project **AGRICULTURE**

SPARK questions about **sustainable** PRACTICES

When do **interactions** between **natural** and **agricultural ecosystems** promote **sustainability?**

Interactions between natural and agricultural ecosystems are part of a sustainable food system.

understanding how ecosystems work is necessary for agriculture

Agriculture is affected by – and affects – natural environments. Therefore, it must function within those natural systems.

Farming practices are continuously monitored, examined and analyzed to ensure that they are maintaining and improving the environment and its resources. This includes the soil, water, air, plant and animal life as well as the nutrient and energy cycles that are part of all ecosystems.

- ☐ **I will use information and INVESTIGATE FURTHER questions to help me identify a project question I want to investigate for an sustainable PRACTICES project.**
- ☐ **I will identify what I need to know more about.**

Canadian farmers supply sustainably-produced food to Canada and the world

The Canadian government supports the **United Nations Sustainable Development Goals**, many of which are focused on protecting the environment. These global goals are focused on sustainability and on a "sustainable future."

The 17 goals are a "call to action" for countries to promote prosperity while protecting the planet. Sustainable agriculture is part of **Goal 2 – Zero Hunger**.

Ensuring sustainable food supports Canada's goals related to climate action, healthy wildlife, clean water, clean growth and sustainable communities:

- Sustainable agricultural practices can increase carbon sequestration in soil, protect water quality and help maintain wildlife habitat capacity
- Sustainable fisheries, including aquaculture, contribute to healthy freshwater and marine ecosystems
- Access to safe and healthy food helps communities flourish
- Investing in clean technology helps sectors such as agriculture, fisheries and aquaculture become more sustainable and competitive

INVESTIGATE FURTHER

How do Canada's goals for sustainable food include protection for natural ecosystems?

INVESTIGATE FURTHER

How does the United Nations goal of Zero Hunger involve sustainable agricultural practices?

The icons below show nine of the 17 United Nation's Sustainable Development Goals. In what ways do you think each of these goals connect to sustainable agriculture?

Department of Economic and Social Affairs. The 17 Goals. United Nations Online. https://sdgs.un.org/goals

farmers apply their experience and science to promote sustainable practices

In farming and food production, experimentation is a necessity, not an option. This is because natural environments and conditions can change over time. Farmers apply what they have learned through experimentation with different practices on their farms.

Both farmers and scientists also intentionally design and implement experiments to test new practices, plant or animal breed, innovations and inventions.

For example, pests and new weeds can pose problems for crops. New seeds are tried out to adjust to changes in weather and climate or to meet new human needs. Improvements in seeding and harvesting practices are tried and then adopted to increase soil health.

Farmers ask many of the same questions that agricultural researchers and scientists ask. Many of the developments in sustainability come from inquiries and experiments around questions such as the ones that follow.

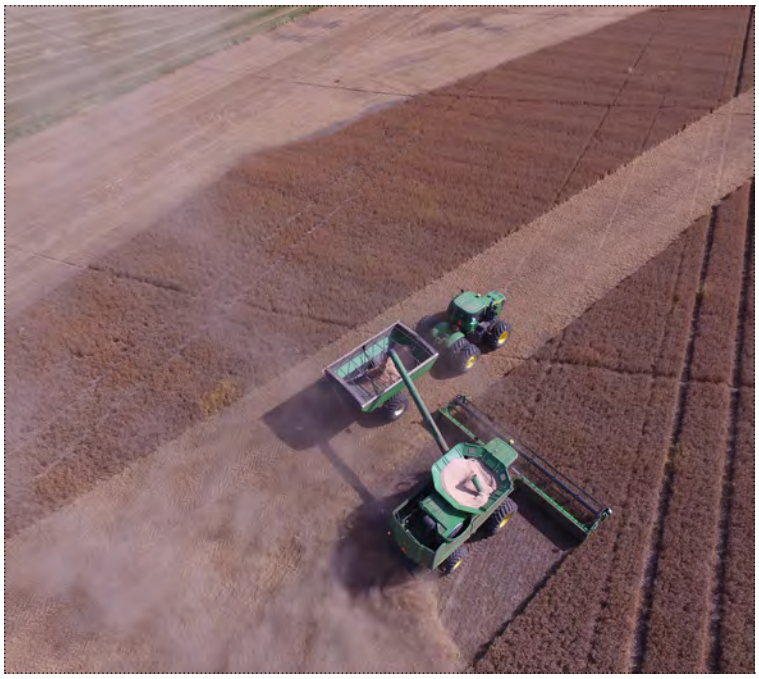
- How does the type of soil affect the type of crops that can be grown?
- How do crop plants interact with the soil?
- How can soil erosion be reduced on crop land?
- Is it always necessary to till the soil to grow food?
- How can the stubble left over from harvested crops be used?
- How do nitrogen, phosphorus and/or potassium affect plant growth?
- How can soil testing help increase food production?
- How do plants and microbes interact with the soil?
- How do certain plants fix nitrogen into the soil? How does this benefit the soil and the crop?

INVESTIGATE FURTHER

How can research into the connections between natural and agricultural ecosystems support sustainable farming practices?

