Plane	38

SECTION THREE

Know What You Eat

This section is divided into two parts. The first section begins with a basic food identification activity to familiarize your students with certain produce, and a matching activity to help draw connections between produce and their processed state. The second part of this section is intended to inspire students to think about meal creations, and to become aware of what foods are used in their everyday meals.

Grade Suitability

The first section, including the food identification and the matching exercise is suitable for K-2. The second part – 'My own Bistro' is suitable for grades 3-8.

Teacher's Reference

Buying local food is not only more sustainable, but also tastier, fresher, and more nutritious. A recent nutrition study proved that long-distance travel and treatment decreases the amounts of vitamins C, A, E, and riboflavin that is found in produce. Furthermore, produce is often treated with waxes, fungicides, and irradiation. Unlike imported foods which must be bred to withstand travel and storage, local foods are picked at their peak and can often be found at market the same day.

The next largest loss of nutritional value occurs during processing. The more highly processed the food, the less food value it tends to have. Buying fresh products keeps the money locally, and ensures that your family is using the full nutritional value of the product.

Thirdly, the most nutritious food is local & organic. However, when you go to the grocery store and you want to buy organic greens, there is a good chance they will have come from a farm in California's Salinas Valley, where they produce 80% of the organic lettuce in the United States. It's plastic boxes of fresh-cut, washed salad mix are widely available in Canada. The company's organic practices are a model for industrial farming, but by supporting a Californian company, we neglect our own local, organic farmers.

Weighing the cost of the food against the environmental, social and economic costs should be a major part of all food purchases.

Description

The following food identification and matching activities are designed to be photocopied and distributed to students. Students can work individually or in groups, following the directions at the top of each page.

Objectives

These activities hope to increase student's awareness of the different types of fruits and vegetables, and the products they can be processed into.

Materials

- Photocopies of pages 21 and 22
- Crayons, pencil crayons or markers

CURRICULUM CONNECTION

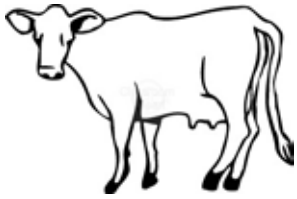
Subject: Health
Grades: K-2
Outcomes: Personal Wellness: students can learn about healthy ways to have fun in their free time, and how good eating habits contribute to health and well being. Also, to learn about ways to make the community a healthier and safer place to live and work, and learn that personal habits can contribute to improved health.

Food Identification

Colour and Identify these fruits and vegetables

Match Me

Draw lines connecting which food on the left side coresponds with the food on the right side.



My Own Bistro

Description

By pretending to help Chef Cheryl at 'All Local Cafe' with her menu preparation, students will be stimulated to think about using local foods as staples in their meals, and turning these foods into delicious meals.

Directions

1. Photocopy page 24.
2. Ask students to help you create a list on the board of produce that is grown within their province.
3. Distribute page 24 to each student in the class.
4. Have the students use this sheet to create a three-course meal for Chef Cheryl at 'All Local Cafe'. Or, if more appropriate have the students design a single course – like a dessert.

Questions/Discussion

- Name some foods that are not local?
- Examine the difference between fast/processed foods and food made from fresh ingredients.
- Students can help make their meals. It's fun!
- Encourage students to use their ideas for their own meals at home.

3

CURRICULUM CONNECTION

Subject: Health
Grades: 4-8

Outcomes: To apply the principles of healthy eating to their daily lives, and to evaluate eating habits, and strategies for increasing frequency of breakfast consumption. To be more aware of wellness choices.

Help Chef Cheryl at 'All Local Cafe'!

Menu

Appetizer _____	Main Dish _____	Dessert _____
Ingredients:	Ingredients:	Ingredients:
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Foods Produced in New Brunswick

Vegetables
Asparagus, beets, beans, dulse, garlic, mushrooms, onions, peppers, potatoes, rhubarb, scallions, summer and winter squash, peas, lettuce, spinach, cucumbers, carrots, cabbage, leeks, turnip, cauliflower, eggplant, brussel sprouts, broccoli.

Fruit
Tomatoes, melons, apples, blueberries, cranberries, gooseberries, josta berries, plums, raspberries, strawberries, grapes, pears.

Meats
Beef, chicken, eggs, lamb, elk, lake trout, white fish.

Grain
Barley, buckwheat, corn, flax, oats, rye, spelt, wheat.

Legumes and nuts
Lentils, soybeans, hazelnuts, pine nuts.

Dairy
Milk, cheese, sour cream, whipping cream, yoghurt.

Other
Maple Syrup, honey.

SECTION FOUR

Jeopardy

This interactive game is meant to act as a review of the previous activities. Students can work in groups to test what they have learned, or to learn new facts relating to food miles.

Grade Suitability

This exercise is suitable for grades 4-8.

4

Jeopardy

Description
In this activity, your class will play a game of Jeopardy in which they will explore the basic issues of local food systems.

Objective
To gain a sense of how much your class has learned about the issues of food security and local farming. Also to review some basic facts and stimulate further thinking.

Materials
- Photocopied overhead of the Jeopardy game
- Overhead projector and screen
- Paper to cover the 'answer' squares

Game Directions
1. Divide students into teams of four of five
2. Introduce the jeopardy game rules:

    a. The right to choose the category is rotated around the class clockwise.
    b. Once a team chooses a category and the 'answer' square is revealed, all teams have equal right to guess the 'question.'
    c. When a team is ready to guess the 'question,' they put their hand in the air and shout 'Jeopardy!'
    d. The first team to guess the 'question' correctly wins the points
    e. The team with the greatest number of points at the end of the game wins.

3.In order to determine which team goes first, give a sample 'answer.' Whichever team first guesses the 'question' correctly, gains the right to choose the first category.
4. When the game is over, answer questions about the facts that were raised during the game.

CURRICULUM CONNECTION

Subject: Health
Grades: 4-8

Outcomes: To evaluate eating habits and learn about what influences health – identifying factors that affect healthy eating and living.

Jeopardy

$$$	Food Miles	Food Costs	Know Your Food	Taking Action
100	The number of kilometres the average piece of food travels to reach our plates.	This percent of our food is grown within New Brunswick.	An important quality food loses while being transported from field to plate.	A place where you can buy food from a variety of local farmers.
200	The freshest, most sustainable harvest is grown in this area.	By not using these chemicals, farmers reduce growing costs and negative environmental effects.	These large, round fruit can be grown in NB, but are thought to be only grown tropically.	This type of garden is a way communities can grow food together.
300	This form of transportation emits the most fossil fuels.	This is the percent of income that most people in NB spend on their grocery bills.	Most organic lettuce in the grocery store comes from here.	An activity you can do at home that is fun, healthy and gives you and your family food to eat.
400	Transportations emits what kind of harmful gases that contribute to climate change.	This is one reason that food costs are so low in Canada.	Number of months we can grow food in New Brunswick.	By checking this you can determine where your food came from.

