

# Pumped Up For Pumpkins

2020

Lesson 4 & 5: Plants and Water

the virtual *pumpkin* project

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



UNIVERSITY OF CALIFORNIA  
Agriculture and Natural Resources

Research and Extension Center System

# Zoom Etiquettes



**Mute  
yourself**

**Be  
Ready to  
Unmute  
your mic**



**Raise your  
hand**

**Use the  
chat box**



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

# Crop Report

Should I prune vines?



| 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**

e

Insects: Squash Bugs  
Whiteflies

Gophers: Yes!

Some Yellowing  
Overall Healthy

50% Weeds



What is germination?

What did your team find?



# The Butterballs!

Where did you find it?





The process by which something begins to grow or develop

# Germination

Three things seeds need to germinate:

1. Water
2. Temperature
3. Light

What part of the seed emerges first?

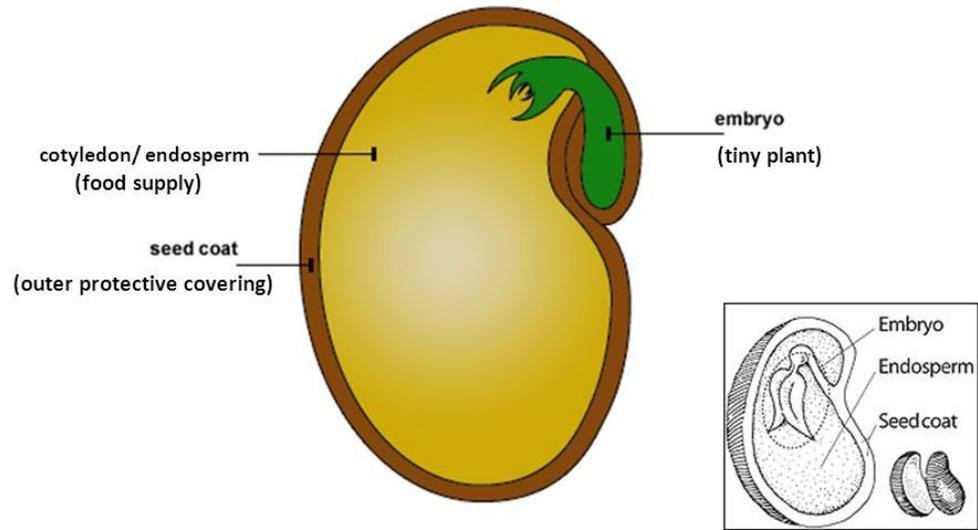


What did your team find?

Where did you find it?

# SEEDS

## Three Main Parts of a Seed



# I Love Orange!

Besides pumpkin seeds, name three other seeds we eat.

Where did you find it?

What did your team find?



A large pile of various grains, beans, and nuts. The items are arranged in a dense, overlapping manner. The colors of the items include red, white, yellow, green, and black. The labels are placed over the items in a circular pattern. The labels are: CORN (blue), SORGHUM (yellow), PISTACHIOS (blue), BLACK PEPPER (green), PEAS (green), SUNFLOWER (orange), ALMONDS (yellow), BEANS (orange), RICE (blue), SESAME (yellow), and CHIA (green).

CORN

SORGHUM

PISTACHIOS

BLACK  
PEPPER

PEAS

SUNFLOWER

ALMONDS

BEANS

RICE

SESAME

CHIA

What three things do roots do for the plants?

Where did you find it?



What did your team find?

PIKMIN SQUAD

Fairmont 4-H



# STEMS

- Support leaves, flowers, and fruit
- Transport fluids between the roots and leaves
- Store nutrients



# LEAVES

- Make food through photosynthesis
- Stomata absorbs carbon dioxide and release oxygen

# ROOTS

- Absorb water and minerals
- Anchor and support the plant
- Store food



Spring Valley 4-H

# Squash Squad

What is photosynthesis?

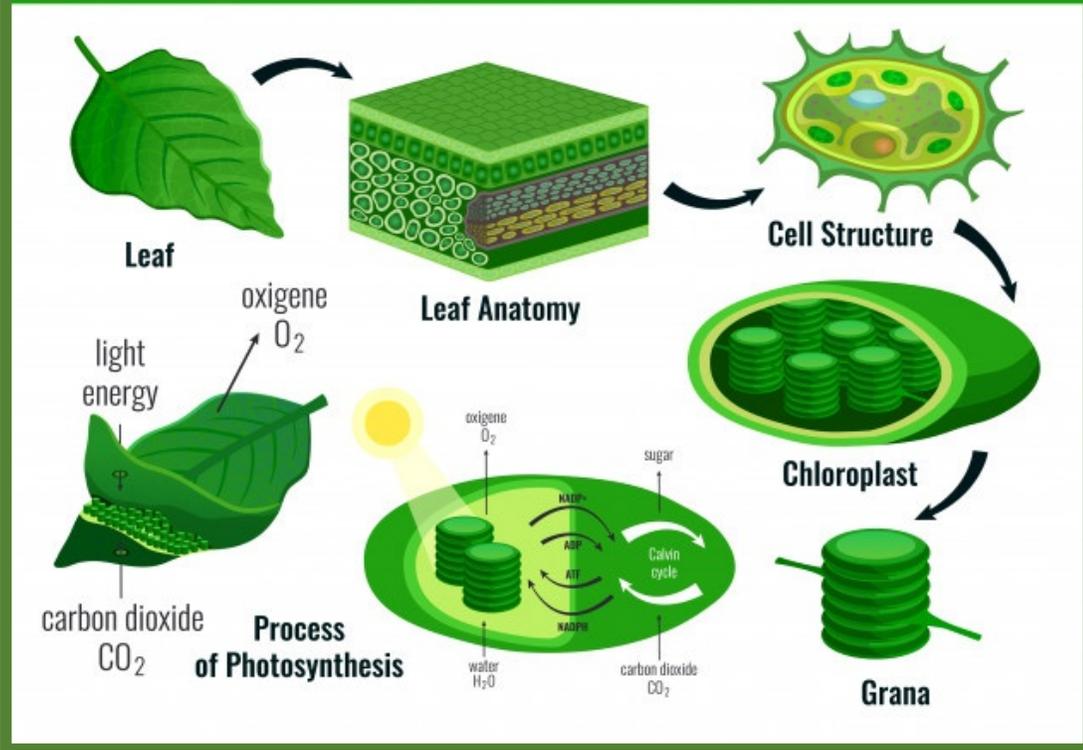
Where did you find it?

What did your team find?

