

# Global IV Lesson- Green Revolution

## TEACHER GUIDE

Lesson developed by Anthony Rau and Raquel Vigil.

### SYNOPSIS

This lesson is designed to engage students in ideas related to sustainable development, and the Green Revolution. After reading about the Green Revolution students will relate those ideas to the Morris Campus farm.

### LEARNING OUTCOME(S)

Students will explain ideas related to the Green Revolution and apply them to the Morris Campus farm

### LITERACY AND LANGUAGE OBJECTIVE(S)

Language objectives clarifies how students will learn and/or demonstrate the content knowledge by reading, speaking, writing, or listening.

This lesson emphasizes:



In this lesson students will use *Writing Revolution strategies* related to “but, because, and so” and “phrases vs. complete sentences” when explaining ideas related to the Green Revolution.

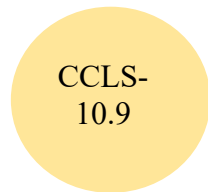
### LITERACY: KEY VOCABULARY

We recommend introducing students to key vocabulary terms before the lesson begins or having a vocabulary guided worksheet for students.

Word	Definition
Allele (n.)	An allele is an alternative form of a <a href="#">gene</a> (one member of a pair) that is located at a specific position on a specific <a href="#">chromosome</a> . These <a href="#">DNA</a> codings determine distinct traits that can be passed on from parents to offspring through <a href="#">sexual reproduction</a> .
Irrigation (n.)	the supply of water to land or crops to help growth, typically by means of channels. "the river supplies water for irrigation of agricultural crops

Photosynthesis (n.)	The process by which green plants and some other organisms use sunlight to synthesize foods from carbon dioxide and water. Photosynthesis in plants generally involves the green pigment chlorophyll and generates oxygen as a byproduct.
True-breeding plant	A true-breeding plant is one that, when self-fertilized, only produces offspring with the same traits. True-breeding organisms are genetically identical and have identical <a href="#">alleles</a> for specified traits.

## STANDARDS



 Common Core

CCLS: NYS Standards for Social Studies – Global History and Geography – 10.9c- The Environment and Sustainability

## MINDFUL PRACTICES

Mindfulness practices for this lesson will take place in the second part of this lesson when students go to the farm. Please see the MCEF Mindful Activities sheet for suggestions for mindful activities.

## ASSESSMENTS

Performance Task:	Other Evidence:
<ul style="list-style-type: none"> <li>Students will be assessed on their answers to the <i>Writing Revolution activity</i></li> </ul>	<ul style="list-style-type: none"> <li>Students responses will be reviewed in a group discussion.</li> <li>Students will also share their responses on the board.</li> </ul>

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### LESSON PLAN

<b>Prior Knowledge/Notes to Teacher</b>	This lesson will be taught over two days. The second day students will go out to the farm.
<b>Materials</b>	<ul style="list-style-type: none"> <li>- World History and Geography text p. 743</li> <li>- Handout with <i>Writing Revolution</i> stems</li> <li>- Student Reading: <i>All You Wanted to Know About the Green Revolution</i></li> </ul>
<b>Lesson Procedures</b>	<p><u>Do now:</u></p> <p>Students will read p. 743 from <i>World History and Geography text</i> (included below) and list three examples of sustainable development on the <i>Do now worksheet</i></p>
	<p><u>Mini-lesson:</u></p> <ul style="list-style-type: none"> <li>- Students will discuss DO Now question</li> <li>- Student will then answer: Why has sustainability become more important in recent times?</li> <li>- Student discussion will be related to population increases in urban areas and in certain parts of the world – A basic definition of Green Revolution will be generated and discussed.</li> </ul>
	<p><u>Activity:</u></p> <ul style="list-style-type: none"> <li>- Students will use writing revolution worksheet to complete phrases related to the Green Revolution using information from the <i>student reading: All You Wanted to Know About the Green Revolution</i>.</li> </ul>
	<p><u>Summary:</u> Discuss Green Revolution reading with students, putting their response on the board and copied if necessary</p>

Day Two:

- Students will come to the Morris Campus Farm for class.
- Lead students through a mindful activity using the Mindfulness Activities Sheet located on the MCEF website.
- Students will discuss the edible crops grown there and tour the farm.
- Students will have the opportunity to participate in any farm work necessary on that particular day if they so choose
- After returning to class, students will discuss how ideas related to the Green Revolution can be applied to our own campus farm. Ideas will be brainstormed and recorded by the instructor and be shared with farm personnel.

**REFERENCES**

Briney, A. (2019, April 10). All You Wanted to Know About the Green Revolution. *ThoughtCo*. Retrieved from <https://www.thoughtco.com/green-revolution-overview-1434948>

Mindful Schools (n.d). *Mindful Schools Starter Lesson*. Retrieved from <https://e7n7r7a7.stackpathcdn.com/wp/wp-content/uploads/2015/06/starter-lesson.pdf>

Speilvogel, J. (2013) *World History and Geography*. Columbus, OH, MacGraw Hill Education.

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*Do Now*

### STUDENT WORKSHEET

Name: \_\_\_\_\_

Teacher: \_\_\_\_\_

**Directions:** Read the following excerpt from page. 743, World History and Geography textbook. **List three examples of sustainable development.**

#### Sustainable Development

Economic development that does not limit the ability of future generations to meet their basic needs is known as **sustainable development**. In promoting sustainable development, the United Nations encourages countries to work to conserve all natural resources. Many countries have already enacted recycling and water conservation programs, along with curbing the dumping of toxic materials. A limited water supply affects 4 out of every 10 people globally. People without access to a source of clean water often get sick with cholera, typhoid, and diarrhea. More than 5 million people die every year from the lack of water or from drinking untreated water (Spelvogel, 2013 pg. 743).

