



022 - The Plant Life Cycle with Wisconsin Fast Plants

Supports PA STEELS Standards

- 3.1.2.A Plan and conduct an investigation to determine if plants need sunlight and water to grow.
- 3.1.2.B Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Summary and Timing

Students grow Wisconsin Fast Plants from seed to seed in about 40 days. Students investigate the plant life cycle including germination, growth and development, pollination, and seed harvest. This loan only kit includes seeds, soil, containers, and a tabletop growhouse. Supplement this lab with 021 Exploring and Comparing Seeds and/or 001 Investigating Insects, submit an additional request for these supplementary activities. Suggested timing - 5-6 weeks for the full plant life cycle.

Lab Time: 6 weeks to complete the full plant life cycle. Active time depends on the activities selected. To complete all of the fast plant activities as described in this document, plan for three 30-minute lessons and four or five 15-20 minute observation sessions. Three optional supplementary activities are also described in the teaching sequence.

Materials (view materials)

- Greenhouse with grow light
- Wisconsin Fast Plant seeds (standard *Brassica rapa*)
- Deli containers (2 sizes)
- Cotton twine
- Potting mix with a scoop
- Osmocote 14-14-14 fertilizer
- Squirt bottle and pipettes for top watering
- Forceps to handle seeds and fertilizer and transplant seedlings
- Rulers
- Hand lens
- Scissors
- Brock scopes
- Bee Sticks
- Petri dishes (seed distribution and germination ruler)
- Dried bees glued to petri dish
- Index cards
- Clear tape
- Envelope and zipper bags for seed storage



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Safety

Wash your hands after lab.

Suggested Background Resources

Wisconsin Fast Plants are selectively bred to complete the life cycle quickly, seed pods will be ready for harvest within about 40 days. Visit the [Wisconsin Fast Plants website](#) to learn more about these plants.

Guiding Questions/Phenomena

How do plants grow and change throughout their life cycle?

What do plants need to survive?

How are structure and function related in plants?

What is the relationship between pollinators and plants?

Credits and Document Version

Compiled by V. Stone (2022) from [Wisconsin Fast Plants](#).



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Teacher Notes

Resources: The fast plant activity sequence below refers to specific pages in the [Seed Challenge lesson](#).

- Refer to p. [Seed Challenge p. 12 & 13](#) for reproducible journal pages for your students. Students will need 9 copies of the journal page to complete all of the suggested journaling.
- [Seed Challenge p. 24-26](#) includes vocab words, definitions, and action descriptions that students can cut and paste to help complete the journal.
- Refer to [Seed Challenge p. 8-10](#) for blackline masters of the Wisconsin Fast Plants at different stages of development.

How much time should I plan? At a minimum, you will need to plant the seeds on day 0, pollinate on days 15-17, and harvest seeds around day 40. Each of those activities will take about 30 minutes. Plan additional time for plant care and observations. Observations can occur as little as once a week for 15-30 minutes or multiple times per week, depending on your schedule.

Table 1. Overall Wisconsin Fast Plant life cycle

Days	Action
0	Plant seeds and place them under grow lights for the duration of the experiment.
1-4	Observe growth and development. Top water as needed.
4-5	Thin plants to 6-8 per growing container
6-14	Observe growth and development. Top water and refill the water reservoir as needed.
15-17	Pollinate for 2-3 consecutive days. Pinch off any unopened flower buds on the last pollination day.
18-35	Observe seed pod development. Water as needed.
36	Remove plants from the water. Allow the plants to dry for several days.
40	Harvest seed pods.

Optional Activities: If you wish to use the optional Advancing Science activities mentioned in the timeline below, be sure to submit a separate request form.

How many seeds should we plant? Plant 10 Standard *Brassica rapa* seeds in each deli planting container. Plant one deli container per group of students. If students work in groups of 3-4, an average-sized class will need 6-8 planted containers. If you teach multiple classes, have each class plant a few containers so that you have a total of 6-8 planted containers. Use all 6-8 of the planted containers with each class so that the students can work in small groups.

