

3 PEAS IN A HINDI

By Chaya & Maya





Aim & Introduction

To create a terrarium that will be sealed to grow 3 peas over the course of 4 weeks without letting anything come in or out of the biome. This experiment will allow us to understand if life can actually survive in a bubble.



Hypothesis

I think that by sealing the terrarium with a glad wrap close without giving the pea any extra water, the plant will still flourish and grow a stalk. I believe this because by giving the terrarium sunlight and heat the plastic will sweat and provide water to the plant. However I also think that the soil may contain microorganisms (decomposer) that could effect effect the growth of the plant.

METHOD

STEPS

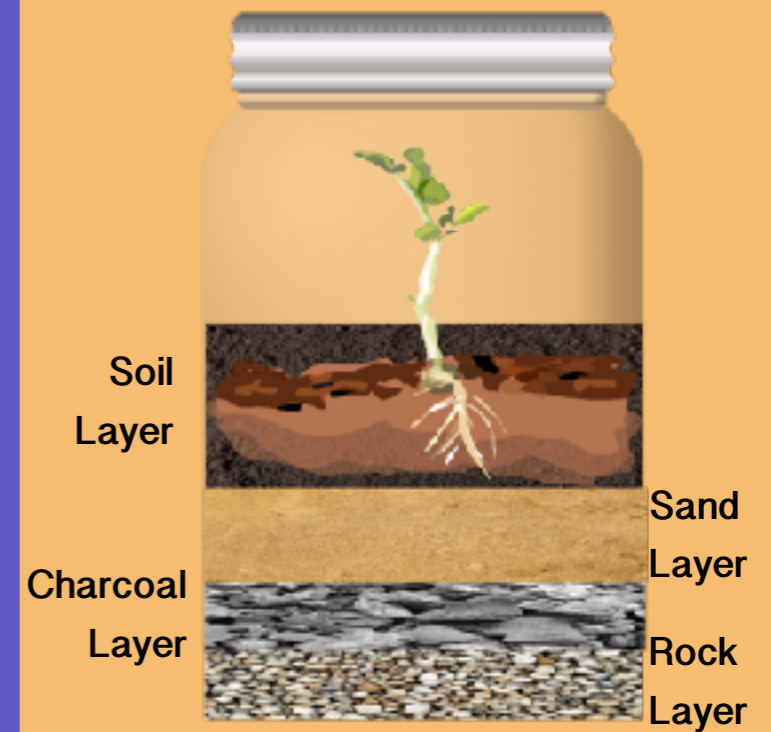
1. To construct the terrarium, collect a jar that is big enough to hold the 5 layers of charcoal, moss, rocks, soil and sand
2. Begin layering the jar in the order of rocks, sand, charcoal, soil and then moss
3. Collect 3 peas and place them in the soil, making sure they are visible from the outside
4. Feed the plant 200ml of water
5. Now collect glad wrap and seal the jar making sure that nothing can get in or out, use masking tape for a better outcome.
6. Leave the terrarium by a window and let the plant grow.

POSITION OF PEA

The position and placement of the planted pea does not effect the growth of the root, this is because the root always grows directly downward. You can tell if the pea is placed upside when the taproot sprouts, if the taproot sprouts from the top part of the pea the root still makes its way down the soil.



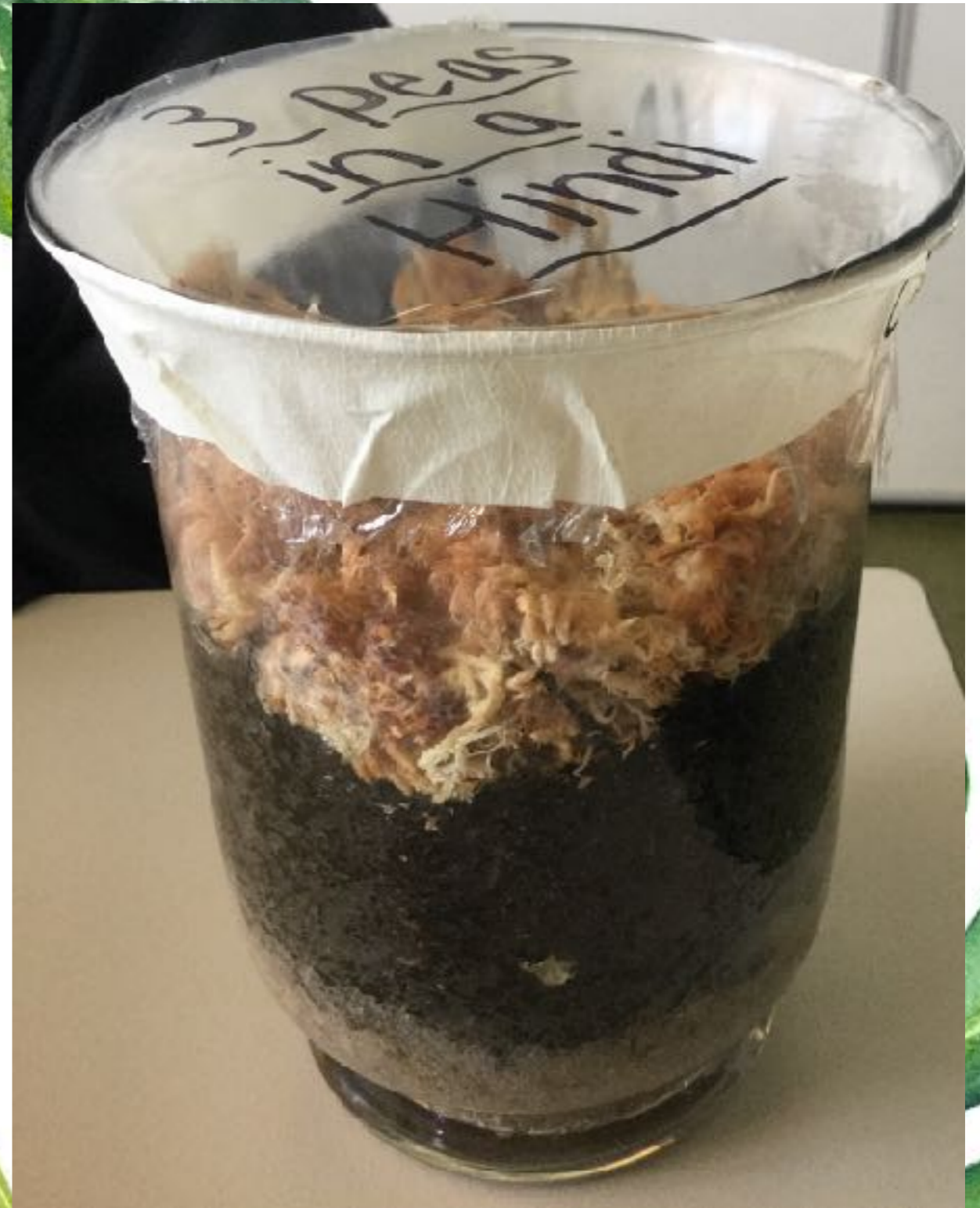
Here is an example of one of the peas sprouting . The picture shows that the root sprouted from the top of the pea, maybe because it was placed upside down. However the root is responding to gravity and making its way down.