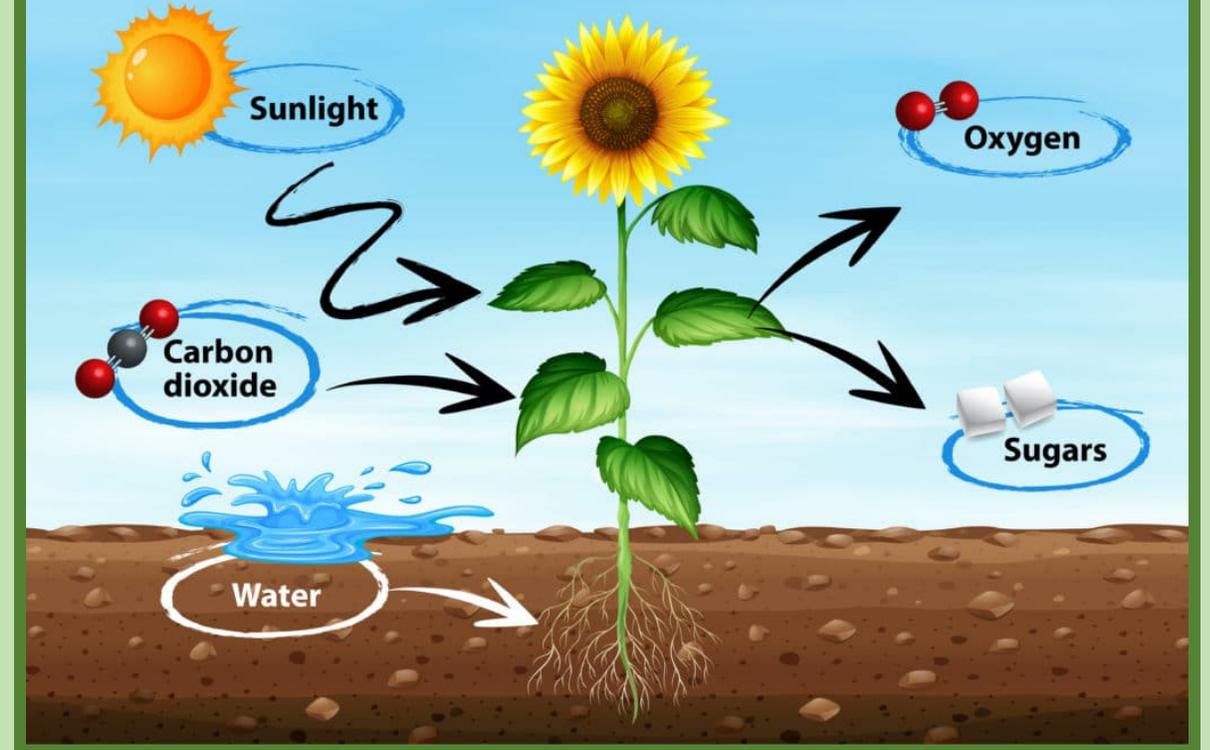


# What is photosynthesis?

## CHLOROPLAST FUNCTION IN PHOTOSYNTHESIS



## Process of Photosynthesis



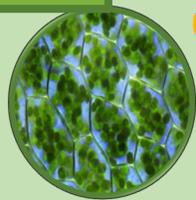
Carbon Dioxide



Water



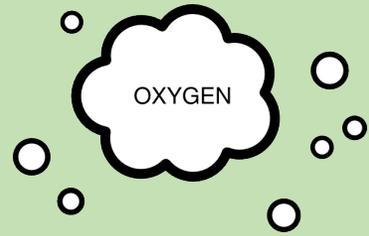
Chlorophyll



Sun



SUGAR



OXYGEN

# Sierra Shadow Spooky Shadow

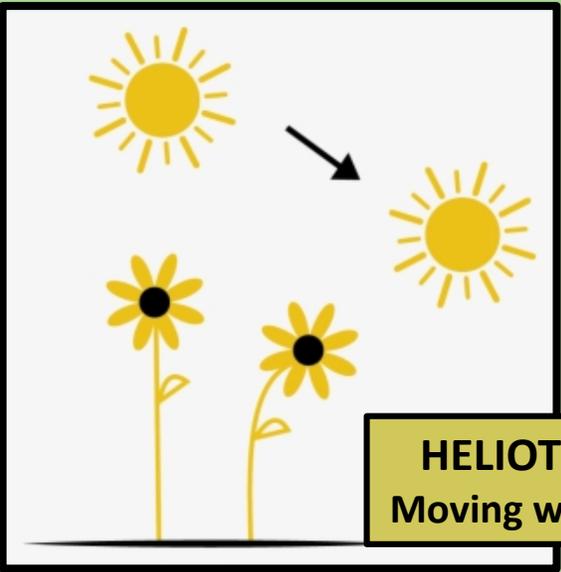
What part of  
the plant  
absorbs  
sunlight?

What did your  
team find?

Where did you  
find it?



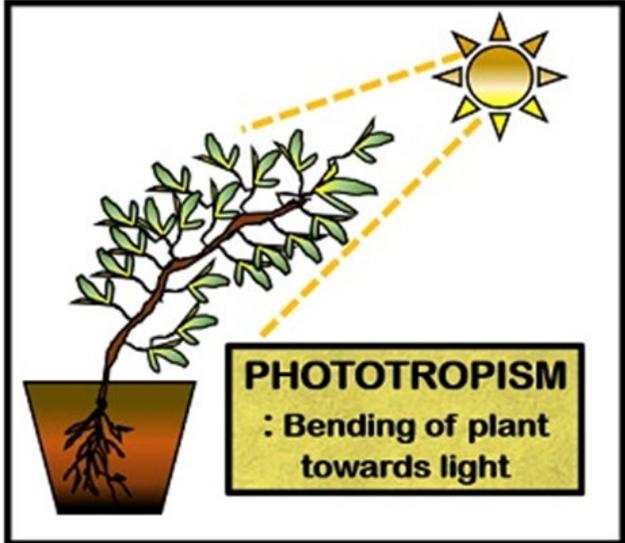
# What part of the plant absorbs sunlight?



**HELIO TROPISM**  
Moving with the sun



Leaves and  
Stems absorb  
sunlight



**PHOTOTROPISM**  
: Bending of plant  
towards light



What is chlorophyll?

# ROYAL KIDS

What did your team find?

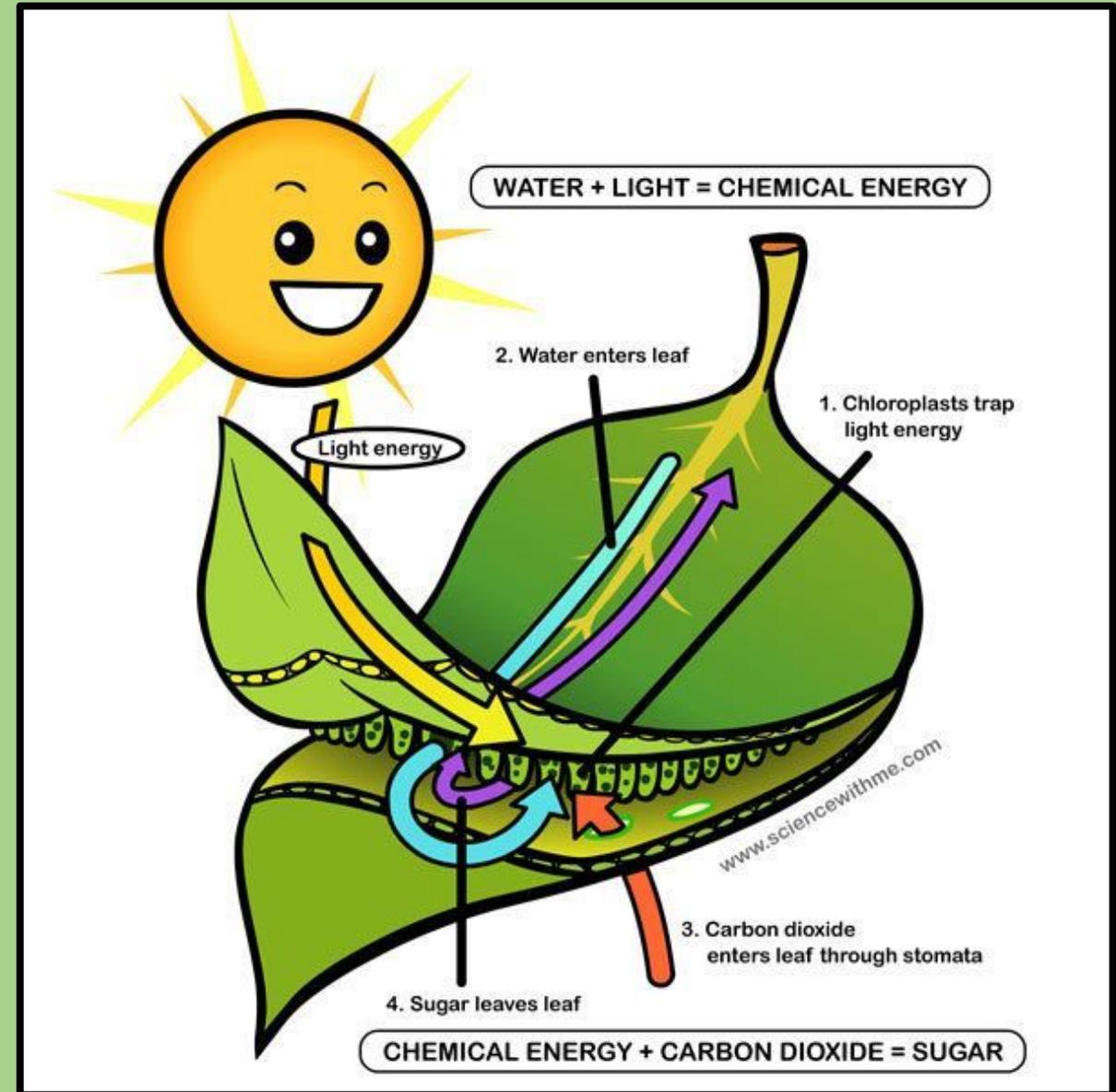
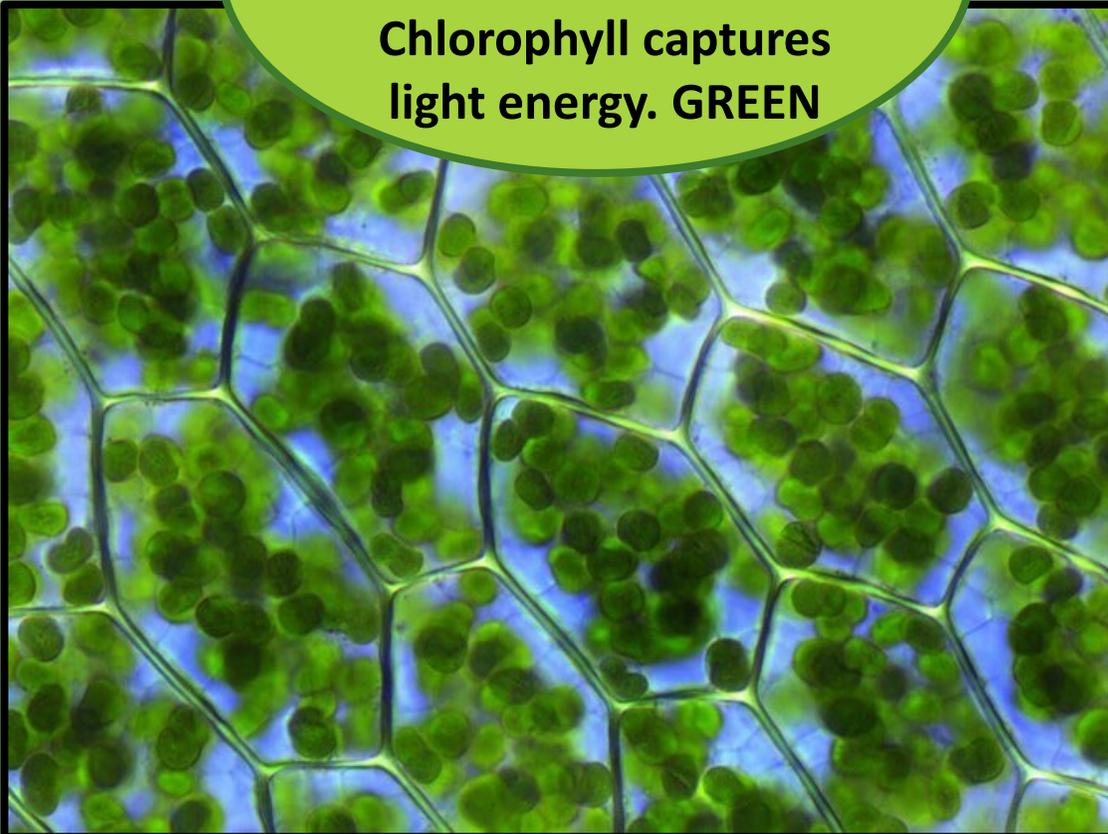
Where did you find it?