Plant Care

- **Water** - Top water and refill the water reservoir as needed throughout the growing period, especially on Fridays. Plan to check the water levels every other day during the growing period and on Fridays.
- **Light** - Keep the lights on throughout the growing period (24 hours a day). Raise the lamp level as the plants grow taller to keep a distance of 5-10cm between the top of the plants and the light. Gently pull the cord through the top hole of the greenhouse to raise the light.



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- **Growing Medium** - Potting mix (not soil) is included with the kit as recommended by Wisconsin Fast Plants.
- **Seeds and Fertilizer** - The fertilizer pellets look similar to the WFP seeds. Store and distribute these materials separately to avoid confusion.
- **Clean Up** - Harvest the seeds and send them back to Advancing Science or store them in your refrigerator to plant next year. If you don't have time to harvest the seeds, send back the drying plants and let AdSci know so that we can collect the seeds. Empty the growing dish and water reservoir. Send back the empty containers. Advancing Science will wash and reuse them for another group.

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Procedure (blue rows are necessary steps, white are optional)

Timing	Life Cycle Phase	Activities – Lessons from the Wisconsin Fast Plants Website are combined with AdSci activities to complete a plant life cycle study.	Supplies from the Fast Plant Kit
Day 0 (30 min)	Seeds	Examine the seeds (Seed Challenge p. 14 and 15 for instructions and discussion/writing prompts.) Plant the seeds (10 Standard <i>Brassica rapa</i> seeds per deli container) in potting mix. Watch the Deli Container Watering System video for planting instructions.	- Seeds - planting containers - cotton twine - potting mix - fertilizer - squirt bottle - forceps - Scissors
Days 1-4 (15 min)	Germination	Observe the fast plants every few days (Seed Challenge p. 16 and 17 for background info and journal prompts). The Seed Challenge instructions are written for a smaller planting container; thin the seedlings to 6-8 per container, if necessary. Optional AdSci activity, request separately – 021 - Exploring and Comparing Seeds Lesson. Students learn about the parts of a seed and observe germination in a soil-less container.	Rulers
Days 5-12 (15 min)	Growth and Development	Observe the fast plants every few days to notice changes in height, spacing between nodes, and number of leaves and buds. (Seed Challenge p. 18 and 19 for background info and journal prompt).	- Rulers - Hand lens
Days 13-18 (30 min)	Flowering, Pollination, Fertilization	Pollinate the flowers. Watch the pollination video for instructions. - Remove one flower per group and use the forceps to dissect the flower, refer to Seed Challenge p. 20-21 Observe the freeze-dried bees using the brock scopes. Optional engineering extension, refer to Bee-ing an Engineer” Fast Plants Lesson. The teacher provides the supplies for this optional extension.	- Forceps - Scotch tape - Index cards - Brock Scopes - Petri dish - Rulers - Bee sticks - Freeze dried bees in petri dishes

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		5. Optional AdSci activity , request separately – 001 Investigating Insects . Students learn about the anatomy, life cycle, and adaptations of insects.	
Days 19-35 (15 min)	Seed development	1. Observe the fast plants every few days to notice changes in seed pod development. (Seed Challenge p. 22 and 23 for background and journal prompt).	• Rulers
Day 36 (5 min)	Dry the plants	1. 20 days after the last pollination event, remove the plant from water to start drying the seed pods for harvest.	
Day 40 (30 min)	Harvest Seeds	1. Collect the seeds when they are dry, around day 40. Watch the harvesting video for instructions. Older students can complete the calculations listed in steps 2 and 3 below. 2. Count the number of seeds harvested per growing container. Divide that number by the total number of seeds planted to calculate your net seed yield. Record the “ net seed yield ” value on the seed storage envelope. 3. Optional: Test the viability of your seed crop. Place 20 seeds on a wet paper towel in a plastic bag or petri dish. After 24 hours, calculate the percent germination - divide the number of germinated seeds by 20 (or the total number of seeds), multiply the quotient by 100 to get the % germination or “viability” of your seed. Record this data on the seed storage envelope. 4. After harvesting, place your clean, dried seeds into a labeled envelope . Place the seed envelope in a zipper bag with a silica gel packet and either store the seeds in your refrigerator to grow with next year’s students or return your seeds to Advancing Science to share with another school.	• Seed envelopes • Zipper bag