

Instructional Scenario

Setting Up a Scientific Experiment



Course/Duty Area: Agriscience & Technology/Becoming Oriented to Agriscience Technology

Scenario:

Like most flowering plants, strawberries can engage in both sexual and asexual reproduction methods. However, due to poor germination rates, strawberry seeds are often not considered a viable option by commercial producers. Instead, plant runners and cuttings through asexual reproduction are more common. However, altering environmental settings such as moisture, chemical contact, and temperature can increase seed germination rate.

The experimenter began the project by splitting seeds into four groups of 75 strawberry seeds. Each group of seeds were placed in a wet plastic bag that had been treated with one of the following chemicals: gibberellic acid, sulfuric acid, ethylene, and an untreated control group. After an exposure time of 24-hours, the seeds were washed and transferred to another sealed bag with only water. Next, the seeds were placed in 128-plug trays filled with potting soil.

The trial period lasted 30 days with germination rates recorded every five days. The hypothesis was that if strawberry seeds were treated with various chemicals, then the seeds treated with ethylene would have a significantly greater germination rate ($p\text{-value} \leq 0.05$) than other chemicals because it is the most effective form of chemical scarification.

The results of the experiment showed, the control group had a significantly lower germination rate of 17.33 percent while gibberellic acid had the highest germination rate of 80 percent. However, all three chemicals had similar germination rates. In conclusion, the experimental hypothesis was rejected as all three chemicals proved to be viable sources of chemical scarification.

Big Question:

The purpose of the current study was to determine if strawberry seed germination rate would increase when treated with any of the following chemicals: gibberellic acid, sulfuric acid, and ethylene.

Focused Questions:

- What materials would have to be secured to complete or repeat this experiment?
- What is the procedure that the experimenter followed?
- What is the hypothesis of this experiment?
- What was the control of the experiment?
- What are the variables?
- Did the results support the hypothesis or not?

Student Project or Outcome:

Laboratory Notebook

Project-Based Assessment:

Create an AFNR lab using the steps of the scientific method. The AFNR lab can be a real one that you perform or one that you would find interesting but unable to perform. The lab should include: a laboratory notebook, and these steps of the scientific method: 1) asking a question about something you observe, 2) doing background

research to learn what is already known about the topic, 3) constructing a hypothesis, 4) setting up the experiment to test the hypothesis, (experimental procedure, materials list) and be able to viable or beneficial to the AFNR pathway. Be sure to clarify all procedures/steps and generate a hypothesis.

Teacher Resources:

- [Science Buddies: Steps of the Scientific Method](#)
- [Agriscience Fair Resource Guide](#)

Scenario source: [FFA Agriscience Fair Manuscript Examples](#)