# What is chlorophyll?

Photosynthesis happens inside Chloroplast.

Chlorophyll captures light energy. GREEN



What is xylem?

# *PUMKINATORS*

What did your team find?

Where did you find it?



# Goal

What is phloem?

What did your team find?

Where did you find it?

# Diggers



# The Movement of Nutrients

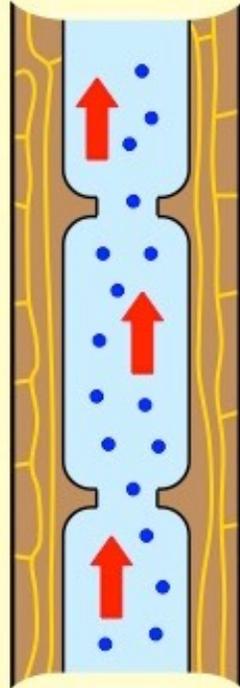


water and minerals

no end walls between cells

one-way only

outer cells are not living



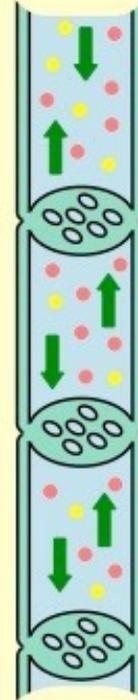
**XYLEM**

organic molecules

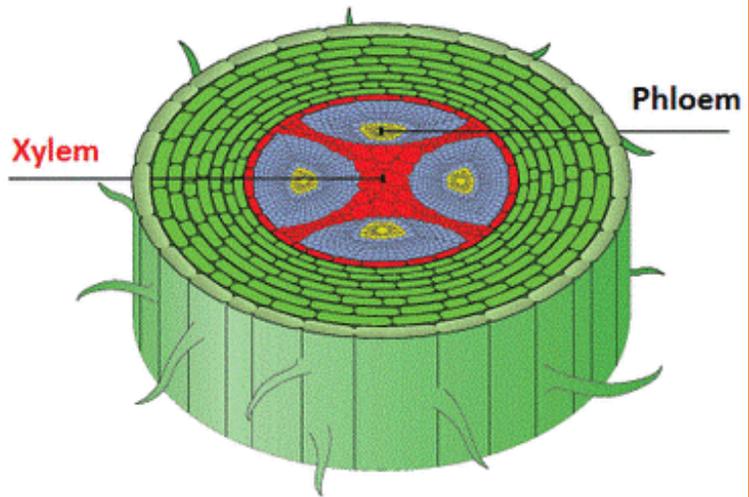
end walls (sieve plates)

two-way movement

cells are living but need support



**PHLOEM**



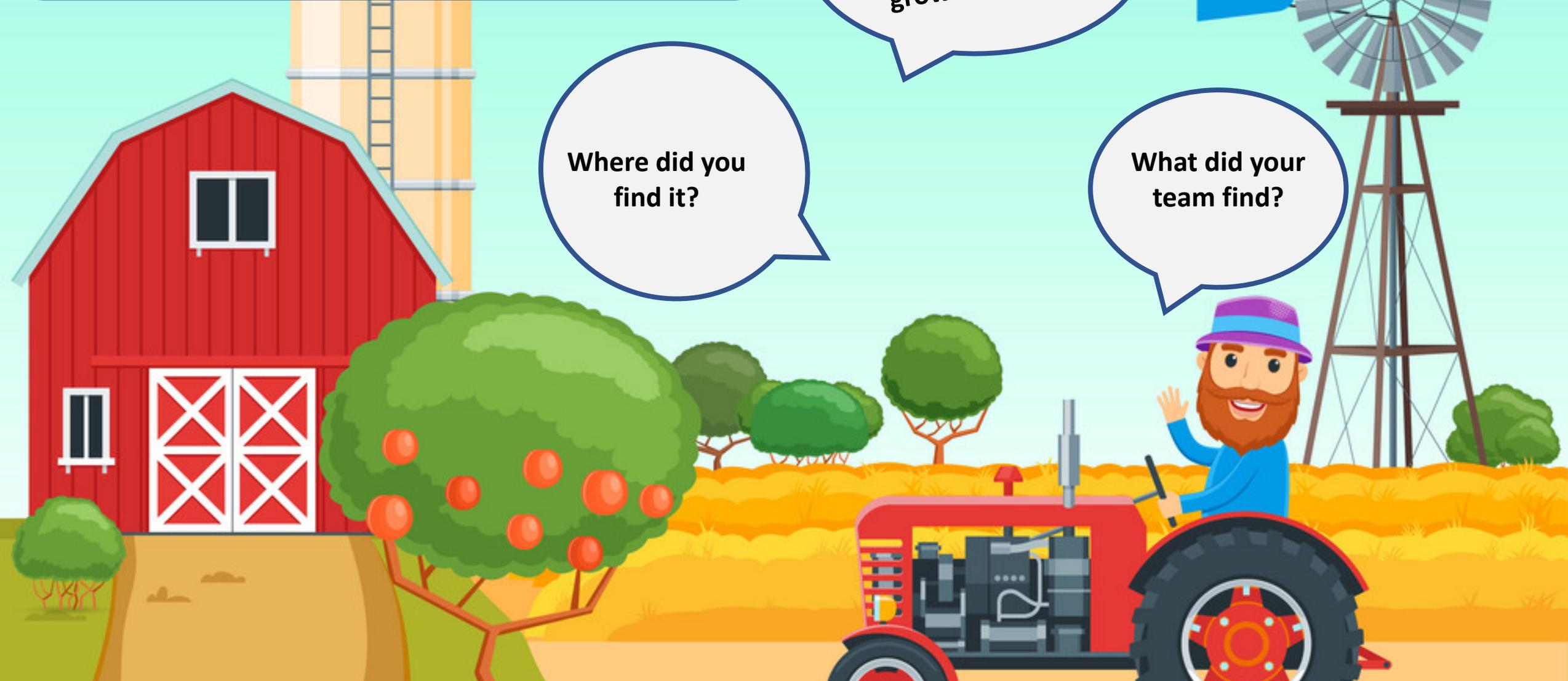
**Pumpkins** are 90% water but can grow bigger and bigger because of the efficiency of their supersize **phloem**.

