

Feeding a growing world: Observing starch grains in potato tissue

Teacher notes

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.

There will be plenty of pieces of potato tuber left over from the main investigation into potato reducing-sugar content. These pieces can be used in a quick review of microscopy skills at the end of the practical lesson.

Assumed prior learning

- Use of light microscope, including use of an eyepiece graticule.

Learning objectives

- Observe starch grains in potato cells, using an optical microscope.

Practical investigation: starch grains

Safety

Carry out a risk assessment with the students. Ask what hazards they can predict and how to control them.

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

Wear eye protection when using iodine/potassium iodide (KI) solution.

The practical investigation is described in the student activity sheet.

Answers to questions

1. Potatoes are polyploid; most cultivated potato varieties are tetraploid (they have four of each chromosome) and have 48 chromosomes in the nucleus of each cell. Therefore the nuclei have to accommodate a large number of chromosomes.
2. Starch grains will not be visible in cooked potato tissue because heat breaks down the membranes around the plastids (starch grains). During cooking, therefore, the starch grains take up water, swell and burst.