Jeopardy Answers

Food Miles

100 What is 2400km?
200 What is locally?
300 What is a truck?
400 What are green house gases?

Food Costs

100 What is 20%?
200 What are Pesticides?
300 What is 11%?
400 What are food subsidies?

Know Your Food

100 What are nutrients?
200 What are watermelon?
300 What is California?
400 What is five months?

Taking Action

100 What is the farmer's market?
200 What is a community shared garden?
300 What is gardening?
400 What is checking the label?

SECTION FIVE

Global Talk: Crosswords and Puzzles

These crosswords are review activities for the activities in Part Two – Composting and Seed Saving Science Labs. Sometimes it is nice to have a quick activity that explores the same topics but in a game format. This is the intention of the crossword puzzles. They can be used as an alternate to some of the discussion questions in the guided readings in order to gauge whether key concepts were understood by the students.

Grade Suitability

This exercise is suitable for grades 6-8.

Global Talk: Crosswords

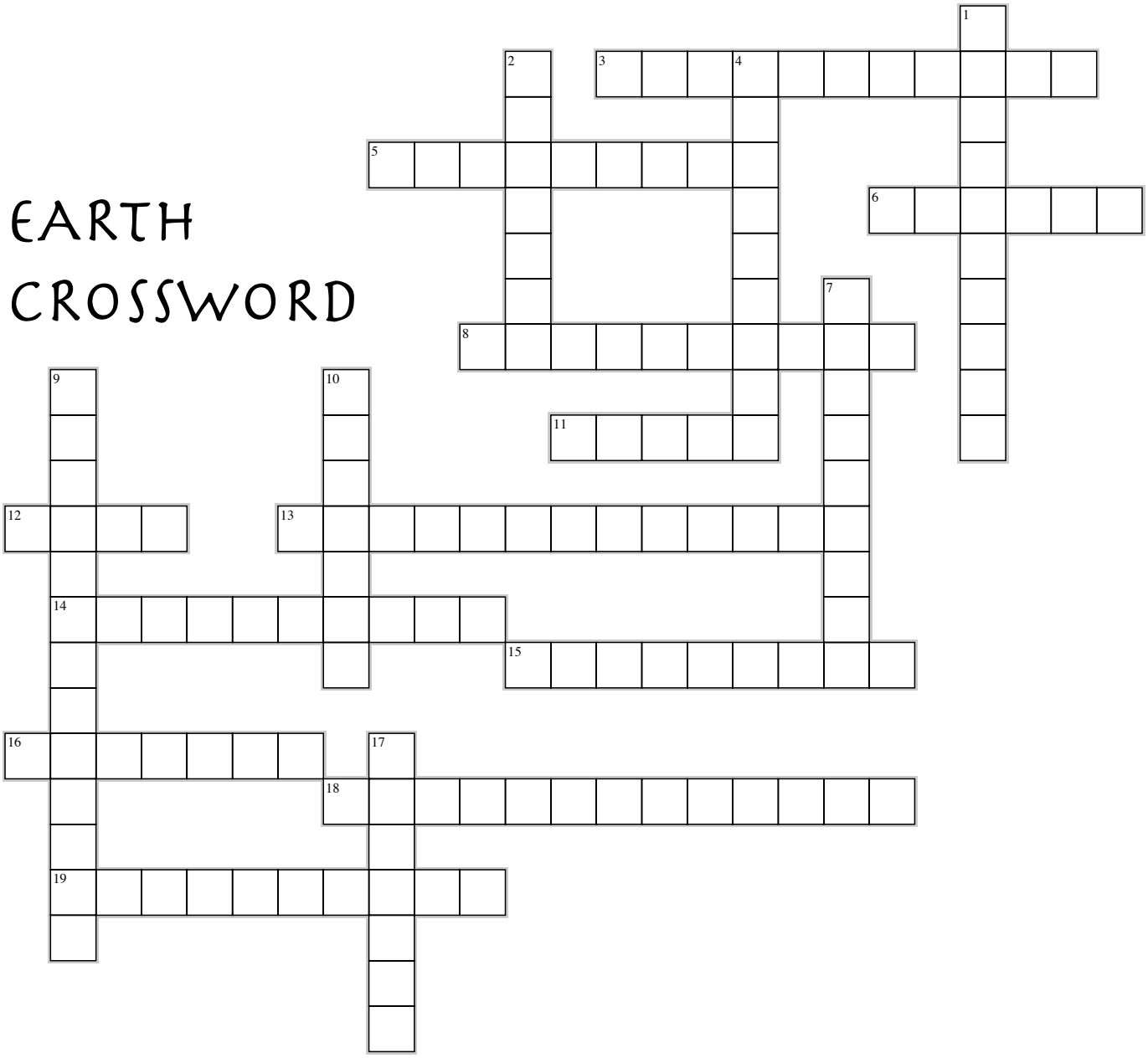
Description
Each cross word has been created as an extention activity to one of the four themes explored in this module. The Earth Crossword & Compost Crossword uses words in reference to the composting activity.

Materials
- Crossword activity sheet
- Associated background reading (i.e. for Earth crossword use the "Composting Magic Reading")
- Dictionary

Teaching Tips
Highlight where the words occur in the guided readings and if students need hints, they can find the highlighted words in the reading and try to make the connections to the crossword clues given.

CURRICULUM CONNECTION
Subject: English Language Arts
Grades: 6-8
Objectives: To help the students learn new vocabulary in a fun, interactive way. The words used are in bold print throughout the previous readings for easy identification and contextual meaning. A teacher's answer key has also been provided.

