

Pumped Up For Pumpkins

2020

Lesson 3: Soil Health and Soil Nutrition

the virtual *pumpkin* project

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Acknowledgement: Jeff Dahlberg, Tracy Newton, Katie Wortman, Gwenn Conville, and Keith Byrum



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Zoom Etiquettes



Audio

**Mute
yourself**

**Be
Ready to
Unmute
your mic**



Chat



**Raise your
hand**

**Use the
chat box**



Video

**How to
Turn off
your
camera if
needed**

CROP REPORT: Sweet Potato Patch



PUMPKINS



1 Small Pumpkin

PESTS



Good: Lots of Ladybugs, Lacewings, and Assassin Bugs

Pollinators: Lots of Honey Bees

Bad: Moderate Aphid Population and 1 Gopher

WEEDS

15% Nutsedge



Plot Info

Mulch: No Mulch
Cultivar: Howden
Fertilizer: UN-32
Irrigation Zone: 3

PLANT HEALTH



No Plants Lost
3 Plants with Aphid Damage

FLOWERS

25+ Flowers
Many Female Flowers



Crop Report



Farm Services	Cost
Plot weeding	\$ 40.00
Pollinating	\$ 40.00
Extra irrigations	\$ 50.00
Fertilizer Boost	\$ 50.00
Organic pesticide A	\$ 15.00
Organic Pesticide B	\$ 10.00
Conventional Pest.	\$ 50.00
Benefic. Insect	\$ 10.00
Micronutrient A	\$ 25.00
Micronutrient B	\$ 20.00
Micronutrient C	\$ 15.00
Farm advisor call	\$ 10.00
Harvest Crew	\$ 40.00
Other	TBD

**Pumpkin
Farmers:**

**What work
would you
like done to
your plot?**

**Community Pest Control
Sivanto**

Soil Monster - Soil Sam Grass Head

Materials In Kit

3 Knee high stockings
3 bags of seed
3 bags of soil types
3 cups
Googly eyes
Pipe cleaners

Things you Might Need

Glue gun or mod podge glue
Markers, fabric or buttons
water



*Instructions

1. Each soil bag has been labeled with a soil type. Write the soil type on the back of the white cup that you will match the soil head to.
2. Open the stockings or hold it open with a cup and pour in 1 bag of seeds by the toe portion of the stocking.
3. Add one bag of soil.
4. Pull the stocking up and pat the bottom of the stocking to reform the stocking into a sphere.
5. Twist the end and make a firm knot.
6. Decorate the grass head and the cup you will be using to hold it.
7. Once the decorations are dry, dip the toe portion of the sock in water to moisten the seeds for a few seconds. Fill the outfit container with water and place the end of the stocking into the water and rest the grass head on top.
8. The stockings will pull the water up to the seeds in the soil and water the grass head for you
9. Check the container daily to make sure there is water inside, fill as needed.
10. Use the ruler to measure the hair.

Hypothesis Question:

Which Soil Head does your team think will grow the longest hair?

Which one will grow the shortest hair?

Journal Log

Write notes on what you observe as the grass hair starts to grow.

How did your team do?



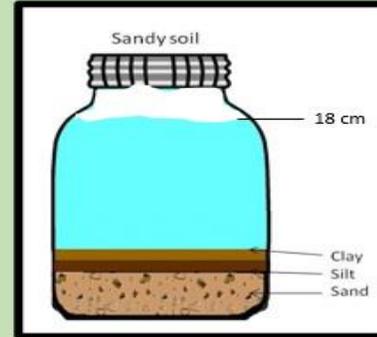
Soil Texture Mud Shake

Materials In Kit

- 2 Water Bottles
- 2 Small paper cups
- 1 bag of KARE Field Soil
- 1 Ruler

Things you Might Need

- Cup to hold water
- Shovel and bucket
- Marker



*Instructions

1. Remove the label and empty the water from the water bottle into a cup.
2. From your backyard remove the first two inches of top soil, dig three inches deep and scoop the soil into a bucket. Mix the soil well and use the paper cup to measure a cup full of soil.
3. Pour the cup of soil into the empty water bottle.
4. Fill the water bottle up with water until it reaches one inch from the top.
5. Close water bottle lid tight.
6. Using your finger to hold the lid shake the bottle well for a few minutes until the soil is mixed thoroughly making a mud shake.
7. Leave the water bottle on a flat surface for 24 hours to allow the soil to settle.
8. Mark on the bottle each layer. There should be three layers (Sand, Silt and Clay). Use the ruler measure in cm each layer that settled starting from the bottom of the bottle. Calculate the percentage of each layer.
9. Repeat with KARE Field Soil.
10. Classify your soil type using the soil texture triangle on the next page.

Calculating the Percentage

- (A) Sand, Silt & Clay _____ cm
- (B) Sand and Silt _____ cm
- (C) Sand _____ cm

$$(B) \text{ _____ cm} - (C) \text{ _____ cm} = \text{Silt } \text{_____ cm}$$

$$(A) \text{ _____ cm} - (B) \text{ _____ cm} = \text{Clay } \text{_____ cm}$$

$$\frac{\text{Silt } \text{_____ cm}}{(A) \text{ _____ cm}} \times 100 = \text{_____ \% Silt}$$

$$\frac{\text{Clay } \text{_____ cm}}{(A) \text{ _____ cm}} \times 100 = \text{_____ \% Clay}$$

$$\frac{\text{Sand } \text{_____ cm}}{(A) \text{ _____ cm}} \times 100 = \text{_____ \% Sand}$$

