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Plant Health

LESSON 2



***How are nutrients
depleted
from the soil?***



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- Could farmers add **too many** nutrients to their fields?

Yes

- Could farmers also **not add enough** nutrients?

Yes

- If growing plants deplete soil nutrients, why should farmers continue to grow crops?

To produce our food so we can eat!



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What is SUSTAINABILITY?



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Watch the Journey 2050: Plant Health Video



As you watch, discover:

- What three primary nutrients are necessary for healthy plant growth, and how can they be replenished?
- How does a plant resist disease and pests?
- What are best management practices?
- What are the 4Rs?



SOIL

Why does soil matter?

Crops that **we eat** grow in the soil like potatoes, lettuce and beans as well as the crops we use to **feed livestock** that provide us with foods like meat, milk and eggs.



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NUTRIENTS

What three primary nutrients
do plants need to grow?

Nitrogen (N), Phosphorus (P) and Potassium (K)



Remember the bank analogy for stored nutrients.
How are nutrients replenished?



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NUTRIENTS

- Where do plant nutrients come from?

Nature!



HOW DOES OVERALL PLANT HEALTH AFFECT A PLANT'S ABILITY TO RESIST DISEASE AND PESTS?

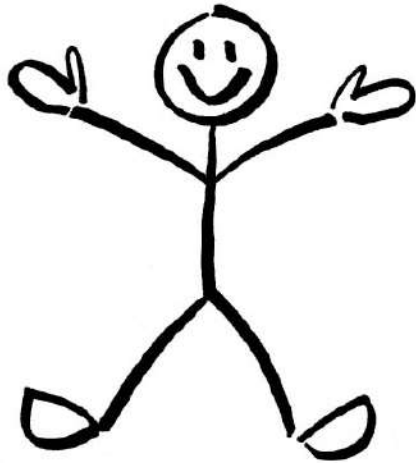


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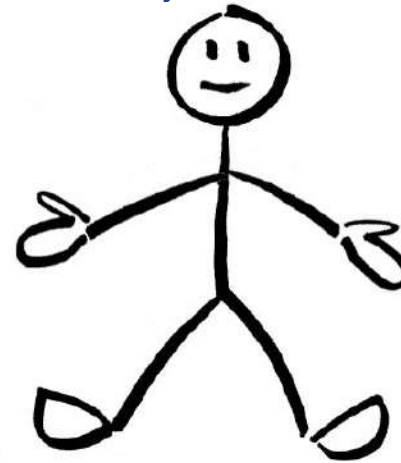
OVERALL PLANT HEALTH

Which person is more likely to get sick if exposed to the same contagious illness?

Eats a balanced diet, exercises and is in overall good health



Eats a poor diet, does not exercise and is generally less healthy



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OVERALL PLANT HEALTH



Insects



Diseases



**Nutrient
Deficiencies**



**Weed
Infestations**

*What can make a plant sick or
destroy a plant?*



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OVERALL PLANT HEALTH



Other benefits to maintaining optimal plant health:

- Plants will be better able to resist pests and disease, thereby requiring less human intervention.
- Plants will grow vigorously and be able to outcompete (grow faster than) weeds.
- Plants will grow to their genetic potential and produce more food.



BEST MANAGEMENT PRACTICES

Choices come in varying degrees...



Poor



Good



Best!

“Best Management Practice” (BMP)
refers to the best way to do something.

Can you think of BMPs that protect the soil?



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4R NUTRIENT STEWARDSHIP



CANOLA CROP

Manufactured fertilizers are responsible for
50% of the world's food supply.

Fertilizer

Applied Based on
4R Nutrient Stewardship

No Nutrients

Added to the Soil



SUSTAINABILITY FARMING GAME

LEVEL 2

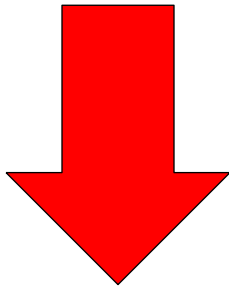


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SUSTAINABILITY FARMING GAME

LEVEL 2 NUTRIENTS

Play the game!



