

# Feeding a growing world: Observing starch grains in potato tissue

## Student activity sheet

### Introduction

Potato plants manufacture carbohydrate in their leaves during photosynthesis. Some of this is translocated via phloem tissue to the underground stolon (stem) tubers; these tubers increase in size and are the potatoes that we eat. In these tubers, some of the sugars are converted to starch – a mixture of amylose and amylopectin, both being polymers of glucose. The starch is stored in membrane-bound structures called plastids or starch grains/granules. When potato tubers are cooked, these starch grains absorb water, swell and break.

### Practical investigation

#### Aim

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The aim of the investigation is to observe starch grains in potato tuber tissue.

#### Method

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#### Safety

Carry out a risk assessment with your teacher. What hazards do you predict, and how will you control them?

Take care when using scalpel blades and when handling microscope slides and coverslips.

Wear eye protection.

#### Equipment

- eye protection
- scalpel
- white tile
- microscope slides and coverslips
- mounted needle
- iodine/potassium iodide (KI) solution and dropper pipette
- microscope

Note: You can use the leftover potato from the main investigation into reducing-sugar content.

1. Wear eye protection.



2. Gently scrape some potato tissue from a cut surface onto a clean microscope slide. The scraping should be very thin.
3. Add one drop of iodine/KI solution.
4. Use the mounted needle to carefully lower a coverslip onto the stained tissue, avoiding the formation of air bubbles.
5. Use a tissue to carefully wipe away any surplus iodine/KI solution and observe the slide under the microscope. Use low power first and then, when you have found some starch grains, use high power. The grains will appear a purple colour.
6. If you have an eyepiece graticule in your microscope and you have calibrated it at different magnifications, you can measure the diameter of some starch grains.
7. Draw two or three potato cells with their starch grains. Label your drawing. Make sure you use a fully sharpened HB pencil. Draw unbroken, clear, non-overlapping lines, and use a ruler to construct your label lines.

## Questions

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1. The cells of potatoes are quite large because the nuclei of potato cells are large. Suggest why the nuclei are large.
2. Would you expect to see starch grains in cooked potato tissue? Explain your answer.