**ACTIVITY: Investigating pollen processing using evidence**

**Activity idea**

In this activity, students use information to annotate a diagram pollen processing and use this to justify the management practice of using processed pollen on New Zealand kiwifruit orchards.

By the end of this activity, students should be able to:

* annotate a diagram by selecting appropriate information from a description
* use the diagram and the annotations to justify the use of a management practice on New Zealand orchards.

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**Introduction/background**

This activity involves students using information from the [Processing pollen](https://www.sciencelearn.org.nz/image_maps/10-processing-pollen) interactive to annotate a diagram showing the process.

The article [Kiwifruit pollination problems](https://www.sciencelearn.org.nz/resources/72-kiwifruit-pollination-problems) provides additional background information that students can use to justify the management practice of fertilising with processed pollen on New Zealand kiwifruit orchards.

The Science Learning Hub acknowledges the assistance of [PollenPlus™](http://www.pollenplus.co.nz/) in creating this resource.

**What you need**

* Access to the article [Kiwifruit pollination problems](https://www.sciencelearn.org.nz/resources/72-kiwifruit-pollination-problems)
* Access to the interactive [Processing pollen](https://www.sciencelearn.org.nz/image_maps/10-processing-pollen)
* Copies of the student handout [Pollen processing](#handout)

**What to do**

1. Introduce the issue of kiwifruit pollination and discuss reasons for scientists working to find a way to overcome the pollination problems. The article [Kiwifruit pollination problems](https://www.sciencelearn.org.nz/resources/72-kiwifruit-pollination-problems) provides useful background information.
2. Project the [Processing pollen](https://www.sciencelearn.org.nz/image_maps/10-processing-pollen) interactive on an interactive whiteboard or students could individually access the interactive.
3. After going through the interactive, have students use the information in the student handout [Pollen processing](#handout) to annotate the diagram. These annotations should identify the key stages or information that are essential to ensure the success of the pollen processing.
4. Discuss as a class the links between the pollen processing management practice and its value in ensuring high quality and quantity of kiwifruit production in New Zealand.
5. Following the discussion, have students individually prepare a written response justifying the use of processed pollen on New Zealand kiwifruit orchards.

**Student handout: Pollen processing**

PollenPlus™ uses a process to prepare kiwifruit pollen for use in artificial pollination, from picking male kiwifruit flowers to pollen extraction and testing at a mill near Tauranga.

1. Use the key information from statements A–F to annotate the Processing pollen diagram on the next page:

**Statement A**

Pollen is packed into 250 g jars – this amount of pollen comes from about 25 kg of flowers. Just 1 gram of pollen contains about 5 million pollen grains. The pollen is frozen for storage. It will later be sent to kiwifruit growers in New Zealand and other countries.

**Statement B**

Dried anthers and pollen are vacuumed up into a cyclone separator. A spinning stream of air separates the fine pollen from the larger particles of the anthers. Pollen from the cyclone separator is filtered to remove the last of the impurities.

**Statement C**

The anthers from beneath the separating drums are spread evenly onto trays for drying. About 1 kg of anthers goes on each tray. The trays are then put in racks, where they are dried at 30°C for 20 hours.

**Statement D**

Male kiwifruit flowers are picked by hand. One picker can collect 30–40 kg of flowers a day, and up to 800 pickers work at the busiest time. PollenPlus™ gets about 80 tonnes of flowers from its orchards in the western Bay of Plenty. One picker fills up to four of these 10 kg bags a day.

**Statement E**

Each bag of flowers is fed into a machine that lightly chops them up. A spinning drum separates the small anthers, which contain the pollen, from the rest of the flower parts. The anthers fall into a tray beneath the drum. The flowers pass through three drums to make sure all the anthers are collected.

**Statement F**

Every 2 kg of pollen is sampled to check that the pollen is viable (still able to pollinate female flowers). Samples of pollen are put in sugar solution for 2 hours, then examined under a microscope to see how many pollen tubes have grown. A viability of at least 80%, which is 80 pollen tubes per 100 pollen grains, is needed for the pollen to pass the test.

1. Use the information from the annotated diagram Processing pollen and from the article [Kiwifruit pollination problems](https://www.sciencelearn.org.nz/resources/72-kiwifruit-pollination-problems) to justify the use of processed pollen in NZ and overseas in kiwifruit orchards. Include in your answer why the processed pollen must have a viability of at least 80%.