Introduction



Nutrients



Water



E

Select Nutrients

No Nutrients	Standard Practice	Best Practice
Crop Yield:	Crop Yield:	Crop Yield:
Soil Health:	Soil Health:	Soil Health:
Cost: \$0	Cost: \$160	Cost: \$800
<input type="button" value="Select"/>	<input type="button" value="Select"/>	<input type="button" value="Select"/>

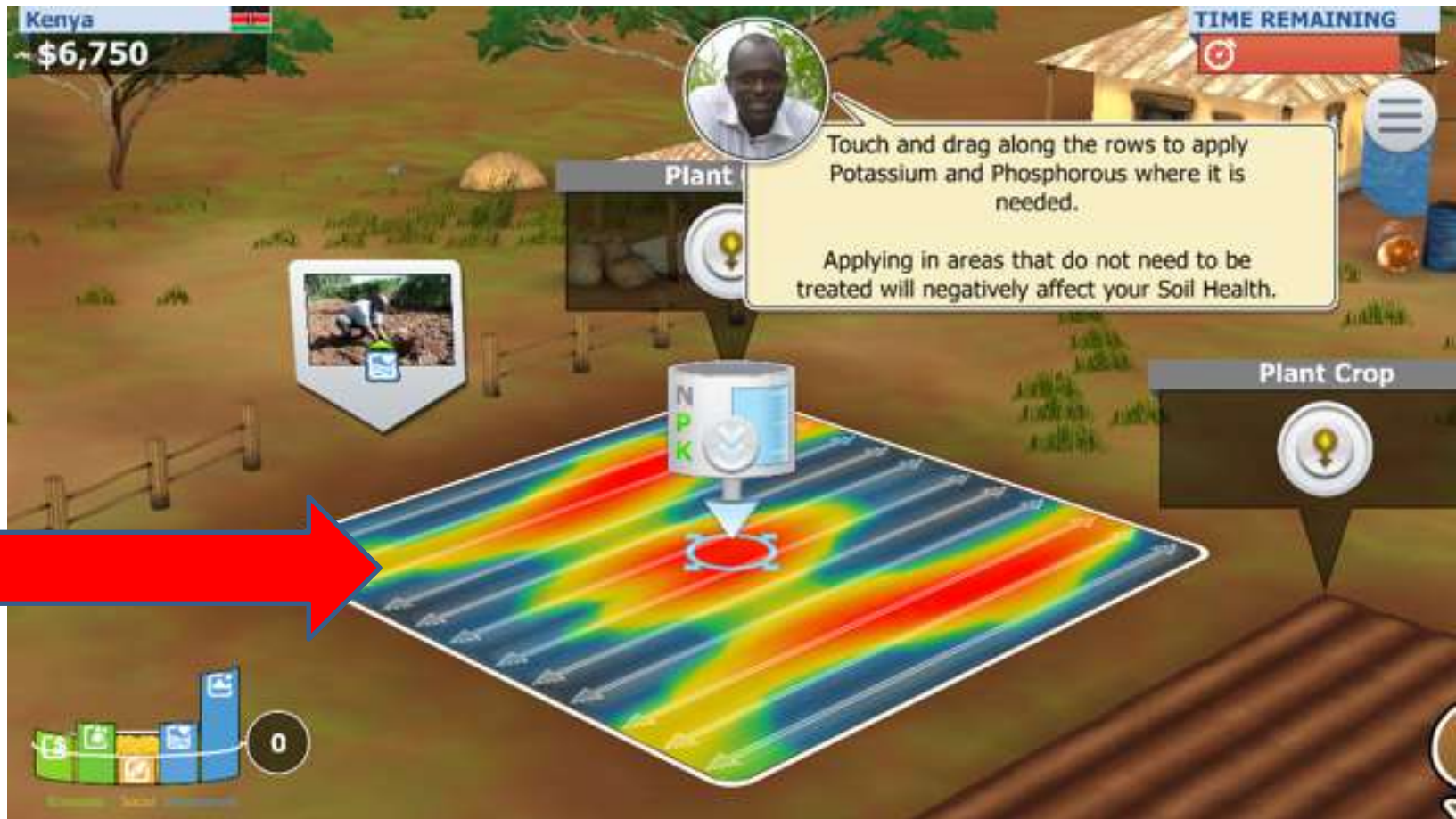


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SLIDE OVER RED/YELLOW AREAS



FOLLOW-UP DISCUSSION



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GAME DISCUSSION

- Which nutrient practice was best?
- If nutrients are **over** or **under** applied what impacts did you notice on crop yields, environment or economics?
- How can farmers be sure they are applying nutrients in a sustainable way?



WRAP-UP

- Agriculture provides our food supply. Growing our food requires the use of nutrients, which must be returned to the soil through proper application in order to continue growing healthy crops.
- Crops grown in soil without proper nutrients are less healthy, less resistant to insects and diseases, and produce a less abundant harvest than crops grown in nutrient-rich soil.
- When plant health is managed using best practices farmers can be more successful in harvesting an abundant crop of healthy foods.