EARTH CROSSWORD



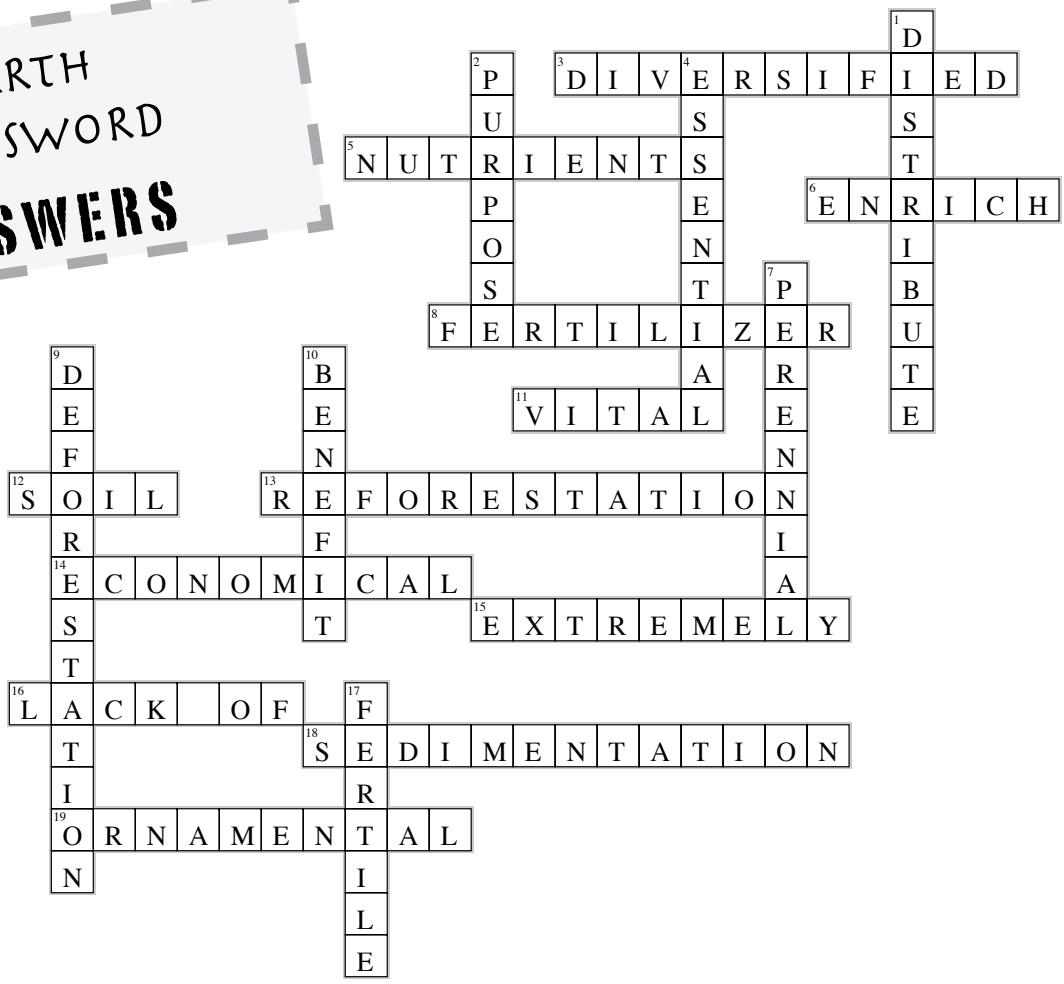
Across

3. having various parts
5. vitamins in soil
6. improve
8. helps plants grow
11. important
12. dark material that covers the earth
13. replanting trees
14. not expensive
15. very
16. not enough of something
18. build up of rocks and dirt in water systems
19. decorative

Down

1. to spread out
2. function
4. necessary
7. grows back every year
9. cutting trees down
10. good outcome
17. soil that is productive

EARTH CROSSWORD ANSWERS

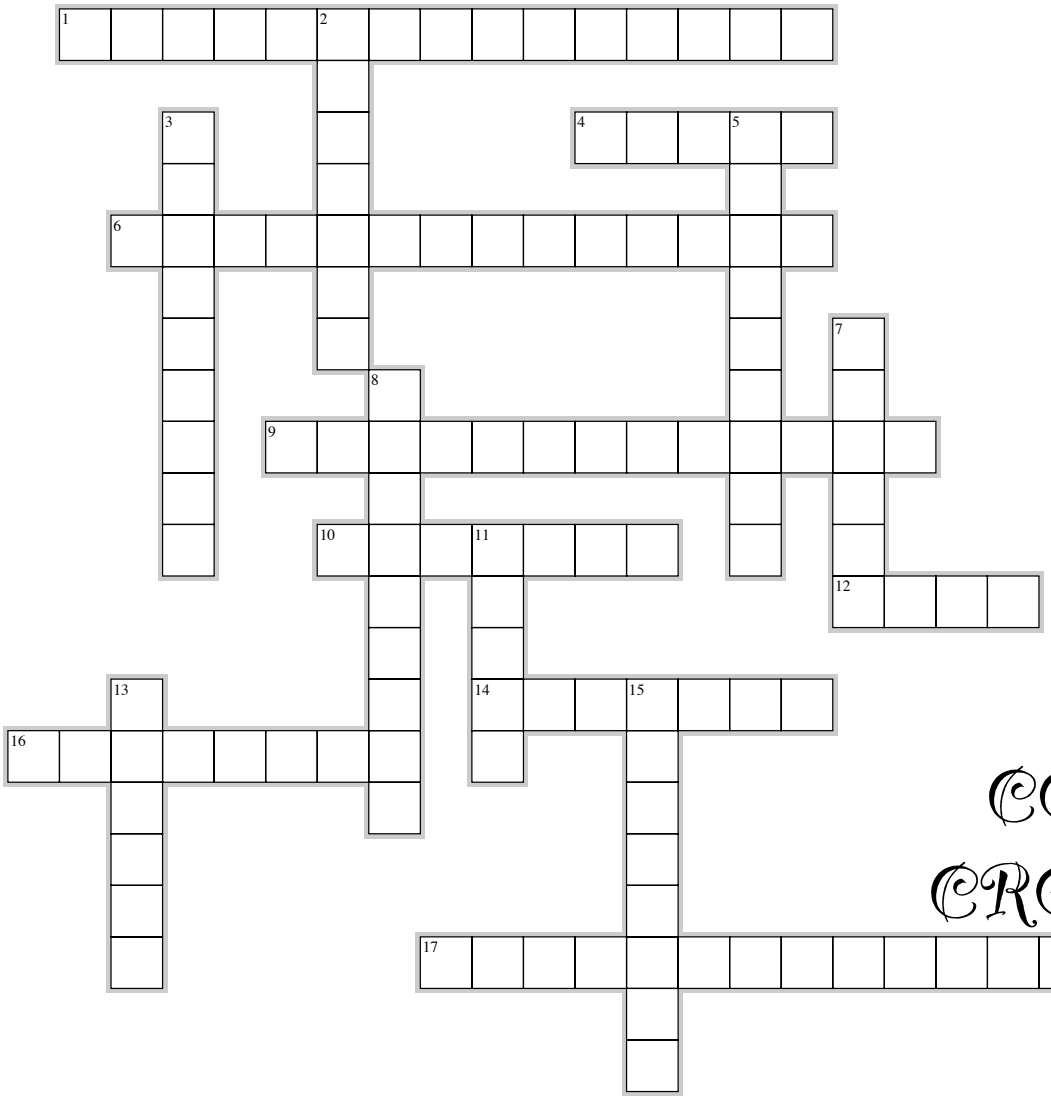


Across

3. **DIVERSIFIED**—having various parts
5. **NUTRIENTS**—vitamins in soil
6. **ENRICH**—improve
8. **FERTILIZER**—helps plants grow
11. **VITAL**—important
12. **SOIL**—dark material that covers the earth
13. **REFORESTATION**—replanting trees
14. **ECONOMICAL**—not expensive
15. **EXTREMELY**—very
16. **LACK OF**—not enough of something
18. **SEDIMENTATION**—build up of rocks and dirt in water systems
19. **ORNAMENTAL**—decorative

