Objectives
Through classroom experiences, students will read about the research of Nobel Prize-winning plant breeder Norman Borlaug and conduct interviews with one another about the reading. Students will describe Norman Borlaug’s influence in beginning the Green Revolution and apply concepts to current local and world events.

Vocabulary
**Crop Failure**—reduction in crop yield to a level that there is no marketable surplus or the nutritional needs of the community cannot be met

**Developing Nation**—a nation with a low level of material well-being

**Dwarf**—an animal or plant much below normal size

**Gene**—a part of DNA or RNA that is usually located on a chromosome and that contains chemical information needed to make a particular protein controlling or influencing an inherited bodily trait or activity or that influences or controls the activity of another gene or genes

**Plant Breeder**—someone who propagates plants sexually under controlled conditions

**Resistant**—capable of withstanding the force or effect of a disease

**Stalk**—a plant stem especially of a plant that is not woody

Background
Norman Borlaug was a **plant breeder**. He used high-yield agriculture techniques to help people get more food from their land. For 50 years he worked in **developing nations** like Mexico, India and Pakistan. Before he began his work, mass starvation had been predicted in many parts of the world. Instead, food production has expanded faster than human population in all parts of the world except sub-Saharan Africa. Borlaug received the Nobel Peace Prize in 1970, mostly for his work reversing food shortages in India and Pakistan during the 1960s.

Norman Borlaug was born in Cresco, Iowa, in 1914. When he was a young man, the Dust Bowl hit the Midwestern US. Some people blamed modern farming methods, but Borlaug believed just the opposite was true. He noticed that the effects of the Dust Bowl were not as bad in Iowa and other places where

"Civilization as it is known today could not have evolved, nor can it survive, without an adequate food supply.”

- Norman Borlaug
Norman Borlaug- Hunter Fighter

High-yield agriculture techniques were being tried. He decided that his life’s work would be to help people grow more food in places where crop failures were regular facts of life.

Borlaug helped found the International Maize and Wheat improvement Center (CIMMYT) in Mexico. There he helped develop high-yielding semi-dwarf wheat varieties. Today this wheat feeds a large portion of the world’s population.

Borlaug’s leading research achievement was the development of dwarf spring wheat. He found many benefits to growing plants with shorter stalks. Nature favors genes for tall stalks, because in nature, plants must compete for sunlight. Borlaug found that plants with stalks that were short and of equal length would receive equal amounts of sunlight when they did not have to compete with taller-stalked plants. In addition, dwarf wheat used more energy growing valuable grain rather than using its energy to grow tall stalks with no food value. Stout, short stalks also support wheat kernels better. Tall-stalked wheat may bend over at maturity, making it more difficult to harvest.

Borlaug also developed cereal grains that were insensitive to the number of hours of light in a day and could, therefore, be grown in many climates. He particularly favored growing wheat in countries where starvation was a concern, because wheat grows in nearly all environments and is resistant to insects.

Additional Reading
Smith, David J., If the World Were a Village, Kids Can, 2002
Activity 1: Norman Borlaug Interview. (ELA, Computer Science) 1-2 50-minute class periods

Procedures
1. Students will pair up to read about Norman Borlaug from the “Reading Page.”
2. Students will write a narrative of an interview with Norman Borlaug, based on the reading.
   — See “Interview Script”
3. Students will use the interviews to individually and collaboratively develop and conduct an online survey that seeks input from a broad audience; use advanced tools to design and create online content (e.g., digital portfolio, multimedia, blog, web page); and/or communicate and publish key ideas and details in a way that informs, persuades, and/or entertains using a variety of digital tools and media-rich resources. Whichever project they develop, the information should be related to Norman Borlaug.

Activity 2: Library Research. (ELA, Social Studies) 3 50-minute class periods

Procedures
1. Students will use online or library resources to conduct research on one of the following topics.
   — Norman Borlaug
   — Green Revolution
   — Nobel Peace Prize
   — International Maize and Wheat Center High-Yield Agriculture
   — Plant Breeding
   — World Hunger
2. See “Middle School Research Graphic Organizer.”
3. Students will report to the class on the results of their research.
Norman Borlaug – Hunger Fighter
Grades 6-8
Standards

Oklahoma Academic Standards

Activity 1: Norman Borlaug Interview (ELA, Computer Science)

6.1.W.1  Students will give formal and informal presentation in a group or individually, providing textual and visual evidence to support a main idea.
7.1.W.1
8.1.W.1

6.IC.SI.01  Individually and collaboratively develop and conduct an online survey that seeks input from a broad audience; use advanced tools to design and create online content (e.g., digital portfolio, multimedia, blog, web page); communicate and publish key ideas and details individually or collaboratively in a way that informs, persuades, and/or entertains using a variety of digital tools and media-rich resources.
7.IC.SI.01
8.IC.SI.01

Activity 2: Library Research (ELA, Social Studies)

6.6.W.2  Students will refine and formulate a viable research question and report findings clearly and concisely, using a well-developed thesis statement.
7.6.W.2
8.6.W.2

6.SS.4.2  Evaluate the effects of human modification of and adaptation to the natural environment through transformation caused by agriculture, the use of modern irrigation methods, industry, demand for energy, and urbanization.
7.SS.4.4

For more resources, please visit www.agclassroom.org/ok
Norman Borlaug was born in Cresco, Iowa, in 1914. When he was a young man, the Dust Bowl hit the Midwestern United States. Some people blamed modern farming methods, but Borlaug noticed that the effects of the Dust Bowl were not as bad in Iowa and other places where high-yield farming practices were being tried. He decided that his life’s work would be to help people grow more food in places where crop failures usually happened.