Day 1 - Wednesday 18th

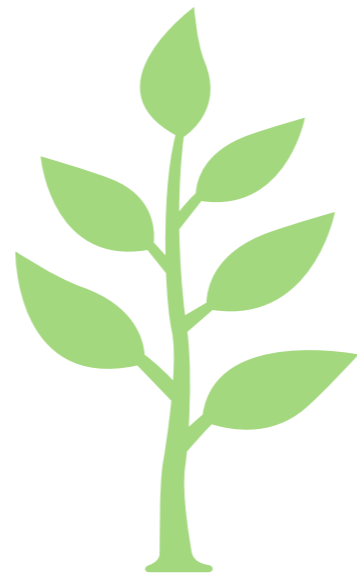
Today is my first day in my new home, I'm being joined by 2 other peas named Peter and Piper, my name is Patricia. I've been planted in a biosphere where I am retained and kept away so that nothing enters or exits my habitat.

Patrica out 🍌





Patrica (me)



Piper

Day 6 - Tuesday 24th

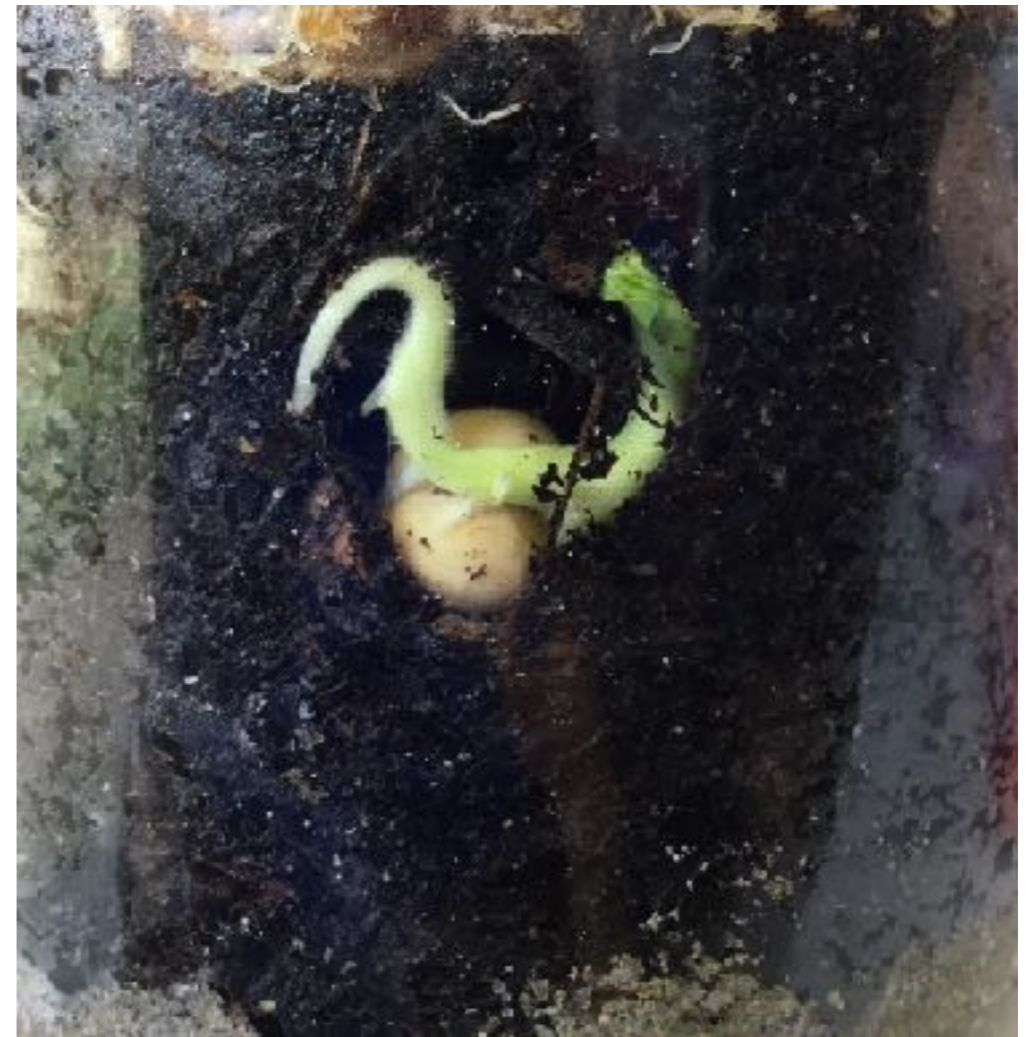
It's currently Day 6 of my life in the terrarium. Lately I've been very thirsty and started adventuring for some water so that I can continue to grow and sprout sometime in the future. I've begun my search for water but it seems my dear friends are searching the opposite way to me, so I've been considering following them. From my 6 days in this terrarium I've noticed that the water in my terrarium is evaporating and is leaving moisture on the walls.