Down

1. **DISTRIBUTE**—to spread out
2. **PURPOSE**—function
4. **ESSENTIAL**—necessary
7. **PERENNIAL**—grows back every year
9. **DEFORESTATION**—cutting trees down
10. **BENEFIT**—good outcome
17. **FERTILE**—soil that is productive



COMPOST CROSSWORD

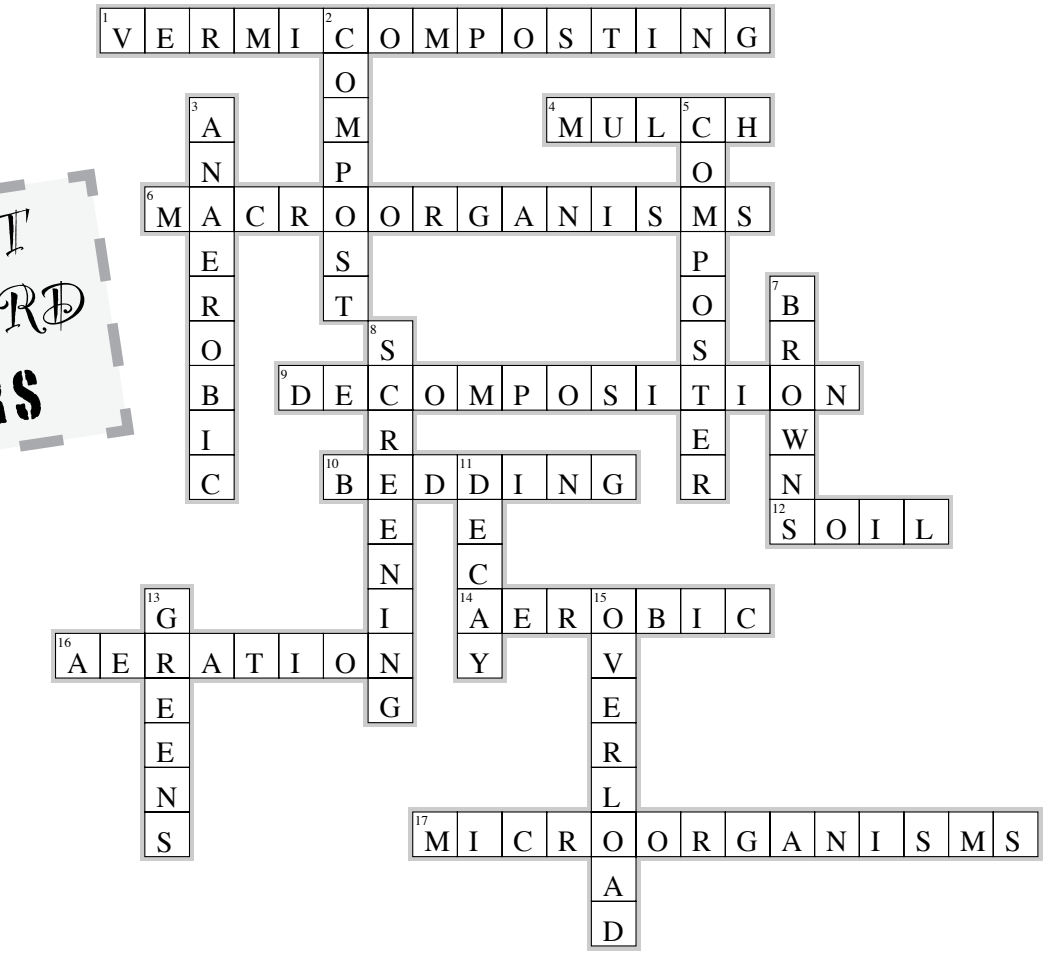
Across

1. composting with worms
4. a layer of partially decomposed plant materials placed on top of garden beds and around plants and shrubs
6. organisms that are visible to the eye
9. breaking down organic matter into its basic elements, including nutrients needed for plant growth
10. materials like newspaper and leaves used as an organic medium for worm composting
12. tiny rocks, sand, silt, and clay plus decomposers and organic matter
14. requires oxygen. Under these conditions, a compost bin will not smell
16. getting oxygen into the compost by mixing or turning
17. organisms that cannot be seen without magnification

Down

2. dark, rich material used to improve the soil.
3. does not require oxygen. Under these conditions a compost bin will smell
5. container, usually a bin or box used for composting
7. carbon rich compostable materials. Usually dry as well.
8. to sift out uncomposted matter from humus to create a fine compost
11. to rot, break down or decompose
13. nitrogen rich compost materials (usually wet)
15. to put more food into a worm bin then can be processed

COMPOST CROSSWORD ANSWERS



Across

1. **VERMICOMPOSTING**—composting with worms
4. **MULCH**—a layer of partially decomposed plant materials placed on top of garden beds and around plants and shrubs
6. **MACROORGANISMS**—organisms that are visible to the eye
9. **DECOMPOSITION**—breaking down organic matter into its basic elements, including nutrients needed for plant growth
10. **BEDDING**—materials like newspaper and leaves used as an organic medium for worm composting
12. **SOIL**—tiny rocks, sand, silt, and clay plus decomposers and organic matter
14. **AEROBIC**—requires oxygen. Under these conditions, a compost bin will not smell
16. **AERATION**—getting oxygen into the compost by mixing or turning
17. **MICROORGANISMS**—organisms that cannot be seen without magnification

Down

2. **COMPOST**—dark, rich material used to improve the soil.
3. **ANAEROBIC**—does not require oxygen. Under these conditions a compost bin will smell
5. **COMPOSTER**—container, usually a bin or box used for composting
7. **BROWNS**—carbon rich compostable materials. Usually dry as well.
8. **SCREENING**—to sift out uncomposted matter from humus to create a fine compost
11. **DECAY**—to rot, break down or decompose
13. **GREENS**—nitrogen rich compost materials (usually wet)
15. **OVERLOAD**—to put more food into a worm bin then can be processed

PART TWO: HANDS ON SOLUTIONS

Part Two is devoted to solutions that students can explore together at school or at home. After learning about the importance of reducing food miles, these are hands-on things that people can do to connect with their food systems, and become more aware of what goes into producing foods.