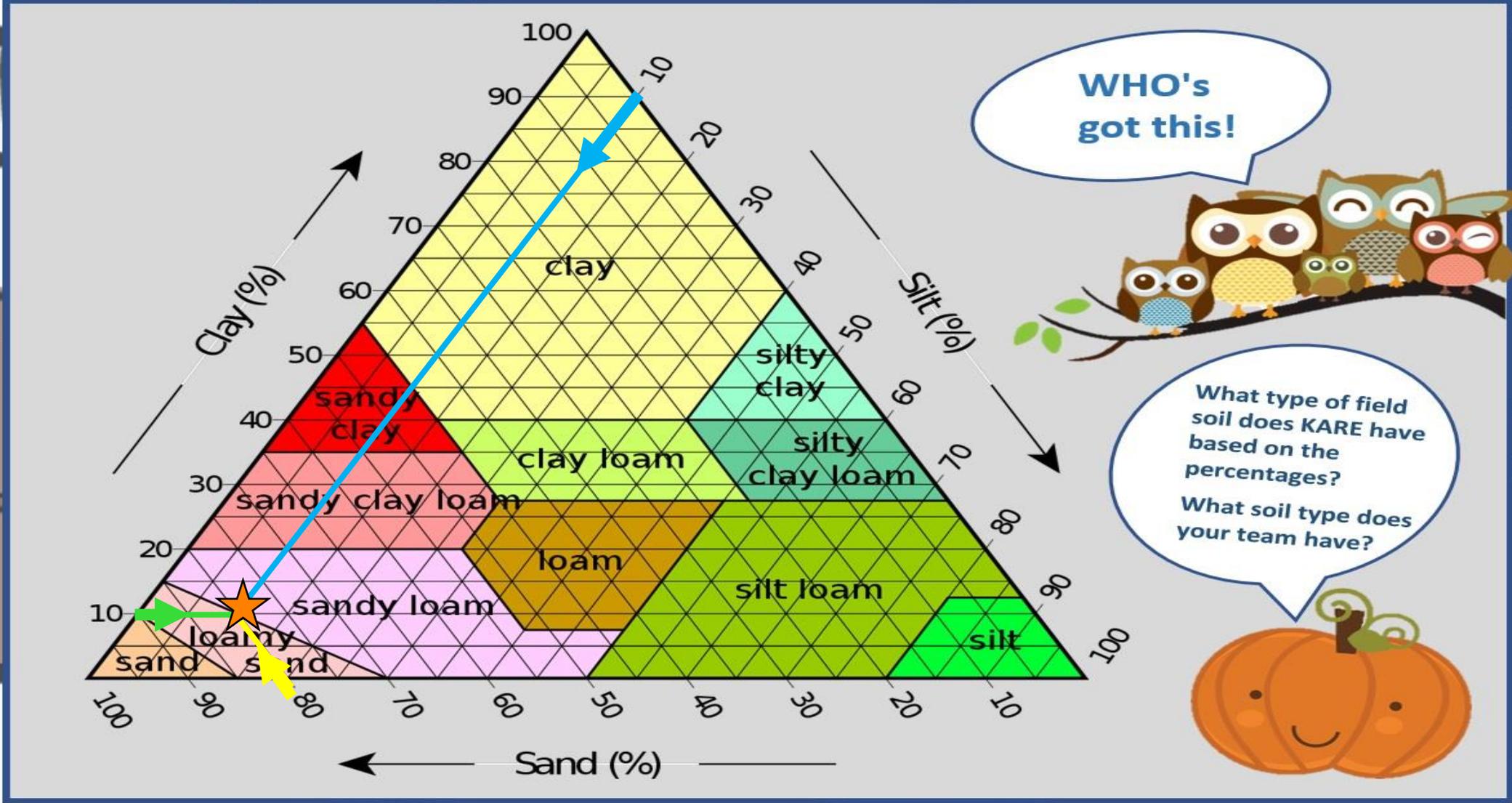
Sand, Silt and Clay?

Sand will settle first because it is the heaviest particle. Silt will settle next and clay will take longer to settle on top.

Can you guess what is floating on top of the water?



**USDA-NRCS Soil Texture Triangle



WHO's got this!



What type of field soil does KARE have based on the percentages?
 What soil type does your team have?



Soil Survey USDA



USDA United States Department of Agriculture
Natural Resources Conservation Service

Web Soil Survey

Home About Soils Help Contact Us

You are here: Web Soil Survey Home

The simple yet powerful way to access and use soil data.

START WSS

I Want To...

- Start Web Soil Survey (WSS)
- Know Web Soil Survey Requirements
- Know Web Soil Survey operation hours
- Find what areas of the U.S. have soil data
- Find information by topic
- Know how to hyperlink from other documents to Web Soil Survey
- Know the SSURGO data structure

Welcome to Web Soil Survey (WSS)

Web Soil Survey (WSS) provides soil data and information produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to the largest natural resource information system in the world. NRCS has soil maps and data available online for more than 95 percent of the nation's counties and anticipates having 100 percent in the near future. The site is updated and maintained online as the single authoritative source of soil survey information.

Area of Interest

Open All Close All

AOI Properties

Clear AOI ?

AOI Information

Name: Pumped Up for Pumpkins

Map Unit Symbols: Use Soil Survey Area Map Unit Symbols Use National Map Unit Symbols

Area (acres): 0.26

Soil Data Available from Web Soil Survey

Eastern Fresno Area, California (CA654)

Data Availability: Tabular and Spatial, complete

Tabular Data: Version 12, May 29, 2020

Spatial Data: Version 3, Sep 16, 2019

Clear AOI

Import AOI

Export AOI

Quick Navigation

Address

Address: 9240 south riverbend ave, parlier, ca

Show location marker:

View

State and County

View Extent: Contiguous U.S. Scale: (not to scale)

Fresno

Soil Triangle

Mud Shake

Area of Interest (AOI) | **Soil Map** | Soil Data Explorer | Download Soils Data | Shopping Cart (Free)

Search

Map Unit Legend

Eastern Fresno Area, California (CA654)

Eastern Fresno Area, California (CA654)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Hc	Hanford sandy loam	0.1	24.4%
Hm	Hanford fine sandy loam	0.2	75.6%
Totals for Area of Interest		0.3	100.0%

Soil Map

**USDA-NRCS Soil Texture Triangle

WHO's got this!

What type of field soil does KARE have based on the percentages?
What soil type does your team have?

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**Resource: USDA-NRCS Soil Texture Triangle, March 18, 2016

What is the
Difference
Between Soil
and Dirt?



What did your
team find?

Where did you
find it?