# West Fresno Sweet Potato Pumpkin Patch

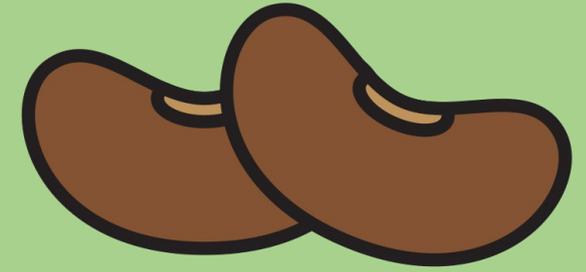
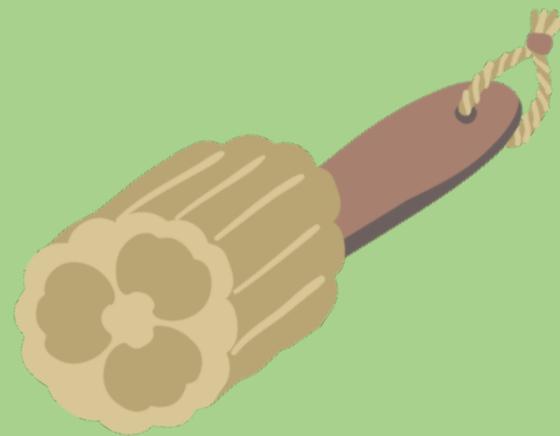
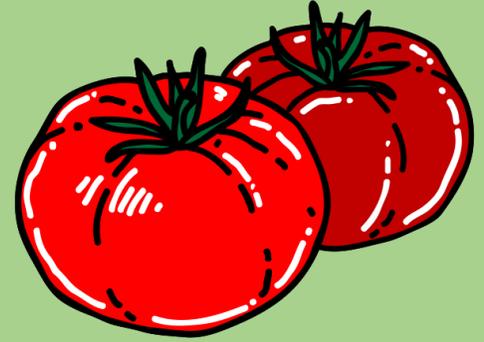
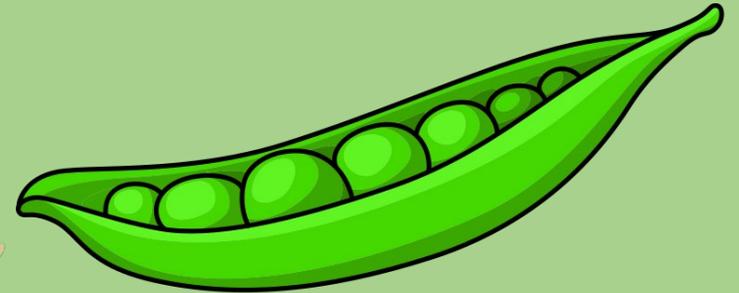
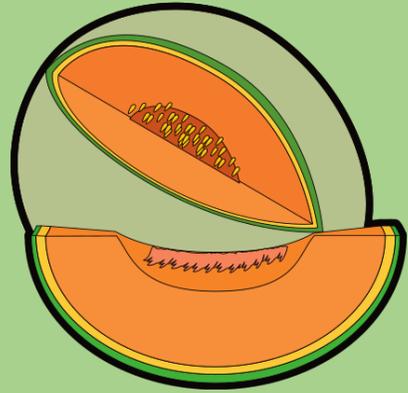
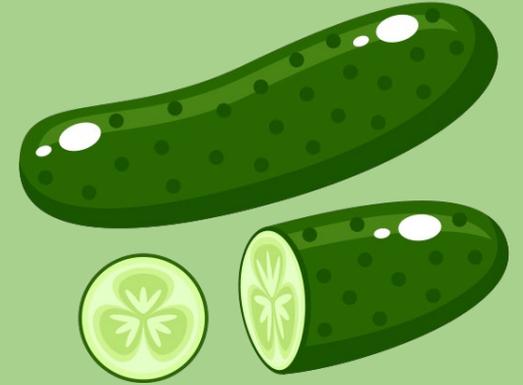
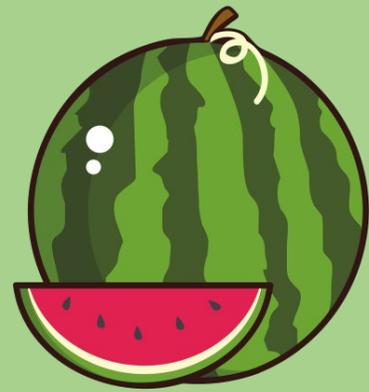
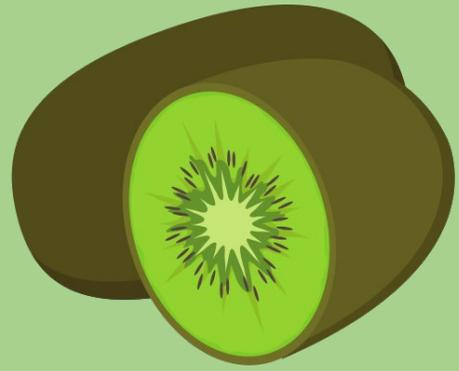
Besides pumpkins,  
what other plants  
grow on vines?

Where did you  
find it?

What did your  
team find?



What part of the plant is the vine?



# Reedley 4-H Pumpkinology

What is a perfect  
flower?

Where did you  
find it?