SECTION ONE

Indoor and Outdoor Transformations: Composting Science Lab

This activity will engage students in building and using an outdoor composting bin and/or an indoor worm composting bin. Students will learn about organic and inorganic matter and the microbiology of compost, and will implement the scientific process and record keeping skills. Gardens start with the preparation of rich soil for planting. Compost is often referred to by gardeners as 'black gold' because it is so rich in nutrients and helps create soil structure, retain moisture and make plants grow!

Grade Suitability

This exercise is suitable for grades 4-8.

Teacher's Reference

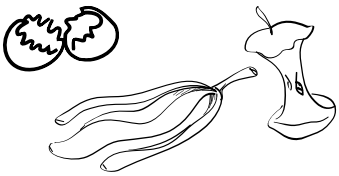
Introducing Composting

The following experiments in composting are simple, interactive, and fun. They introduce students to the wonders of biology in a practical, hands-on manner. They are also designed to teach teamwork and responsibility as students work together to care for their composts and take turns monitoring and maintaining the experiments. These experiments help children develop an awareness of the waste they produce and how to transform it into something of value. It brings them into closer contact with the earth and some of its smallest creatures. They learn about the natural cycles of decomposition and regeneration. Combined with the unit on seed-saving, students gain an understanding of the whole process from soil to seed.

Two different composting activities are presented in the handout. The first can be started with classes in the spring (when temperatures warm up above freezing). The second can be started at any time of year indoors. Both are ongoing activities, which will take a couple of classes to establish, but later only basic maintenance and periodic observations are required. Opportunities are included for students to research topics related to the experiments, such as choosing an organism to research and then to present to the class. These activities can be interdisciplinary as well. For example, the composters can also be an art project for the entire class to paint and decorate (with Earth friendly paints!)

Keep in mind questions like: Why is using compost better than using chemical fertilizers?

We hope you find these activities a useful and interesting means of presenting various curricular components. Happy composting!



Did You Know?

The creation of compost is accelerated by frequent turnings. Simply turn the pile onto itself, moving materials that were on the outside, to the inside of the pile. In some cases compost can be made in as little as three weeks!

1

The Magic of Composting: Reading and Experiments

Preparations

- Read the Teacher's Reference
- Photocopy the provided reading "The Magic of Composting"

What You Need:

- Compost bin: (see diagram and instructions below)
- 10 ' x 3' high wire mesh fencing (the type with small holes, 1"x2" or 1"x3")
- Two latches
- Wood (Two 3-foot lengths of 1"x2" or any scrap wood about this size)
- Plastic cover (eg. tarp, garbage bag)
- Wire-cutters
- Thermometer
- Shovel
- Stick
- Watering can or hose
- Carbon material (dead leaves, straw, shredded newspaper)
- Nitrogen material (grass clippings, food scraps, coffee grinds,
- Red-wiggler worms

CURRICULUM CONNECTION

Subject: Grade 6 Science

Outcomes: (Atlantic Canada Science Curriculum) :
(431) working together to carry out investigations,
(432) becoming sensitive and responsible in maintaining a balance between the needs of humans and a sustainable environment,
(435) becoming aware of the consequences of their actions, and
(429) valuing precise, accurate measurements.

Estimated time: 2 hours for set up
6 to 8 weeks of periodic maintenance and activities

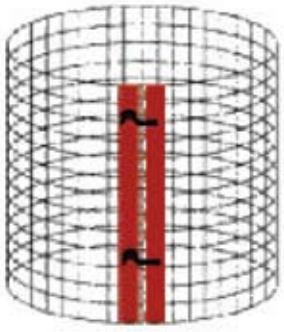
Objectives: 1. To determine how long it takes to produce finished compost from raw materials (food scraps, leaves, shredded newspaper, grass clippings, etc.)

2.To chart the temperature changes in the compost pile from day to day to track the different stages of decomposition

3.To see which organisms live in the compost pile and to observe their activities

Activity: Outdoor Composting

Construct Wire Mesh Compost Bin:
This is one of the easiest and least expensive bins to construct. To turn the pile, you can unwrap the bin and set it up next to the pile and fork the compost back into the bin. It is great to include students in this project as part of a shop or industrial arts class. Students in senior grades can be paired with sixth grade students to complete the task.



Instructions:
1. Unroll hardware cloth (or fencing) and trim excess wire with wire-cutters.
2. Attach wood to the edges of the hardware cloth with stapler or fence nails.
3. Bend hardware cloth into a cylinder.
4. Lastly, attach your hooks and latches to the wood.

Procedure:
This experiment can be started in the spring after the snow has melted and continued until June. Choose a location in the schoolyard that is easily accessible, on level ground, and close to a water source. This is a good opportunity for the class to be outside, learn to work together and share responsibilities. With sufficient planning, a little time can be set aside in the fall for students to collect leaves and store these in garbage bags for compost building in the spring.
1. Divide the class into teams. For a class of thirty students, six teams of five is ideal. Each team works together to build a composter, layer in materials, and monitor the progress of the experiment over a period of 6 to 8 weeks. Alternatively, if resources are scarce or space is limited, the class can work together on a single bin.
2. Water the bottom of the compost pile. This prevents the ground from absorbing moisture from the compost and it encourages worms to come to the surface.
3. Build the bottom layer from coarse, woody materials (for example sticks and brambles) about 4 to 6 inches thick. This will allow air to enter the pile and aid in the process of decomposition.
4. Next, alternate layers of green (nitrogen-rich) and brown (carbon-rich) materials. Make sure that brown materials are chopped up in small pieces so that they break down faster. The compost pile is like a layer cake or lasagna. Each layer should be evenly spread and about 4 to 6 inches thick. Add water between each layer. The compost should be the dampness of a rung-out sponge. To test this, grab a bit with your hand. If you can squeeze out just a bit of water, then you have added the right amount. Be sure to top your compost pile with a layer of brown (carbon) material. This will keep away flies and odours.
5. Add a layer of plastic on top to prevent moisture from evaporating and rain from entering.

Observations: (Monitoring the Experiment):

1. Insert a compost thermometer or candy thermometer fastened to a long stick into the centre of the compost pile. Each class, students take turns reading the thermometer and recording temperatures on the graph provided.

Has the temperature increased, decreased, or remained the same?
What is the highest temperature your pile has reached?
Do you see a relationship between the temperature outdoors and the temperature inside your compost?

2. Check the moisture content of the pile and add water when needed being cautious not to add too much. The compost pile should be moist but not dripping. Record your activities in table A.

3. Look in the middle of the pile. How many different creatures can you find? Make a diagram of these. How do they interact with one another? Chose one organism and research it at the library or on the internet:

What is the lifecycle of your organism?
What does it eat? How long does it live?

