I.
Product Knowledge

Topic 17

The Plant Life Cycle

FACT SHEET

I. Product Knowledge

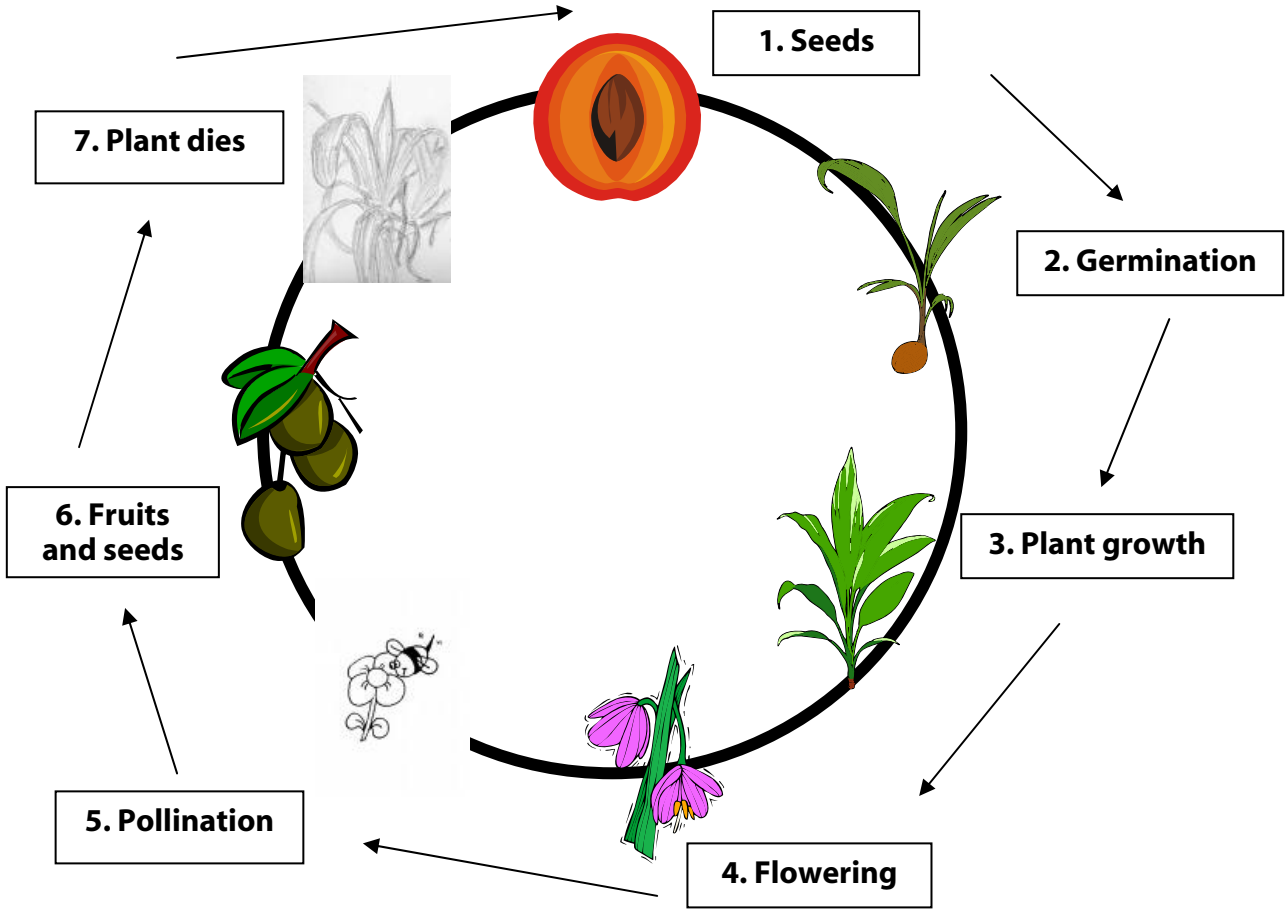
Topic 17: The Plant Life Cycle

To grow, survive, and multiply all living organisms need certain processes. These processes are called a life cycle. Plants are no exception and they too have a life cycle.

The phases of a plant's life cycle:

1. The plant starts its life as a seed.
2. The seed germinates.
3. The seedling grows into a mature plant.
4. The mature plant produces flowers.
5. The flowers are pollinated by insects or wind.
6. The flowers produce seeds in the form of fruit, seedpods or seed tuber.
7. The mature plant dies.

The new seeds germinate and start new plants. The process starts all over again.



The role of flowers in a plant life cycle: Flowering is a process in the plant life cycle that leads to the creation of new seeds. These seeds grow into new plants.