PIKMIN SQUAD

Fairmont 4-H

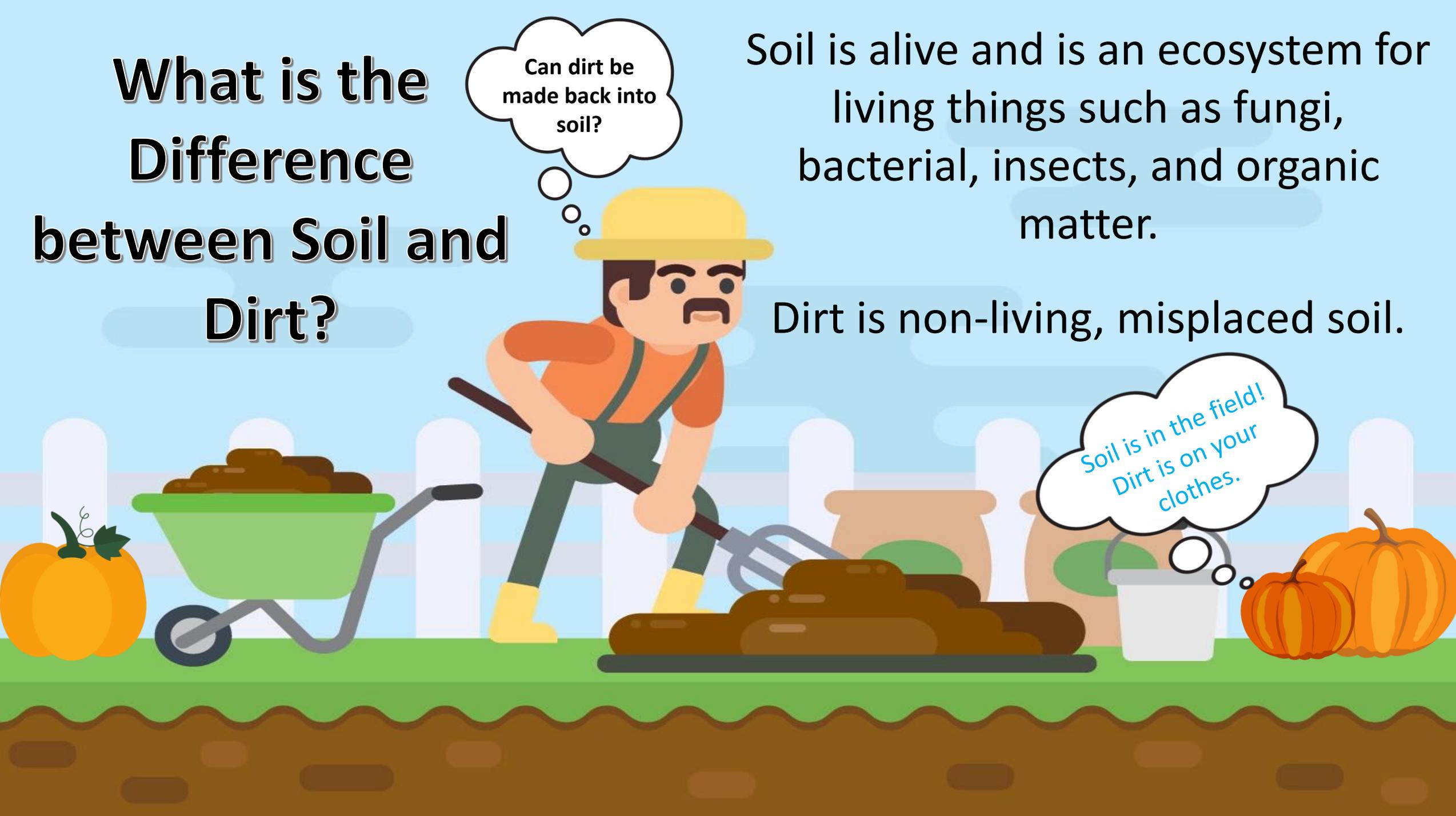
What is the Difference between Soil and Dirt?

Can dirt be made back into soil?

Soil is alive and is an ecosystem for living things such as fungi, bacterial, insects, and organic matter.

Dirt is non-living, misplaced soil.

Soil is in the field!
Dirt is on your clothes.



PUMPKIN 3.14

What is
Organic
Material in
Soil?

Where did you
find it?



What did your
team find?



What is soil made of?

Mineral
Particles
45%

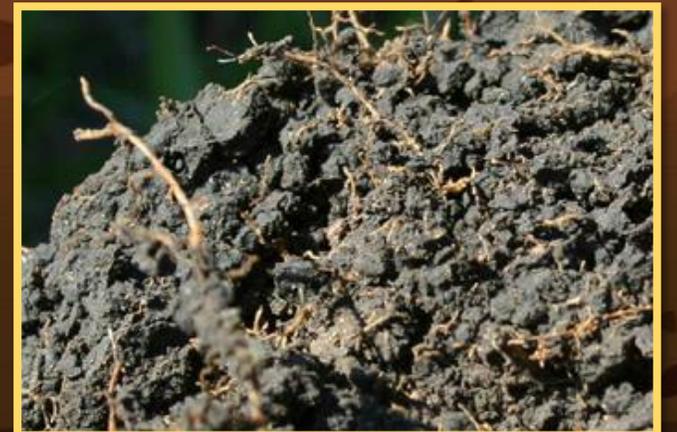
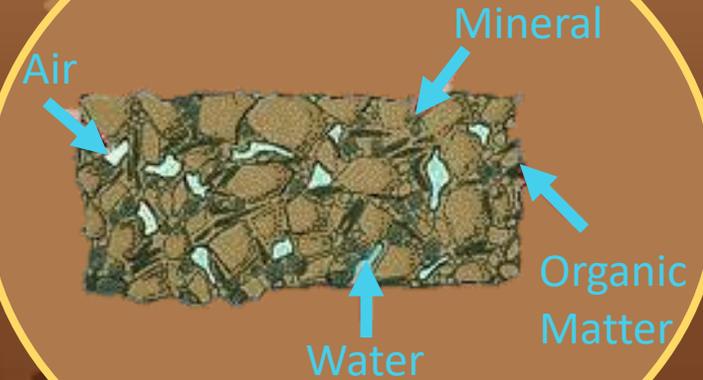
Air
25%

Water
25%

Organic Matter
5%

What is in Organic Matter?

