

STD X SCIENCE (BIOLOGY)

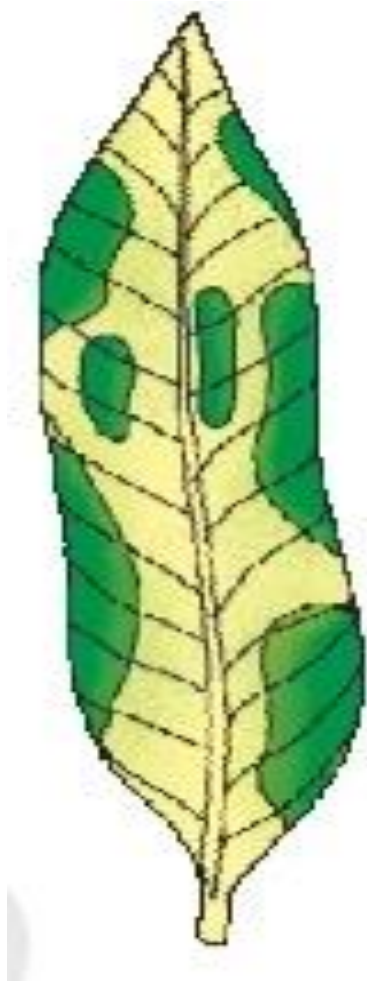
CHAPTER 6 LIFE PROCESSES

PART 3 - ACTIVITY 6.1

Chlorophyll is necessary for photosynthesis

Source - NCERT textbook, CBSE study material and
internet

Variegated leaf



Activity 6.1 Which demonstrates that chlorophyll is necessary for photosynthesis

Activity 6.1

- Take a potted plant with variegated leaves – for example, money plant or crotons.
- Keep the plant in a dark room for three days so that all the starch gets used up.
- Now keep the plant in sunlight for about six hours.
- Pluck a leaf from the plant. Mark the green areas in it and trace them on a sheet of paper.
- Dip the leaf in boiling water for a few minutes.
- After this, immerse it in a beaker containing alcohol.
- Carefully place the above beaker in a water-bath and heat till the alcohol begins to boil.
- What happens to the colour of the leaf? What is the colour of the solution?
- Now dip the leaf in a dilute solution of iodine for a few minutes.
- Take out the leaf and rinse off the iodine solution.
- Observe the colour of the leaf and compare this with the tracing of the leaf done in the beginning (Fig. 6.2).
- What can you conclude about the presence of starch in various areas of the leaf?

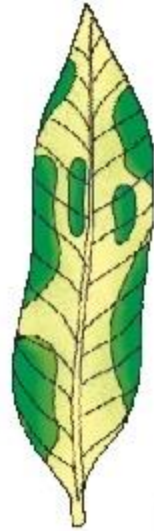
Explanation of the activity

A variegated leaf contains green as well as a non-green part. The green part contains chlorophyll, while the non-green part is devoid of chlorophyll.

To begin with a fresh experiment, we put Leaf in the dark for a few days. Leaf in the dark do not photosynthesize new starch, and the plant consumes all its previous starch.

Now the leaf is put into the sun. Here chlorophyll inside the chloroplast makes new starch. A broken leaf can not transport starch to different parts of the body. So this starch now remains localized to the green area only.

We now put the leaf into boiling alcohol. A boiling solution of alcohol breaks the cell wall and chloroplast. This breakage washes the chlorophyll into the solution. As a result, leaf loses its green colour and become colourless. The colourless leaf is easy to stain with iodine.



Explanation

Now, when we put this colourless leaf into an iodine solution, only the green part of the leaf turn blue.

Detailed Conclusion/Inference:

In this experiment, we see that only the green part of the leaf turn blue with iodine. So, we can say only the green part of the leaf photosynthesize and produce starch. Since the green colour of the leaf is because of chlorophyll, we can also say that only chlorophyll-containing part of the leaf makes starch.

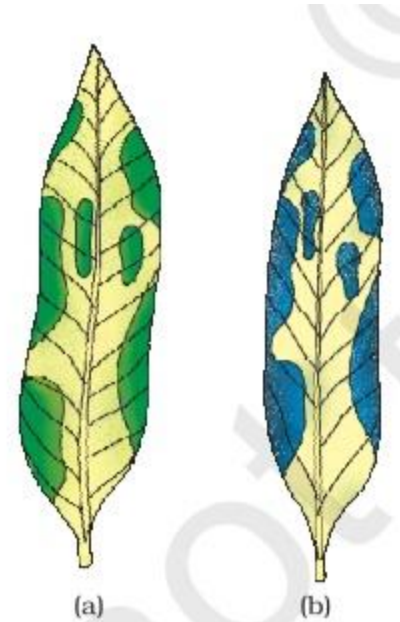


Figure 6.2
Variegated leaf (a) before
and (b) after starch test

Chlorophyll is necessary for photosynthesis.



variegated leaf before and after the experiment.

Home work

- ▶ Explain an activity to show that chlorophyll is necessary for photosynthesis.
- ▶ In this activity why we boil the leaf first in water and then in alcohol?
- ▶ Why the potted plant with variegated leaf is kept in dark room for three days and then in sunlight for only six hours?
- ▶ What do you observe when you put iodine solution on the variegated leaf boiled in alcohol?

Thank you!