Does it have any predators?
What is its scientific classification?

4. Extract some liquid from the centre of your compost pile and place it on a slide. Look at your slide with the aid of a microscope.

What do you see?
Can you identify any of the organisms?
Make a diagram of what you see in the microscope.

Compost Experiment:
Does turning the compost pile affect the speed of decomposition?
Use the graph to track your results.

Table A: Composting

Date (D/M/Y)	Temp.(degrees Celcius)	Moisture (wet, moist, dry)	Observations
Week 1:			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Week 2:			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Week 3:			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Week 4:			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Week 5:			
Monday			

Table A: Composting

Date (D/M/Y)	Temp.(degrees Celcius)	Moisture (wet, moist, dry)	Observations
Tuesday			
Wednesday			
Thursday			
Friday			
Week 6:			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Week 7:			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Week 8:			
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			

Now using a piece of graph paper:
-Record your dates on the horizontal axis
-Air temperatures on the vertical axis
-Compost temperatures on a second vertical axis.

Conclusions/ Discussion:

1. What did you learn about composting from this experiment?
2. How did the temperature change from day to day? From week to week?
3. How did adding water to the compost affect the temperature?
4. How did the outdoor air temperature compare to the compost temperature?
5. What organisms did you see in your observations? Which ones did you see in the microscope?
6. Did the types and numbers of organisms you saw change during the course of the experiment? How did they change?
7. How long did it take to produce finished compost from raw materials?
8. How can you speed up this process? Slow it down?
9. How does compost help plants to grow?
10. What will you do with your new compost?

Activity 2: Indoor Vermicomposting

Outcomes (Atlantic Canada Science Curriculum):
(431) working collaboratively to carry out investigations,
(432) becoming sensitive and responsible in maintaining a balance between the needs of humans and a sustainable environment,
(435) becoming aware of the consequences of their actions, and
(429) valuing precise, accurate measurements.

Estimated Time:
1 hour for project set-up
3 months of periodic observation and activities

Objectives:
1. To discover the process of worm-composting first-hand
2. To observe the lifecycle, diet, and other needs of worms.
3. To produce nutrient-rich worm castings for the next seed-saving lab

Materials:
Shallow container with lid or cover (3'long x 2' wide x 1' high)
Scale
Large, clean, watertight garbage can for mixing your bedding material
4-litre jug
2 handfuls of soil
One pound of red-wiggler worms (can be ordered from growers or bait suppliers or you can collect them in their natural habitat (i.e. barns, decomposing leaves, horse manure)
Bedding (shredded paper)
Food scraps (leftovers from lunches)
Black plastic sheet

The container can be plastic or wood, but must have 12 (_") holes drilled in the bottom for air to enter and water to drain out. This means that the container cannot sit directly on the floor or table surface, but should be raised on boards or legs so that air can enter these holes.

Red wiggler worms (Eisenia foetida) are the best type of worms to use in your bin because they reproduce very quickly, they process large amounts of organic material, and they can be raised in captivity as they do not require a large network of underground tunnels. These worms are sensitive to light and will burrow underground to avoid it.

Procedure:

Worms need a moist environment to live in (75% moisture content).
The ratio of water to bedding needed is 3:1. To prepare the bedding for your worms, you must weigh the shredded paper and mix it with three times as much water. For example, if you use 10 lbs of shredded paper, add 30 lbs of water.

1. Slowly mix the soil, water, and shredded paper together in the garbage can until it is all moistened.
2. **Distribute** this evenly through the worm bin (8" to 1' high)
3. Lightly add worms to the top of the bedding.
4. Cut a piece of black plastic to fit on top of your bin. This will keep moisture in and light out.
5. Use a scale to weigh food scraps. Record weight on chart provided. Bury food scraps beneath one corner of the bedding. Rotate this position each time new food is added. Keep track of which foods the worms are consuming. Remove any that begin to smell and worms are not eating. Make a note of this discovery.

Observations:

1. Use a thermometer to take the temperature in the centre of your worm bin. Record this on a graph. Do you see a difference in the temperature from day to day? Week to week?
2. Is the bedding still damp or is it starting to dry out around the edges?
3. Push away some of the bedding and observe the worms. What foods do they consume the fastest?

What foods takes them longer to eat? Where in the bin do you find the most worms? Do you see any baby worms or cocoons?

4. What other organisms can you find in the vermicomposter? Draw a sketch of what you see.

5. After most of the bedding has been converted to dark worm castings (that's what the worms leave behind after digesting the food!), separate the worms from the bin. Weigh your worms. How many more worms do you have now than when you started?

6. Now you can start the bin again with new bedding or add all the worms and vermicompost straight to your garden.

7. Use your vermicompost mixed with soil to start seeds for the seed-saving lab.

Conclusion/ Discussion:

1.What things are important in caring for your worm bin?
2.Why do we use worms to recycle food scraps?
3.How long does it take for worms to recycle food scraps?
4.What foods do worms like best?
5.What foods took a long time for worms to break down?
6.How long does it take for worms to reproduce?
7. What was the average temperature of your worm bin?
8. What other organisms did you observe in your worm bin?
9. Why do you need bedding in your worm bin?
10.What is the plastic sheet on top for?

For more information on vermicomposting read, "Worms Eat My Garbage" by Mary Appelhof

Class Reading

Composting Magic

"Matter can neither be created nor destroyed, only transformed"– John Dalton

In nature, everything is recycled and nothing is wasted. When an organism dies, it is eaten by something else. Worms, bacteria, and fungi do most of this work called "decomposition". Without their help, the circle of life would be broken. Since worms, bacteria, and fungi are so small, we hardly notice all the work they do to break down dead, organic matter. But just imagine if you threw a banana peel or apple core on the ground and it stayed that way forever? We would be swimming in a sea of vegetable scraps !

In this special unit we will look at the process of decomposition known as "composting". We will explore the Who, What, When, Where, Why and How of composting. You will get the chance to build your own compost pile and see what happens inside. With the help of a microscope, you can discover a tiny universe filled with creatures that most people have never seen before.

What is Compost?

Compost is decomposed organic material used to **enrich** the **soil**. When organic matter, like egg shells and bannana peels, are allowed to age, the resulting material is called compost.

Why is it important?

Compost contains nutrients that plants need to grow and creatures that work to keep the **soil** healthy. Composting reduces the amount of garbage that goes into the dump or "landfill". It prevents the garbage can at your house from smelling rotten, and it recycles old food, grass clippings, dead leaves, and weeds back into the earth to keep the **soil** and plants healthy and strong.

Who are the creatures involved?

Macroorganisms - organisms visible to the eye.
These include earthworms, snails, sowbugs, rove beetles, beetle mites, centipedes, millipedes, ants, flies, and enchytraeids (white worms).