Roots
Organism
Humus



Organic Matter in Soil

**Dead
Decomposing
Plant or Animal
Material**



**Fungi and other
Organisms work
together to make
Organic Matter!**



**Organic Matter
has another
name, In Soil it is
called HUMUS!**



What is
Mycorrhiza?

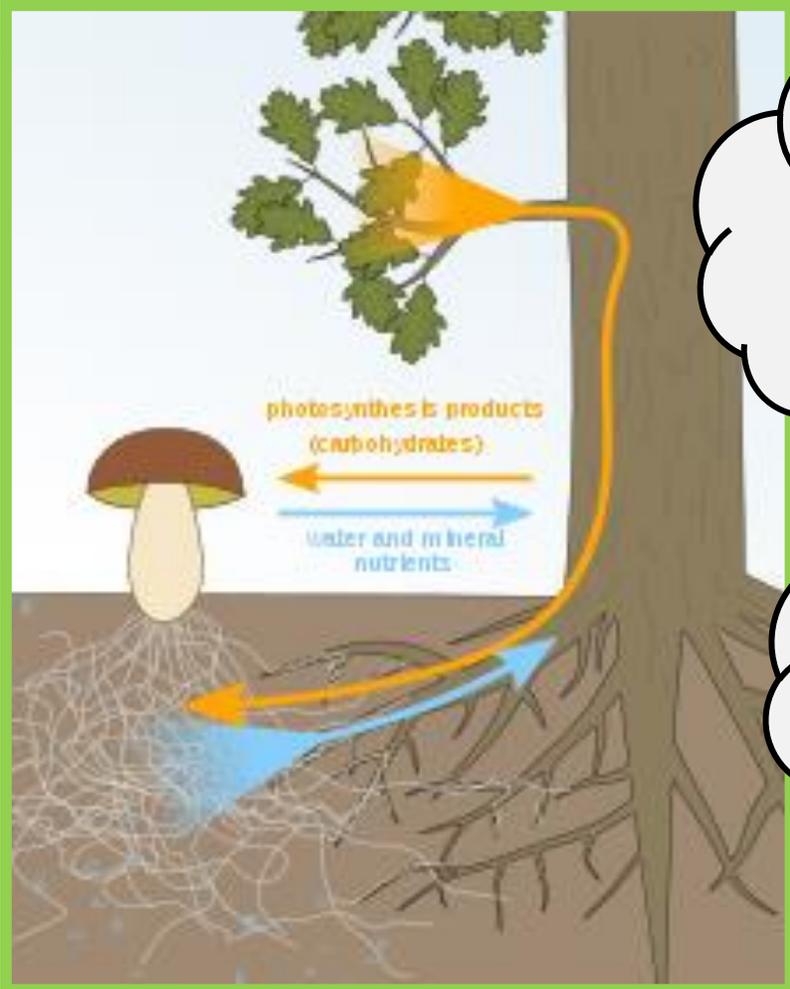
PUMKINATORS

What did your
team find?

Where did you
find it?



Mycorrhiza



Mycorrhiza collects sugar energy from plants in exchange for water and nutrients

Mycorrhiza helps send secret messages to other plants.



Name 3 Types
of Soil Texture?



What did your
team find?

Where did you
find it?

SAND

- Largest particle size
- Gritty feeling

SILT

- Medium particle size
- Feels like grain flour

CLAY

- Smallest particle size
- Smooth feeling

Soil Textures



Why is it important?

Good soil texture allows the roots to have access to water nutrients and air while providing support. We need to know soil texture so we can make decisions on irrigation and amendments.



Reedley Pumpkinology

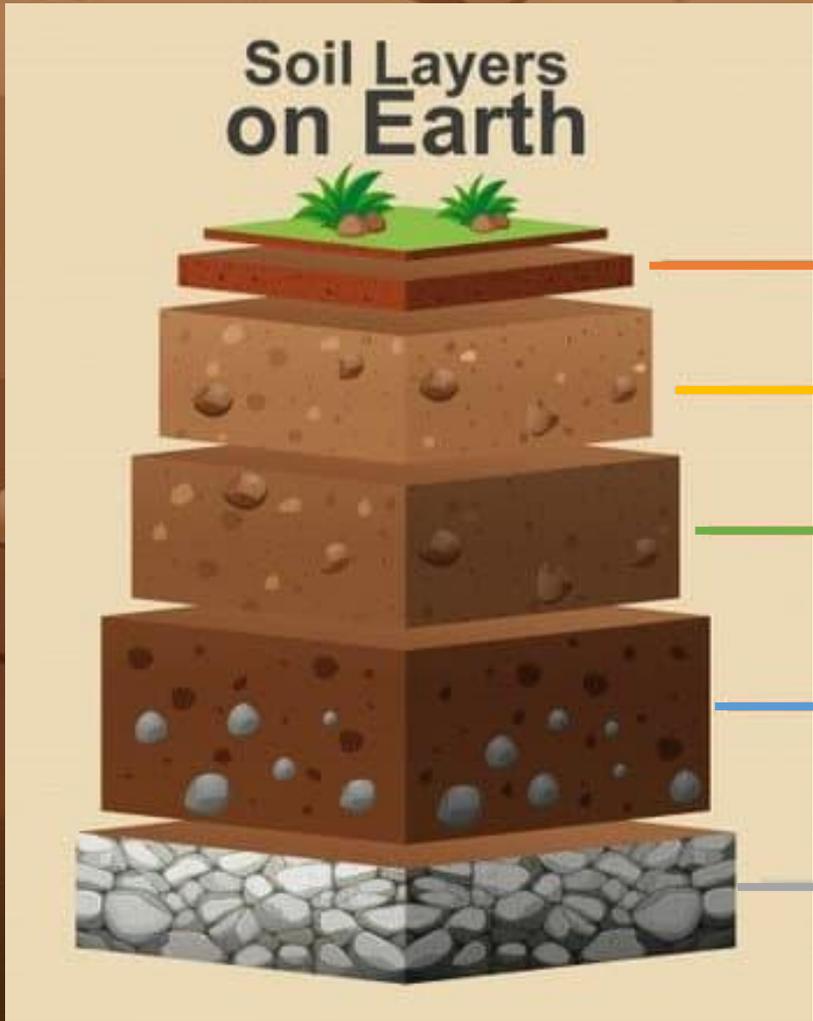


What are the
Soil Horizons?

