

ENVIRONMENTAL SCIENCE Level 3

Common Assessment Task

Work Requirements:

Planning a practical investigation

Assessment Type:

Experimental investigation

Criteria being assessed:

- Criterion 2 – elements 1 and 2
- Criterion 3 – elements 1 and 2

Suggested conditions:

- This task should take no more than two and a half hours of class time.
- The response should be no more than 500 words.
- The response should be submitted electronically.
- This task requires an individual response by each learner.

Task Description:

Design an experiment considering the background information to answer the question - **How do seeds 'sense' that a fire has occurred?**

Using your skills gained from previous experimental design theory, you are to plan your method.

The experimental design may involve minimal risk. You should consider any potential risks associated with it and ensure they are addressed in your experimental design.

Background: In many vegetation types both here and overseas, fire is a regular occurrence. It is common to find that germination of seeds of plant species present in these vegetation types is limited to the months immediately following a fire, with little or no germination in the inter-fire period. This flush of germination occurs when there is plenty of light at the soil surface; nutrient levels in the soil are usually elevated, as the fire has removed the previous vegetation cover, and nutrients present in the biomass are returned to the soil as ash. Further advantages to germinating in the immediate post-fire period may include reduced activity of soil-borne pathogens (killed by the fire), and satiation of seed/seedling predators with overwhelming numbers of seeds/seedling. Observation of the flush of germination that follows a fire then leads to the following question: how do the seeds "sense" that a fire has occurred?

In order for us to know which one or ones of these (or other) factors might stimulate germination, we need to conduct experiments to test the effect of each factor on germination. To investigate these phenomena, we will use seeds from either a species of wattle (*Acacia decurrens*), or a native wheat grass (*Elymus scaber*), or both.

What you need to do:

1. Design an experimental investigation to answer: **How do seeds 'sense' that a fire has occurred?**
2. Some considerations to your experimental design might include:
 - How does time of heat exposure of the seeds (for a given temperature of heat exposure) affect the germination response in the wattle species?
 - Does the native wheat or wattle species show a germination response to heat? To smoke? To smoke + heat?
3. Whatever considerations you choose (from the list above or other reasonable considerations), ensure you have good experimental design. Include what would be your:
 - treatments
 - controls
 - number of replicates.
4. You will need to be ready to set up the experiment and design tables to collect data.

Teacher use only - What needs to be submitted for assessment?

Learners respond to the questions in a separate document, clearly identifying each section they are responding to.