List three examples of sustainable development:

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## Global IV Lesson- Green Revolution

### *Writing Revolution Activity*

#### STUDENT WORKSHEET

Name: \_\_\_\_\_

Teacher: \_\_\_\_\_

**Directions:** Read *All You Wanted to Know About the Green Revolution* and complete the following phrases related to the Green Revolution using information from the text.

The Green Revolution began...

Mexico produced more wheat than it needed so...

Government agencies supported the Green Revolution by...

India was suffering from a famine, so...

Selective breeding of certain plants...

Irrigation helped the Green Revolution because...

Turn paper over

**Directions:** In your own words, write your answers to the following questions:

Explain two criticisms of the Green Revolution

How did the Green revolution help farmers? How did it hurt farmers?

Do you feel the Green Revolution support sustainable practices, why or why not?

## Global IV Lesson- Green Revolution

### STUDENT READING

## All You Wanted to Know About the Green Revolution

by Amanda Briney

The term Green Revolution refers to the renovation of agricultural practices beginning in Mexico in the 1940s. Because of its success in producing more agricultural products there, Green Revolution technologies spread worldwide in the 1950s and 1960s, significantly increasing the amount of calories produced per acre of agriculture.



### History and Development of the Green Revolution

The beginnings of the Green Revolution are often attributed to Norman Borlaug, an American scientist interested in agriculture. In the 1940s, he began conducting research in Mexico and developed new disease resistance high-yield varieties of wheat. By combining Borlaug's wheat varieties with new mechanized agricultural technologies, Mexico was able to produce more wheat than was needed by its own citizens, leading to its becoming an exporter of wheat by the 1960s. Prior to the use of these varieties, the country was importing almost half of its wheat supply.

Due to the success of the Green Revolution in Mexico, its technologies spread worldwide in the 1950s and 1960s. The United States for instance, imported about half of its wheat in the 1940s but after using Green Revolution technologies, it became self-sufficient in the 1950s and became an exporter by the 1960s.

In order to continue using Green Revolution technologies to produce more food for a [growing population worldwide](#), [the Rockefeller Foundation](#) and [the Ford Foundation](#), as well as many government agencies around the world funded increased research. In 1963 with the help of this funding, Mexico formed an international research institution called [The International Maize and Wheat Improvement Center](#).

Countries all over the world in turn benefited from the Green Revolution work conducted by Borlaug and this research institution. India for example was on the brink of mass famine in the early 1960s because of its rapidly growing population. Borlaug and the Ford Foundation then implemented research there and they developed a new variety of rice, IR8, that produced more grain per plant when grown with irrigation and fertilizers. Today, India is one of the world's leading rice producers and IR8 rice usage spread throughout Asia in the decades following the rice's development in India.

### Plant Technologies of the Green Revolution



The crops developed during the Green Revolution were high yield varieties - meaning they were domesticated plants bred specifically to respond to fertilizers and produce an increased amount of grain per acre planted.

The terms often used with these plants that make them successful are harvest index, photosynthate allocation, and insensitivity to day length. The harvest index refers to the above ground weight of the plant. During the Green Revolution, plants that had the largest seeds were selected to create the most production possible. After selectively breeding these plants, they evolved to all have the characteristic of larger seeds. These larger seeds then created more grain yield and a heavier above ground weight.

This larger above ground weight then led to an increased photosynthate allocation. By maximizing the seed or food portion of the plant, it was able to use [photosynthesis](#) more efficiently because the energy produced during this process went directly to the food portion of the plant.

Finally, by [selectively breeding plants](#) that were not sensitive to day length, researchers like Borlaug were able to double a crop's production because the plants were not limited to certain areas of the globe based solely on the amount of light available to them.

### Impacts of the Green Revolution

Since fertilizers are largely what made the Green Revolution possible, they forever changed agricultural practices because the high yield varieties developed during this time cannot grow successfully without the help of fertilizers.

Irrigation also played a large role in the Green Revolution and this forever changed the areas where various crops can be grown. For instance before the Green Revolution, agriculture was severely limited to areas with a significant amount of rainfall, but by using irrigation, water can be stored and sent to drier areas, putting more land into agricultural production - thus increasing nationwide crop yields.

In addition, the development of high yield varieties meant that only a few species of say, rice started being grown. In India for example there were about 30,000 rice varieties prior to the Green Revolution, today there are around ten - all the most productive types. By having this increased crop homogeneity though the types were more prone to disease and pests because there were not enough varieties to fight them off. In order to protect these few varieties then, pesticide use grew as well.

Finally, the use of Green Revolution technologies exponentially increased the amount of food production worldwide. Places like India and China that once feared famine have not experienced it since implementing the use of IR8 rice and other food varieties.

### Criticism of the Green Revolution

Along with the benefits gained from the Green Revolution, there have been several criticisms. The first is that the increased amount of food production has led to [overpopulation worldwide](#).

The second major criticism is that places like Africa have not significantly benefited from the Green Revolution. The major problems surrounding the use of these technologies here though are a lack of [infrastructure](#), governmental corruption, and insecurity in nations.

Despite these criticisms though, the Green Revolution has forever changed the way [agriculture](#) is conducted worldwide, benefiting the people of many nations in need of increased food production.