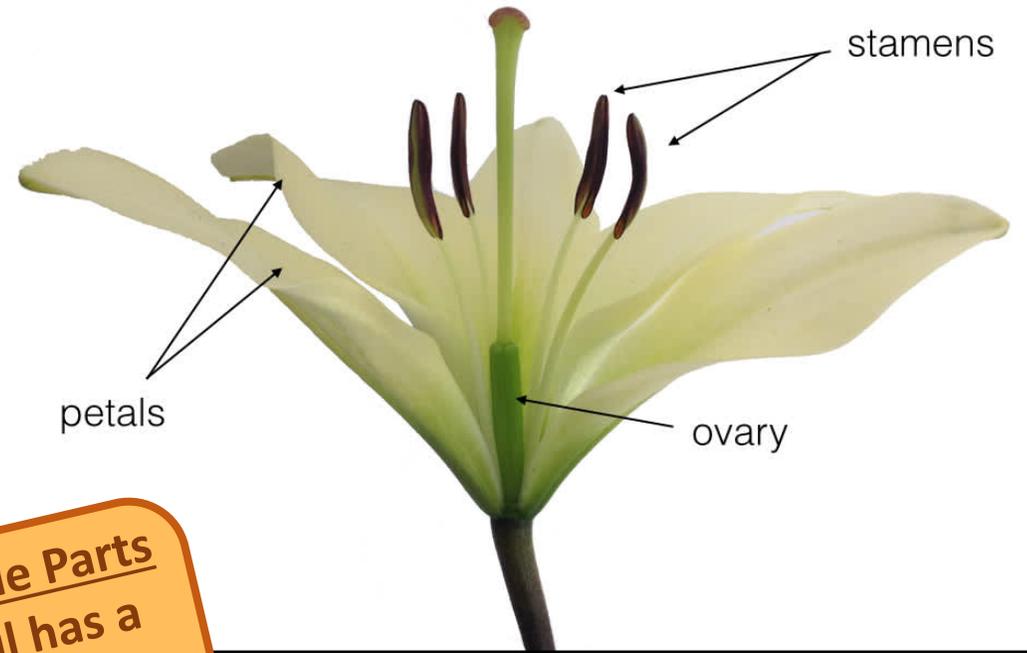
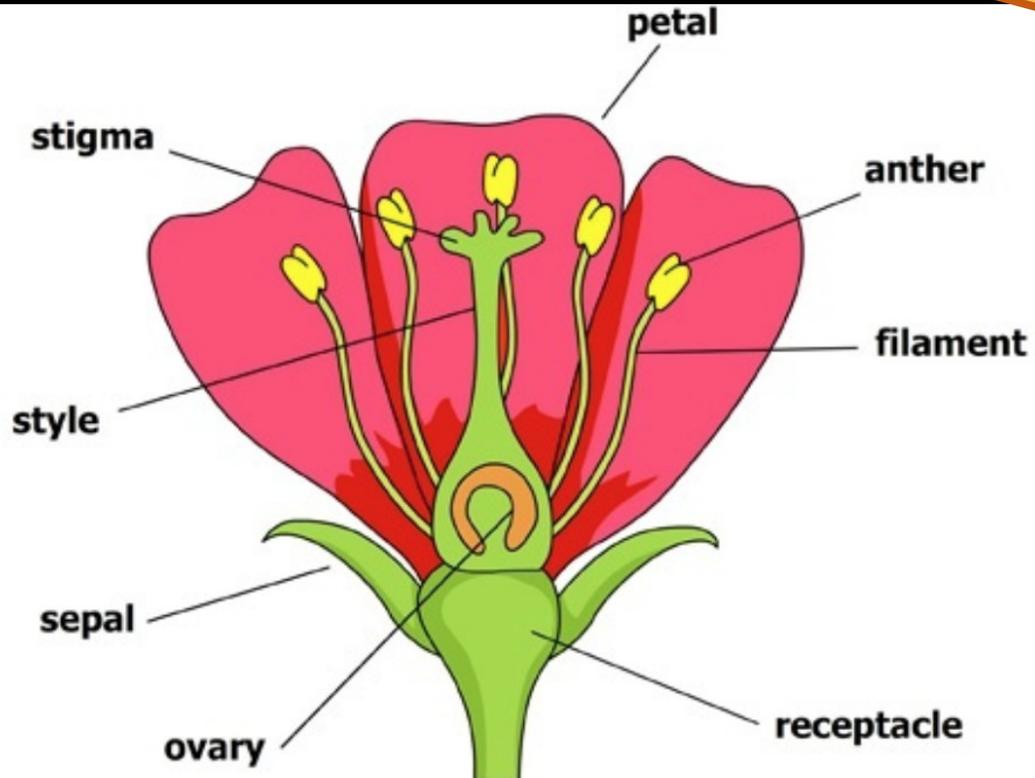
What did your  
team find?



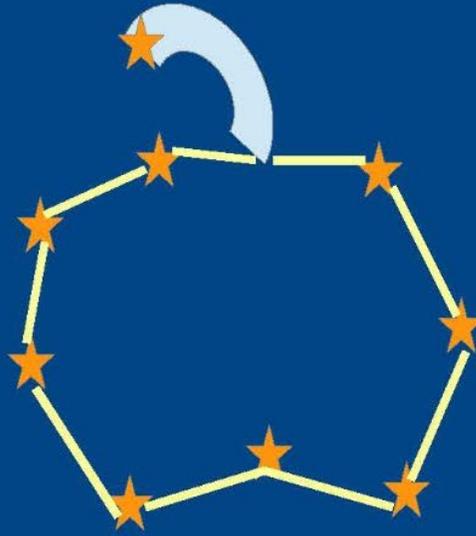
# What is a perfect flower?

Contains Male  
and  
Female Flower  
Parts

Male Parts  
Stamen has an  
Anther  
Filament



Female Parts  
Pistil has a  
Stigma  
Style  
Carpel  
Ovary



# Team Constellation

What is an imperfect flower?

What did your team find?

Where did you find it?

# PUMPKIN 3.14

What part of the plant does the fruit develop from?

Where did you find it?



What did your team find?



# What is an imperfect flower?

Male and Female Flowers are separate



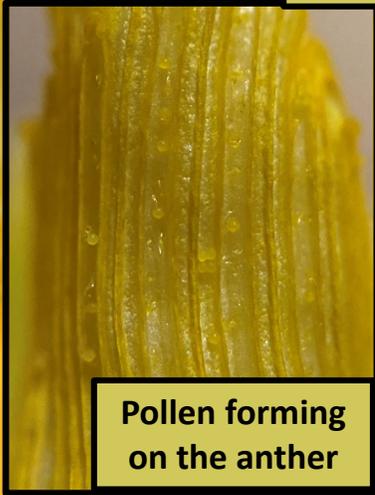
Female Flower



Male Flower



Pollen attached to the Stigma



Pollen forming on the anther



# Pollination

## GARDEN Hints and Tips

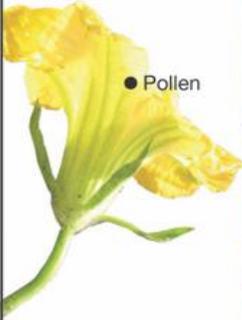
### Pumpkin Pollination

Pumpkin plants are not naturally self-pollinating and require the help of insects or hand pollination for it to occur. The male flowers have get to the stigma of the female flowers to set fruit.

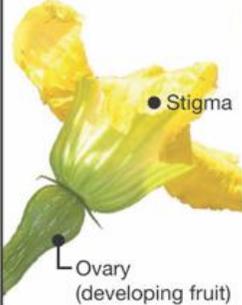
#### Identification

Pumpkins have separate male and female flowers.

#### MALE



#### FEMALE



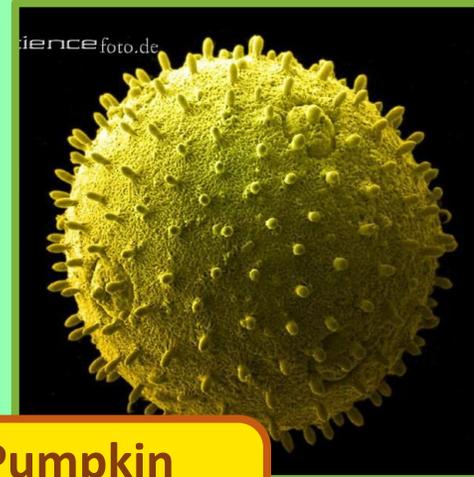
#### Hand Pollination

1 Female flowers open in the early morning while the male flowers are still viable.



2 Remove a few male flowers from their stems. Transfer the pollen by rubbing the male flower centers against the female flower centers, or gather the pollen on a soft brush and transfer it onto the top of the stigmas in the female flowers.