Where did you
find it?

What did your
team find?





Topsoil
 Made up of minerals and decomposed organic matter and it is also very dark in color. This is the layer that many plants roots grow in.

Organic Material
 First layer of soil that is made up of living and decomposed materials like leaves, plants, and bugs. This layer is very thin and is usually dark.

Sub Soil
 This layer has clay and mineral deposits and less organic materials than the layers above it.

Parent Material
 Made up of slightly unbroken rock and only a little bit of organic material is found here. Plant roots are not found in this layer.

Bedrock
 Mass of rock such as granite, basalt, quartzite, limestone or sandstone that forms the parent material for some soils. This is not soil.



West Fresno Sweet Potato Pumpkin Patch

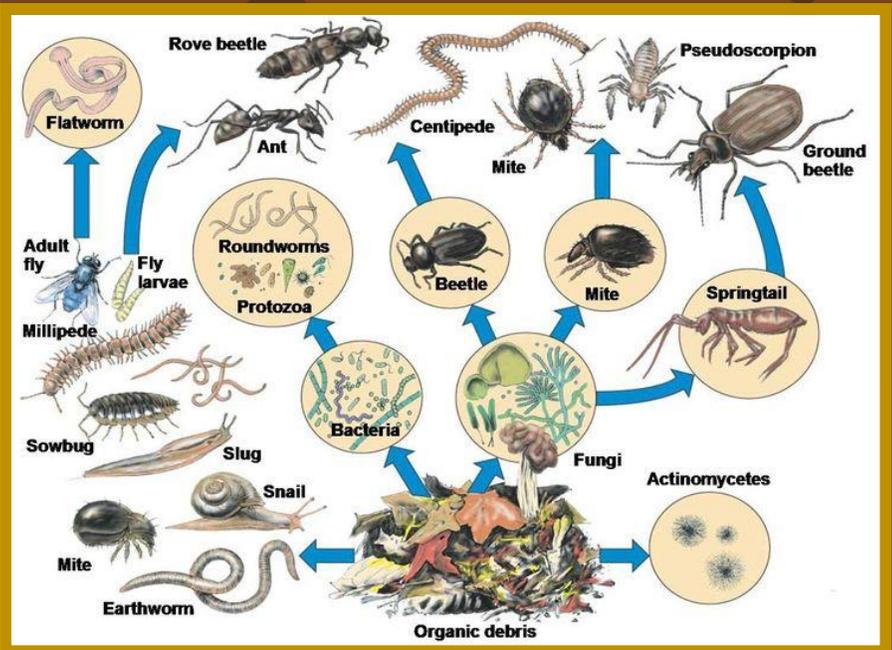
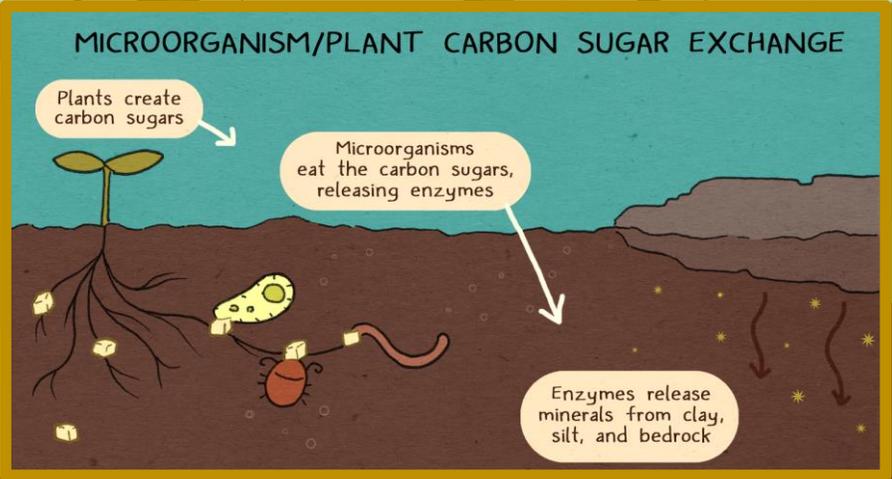
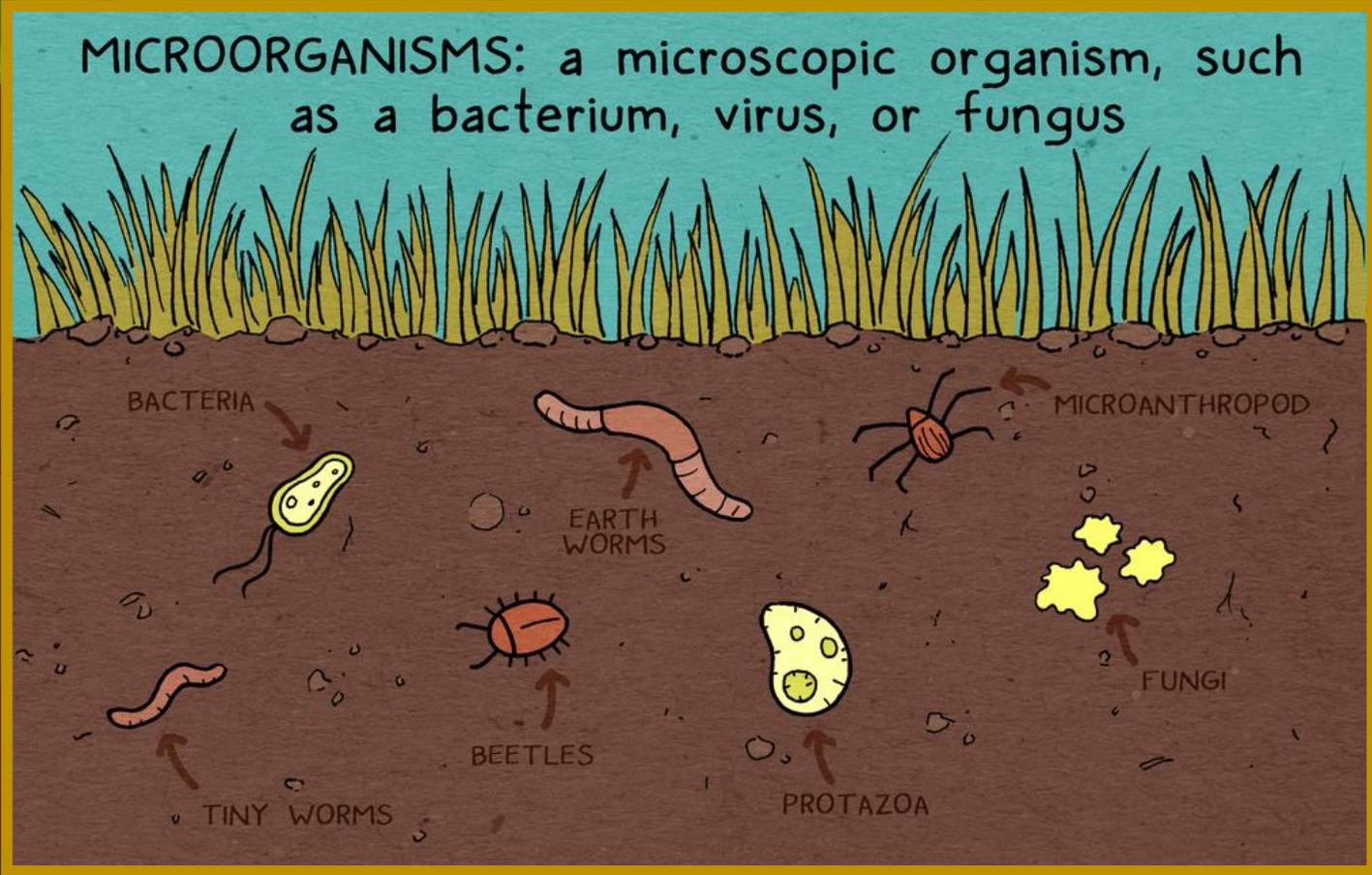