INVESTIGATE FURTHER

How can the steps of the scientific method be followed to investigate sustainable farming practices?



To answer these types of questions, both farmers and scientists use data and evidence gathered from observations, experience and/or experiments.

For example, inventions and improvements like the use of GPS in crop farming and the use of biotechnologies to develop new plant breeds like canola have come from scientific research and farmer problem solving.

INVESTIGATE FURTHER

How can traditional knowledge of the land contribute to sustainable farming practices?

sustainable agriculture is practiced by Indigenous people

Indigenous communities are working to protect the ecosystems that provide the basis for their traditional food and ways of life.

Indigenous food systems include the land, air, water, soil and culturally important plant, animal and fungi species that have sustained Indigenous peoples over thousands of years.

What do the two article excerpts that follow tell you about sustainability in Indigenous food systems, past and present?

INVESTIGATE FURTHER

How are Indigenous food initiatives protecting natural ecosystems?

Restoring Indigenous food systems

To the Anishinaabe people, Manoomin, or wild rice was as central to their lifestyle as the buffalo were to the Lakota. Wild rice grows in the shallow edges of lakes. Coastal wetlands, like grasslands, have a huge ecological importance which has been long overlooked. Wetlands are the kidneys of the earth. They purify toxins from the water. They protect the coasts from storm surges and winds and give flood waters a place to go. They are home to more than a third of endangered species. Wetlands can store vast quantities of organic matter for hundreds of years, therefore providing a carbon sink equal to or superior to forest land.

Wild rice, not actually related to rice, is an indigenous plant to North America and has been growing around the Great Lakes and boreal forest regions for thousands of years.

It had largely been wiped out due to water pollution, to development, to tampering with water levels (wild rice requires shallow water) and to removal by people who didn't understand its value and thought of it as a weed. Today, there are projects to bring it back in a number of places in Canada and the US.

Excerpted from Fitzsimmons, A. (November 5, 2020). Restoring Indigenous Food Systems. Regeneration Canada: Online. https://regenerationcanada.org/en/restoring-indigenous-food-systems/

Restoring fire, wolves and bison to the Canadian Rockies

Waterton Lakes National Park in Alberta, Canada and the Blackfoot tribal lands outside the park are some of the few places where you can get a sense of North America as it was before settlers arrived. Only five percent of Canada's native grasslands remain, and they are right here, filled with iconic native animals like wolves, grizzly bears, cougars and eagles.

When this land was colonized by Euro-Americans 150 years ago, the natural balance of the landscape was knocked off kilter, and now the leadership of the national park and the Kainai First Nation are striving to use natural forces, like wolves, bison and fire to restore a healthy balance. Waterton National Park Natural Resources staff set prescribed fires to keep aspen from taking over the native grassland. Where there are no wolves, elk eat the aspen shoots that grow after burns, clearing space for grass to grow.

But here in Waterton, the presence of wolves keeps elk from lingering while they eat, meaning they clear fewer aspen shoots. This tips the scale back toward expanding aspen stands, and decreasing native prairie. The missing piece? Bison. Wild, free-ranging bison historically kept these grasslands open by trampling aspen and tearing them up with their horns.

This research is important because it engages the Kainai First Nation and the Blackfoot confederacy, to whom bison, fire, and wolves are sacred, in restoring their ancestral landscape and using their traditional ecological knowledge (TEK).

INVESTIGATE FURTHER

What benefits can a mix of "western" science and Indigenous science and knowledge provide to the food system?

Excerpted from Restoring Fire, Wolves, and Bison to the Canadian Rockies Earthwatch Online.

sustainable farming uses different types of practices

Initiatives like the projects to farm wild rice and bring bison herds back to natural grasslands are connected to an increasingly popular practice called regenerative agriculture.

Regenerative agriculture is a term used to describe a set of farming practices focused on enhancing soil health. Many farmers use regenerative agriculture methods.

INVESTIGATE FURTHER

To what extent do different approaches to agriculture promote sustainable food production?

Soil is a living ecosystem. Regenerative agriculture uses several practices that protect the soil ecosystem that include:

- Minimizing **tillage** (which involves turning the soil to control for weeds and pests and prepare for seeding)
- **Cover crops** – like legumes (including **pulses** – the dry edible seeds of legume plants), rye, oats and buckwheat – are planted to recycle soil nutrients and protect soil fertility. They can also be used as **forage crops**, which can produce feed for livestock, such as cows, sheep or goats.
- Using **crop rotation**, which involves planting different crops in a field from one year to the next
- Introducing grazing livestock to cropland has multiple benefits. Livestock eat cover crops which reduces feed costs, and the manure they produce recycles nutrients from their food back into the soil.

In agricultural ecosystems, these practices enhance the water cycle and increase bio-diversity by introducing livestock and new plant species. In urban areas, these practices include composting organic material, growing urban gardens and increasing green spaces.

Check out the full infographic at https://aitc-canada.ca/Portals/0/adam/snapAG/w6UeQKpg-006DvX-0E458w/Link/Regenerative%20Ag%20Final.pdf.

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