3 Tie the female flowers shut with string or a zip tie to ensure the hand pollination remains uncontaminated.

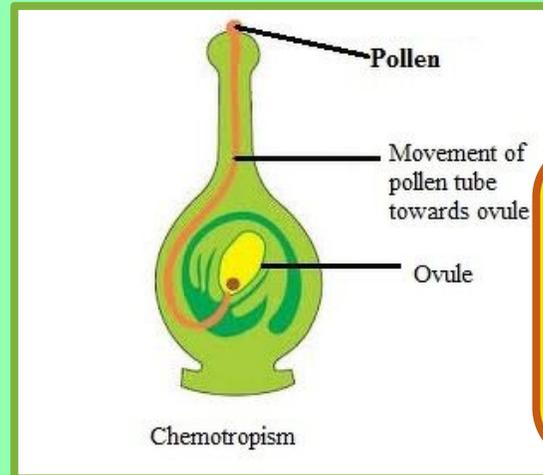


Pumpkin Pollen shape

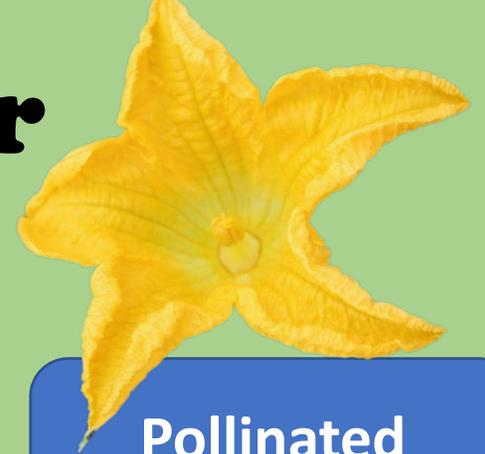


Chemotropism Response to chemical compounds

Bumblebees don't like pumpkin pollen



# What happens if a flower is not pollinated?

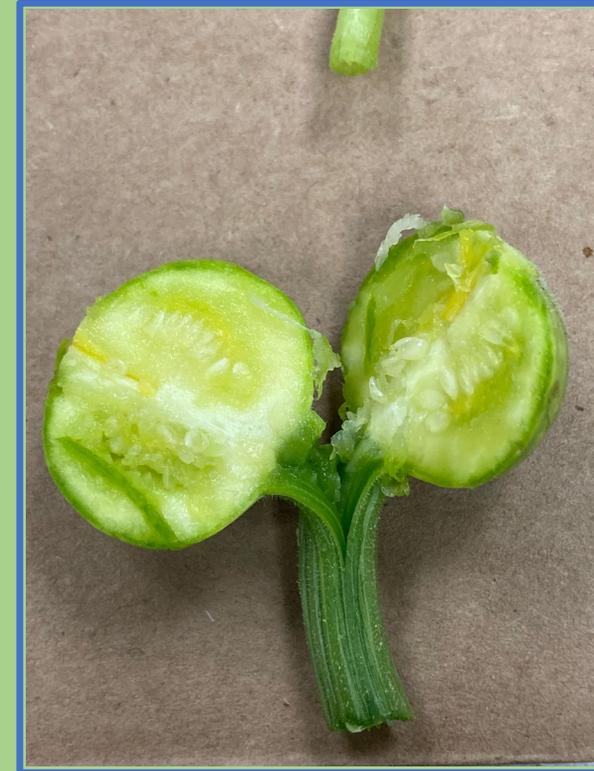


Pollinated Flower Base



Different flower stages

Dissected Flower Base



Unpollinated Female Flower

# Kerman Pumpkin Pickers

What are  
tendrils and  
what do they  
do?

What did your  
team find?

Where did you  
find it?



# What are tendrils and what do they do?



Specialized  
plant part for  
Support and  
Climbing



Thigmotropism  
moves to  
respond by  
touch

Pumpkin



Kingsburg  
4-H



Smash!

18 USC 707

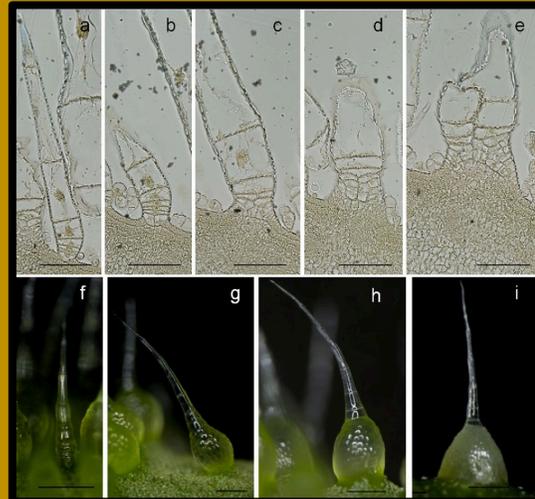
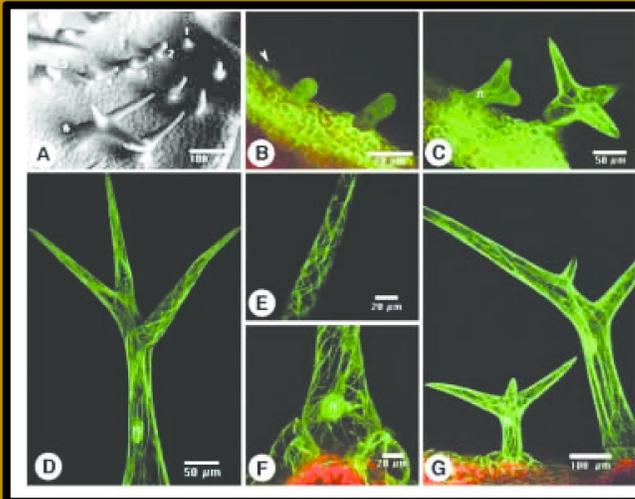
What are trichomes and what do they do?

What did your team find?

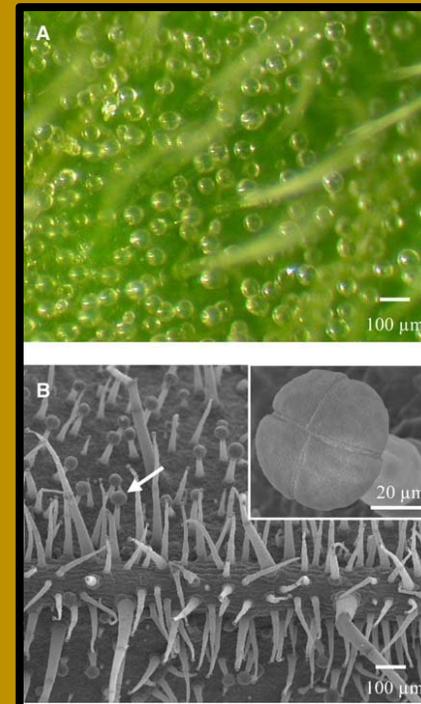
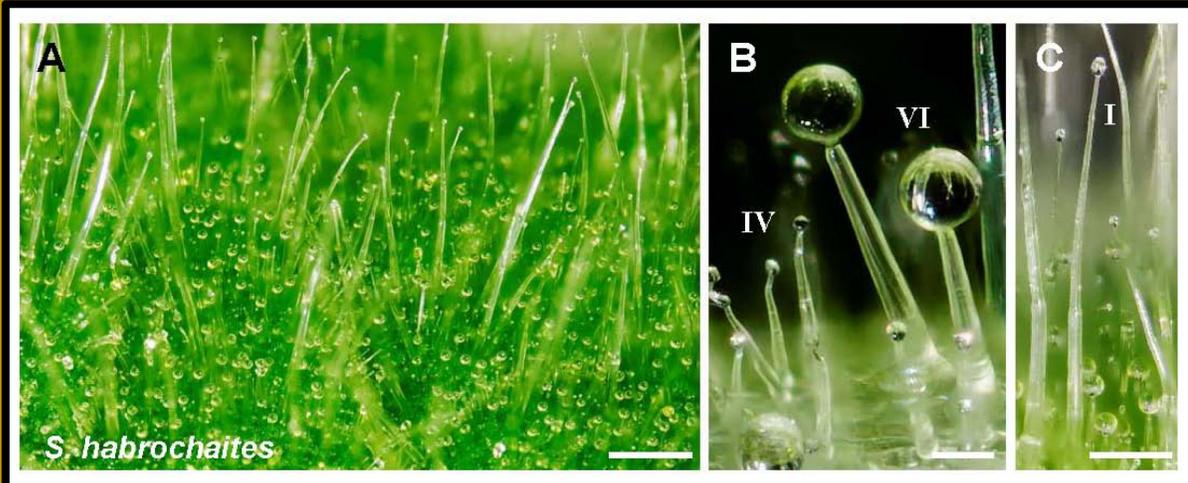
Where did you find it?