Patrica out 🤞

Day 8 - Thursday 26th

It's now been a total of 8 days that I have spent growing and living in this terrarium. I've begun my trek down just like my other friends in hope to find a water source. I have also started sprouting a stem just like my other friend Peter! During my 8 days in my biosphere I've been thinking that my creator might of planted Peter and Piper too far down in the soil, this may impact the growth of my friends because they might not be able to reach the surface. Unlike my other friends I have yet to grow any branch roots yet.

Patrica out 🙌



Patrica (me)



Peter



Piper

Day 12 - Monday 30th

It has been 12 days that I've spent enclosed in the terrarium now. Upon the 12 days I've been very busy growing feeler roots that have been put to work to search for water and nutrients. My stem has also found its way to the top just like my friend Piper, however her stem is hidden among the moss. My roots look very different compared to my friends. This may be because I was planted upside down and when I sprouted my roots came from the top of the pea instead of from the bottom and are responding to gravity which makes the roots look the way they look Patrica out 🙌



Peter



Piper



Patrica (me)



Piper



Patrica (me)



Peter

Day 14 - Wednesday 2nd

Upon day 14 of life in our Hindi clan, I've spent my day daydreaming about the strange moisture that has been left upon the wall. I overheard our creator talking about the unknown moisture and apparently it's water, that has been left on the roof due to evaporation. Evaporation is important to our little ecosystem as we live inside and sealed and don't get water. So we rely on the sun to evaporate the water that gets caught on the glad wrap and condenses down to us. This is how we survive without needing extra water.

Patrica out 🤞

Day 19 - Monday 7th

Today is a big day for me! Between my last entry and now, you can spot two massive changes... our terrarium has three tall and healthy stems and secondly we have been freed from our enclosed ecosystem. This could be dangerous, as that I predict that all of our water will be evaporating into the atmosphere and we will be receiving nothing. At the moment I am the tallest pea out of our Hindi clan, however I did have a head start as I was planted closer to the surface and not as squished in as Peter and Piper! Also as you can see our feeler roots have extended and have kept growing. I've overheard my creator and her teacher planning a mass murder upon our Hindi clan. So if this is my last entry...
goodbye

Patrica out 🙌



Patrica (me)



Piper



Peter



Peter



Patrica (me)



Piper

Day 21 - Wednesday 9th

Nothing much has changed over here since the last time I checked in. Life is running smoothly however I do have one problem which is that I'm very thirsty and finding it hard to find any water! I'm beginning to believe that my creator has begun her attempt to murder me and my friends by dehydrating us.

Patrica out 🙌

Day 26 - Monday 15th

Day 26 of life in the terrarium has been a hard and frustrating day. My day ended by having an introduced species enter by biome who then began mauling and eating my friend Peter. I have also have a lot of stress as I am beginning to worry about the lack of water in this habitat,

I really don't want to die!

Patrica out 🙌



Patrica (me)



Peter



Piper



Day 28th - Wednesday 16th

Today on day 28, I'm beginning to realise that the Hindi clan is very close to the breaking point. As you can see by the images I have provided the soil is loosing moisture and becoming very dry and our leaves have begun to close in.