Microorganisms are organisms that cannot be seen without magnification. Some microorganisms bacteria, protozoa, nematodes, rotifers, springtails, and mites are so tiny that you need a microscope or magnifying glass to see them.

Where can you compost?

It is best to build your compost pile in an outside location close to the place where you will use the finished compost, but not too far away to easily add new materials. Access to water is an important consideration too.

In the winter, worm-composters (or vermicomposters) can be used inside your home or classroom.

How do you start a compost pile?

The important thing to remember when building a compost pile is that you are making a comfortable home for macroorganisms and microorganisms to live in so that they can do the work of breaking down raw materials into rich, dark compost. These organisms need food, air, and water to be happy. Just like you and I, they must eat a balanced diet. But their diet includes a balance of nitrogen-rich materials like grass clippings, weeds, and food scraps as well as carbon-rich materials like straw, leaves, wood chips, and shredded paper. They also need air, so the pile cannot be too compact or air will not be able to enter all the little spaces where these organisms live. Water is very important too. So the pile cannot be allowed to dry out. It is important to maintain a balance in moisture levels; if there is too much water, then not enough air can enter and the organisms will not be able to breathe.

Discussion Questions:

1. What is decomposition and why is it important?
2. What organisms do the work of decomposition?
3. How does composting help the environment?
4. What three things do organisms in the compost need to survive?

PART TWO: HANDS ON SOLUTIONS

SECTION TWO

Seed to Seed: Seed Saving Science Lab

Growing and collecting garden seeds is crucial to food security for families around the world. This experiment was designed to show students the connection of seeds, plants and food through the life cycle of a plant: from seed to seed. It compliments the composting and worm composting labs to provide students with seeds to plant in their newly made compost.

Grade Suitability

This exercise is suitable for grades 4-8

Teacher's Reference

Introducing Seed Saving

This is a complimentary activity to the worm composting or composting lesson plan. It is intended as a side project that requires little attention in the sense that once seeds are planted the students will only have to worry about watering the plant and assuring the plant receives enough sunlight to trigger seed production.

The main part of the project will come once the plant flowers and goes into seed production. It is at this point that more attention will be required from the class to check that their plants are indeed producing seeds. The plant must go through its whole cycle of flowering and drying in order to collect the seeds. Once seeds are collected and dried the students can use their new compost to plant the seeds and take them home.

Did You Know?

- All vegetables and flowers produce some form of seed or bulb.
- Garlic is planted in the fall, before the snow and harvested in August the following year.
- Carrots, onions, & cabbage all take two years to produce their seed in our climate!

Seed to Seed: Seed Saving Science Lab

Description

This is a complimentary activity to the worm composting or composting lesson plan. It is intended as a side project that requires little attention in the sense that once seeds are planted the students will only have to worry about watering the plant and assuring the plant receives enough sunlight to trigger seed production.

Materials

- The compost mixed with soil (store bought or from the schoolyard).
- Different annual seeds (radish, lettuce, beans, peas)

Teaching Tips

While this activity focuses on garden seed, kids love planting trees. If you begin this project in the fall, collect some green acorns and soak them overnight. Get students to place them in a bag to keep in the fridge until spring. Then as an extention activity, plant acorns in March and let kids observe what happens.

CURRICULUM CONNECTION

Subject: Science
Outcomes: (Atlantic Canada Science Curriculum) :
107-6: home and school examples of problem-solving tools, techniques, and materials
205-7: record observations using point form, sentences, diagrams and charts.
206-9: identify new questions or problems
207-2: communicate procedure and results using lists, notes, charts, graphs, drawings, and oral expression.
Estimated time: 12 weeks
Objectives: Growing and collecting garden seed is crucial to food security for families participating in the Kitchen Garden Project. This experiment was designed to show students the connection of seeds, plants and food through the life cycle of a plant: from seed to seed. It compliments the composting and worm composting labs to provide students with seeds to plant in the newly made compost.

2

Directions

Materials:

Part one: Plant Growth

1. Window ledge/table set-up to grow plants indoors (needs access to light and warmth)
2. easy to grow seeds such as beans or peas;
3. approximately 4-5 seeds per student, or more if dealing with smaller seeds.
4. plastic containers; one per student (tall yogurt containers work well)
5. tray with lip to hold containers and excess water
6. soil and gravel to fill each student's container
7. markers to label student's containers
8. larger pots for transplanting
9. watering can

Part two: Seed Saving

1. Brown paper bags for storage
2. Compost soil for planting
3. Reuse same plastic containers as in part one

Procedure:

1. Soak seeds overnight in warm water to aid germination.

2. Each student should have one plastic container. The students can bring these from home prior to beginning the experiment. The container should have a number of small holes in the bottom to allow excess moisture to seep out. Containers should be placed on a tray so that water does not drip on to the floor.

3. Fill containers with 5 cm of gravel or loose rocks on the bottom, followed by soil up to 2 cm from the top.

4. Plant seeds about 2 cm deep and cover with soil. Water with clean, cool water until soil is moist. Label each container with student's name and type of seed.

5. Keep soil moist, warm and dark (cover surface lightly with moist newspaper) until seeds have germinated (approximately 3-7 days). Once sprouts are poking through soil surface, expose containers to light.

6. Once seeds are planted students will have to monitor plant growth by making sure the plant is getting enough water, light and warmth. Water: Plants need enough water to keep the soil moist like a wrung-out sponge. Light: Plants need about 12 hours per day during their growth phase. Warmth: Ideal growing temperatures for beans and peas range from 65 – 80 degrees Fahrenheit. Plants will bear seed in approximately 60 to 90 days.

7. When the flowers dry out the seeds should be visible in the centre of the flower. When they are dry the students can shake the seeds into a brown paper bag. The seeds should remain in the brown paper bag until they are ready to be planted. They should be stored in a cool dry place, to allow them to dry completely.

8. At this point the students have experienced the whole life cycle of a plant; from seed to seed. If students have also done the composting or worm composting project then they can take soil from their compost and plant some of the newly collected seeds. These new plants can be taken home so that the students may grow these plants over the spring and summer either in a planter or in their own gardens.

Teacher's Notes:

The main part of the project will come once the plant flowers and goes into seed production. It is at this point that more attention will be required from the class to check that their plants are indeed producing seeds. The plant must go through its whole cycle of flowering and drying in order to collect the seeds. Once seeds are collected and dried the students can use their new compost to plant the seeds and take them home. The compost should be mixed with soil (store bought or from the schoolyard).

Lettuce:
The plants will send up seed stalks. Once they are full grown the leaves at the top will produce yellow flowers. When the seed is mature it has a fluffy, feathery appearance. Not all seed will mature at the same rate, so seeds can be collected as they mature. When mature seeds are spotted simply shake into a brown paper bag. Let seeds dry further for several days and then store in a cool, dry place.