# What are trichomes and what do they do?

Protection against pest, wind and heat.  
Attract species



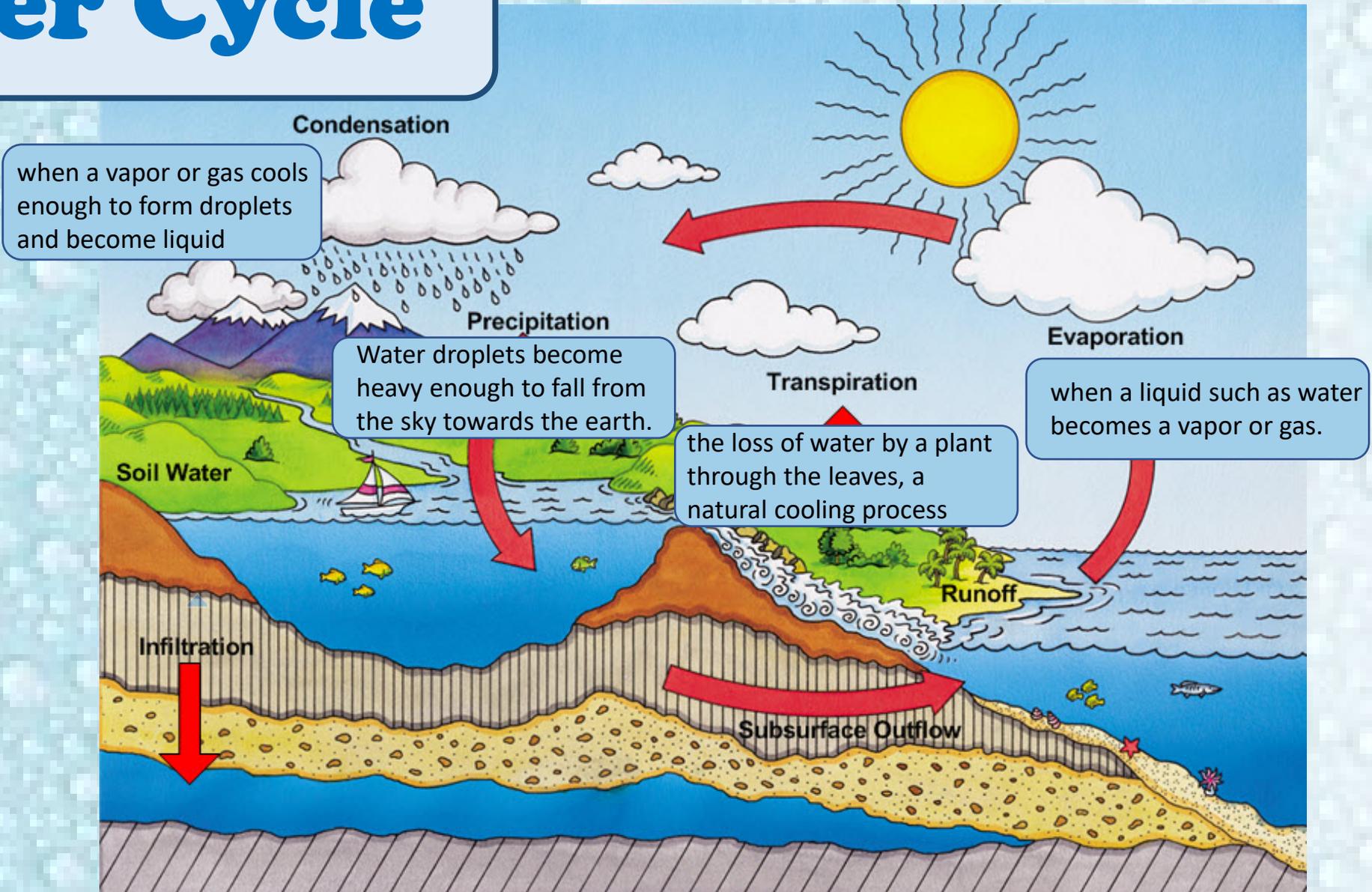
Different shape and sizes.  
Sometimes glandular liquid



The image features a vibrant blue background with a soft, ethereal glow. In the center, three clear, spherical water droplets are arranged vertically, appearing to fall or rise. Below the bottom droplet, a series of concentric ripples emanate from a point of impact, creating a sense of movement and depth. The ripples are most pronounced in the lower half of the frame. In the upper corners, several bright green, elongated leaves hang down, their edges slightly blurred, adding a natural, fresh feel to the composition. The overall aesthetic is clean, refreshing, and serene.

# **PART 2: WATER**

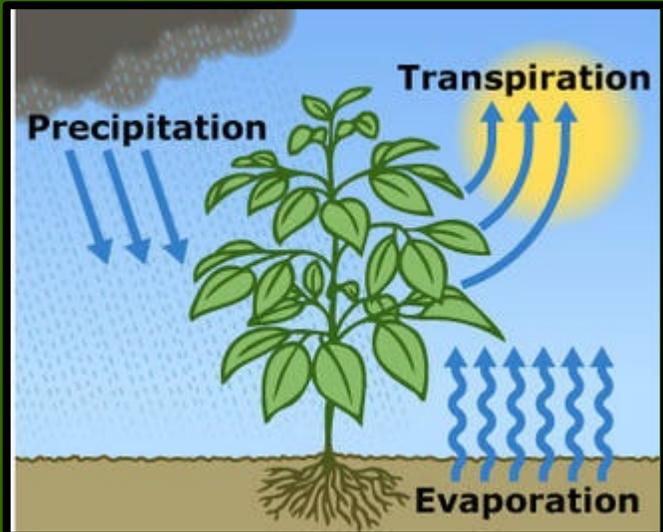
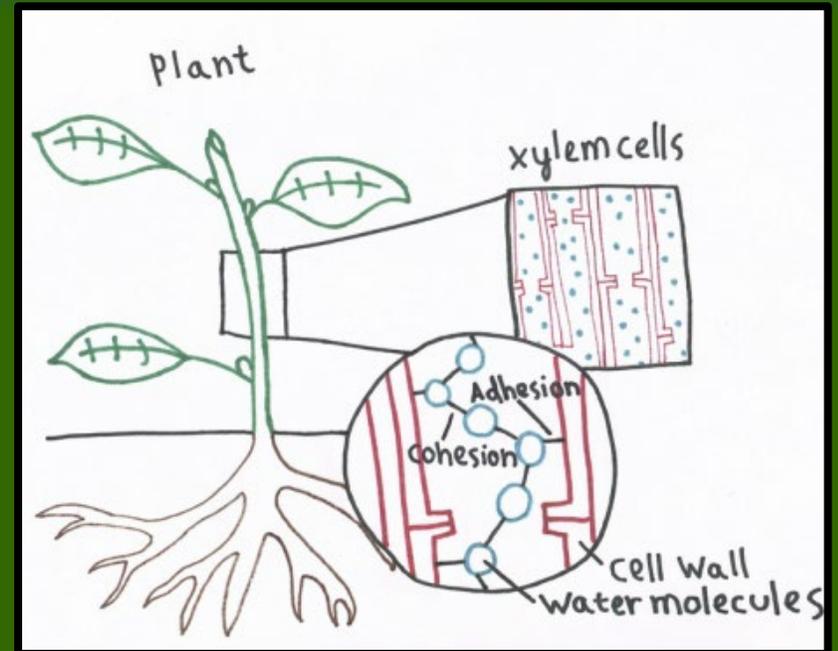
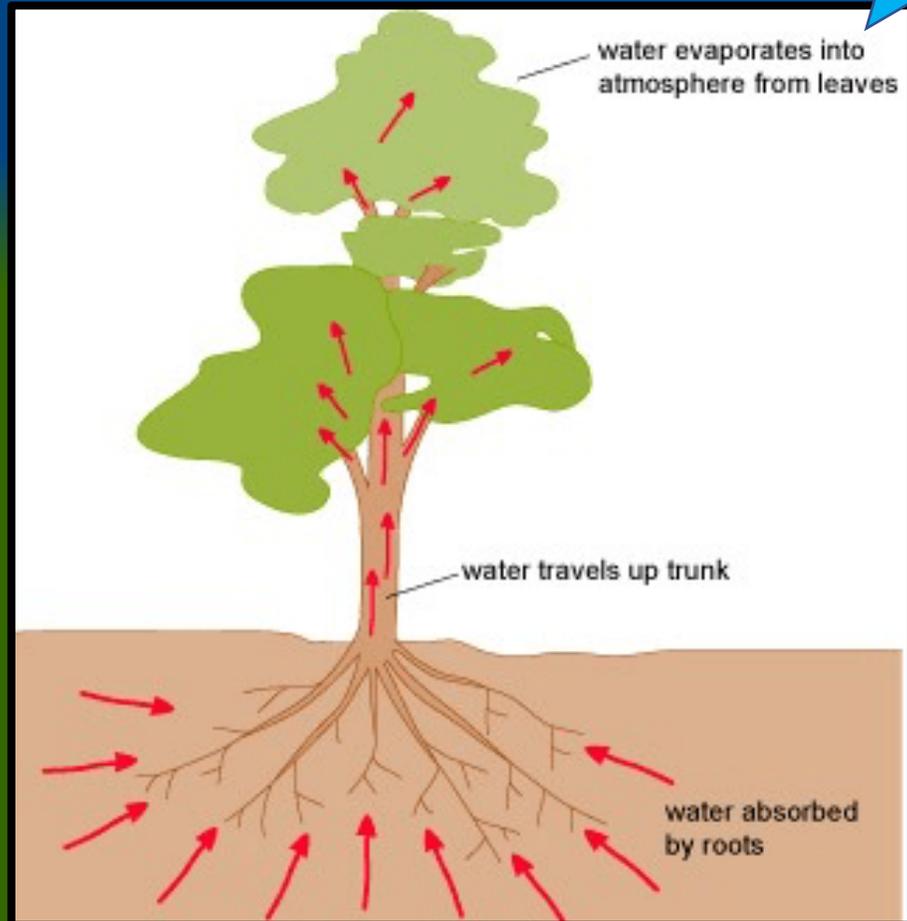
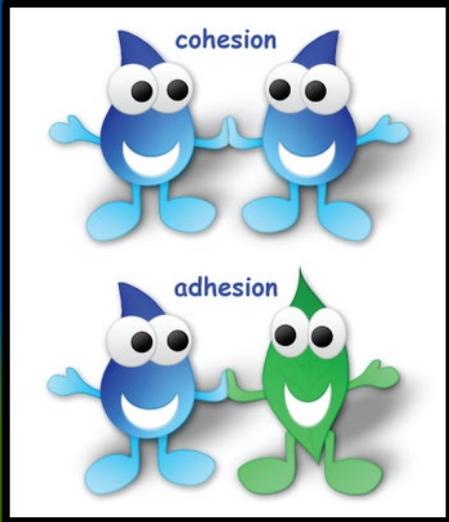
# Water Cycle