Where did you find it?

Name 3 Soil animals that eat and decompose plant material?

What did your team find?

Decomposers and Soil Animals



Kerman Pumpkin Pickers

Name 3 Major
Nutrients
Plants Need?

What did your
team find?

Where did you
find it?



Goal

Name 3
Micronutrients?

What did your
team find?

Where did you
find it?

Diggers





Name 3
Macronutrients?

What did your
team find?



The Butterballs!

Where did you
find it?



Plant Nutrients

Essential Nutrients
Carbon, Hydrogen
and Oxygen

Macronutrients
Nitrogen,
Phosphorus,
Potassium,
Calcium, Sulfur,
and Magnesium

Micronutrients
Boron, Manganese,
Iron, Zinc,
Molybdenum,
Copper and
Chlorine

**HEALTHY
FOLIAGE**

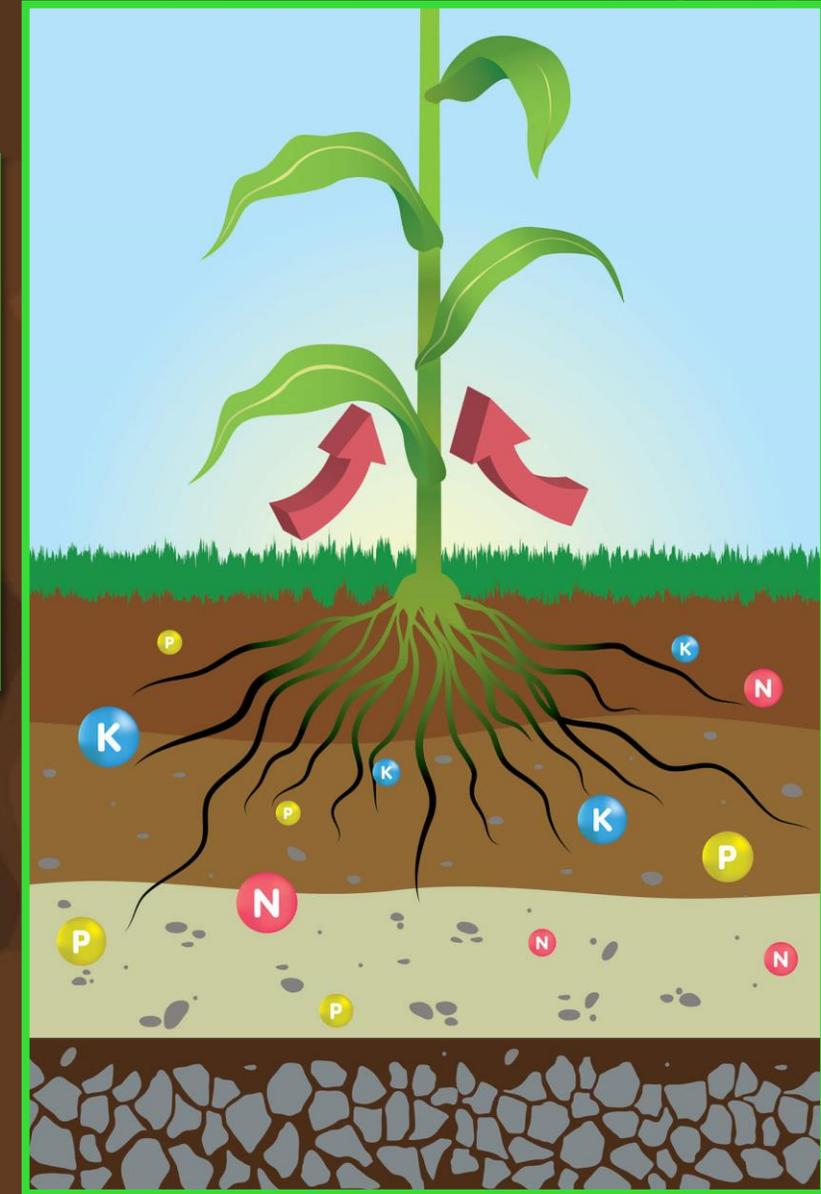
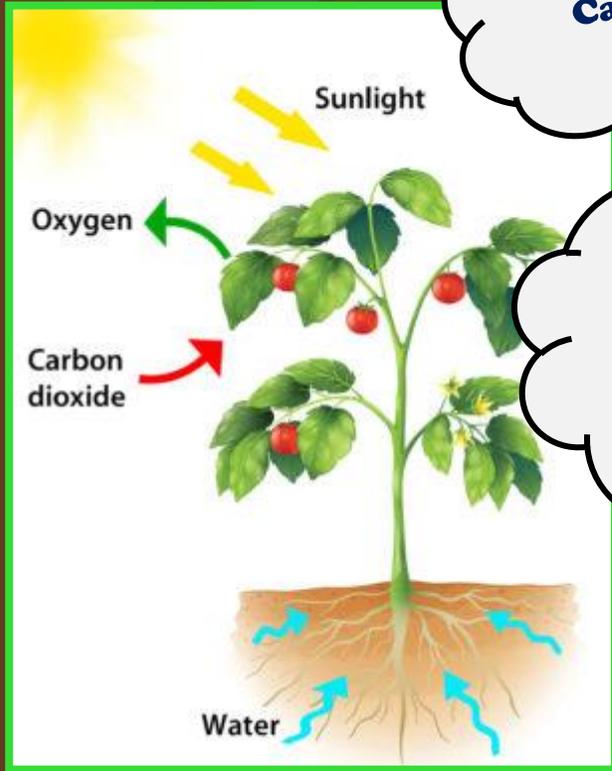
N 