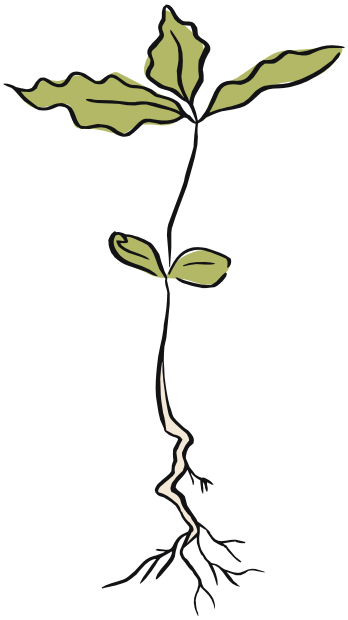
What happens during flowering? Flowers are the reproductive parts of most plants. Inside a flower are different parts. Some of these parts are male and they produce pollen. The other parts are female and contain ovules (eggs). With the help of insects or wind, the pollen is transferred to the female parts and the ovule (egg) becomes fertilized. The ovule (egg) develops into a fruit.

Creation of a seed: Together with the fruit, a seed is created. The seeds can either be produced in a seedpod, hidden inside a fruit, or be in the soil as a tuber from which new plants can grow. Each seed contains a tiny little plant inside waiting for the right conditions to germinate and start to grow.

- Example of a seedpod plant: Sweet-pea
- Example of a seed inside the fruit: Peach and mango
- Example of a seed tuber: Potatoes and sweet potatoes

What is inside a seed? A seed consist of three basic parts:

- **The embryo:** This is the most important part and will eventually develop into a real plant.
- **The food reserves:** In the beginning of growth, the embryo has no leaves and cannot produce its own food. The embryo uses the food reserves around it to grow.
- **The seed coat:** The seed coat protects the inside parts of the seed until the perfect conditions for germination are there. The seed coat can protect the embryo and food reserves for a very long period of time.



What does a seed need to grow? A seed needs water, the right temperature and a growing medium like fertile soil to grow in. Sometimes seeds will stay in the soil for a long period and only start to grow if the conditions are perfect.

The role of seeds in the life cycle of a plant: Seeds are the most important in a plant's life cycle. The quality of the seeds directly influences the quality of the plant. **The better the seed, the better the plant, and the higher the yield.**

ADDITIONAL INFORMATION

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In addition to the annual, biennial, and perennial plants there are also plants with a very long life span. Some palm trees live up to 65 years. The life span of the Welwitschia desert plant is well over 100 years.

Different life periods for different plants: Earlier in the lessons we've mentioned that the mature plant dies after producing the fruit or seedpod. Not all plants die in the same period of time. Some plants only live for one year, others for two years, and other even longer. We can classify the different life periods of plants into:

- **Annuals**: Annual plants take one year to complete the life cycle. They germinate, flower, and die in one year.
- **Biennials**: Biennial plants take two years to complete the life cycle. In the first year they germinate and grow. In the second year they flower, produce fruit or seedpods and die.
- **Perennials**: Perennial plants live for several years. During this period the plant will produce flowers, fruits or seedpods several times.

The number of times plants flower and fruit during their life cycle: Some plants will flower and fruit only once, while other plants will flower and fruit more than one time. They can be divided into two groups:

- **Monocarpic plants:** These plants flower and fruit only once in their life cycle and die (Mostly Annual and Biennial plants), e.g., tomato plant.
- **Polycarpic plants:** These plants flower and fruit many times during their life cycle. (Mostly Perennial plants), e.g., fruit tree.

Germination of seeds: We've learned that seeds will germinate if the basic needs are met: water, the right temperature and availability of a fertile growing medium. Germination consists of four phases:

1. **Early stage**: The seed swells and starts to open. The seed needs adequate water now. The seedling appears. The seedling relies in the early stage on food stored within the seed.
2. **Development phase**: The primary roots develop and grow downward. Internal plant processes start.
3. **Emergent phase:** The stem breaks the soil and straightens up pulling the seedling from the soil.
4. **Seedling growing phase**: The primary leaves unfold and more roots grow after the true leaves emerge and the plant starts to grow.