Norman Borlaug became a plant breeder. He used high-yield agriculture practices to help people get more food from their land. For 50 years he worked in developing nations like Mexico, India and Pakistan. Before he began his work, mass hunger had been predicted in many parts of the world. Due to his research, food production expanded faster than the human population in all parts of the world except sub-Saharan Africa. Borlaug received the Nobel Peace Prize in 1970, mostly for his work reversing food shortages in India and Pakistan during the 1960s.

Borlaug helped found the International Maize and Wheat Improvement Center (CIMMYT) in Mexico. There Borlaug’s leading research was the development of dwarf spring wheat. He found many benefits to growing plants with shorter stalks. Nature favors genes for tall stalks, because in nature, plants must compete for sunlight. Borlaug found that plants with stalks that were short and of equal length would receive equal amounts of sunlight when they did not have to compete with taller-stalked plants. In addition, dwarf wheat grew more grain, which could be eaten, rather than growing tall stalks with no food value. Stout, short stalks also support wheat kernels better. Tall-stalked wheat may bend over at maturity, making it more difficult to harvest. Today this dwarf wheat feeds a large portion of the world’s population.

Borlaug also developed cereal grains that needed less hours of light each day and could be grown in many climates. He favored growing wheat in countries where starvation was a concern. This is because wheat grows in nearly all environments and is resistant to insects.

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Norman Borlaug – Hunger Fighter
Activity 1 Worksheet 2: Interview Script
Name: ______________________________ Date: _______________
Class/Hour/Teacher: ____________________________________________

Directions: Interview your partner using the following questions. Create two questions of your own based on the readings. Record your partner’s answers, which should come from the reading page. After interviewing, you and your partner will work individually and collaboratively to develop, create, and conduct either: an online survey about Norman Borlaug; digital portfolio, multimedia, blog, or web page about Norman Borlaug; and/or communicate and publish key ideas and details in a way that informs, persuades, and/or entertains.

1. When did Borlaug win the Nobel Peace Prize? What was his motivation?

2. Why did he win the Nobel Peace Prize? Do you believe his work was worthy of the Nobel Peace Prize?

3. How did he become interested in his work on high-yield agriculture?

4. What difference did his work make in the world? Do you think his work has impacted your life?

5. ____________________________________________________________________________

6. ____________________________________________________________________________
Norman Borlaug – Hunger Fighter
Activity 1 Worksheet 2: Interview Script ANSWERS
Name: _________________________________ Date: _________________
Class/Hour/Teacher: ___________________________________________________

Directions: Interview your partner using the following questions. Create two questions of your own based on the readings. Record your partner’s answers, which should come from the reading page. After interviewing, you and your partner will work individually and collaboratively to develop, create, and conduct either: an online survey about Norman Borlaug; digital portfolio, multimedia, blog, or web page about Norman Borlaug; and/or communicate and publish key ideas and details in a way that informs, persuades, and/or entertains.

1. When did Borlaug win the Nobel Peace Prize? What was his motivation?
ANSWERS WILL VARY BUT SHOULD INCLUDE: Borlaug received the Nobel Peace Prize in 1970. He decided that his life’s work would be to help people grow more food in places where crop failures were regular facts of life.

2. Why did he win the Nobel Peace Prize? Do you believe his work was worthy of the Nobel Peace Prize?
ANSWERS WILL VARY BUT SHOULD INCLUDE: He won mostly for his work reversing food shortages in India and Pakistan during the 1960s.

3. How did he become interested in his work on high-yield agriculture?
ANSWERS WILL VARY BUT SHOULD INCLUDE: He noticed that the effects of the Dust Bowl were not as bad in Iowa and other places where high-yield agriculture techniques were being tried.

4. What difference did his work make in the world? Do you think his work has impacted your life?
ANSWERS WILL VARY BUT SHOULD INCLUDE: Borlaug found that dwarf wheat used more energy growing valuable grain rather than using its energy to grow tall stalks with no food value. Borlaug also developed cereal grains that could be grown in many climates. He particularly favored growing wheat in countries where starvation was a concern, because wheat grows in nearly all environments and is resistant to insects.

5. ANSWERS WILL VARY

6. ANSWERS WILL VARY

For more resources, please visit www.agclassroom.org/ok
Conduct research on one of the following topics: Norman Borlaug; Green Revolution; Nobel Peace Prize; International Maize and Wheat Center High-Yield Agriculture; Plant Breeding; or World Hunger. Use the Graphic Organizer to record the main ideas from your research, add more boxes if needed. Use the information to write a research paper, with a clear thesis statement.