**STRONG
ROOTS**

P 

**HEARTY
GROWTH**

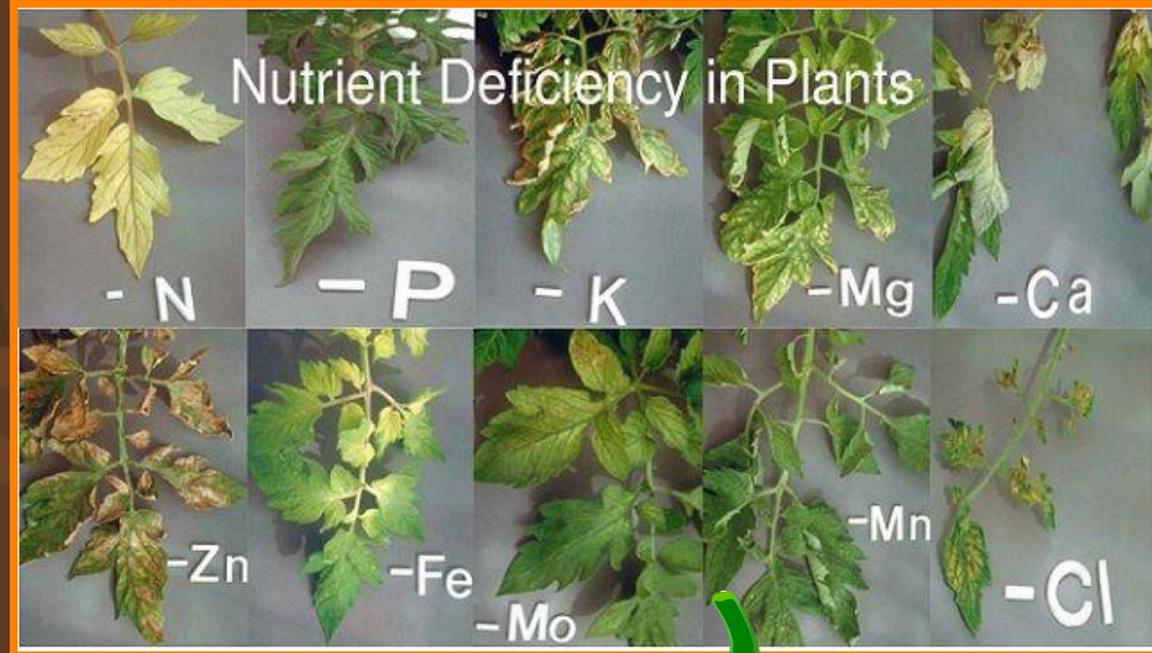
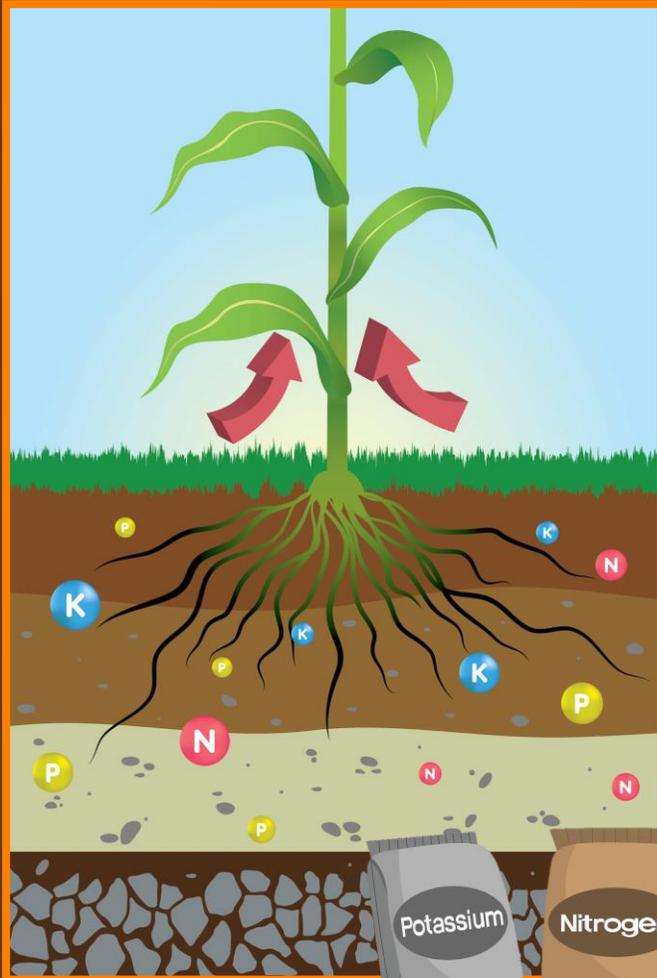
K 



Plant Nutrients

Balanced Nutrition makes a happy Pumpkin Grow!