Patrica out 🙌

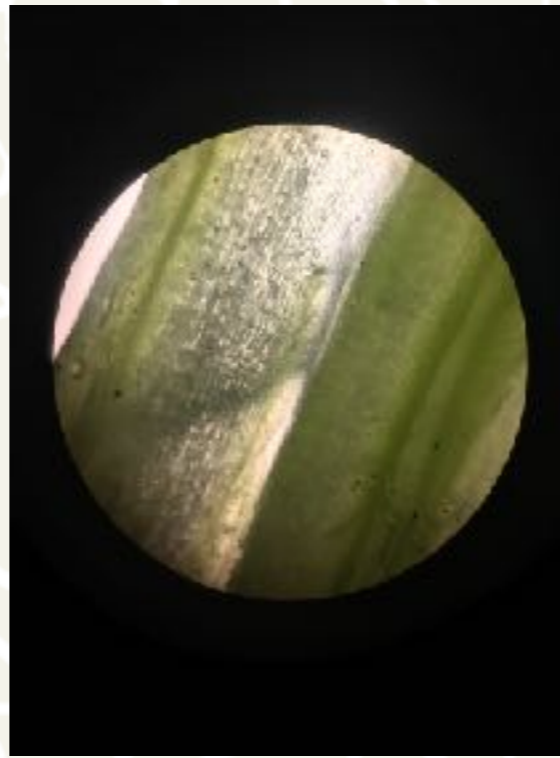
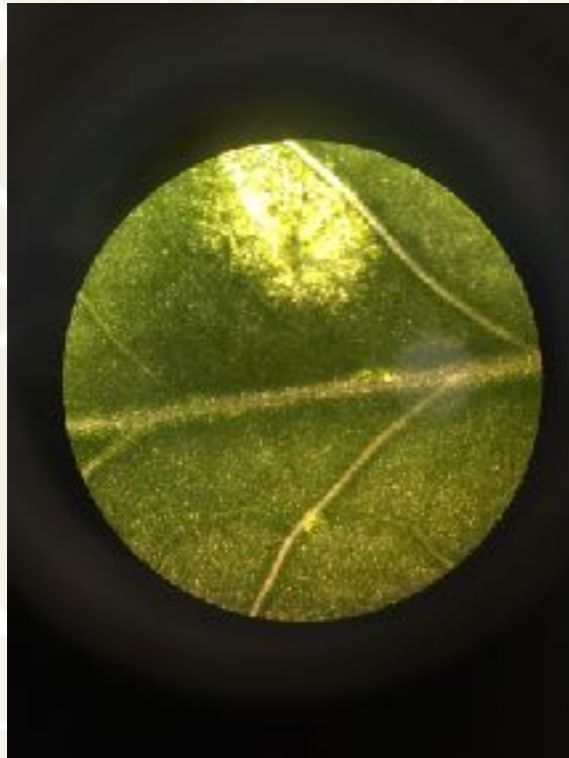
Day 34 - Thursday 24th

Day 34 is the closest that we have been to our last day. As you can tell by our stalks we are holding each other up for support. Since our seal has been taken off it has been a hard mission to produce our own food. We aren't getting enough water to make glucose. So we were left here to starve.

Patrica out 🕊️



3 PEAS IN A HINDI UNDER A MICROSCOPE



Conducting a microscope experiment allows me to view the stomata and chloroplasts cells. These cells such as the stomata acts as the doorway to photosynthesis and cellular respiration. The cells known as chloroplasts contain chlorophyll which embodies the key elements needed in photosynthesis to produce food. As the chlorophyll absorbs red and blue light used as energy in the process, it reflects the green colour. My question is why do other plants such as the Indian pipe which is pure white not absorb blue and red spectrums. And does this impact the photosynthesis or process they undergo to generate food and breath out oxygen

Significance of the layers

Sand

Sand is necessary as a layer in the terrarium as it allows the water to move through and evaporate to the surface. It also acts as a filtration device when the water passes through.

Soil

Soil acts as a base on which the plants hold on to for support as it gets bigger. It also provides the plant with nutrients and water in order for the plant to grow. These nutrients include nitrogen, phosphorus, potassium, magnesium and sulfur.

Charcoal

Due to the fact that terrariums don't have drainage holes, this layer is necessary to make sure excess water won't sit and rot the plant's roots. This will keep bacteria and mould from developing in the terrarium.

Rocks

Just as the charcoal layer, the rocks as a drainage system and allows the roots to keep from developing any bacteria and the rot.

3 PEAS IN A HINDI #2

By Chaya & Maya





Aim & Introduction

To create a second terrarium where we grow 3 more peas, however in this trial we will grow the plant under differing light conditions



Hypothesis

My hypothesis is that 'Dark Danny' will not survive as long as 'Sunny Sam'. I think this because Dark Danny will fail to produce its own food, as it is missing a vital piece in the process of photosynthesis, which is sunlight. However I think that as we are watering both plants, 'Sunny Sam' will grow and flourish like a normal plant. Although having only a soil layer may cause the plant to rot and become mouldy.

METHOD

STEPS

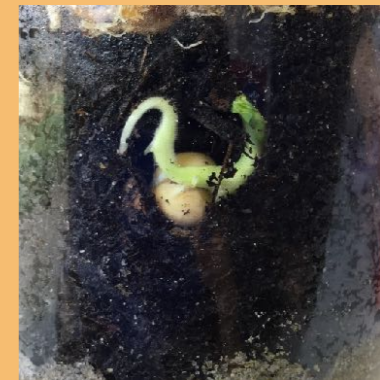
1. To construct the plant, first collect a cup or jar to hold it in
2. Begin filling the cup halfway with soil, the. Place the grow pea in and cover again
3. Feed the plant 20ml of water
4. Repeat again with a seperate jar
5. Place one plant in a dark place and the other in a sunny area
6. Observe the observations and differences that occur to plants under varying light conditions



Soil
Layer

POSITION OF PEA

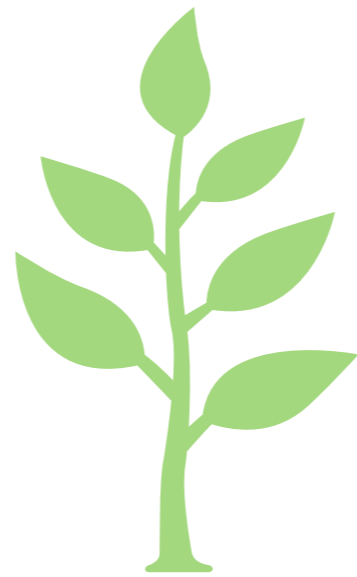
The position and placement of the planted pea does not effect the growth of the root, this is because the root always grows directly downward. You can tell if the pea is placed upside when the taproot sprouts, if the taproot sprouts from the top part of the pea the root still makes its way down the soil.



