

Feeding a growing world: Planning potato investigations

Teacher notes

Introduction

Students are asked to use their experience of the investigation into the reducing-sugar content of potatoes to inform designs of further investigations into the effect of storage temperature, length of storage and type of potatoes used. Depending on the time available, you may wish to ask them to design just one of the investigations. You could also ask them to carry out the investigation once you have checked their experimental protocol.

Assumed prior learning

- Learning from the main practical investigation in The Crunch kit, Potato reducing-sugar content.

Learning objectives

- Solve problems set in practical contexts.
- Design an experiment and carry out a risk assessment.
- Identify variables including those that must be controlled.

Answers to questions

How does storage temperature affect the reducing-sugar content of potatoes?

Plan for investigation should include:

- an explanation of the rationale behind the investigation
 - a list of equipment needed
 - the independent variable and the dependent variable
 - the control variables and a description of why and how they should be controlled
 - the steps for the procedure
 - a risk assessment
 - a description of how data will be recorded, analysed and presented.
1. More, as the reducing-sugar content of potatoes stored below 4°C increases. More reducing sugar leads to more acrylamide during processing.
 2. No, as it increases their reducing sugar content and therefore their potential to produce acrylamide.



How does storage time affect the reducing-sugar content of potatoes?

Plan for investigation should include:

- a testable hypothesis
 - an explanation of the rationale behind the investigation
 - a list of equipment needed
 - the independent variable and the dependent variable
 - the control variables and a description of why and how they should be controlled
 - the steps for the procedure
 - a risk assessment
 - a description of how data will be recorded, analysed and presented.
3. Sprouting potatoes will contain more reducing sugars as enzymes digest stored starch to sugar for respiration to provide energy/ATP for growth/cell division/tubule formation and DNA replication for/before mitosis so will generate more acrylamide when heated to temperatures above 120°C.

Do new potatoes contain more sugar than main-crop potatoes?

Plan for investigation should include:

- a testable hypothesis and a statement of the null hypothesis
 - an explanation of the rationale behind the investigation
 - a list of equipment needed
 - the independent variable and the dependent variable
 - the control variables and a description of why and how they should be controlled
 - the steps for the procedure
 - a risk assessment
 - a description of how data will be recorded, analysed and presented.
4. Probably not, as new potatoes contain a greater concentration of reducing sugars and may therefore produce more acrylamide when fried.
5. Boiling cooks the potatoes at 100°C, and acrylamide is not formed until the potatoes are heated to above 120°C.