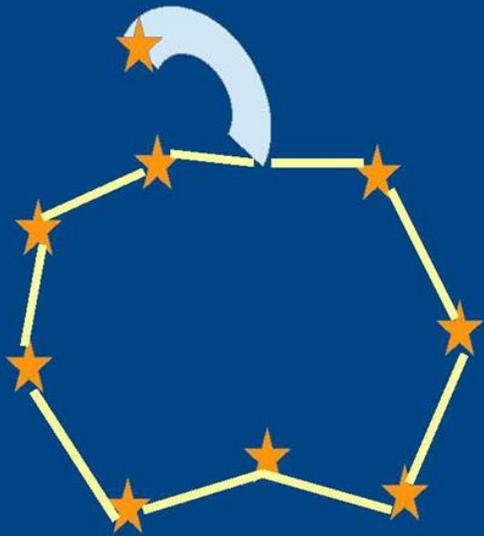
NPK on the bag!



Potassium
From Potash. It once was obtained from pots containing wood ash!

Too Much Nutrients can cause **Nutrient Toxicity** in plants and make them sick

Phosphorus
Comes from phosphate found in bones and animal waste



Team Constellation

What is Commercial Fertilizer?

What did your team find?

Where did you find it?

Spring Valley 4-H

Squash Squad

What is
Organic
Fertilizer?

Where did you
find it?



What did your
team find?

What are the differences between organic and commercial fertilizer?

Organic Fertilizer

Organic fertilizers come from animal or plant sources such as manures, compost, and bone meal. They contain multiple nutrients in low concentrations and take time to break down into forms plants can use.

Commercial Fertilizer

Commercial fertilizers are manufactured and made from synthetic materials. They only contain a few nutrients such as N, P, and K but in high concentrations. The nutrients are ready to be used by the plant right away.



Why do Plants
Need Healthy
Soils?

What did your
team find?

Where did you
find it?



Why do plants need healthy soil?



Sierra Shadow Spooky Shadow

Where did you find it?

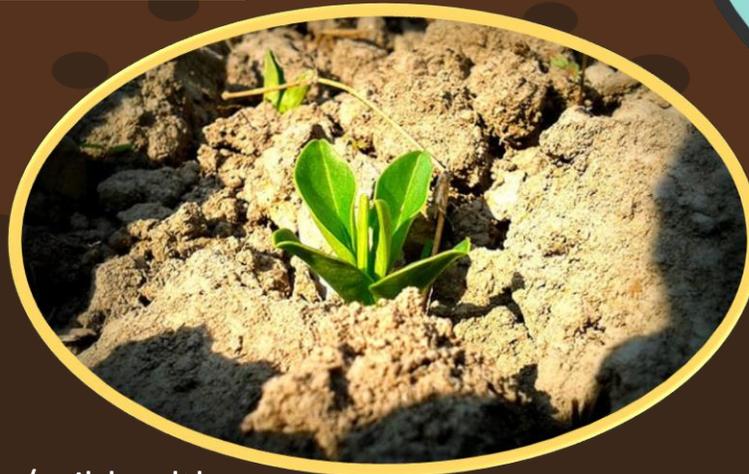
What are Some Signs of Unhealthy Soil?

What did your team find?



What are signs of unhealthy soil?

Can you grow plants in poor soil?



Pumpkin



Kingsburg
4-H



Smash!

18 USC 707

Name 2 Things
You Can Do to
Improve Soil
Health?

What did your
team find?

Where did you
find it?

Ways to Improve Your Soil



Use plant diversity to increase diversity in the soil.

Manage soils more by disturbing them less.

Keep plants growing throughout the year to feed the soil.

Keep the soil covered as much as possible.



I Love Orange!

What is Crop Rotation?

Where did you find it?

What did your team find?





Crop Rotation



How It Works

Crops are rotated each season in a planned sequence

Our Rotation

Winter forage,
fallow, pumpkins



How It Helps

- Reduces fertilizer needs and pesticide costs
- Protects water quality
- Increases organic matter
- Reduces soil erosion

What is a perfect flower?

What is an imperfect flower?

Besides pumpkin seeds what are 3 other seeds we eat?

What part of the plant absorbs sunlight?

What is germination?

What part of the seed emerges first?

What is Photosynthesis?

What is Chlorophyll?

Besides pumpkins, what other plants grow on vines?

What three things do the roots do for a plant?

What is xylem?

What is Phloem?

What part of the plant does the fruit develop from?

What are trichomes and what do they do?

What are tendrils and what do they do?



Plant Party Scavenger Hunt

Special Thanks

Acknowledgement:

Jeff Dahlberg
Tracy Newton
Katie Wortman
Gwenn Conville
Keith Byrum

KARE-ing Volunteers:

Cayci Allison	Mike Lopez
Christian Basulto	Victoria Morelos
German Camacho	Luke Paloutzian
Valeria Cisneros	Julie Pedraza
Tyler Colombero	Ryan Puckett
Evenia DiCicco	Jose Reyes
Jesus Ferreyra	David Rodriguez
Marvin Flores	Alma Romero
Kelsey Galvan	Reva Scheibner
Javier Herrera	Jaclyn Stogbauer
Brady Holder	Meuy Saechao
John Lake	Patrick West



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