Here is an example of one of the peas sprouting . The picture shows that the root sprouted from the top of the pea, maybe because it was placed upside down. However the root is responding to gravity and making its way down.



Sunny Sam



Dark Danny

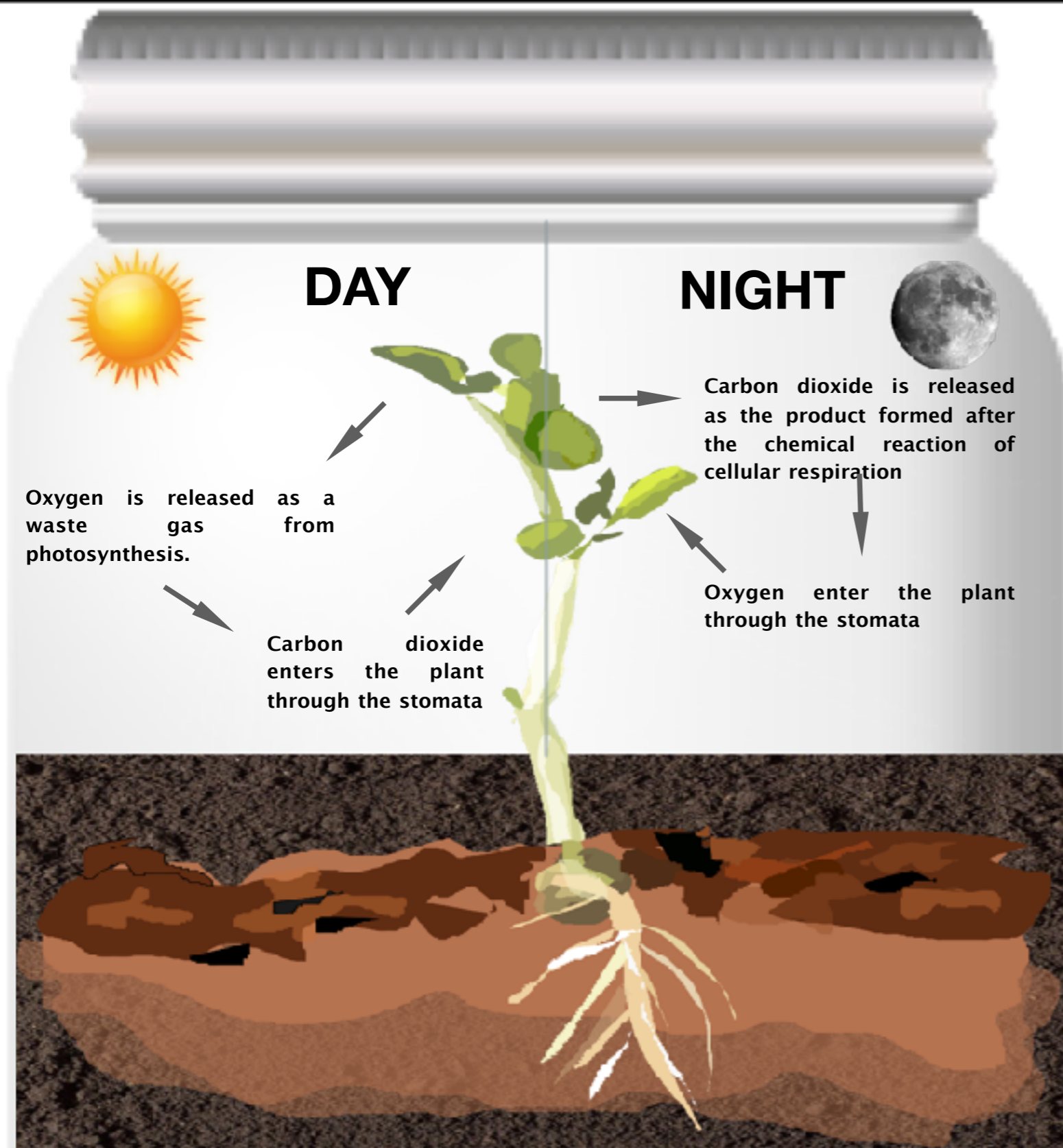
Day 1 - Thursday 24th

The first day of life for the two peas began being separated - one in the cupboard and one on the window seal -.



Day 5 - Tuesday 29th

Referring to Dark Danny I noticed the leaf is turning a yellow colour. This is due to the fact that the leaf isn't producing enough chlorophyll and therefore is losing its colour. My prediction for the life of the pea in the future is that without producing chlorophyll the plant will eventually die, unless it is given light. Also Dark Danny's pea is beginning to rot and become mouldy. This is due to the fact that without the layers such as, rocks and charcoal playing their role in the terrarium the water fed to the plant sits and rots.