Beans:
To collect bean seeds let the pods dry out and the leaves die down and begin to fall off. Pull off pods which have begun to dry and cover them with newspaper to complete the drying process. Beans can be removed from their pod by hand shelling.

Peas:
Let the pods dry out and the leaves die down and begin to fall off. Peas can be removed from their pod by hand shelling.

Radishes:
Radishes grow quite quickly and if left in the ground will send up long stalks with yellow flowers. The flowers will then produce long narrow pods that are quite fleshy. Once the pod becomes dry the seeds are ready inside.

Glossary of Terms

Biodiversity: The variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part: this includes diversity within species, between species and of ecosystems.

Community Supported Agriculture [CSA]: The farmer sells shares or subscriptions for the year's crop of vegetables (some farms also include fruits or flowers). Customers who buy a share usually pay for it early in the year and then receive a weekly box of produce for a set number of weeks.

Compost: process whereby organic wastes, including food wastes, paper, and yard wastes, decompose naturally, resulting in a product rich in minerals and ideal for gardening and farming as a soil conditioners, mulch, resurfacing material, or landfill cover.

Environmental Stewardship: The careful and responsible management of our natural resources and the environment.
Ethylene: A gas produced by many fruits and vegetables that accelerates the ripening and aging processes.

Farmers' Market: Usually in the open air, usu
ally on a regular schedule of time and day (or days) of the week, these are gatherings of farmers who set up displays of products for sale.

Food Miles: The number of miles food produce travels from 'plough to plate', that is from the place of production to consumption.

Food Security: as defined by The BC Food Systems Network is a community in which all people, at all times, have access to nutritious, safe, personally acceptable and culturally appropriate foods, produced in ways that are environmentally sound and socially just

Fossil Fuels: Carbon rich fuel (coal, oil, and natural gas) formed from the remains of ancient animals and plants. Their combustion contributes to "Global Warming"

Fungicides: A pesticide used to control or destroy fungi on food or grain crops

Global Food System: A concept developed around the vast influences of trade, globalization, labour and market competition in the way it effects the production, distribution, pricing and consumption of food worldwide.

Greenhouse Gases: Gases in the atmosphere that trap the sun's energy and thereby contribute to rising surface temperatures; include carbon dioxide (by-product of burning fossil fuels), methane (from agricultural sources) and nitrous oxide (from industrial sources).

Industrial Agriculture: A key feature of industrial agriculture is its cultivation of a single crop that will ripen at once and ship easily. This results in economies of scale that can reduce production costs and as a result the prices of commodities in the marketplace. Farms that grow one or two crops inevitably invite pests and usually require heavy doses of insecticides and herbicides to control them. Planting the same crops year after year can deplete the soil, increasing the need for fertilizers and thereby jeopardizing the future productivity of agriculture. The life and health of farmers, rural communities, and the natural world are all in jeopardy. As a result our ability to feed an ever-growing population and the food security of our nation and world are threatened.

Irradiation: is a process of food preservation using either electron beams or high-speed gamma rays to affect the food. It destroys some vitamins and enzymes in the food, creates free radicals which may react with cell membranes of the human body causing them to function poorly, and may leave a trace amount of radioactivity in certain foods.

Local: when relating to local food movements this can have many different definitions. In the case of the Food Miles Challenge when "local products" are referred to it is meant to describe New Brunswick made products. Anything from NB grown vegetables to jams, honey, apple cider, baked goods, flour, grains…….and everything in between.

Organic: Food that is labelled as organic has been grown according to the National Organic Standards. Synthetic fertilizers and synthetic pesticides cannot be used on crops. Antibiotics and growth hormones cannot be used on livestock, animals must eat organic feed, and animals cannot be fed animal by-products. Genetically modified organisms are prohibited. In addition, organic farmers are to have a management plan to improve their soil and to manage weeds and other pests without harming the environment.

Organic Farming: A way of farming using natural methods to feed the soil and reduce pests, ideally producing good crop yields with minimal impact on the environment and on ecological factors. Use of synthetically-produced fertilizers, pesticides, growth hormones and growth regulators is prohibited. Organic production uses a holistic approach that integrates biological, mechanical and cultural management techniques. Its proponents believe that healthy soil, maintained without the use of man-made fertilizers and pesticides, and livestock raised without drugs, yields higher quality food than conventional, chemical-based agriculture. Before a product can be labelled organic, a government-approved certifier inspects the farm where the food is grown to make sure the farmer is following all the rules necessary to meet USDA organic standards. Companies that handle or process organic food before it gets to your local supermarket or restaurant must be certified, too.

Pesticides: chemicals which include insecticides, herbicides and fungicide: used to control weeds, insects and other pests. Toxic to some degree, they can kill beneficial earthworms and organisms and can pose a threat to people and pets if overused or carelessly applied.

Pollutants (pollution): unwanted chemicals or other materials found in the air. Pollutants can harm health, the environment, and property. Many air pollutants occur as gases or vapours, but some are very tiny solid particles: dust, smoke, or soot.

Seasonal Food: This refers especially to fresh fruits and vegetables, which are available from local farmers only at certain times of the year. For example, rhubarb, and asparagus are some of the first fresh foods available in the spring.

Subsidies: Grants of money made by the government to either a seller or a buyer of a certain product or service, thereby altering the price or cost in a way which affects the output. Governments usually make payments to domestic producers to offset partially their costs of producing and selling certain goods and services.

Sustainable: A farming system or any other kind of system that is sustainable is one that can continue far into the future because it does not overuse its resources. Sustainable agriculture is a farming system that balances economic, environmental, and quality of life benefits for the farmers and their communities.

Sustainable Agriculture: Integrates three main goals: environmental stewardship, farm profitability, and prosperous farming communities.

References

Backyard Magic – The Composting Handbook: www.gnb.ca/0009/0372/0003/0001-e.asp

Conservation Council of New Brunswick: www.conservationcouncil.ca

Environment Canada: www.ec.gc.ca

Falls Brook Centre: www.fallsbrookcentre.ca/food-miles

Fresh From The Farm: www.freshfromthefarm.com

New Brunswick Department of Agriculture: www.gnb.ca/0027/index.htm

Seeds of Diversity: www.seeds.ca

100 Mile Diet: Local Eating for Global Change >> Map: www.100milediet.org/map

What WE can do to reduce food miles!

1. Shop at a Farmer's Market
2. Check food labels
3. Plant a garden
4. Support local farmers
5. Join a Community Shared Garden
6. Encourage grocers to carry local foods
7. Buy seasonally and preserve food for the winter