# Water Movement from Soil to Atmosphere

Capillary Action!!

Capillary action in your pumpkin vines is responsible for moving water through the



# So how much water does a plant or tree need a day?

By Ryan's calculations, on a hot day, each of your fully grown pumpkin vines drink about 4 gallons of water.

It all depends...

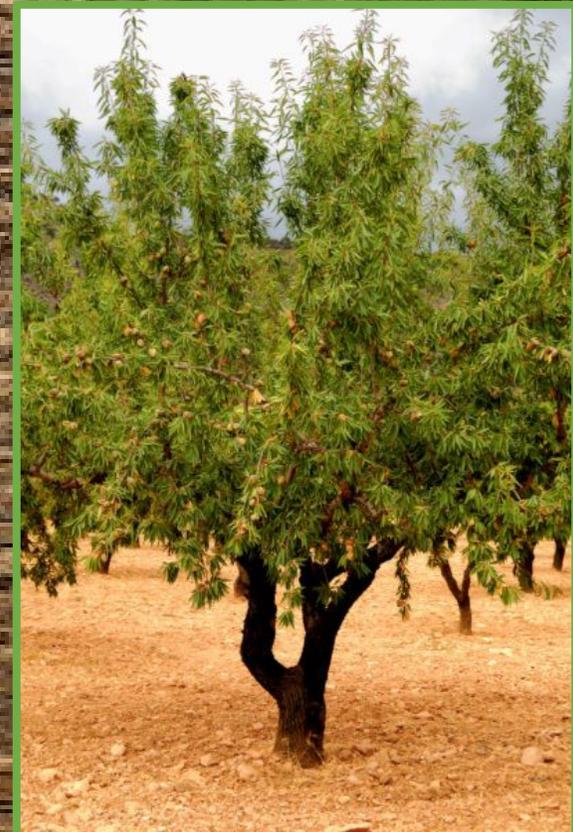
- How hot it is per day
- How dry the air is
- How much wind there is
- The size of the plant or tree
- How big the leaves are and if the plant is drought tolerant

A full-grown almond tree may drink up to 50 gallons of water in a day!



Small tomato vines in the garden possibly need one gallon per day, until it is big enough to need two gallons.

A succulent like an agave could go a month on just a gallon of water.



# Water

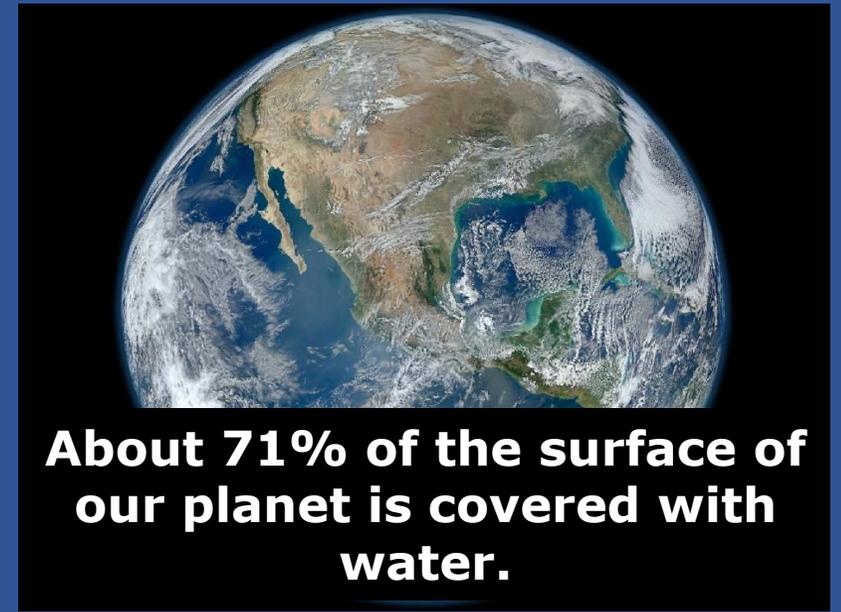
## Earth's water supply

Most of the fresh water is tied up in ice at the poles and in glaciers. About 30% of fresh water is in the ground, leaving only 1% of the world's fresh water at the surface of the planet.

96.5% salty sea water

1% other salt water

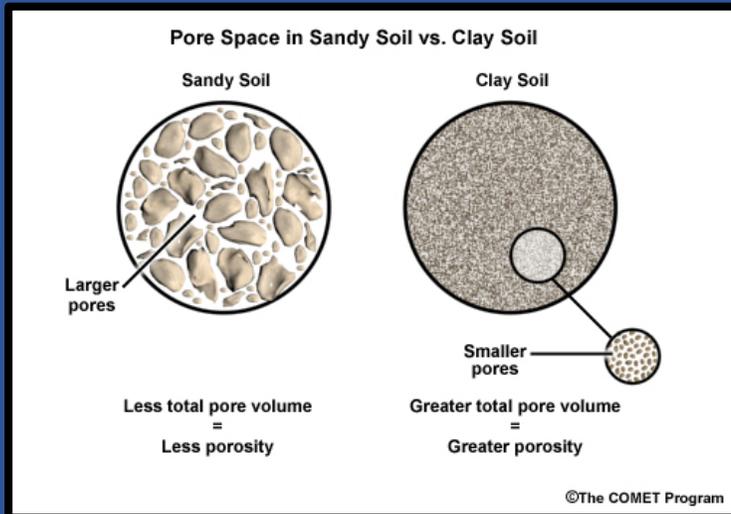
2.5% fresh water



**About 71% of the surface of our planet is covered with water.**

Soil that is too sandy can't hold the water you give it before it drains below the roots.

### Review: Soil Lesson



Soil that has a lot of clay holds on tightly to the water. It has so much surface area in contact with water molecules. Adhesion, making it hard for the roots to uptake water.

Most plants do not like salt. Plants won't do well where the soil contains high levels of salt and when the irrigation water has high levels of salt. This is a big problem on the west side of the Central Valley.



# Pests Scavenger Hunt

Name the different types of pollinators.

What are commercial pesticides?

How to aphids feed?

Name two ways to remove squash bugs without pesticides.

Name two types of insect feeding behavior.

What is an instar?

What are organic pesticides?

What are squash bugs?

What is Integrated Pest Management?

What is pollination?

What is a pest?

What is a parasitoid?

How do gophers harm pumpkins?

How do aphids cause sooty mold?

# Special Thanks

## Acknowledgement:

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Gwenn Conville  
Keith Byrum

## *KARE-ing Volunteers:*

|                   |                  |                  |
|-------------------|------------------|------------------|
| Cayci Allison     | Kelsey Galvan    | Ryan Puckett     |
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| German Camacho    | Bryan Heyano     | David Rodriguez  |
| Valeria Cisneros  | Brady Holder     | Alma Romero      |
| Tyler Colombero   | John Lake        | Meuy Saechao     |
| Evenia DiCicco    | Mike Lopez       | Reva Scheibner   |
| Jesus Ferreyra    | Victoria Morelos | Vincent Silva    |
| Marvin Flores     | Luke Paloutzian  | Jaclyn Stogbauer |
|                   | Julie Pedraza    | Patrick West     |