The carbon dioxide to oxygen cycle begins with the CO₂ trapped in the terrarium when you seal the lid. This CO₂ enters through the stomata which are located in the leaf of a plant. The plant uses carbon dioxide in the process of photosynthesis and then breaths it out as a waste gas. However at night when the plant cannot perform photosynthesis it uses glucose and oxygen during cellular respiration and releases carbon dioxide which can be used again during the day time for photosynthesis. This is how oxygen and carbon dioxide is produced and how they work with each other.

Why is Dark Danny dying?

Dark Danny lives hidden away in a dark cupboard with no given light. Light is essential to the growth of a plant as it releases spectrums that plants use as energy when creating their own food or otherwise known as photosynthesis.

Plants contain a pigment called chlorophyll that absorbs red and blue light and then reflects a green colour, which therefore is why plants appear green. As Dark Danny is not receiving any light during night or day it therefore cannot absorb red or blue light to reflect a green colour (which is chlorophyll) to create its own glucose.

As Dark Danny is changing into a yellow colour it shows us that he is dying and lacking nourishment.

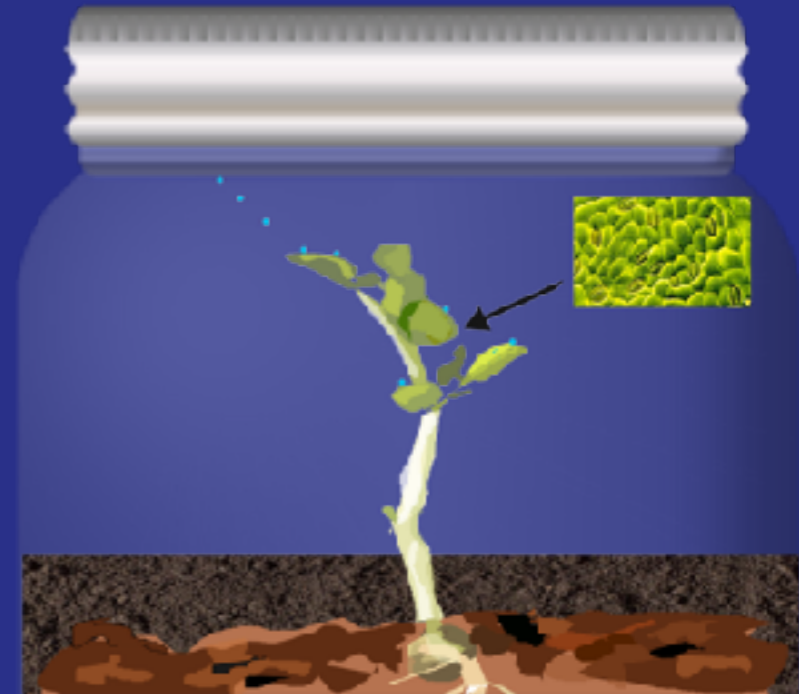
Water Cycle in 3 Peas In a Hindi



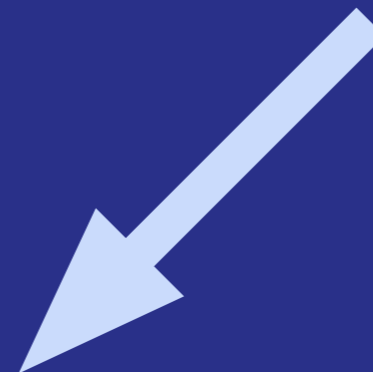
The water cycle begins in the soil where the roots absorb the water and taken into the body and leaves



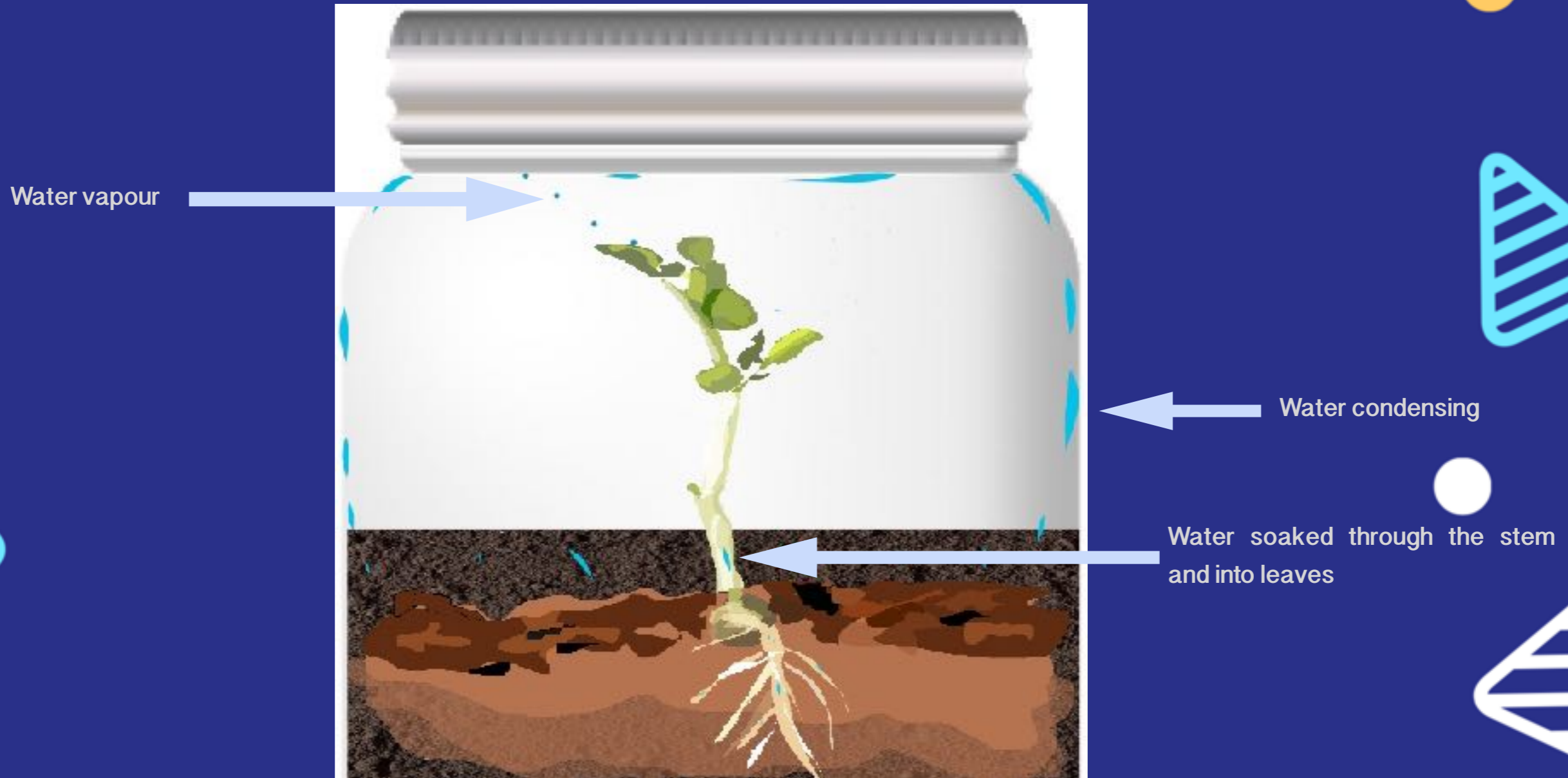
Caught by the seal, the recycled water condenses down the terrarium and into the soil where the cycle begins again.



