Teacher's Guide – How Pulses make Agriculture More Sustainable lesson

Grade level: Grade 3

Curriculum Connections:

- Science – Growth and Changes in Plants Unit
    - 3-1-08 Explain how different adaptations of plants help them survive in particular environments. *Examples: pulses can grow in soil with little nitrogen because they have a symbiotic relationship with bacteria to fix nitrogen from the air.*
    - 3-1-13 Describe ways that plants and animals depend on each other. *Examples: pulses provide root nodule homes for soil bacteria. Soil bacteria provide nitrogen for the pulse plant.*
    - 3-1-14 Describe ways plants are important to the environment. *Examples: improve soil, air, and water quality; reduce erosion*
- Science – Soils in the Environment Unit
    - 3-4-09 Identify animals found in soil and explain their importance to soil quality. *Examples: soil bacteria help to increase nutrients in the soil*

Student materials included:

- How Pulses make Agriculture more Sustainable
- Kid Bean Checks Your Understanding

Lesson suggestions:

Vocabulary to introduce before the lesson:

Agriculture	Nitrogen
Bacteria	Nutrients
Consumers	Nutritious
Environmental Health	Sustainable
Economic Vitality	Sustainability
Greenhouse Gases	

It is suggested that you have a discussion with the students about what sustainability is and why it is important in all areas of our life before the lesson.

Additional materials:

- Appendix A: Edible Parts of the Plant – links to Grade 3 Science Growth and Changes in Plants
    - 3-1-07 Identify the basic parts of plants and describe their functions. Include: roots, stems, leaves, flowers, pistil, stamen, ovule, pollen, seeds, fruit

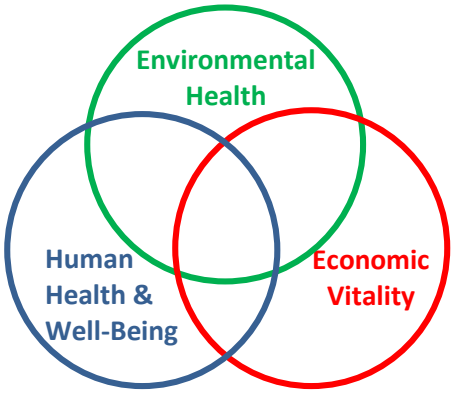
Hey do you like to eat? Well then you will want to know about agriculture.

Agriculture is all about providing safe, nutritious food. Of course eating food is about more than just liking to eat. Food is a basic human need.

If agriculture is going to meet that need it is very important that agriculture be sustainable.

Growing pulse crops like me can help agriculture be more sustainable! Let me show you how.

Major factors in Sustainability



In order for agriculture to be sustainable it needs to:

- Make agriculture's environmental footprint as small as possible
- Produce nutritious, healthy food
- Provide food at a price people can afford to pay
- Provide a fair wage to the farmers and other people who work in agriculture.

How Pulses make Agriculture more Sustainable

Environmental Health

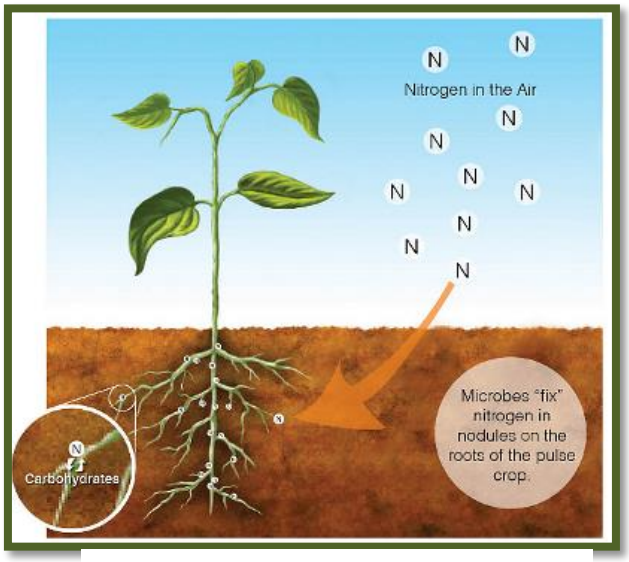
Just like you need nutrients like protein to grow, plants need nutrients like nitrogen to grow.

For most crops, like wheat and canola, farmers add nitrogen fertilizer to the soil to feed these plants. But this fertilizer can give off nitrous oxide into the air. Nitrous oxide is one of the greenhouse gases. Greenhouse gases are important because they trap heat so it doesn't all escape into space. Without the greenhouse gases the Earth would be a frozen, lifeless ball in space. But when there are too many greenhouse gases then too much heat is trapped. The planet warms up and this causes dangerous climate change.

Pulses are not like other crops. Pulses have a special way of getting the nitrogen they need. Pulses grow nodules or bumps on their roots which provide a home for a special soil bacteria. These bacteria take nitrogen from the air and give it to the pulse plant.

This means farmers don't need to add nitrogen fertilizer to their pulse crops. Therefore, no nitrous oxide greenhouse gas gets added to the air.

Pulses crops also leave behind nitrogen and increased numbers and kinds of bacteria in the soil. When the farmer plants his next crop, such as wheat or canola, in that field the farmer will use less nitrogen fertilizer so again less nitrous oxide will be added to the air.

