

The Green Revolution

Common Core Standards:

Next Generation Science Standards

NGSS.5.ESS3

Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

NGSS.3.5.ETS1.2

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Target audience:

Grades 3-5

Objectives:

- Describe how methods of farming have changed over the last century.
- Compare farming methods before and after the Green Revolution.
- Evaluate evidence we have about present farming techniques in order to devise better solutions for the future.

Key words:

Green Revolution; Crop variety; Irrigation; Fertilizer; Pesticides; High yield crops; Plant breeding; Genetic modification; Exports; Multiple cropping; Erosion; Greenhouse gas emissions; Fossil fuels; Pollution

(Using Key words: Students can create a glossary, in books or on wall in classroom.

Students are encouraged to practice using vocab in written or verbal sentences –

perhaps writing example sentences and displaying them. Students could earn points for using the vocab in novel sentences each week.)

Resources:

- PowerPoint - The Green Revolution
- Green Revolution Photos (same ones that are in PPT)
- Gardening tools (gloves and tools for weeding, tilling, raking)
- Soil
- 2 packets of radish seeds
- Water
- Fertilizer
- Ruler

Activities:

The week before: Introduction & Planting Activity: do a brief introduction and prepare garden for next week's planting activity.

1 WEEK BEFORE LESSON: PREPARATION:

Introduction

The term Green Revolution refers to the advances in research, technology, and agricultural practices between the 1940s and 1970s, which resulted in a huge increase in agricultural productivity around the world. This was a very important period in agricultural history. Scientists dedicated a lot of research into devising better irrigation systems; creating new chemical fertilizers and synthetic pesticides; and designing new crop varieties that could grow bigger and faster. All of these new technologies helped increase the amount of crops produced and prevented starvation in many developing countries. The Green Revolution also lowered the cost of production and the prices of food in the market. However, there are many issues in our current farming system as a result of the Green Revolution technologies. The environment suffered from increased pollution, and many small farms were driven out of the market because they could not afford the new technologies like bigger farms could. The Green Revolution was very

successful in producing more food, but it has also resulted in many negative consequences.

Planting Activity (preparing garden for next week's Healthy Growing Session)

Take small groups of students out to explore, weed, and till the garden in preparation for next week's gardening activity. Identify ideal areas in the garden that receive full sunlight and have good soil. Use tools or hands to remove weeds and loosen the soil. Then smooth the surface with a rake, and water thoroughly. Allow bed to rest for several days before planting.

***LESSON BEGINS*:**

Group Activity/Discussion

Present PowerPoint slides: 1-9. Go through and emphasize key words. For Slides 8 and 9, divide into groups and show (do not discuss) pictures of the benefits and issues resulting from the Green Revolution.

Slide 8: Have them write what they think are some of the benefits resulting from the Green Revolution, then feedback to the class. Show them images on Slide 8 to give them hints.

Slide 9: Have them write what they think are some of the issues that have resulted due to the Green Revolution, then feedback to the class. Show them images on Slide 9 to give them hints.

Further Activities/Homework:

Imagine you had a time machine and you went back in time to tell Norman Borlaug (the father of the Green Revolution) about his Green Revolution. Write a letter addressed to Norman and date it right before the Green Revolution started (~1930s). Now that you know the benefits and issues resulting from the Green Revolution, what would you say to Mr. Borlaug? (e.g., What technologies are good and should be invented? What

technologies became too harmful and should never have been invented, or should be modified? Are there new technologies that can be invented to improve the effects of the Green Revolution?) Get creative and think big!

Have students share ideas from their letters to Norman Borlaug.

Present PowerPoint slide 10 on the current Second Green Revolution. Draw parallels between the students' ideas and the actual new technologies presently underway which are part of the Second Green Revolution.

Assessment:

Quality of predictions

Contributions to class discussion

Language Arts (writing, creative thinking)

Healthy Growing Session:

This growing session will show how fertilizer affects plant growth. Plants need nutrients to grow and fertilizer provides a good source of nutrients that the soil may be lacking.

- Label one half of the garden “control.” These seeds will not get any fertilizer.
- Label the other half of the garden “test.” These seeds will get fertilizer.
- Plant at least 5 radish seeds for each experimental group. Sow seed 1/2 inch to one inch deep and cover loosely with soil. (Seeds should be spaced 1 inch apart in each row. Rows should be spaced 12 inches apart.)
- Using gloves, apply the recommended concentration of fertilizer (instructed on packet) to the test group only. Avoid dropping the fertilizer directly onto the plants, as chemicals can burn them.
- Till the fertilizer into the soil around the plants to make it available to the plant's roots, to accelerate absorption, and to prevent run-off in the case of rain.
- Water both the control and test groups equal amounts.

- Ensure soil is kept evenly moist throughout the growing period for both experimental groups. Students could draw up a schedule for who will water them (including over holidays) to display in the classroom.
- Measure the height of the plants as they grow.
- At the end of the growing period, calculate the average height for each experimental group. Compare average heights and discuss the effects of fertilizer on plant growth.

Downloads:

[Lesson Plan: Green Revolution](#)

[PowerPoint: Green Revolution](#)

[PowerPoint Outline: Green Revolution](#)