Next the water caper escapes by transpiration from pores in the leaves called stomata.



Water Cycle in 3 Peas In a Hindi



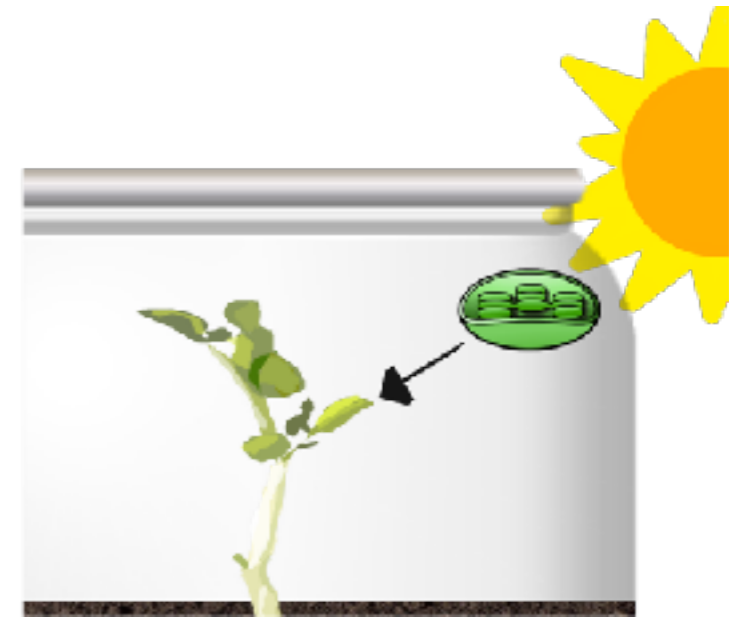
PhotoSynthesis in 3 Peas in a Hindi



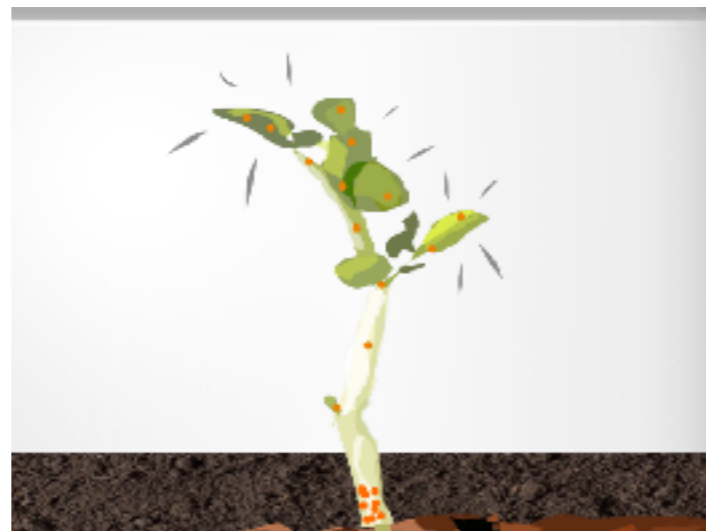
Water is absorbed into the plant by the xylem and phloem which are both known as transport tissue that begins at the root of the plant. This tissue helps by bringing water molecules and minerals to the leaves in order to begin the process of photosynthesis



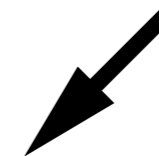
Carbon Dioxide enters the plant through the stomata, which are tiny pore that are located in the leaves.



