

\*Note: This PowerPoint Outline contains the same notes located within the PowerPoint\*

## History

### **SLIDE 2**

In the early 20th century, as the population continued to grow, the agricultural industry struggled to supply food for the increasing number of consumers which led to food crises in some countries such as India and Pakistan. The Green Revolution, which began in the 1940s, made it possible to feed the growing human population and saved millions of lives from starvation.

### **SLIDE 3**

Norman Borlaug (1914-2009) led this movement and is known as the “father of the Green Revolution”. He created a new strain of wheat that could resist certain diseases, that was shorter (reduces damage from wind, doesn’t block sunlight from neighbors), and that could produce large seed heads and higher yields. He introduced this wheat variety to Mexico; within 26 years, wheat production increased fourfold. Following the successes of the GR in Mexico, its technologies spread worldwide and benefited many more countries.

## New Technology

### **SLIDE 4**

Irrigation: before the GR, water was limited to areas with high rainfall. New irrigation systems allowed water to be stored and sent to drier areas.

### **SLIDE 5**

New chemical fertilizers: (e.g., potassium, nitrogen, phosphorus) provide crops extra nutrients and nutrients that poor soil may be lacking, which increases crop yields.

### **SLIDE 6**

Synthetic pesticides: controlled weeds, killed insects, prevented diseases

### **SLIDE 7**

High yield crops: These crops are specially bred and genetically modified to increase production yields.

Multiple cropping: Different crops grow during different times of the year. Multiple cropping is growing 2+ crops on the same piece of land during a growing season, so that the field always has something growing on it.

## Benefits

### **SLIDE 8**

\*Ask students what they think are some of the benefits resulting from the Green Revolution. Show them images on Slide 8 to give them hints.\*

These new agricultural techniques produced more crops without having to use more land or more labor. This resulted in economic and environmental benefits.

- Economic: reduced production costs and food market prices.
- Environmental: less natural area needed to be converted into farmland; wildlife can still use this land

Other benefits:

- Increased crop production/yields (more food)
- Reduced countries' dependence on imports (they could make more money on exports)
- Increased food security; saved millions from starvation
- Varied diet (more choices!)

## Issues

### **SLIDE 9**

\*Ask students what they think are some of the issues that have resulted due to the Green Revolution. Show them images on Slide 9 to give them hints.\*

The GR yielded many benefits but also resulted in many issues for the environment and society.

Environment:

- Polluted air, soil and water systems around the field
- Lower soil quality, increased risk of erosion of the topsoil
- Growing more plants required more water. The irrigation systems put pressure on the natural water reserves and resulted in water shortages and droughts.
- During the GR, the farming industry shifted from human/animal labour to the use of large machines. This took away many jobs and also led to an increase in energy consumption of fossil fuels, increased GHG emissions, and increased pollution.

Society:

- Exposed people downstream to the chemicals used in farm fields; polluted air and water for nearby households
- Benefited large farms that could afford the new GR technologies, but smaller farms were unable to afford these new technologies and could not compete with

the lower food prices from the larger farms. Many small farms had to sell their land and were driven out of the agricultural industry.

### Further Activity or Homework

#### **SLIDE 10**

Have students share ideas from their letters to Norman Borlaug. Present PowerPoint slide 10 on the current Second Green Revolution (notes located below). Draw parallels between the students' ideas and the actual new technologies presently underway.

Due to the issues of the first revolution, a second more science-based Green Revolution is in the works! New technologies underway include:

- Using genetics/breeding to create:
  - Climate change-tolerant crop varieties (e.g., drought-tolerant)
  - Less resource-intensive crop varieties (e.g., crops that use less water, less pesticides, less fertilizer)
  - Bigger and more nutrient-packed crop varieties (e.g., some rice varieties are being developed to have higher levels of iron, zinc, and vitamin A)
- Using drones/remote sensing technology/mapping systems to:
  - Monitor farm fields and study where crops are performing well or not, and devise plans to improve their growing success