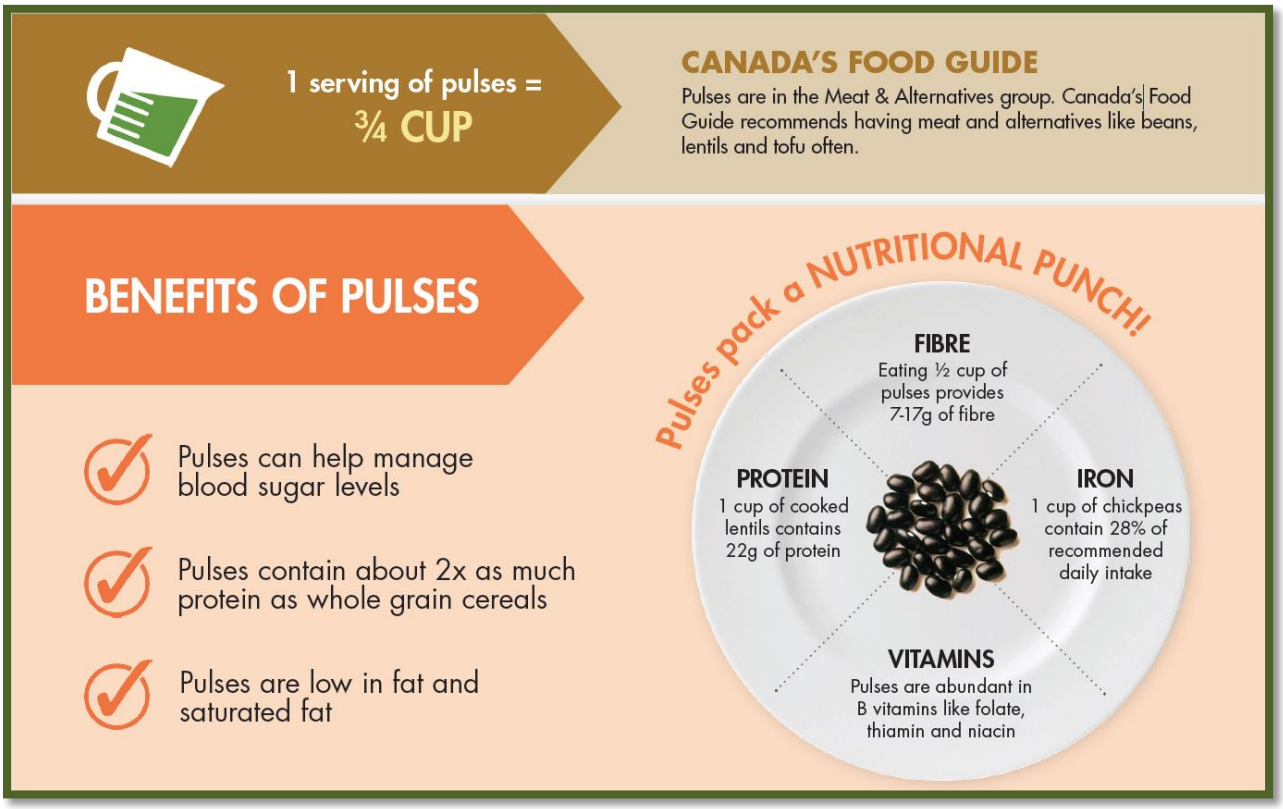


Pulse crop with root nodules and bacteria fixing nitrogen

Pulses reduce the greenhouse gases produced by agriculture. That makes agriculture's environmental footprint smaller and our planet healthier!

Human Health

Pulses provide a healthy food choice for consumers which leads to the sustainability of human well-being.



Economic Vitality

Farmers do not need to buy nitrogen fertilizer for their pulse crops. Less money spent on fertilizer means more money for the farmer and his family. This makes agriculture more sustainable for farmers.

Pulses help consumers too. Pulses, like lentils, provide a low cost, nutritious choice when picking a food from the meat and alternatives group of Canada's Food Guide.

Information from Stats Canada Average Retail Prices data, Nov. 2015

So that's my sustainability story.

I help lower greenhouse gases from agriculture and
I provide healthy food for people at a low cost.

Yes, we pulses have a big part to play in improving the sustainability of agriculture.

By growing more pulses, farmers are doing their part.

You can help too by choosing to eat pulses more often.

Kid Bean Checks Your Understanding

1. What would the Earth be like if we had no greenhouse gases?

2. Explain what happens if there are too many greenhouse gases?

3. What greenhouse gas is given off by nitrogen fertilizer?

4. Farmers don't need to add nitrogen fertilizer to pulse crops. Explain how pulses get their nitrogen?

5. Name 3 health benefits of pulses?

6. Name 4 nutrients found in pulses?

7. How do pulses help consumers spend less money on food but still eat a healthy diet?

Appendix A

Edible Parts of the Plant

We eat different parts of plants. We eat the roots of some plants. Some plants have tasty leaves. With some plants, we eat the fruits.

For pulse plants, we eat their seeds and they come in a handy wrapper called a pod.

1. Look at the diagram below.
   a) Use the words from this box to label the food in each section with the part of the plant it is.

roots	stems	leaves	flowers	seeds	fruits

   b) Find the Pulse Crop and circle it.