Once both the water and carbon dioxide is in the leaf, glucose begins forming. Plant cells contains tiny structures that are called chloroplasts in which contain chlorophyll. It is in the chloroplast where carbon dioxide and water, in the presence of sunlight and chlorophyll gets converted in glucose and oxygen. The sunlight gives of energy to the chloroplasts in order to make the food.

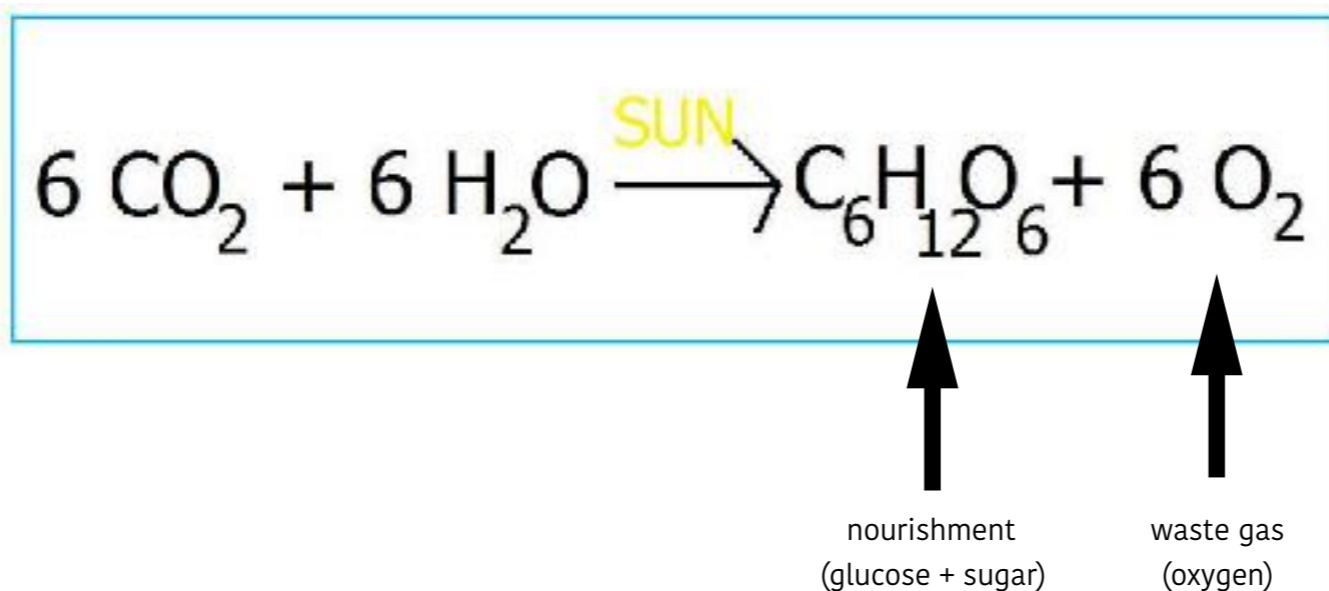


The glucose or sugar provides the plant with food and is distributed to all parts of the plants body and oxygen is used as a waste gas that breaths out through the stomata. The extra glucose is stored in the plant in the form of starch for further nourishment later.



PhotoSynthesis in 3 Peas in a Hindi

Photosynthesis is a process in which plants make their own food from a chemical reaction between carbon dioxide and water in the presence of sunlight and chlorophyll. This process occurs in the leaf of a plant, or more specifically the chloroplast.



When we removed the seal from the terrarium, our plant started to wither and become dry. The seal acted as a barrier for the water and created the terrariums own self sufficient ecosystem as well as a water cycle. When the seal was removed the water vapour evaporated and left the ecosystem, therefore breaking the water cycle. We left the terrarium indoors without water, therefore the plant could not produce any food as water is vital in the process of photosynthesis.

Key Terms

TERRARIUM

a sealed transparent globe or similar container in which plants are grown

ABIOTIC

A Non-Living thing that does not contain organisms

BIOTIC

A living organism containing cells

BIOME

A large community of plants and animals that occupies a distinct region

BIOSPHERE

The regions of the surface and atmosphere of the earth or another planet occupied by living organisms

PHOTOSYNTHESIS

The process in which plants convert carbon dioxide, water and sunlight in to glucose and oxygen

ANALYSIS OF RESULTS

Upon the growth of the terrarium, I noticed that the peas were thriving the most when they were enclosed as their own biosphere as the terrarium generated its own water cycle. When we removed the seal and didn't add extra water the plants started to wither and die due to the fact that the water cycle broke and therefore could not perform photosynthesis and produce more food. After a week of starving the plants we begun adding more water on a daily basis however this was not a sufficient way of maintaining the growth of the plant.

LINKS TO REAL LIFE

The peas we grew in a sealed terrarium is a replica of a mini biosphere. The plants inside this terrarium produce their food via photosynthesis which then releases the waste gas of oxygen. In Earth's biosphere the waste gas of oxygen that plants release is what generates life over the globe. Without the process of photosynthesis humans and other organisms will not be able to live due to the fact that there would be no oxygen to breathe in.

CONCLUSION

Reflecting upon my efforts and growth of the plant over the weeks, I have observed that the most water efficient way to grow plants is to enclose the terrarium, which allows the peas to recycle their water for all of their uses during growth.

When we created 3 Peas In A Hindi 2 it made it clear that plants need sunlight in order to survive to receive the spectrums in which they need into to use it for energy.