INSTRUCTIONS

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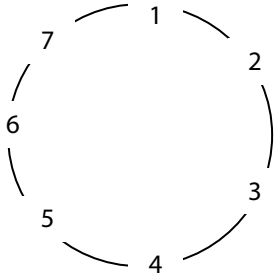
Materials needed

- ☑ Flip-sheet board with flip-sheets
- ☑ Markers (1 black, 1 blue, 1 green, 1 red)
- ☑ Colored cards for preparations
- ☑ Masking tape

Time needed: 45 minutes

Preparations:

- ☑ Flip-sheet with the heading *The Basic Plant Life Cycle*
- ☑ 3 sets of Plant Life Cycle colored cards with the following:
  - *Seed*
  - *Seed germinates*
  - *Plant grows to maturity*
  - *Plant flowers*
  - *Flowers are pollinated*
  - *Flowers produce fruit*
  - *Mature plant dies*
- ☑ 3 flip-sheets with a large circle (covering the whole flip-sheet) with the numbers 1 to 7 written on it as in the example:



- ☑ One mango, maize, and potato (or other examples for seedpod, fruit, and tuber)

Set up

Attention:	Ask participants if anyone knows how chickens grow. They will tell you that the hen lays eggs, the eggs hatch, and new chickens are born.
Title:	Tell participants the title while showing the flip-sheet with the title: *The plant life cycle.*
Credibility:	Explain your experience in plant biology.
Objectives:	To explain the life cycle of a plant and the role of seeds in it.
Benefits:	If you understand how seeds are developed, you as agro-dealers will understand the importance of the quality of seeds. This will help you to advise your customers better.
Direction:	During this session, we will focus on how plants generate seeds in the life cycle and how seeds develop into mature plants. We will not yet discuss seeds for different crops.

Delivery

Explanation, **D**emonstration, **E**xercise, and **G**uidance:

1. Tell the participants that you are still thinking about the chicken and the egg. Ask the participants what was first in the world: The chicken or the egg? They will immediately start a debate. Allow a minute or two. Tell them that nobody knows. The egg is however very important. Without eggs, chickens can't breed and survive.
2. Tell the participants that every living organism on earth has a **life cycle**. The chicken's life cycle consists of the egg, followed by hatching, the newborn chicken appears, grows to a mature chicken, the mature chicken lays eggs and later dies and is replaced by a younger generation. Tell that plants are exactly the same. They also have a life cycle.
3. Divide the participants into three groups and hand each group a set of Plant Life Cycle colored cards. Give each group a flip-sheet with a circle on it and ask them to sort the cards in to the correct sequence and paste them on the circle. They should put the first card on top of the circle and follow the direction of a clock for the other cards. Allow a few minutes for the exercise.
4. Ask each group to come forward and paste their flip-sheet on the wall.
5. **Discuss** the flip-sheets. Start with the first card and see if every group agrees. If a group has a different card, ask for an explanation. Agree on where to place the card. Make sure to explain all the steps. The correct order is:
    a. **Seed**: The plant starts its life as a seed.
    b. **Seed germinates**: A small plant grows out of the seed.
    c. **Plant grows to maturity**: The plant is now ready to reproduce.
    d. **Plant flowers**: The mature plant produces flowers.
    e. **Flowers are pollinated**: This is done by insects or wind.

f. **Flowers produce fruit**: Flowers produce seeds in the form of fruit, seedpods or seed tuber.
g. **Mature plant dies**: The seeds are released and will grow into new plants.

6. Conclude the exercise by telling the participants that each part of a life cycle is important. If you take one part away, the plant cannot reproduce.
7. Tell them that seeds are developed together with the fruit after the flowering process. There are different **types of seeds**:
   - Seeds in a **seedpod**. Put the maize on the table
   - Seeds inside a **fruit.** Put the mango on the table
   - Seeds that are part of a **tuber** in the soil. Put the potato on the table
8. Let the participants come forward and look at the samples.
9. Tell participants to imagine that they will go to a very cold place where there is no food for one week. After one week it will get warmer and food will arrive. What will they do? Lead their answers to: proper protection for the body against the temperature, bring food to eat, and survive until better times arrive.
10. Tell the participants that seeds are exactly the same to let the embryo survive until it can start to germinate and develop into a plant. Therefore seeds have a:
    - **Seed coat** to protect the seed until conditions are good for germination.
    - **Food reserve** for the embryo to use until it can produce its own food.
11. Finish the delivery phase by saying that the quality of the seeds directly influences the quality of the plant. **The better the seed, the better the plant, and the higher the yield.**

Finish

Summary:	Give a summary by repeating the phases of the plant life cycle. Single the seed out as the most important part of the whole process.
Questions:	Ask if anyone has a question or comment.
Evaluation:	Ask them to name all stages of a plant's life cycle. Ask them why flowering is so important in seed development. Ask them what the term s*eedpod* means.
Next step:	In this session, we learned about the life cycle of plants and how the plant produces seeds. In the next session, we will look into the different types of seeds.

Distribute the **fact sheet** to all participants.