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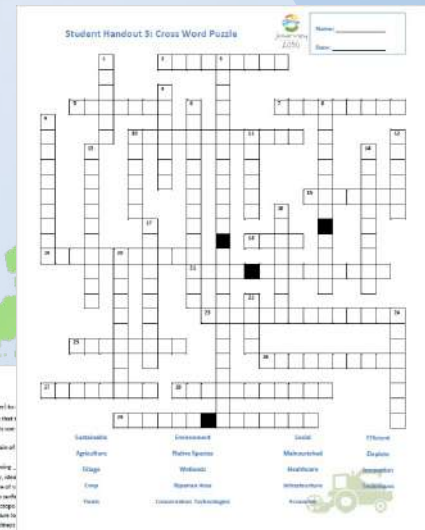
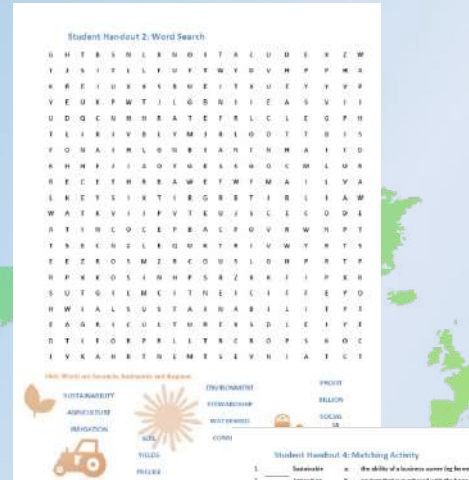
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Questions?

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ENRICHING ACTIVITIES

- Student Handouts:
 - Word Search
 - Crossword Puzzle
 - Matching Activity
- Nutrients for Life Resource:
 - Feeding the World and Protecting the Environment.



ENRICHING ACTIVITIES

- Case Study:
Pests and Diseases

Split the class into two groups and assign each a case to review.

- Students will understand the importance of taking action through service-learning using the WE Service Learning in Action: [Plant Health](#) lesson plan



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CASE STUDY 1

Farmers: Bob & Sue Jenson

Location: Minnesota, USA

Crop: Soybeans

Problem: Bean Leaf Beetle

Agronomist Report: An agronomist inspected this crop and noticed that all stages of plant growth were impacted. There is a decrease in crop yield and poor seed quality. The beetles are feeding on pods and breaking the pods, as well as scarring the leaves allowing for fungus to enter. Last, the agronomist report said this beetle was carrying a virus to the plant called bean pod mottle virus, which is mainly a concern if the Jenson's are selling their soybeans for food because it affects the seed coat quality.



1. Research the Bean Leaf Beetle

2. Identify at least one solution to address this pest



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CASE STUDY 2

Farmers: Shad & Lita Meena

Location: Kenya, Africa

Crop: Maize

Problem: Maize Lethal Necrosis Disease (MLND)

Agronomist Report: An agronomist inspected this crop and noticed a 30 percent loss in yields! The agronomist could see the leaves were dry, there were malformed ears, sometimes even no ears on the plants, and some of the ears were rotting. The agronomist let the Meena family know the disease was likely from a long drought, poor soil fertility and poor agricultural practices.



1. Research the Maize Lethal Necrosis Disease.
2. Identify at least one solution to address this disease



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SCIENCE OF FARMING: RECAP

- Farm practices and technology are constantly evolving.
 - Conservation practices (4R Nutrient Stewardship System, contour plowing, terracing, windbreaks, cover crops, crop rotation, no-till farming, etc.)
 - Cultural controls (varied planting seasons, etc.)
 - New farm equipment
 - New technology (Global Positioning System, weather monitoring system, soil PH and temperature analysis, new seed varieties, etc.)
 - Biological controls (ladybugs, etc.)
 - Chemical controls (pesticides and herbicides)



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SCIENCE OF FARMING: RECAP

Goal: Grow a healthy crop and raise healthy livestock while balancing a budget and environmental footprint

Reality: Farmers must use the resources they have to make informed decisions

- Does a Kenyan farmer have the same equipment as a North American farmer?
- How does an organic farmer vs a conventional farmer respond to a problem with nutrients, pests or diseases?



There is no one-size-fits-all solution.
Every farmer grows the healthiest plants and animals they can.

A farmer's livelihood depends on sustainable practices.



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BROUGHT TO YOU IN COLLABORATION

