Contents

INTRODUCTION

The Insects and Plants kit contains

- *Teacher Toolkit: Insects and Plants*
  - 1 *Investigations Guide: Insects and Plants*
  - 1 *Teacher Resources: Insects and Plants*
  - 1 *FOSS Grade 2 Science Resources*
- *FOSS Science Resources: Insects and Plants* big book
- Equipment for 32 students

A new kit contains enough consumable items for at least two classroom uses before you need to resupply.

FOSS modules use central materials distribution. You organize all the materials for an investigation on a single table called the materials station. As the investigation progresses, one member of each group gets materials as they are needed, and another returns the materials when the investigation is completed. You place items at the station—students do the rest.

Individual photos of each piece of FOSS equipment are available online for printing. For updates to information on materials used in this module and access to the Materials Safety Data Sheets (MSDS), go to FOSSweb (www.FOSSweb.com). Links to replacement-part lists and customer service are also available on FOSSweb.

NOTE
Delta Education Customer Service can be reached at 1-800-258-1302.

KIT INVENTORY *List*

Drawer 1—permanent equipment

		Equipment Condition
1	*Teacher Toolkit: Insects and Plants* (1 *Investigations Guide*, 1 *Teacher Resources*, and 1 *FOSS Grade 2 Science Resources*)	
1	*FOSS Science Resources: Insects and Plants*, big book	
2	Basins, clear plastic, 6 L	
1	Basin, 8 L	
1	Bottle brush	
3	Class calendars, laminated	
8	Cardboard pieces, 23 × 30 cm (9" × 12") ✪	
8	Containers, 1/2 L	
50	Cups, plastic, 250 mL (9 oz.)	
20	Cup lids, plastic ✪	
32	Hand lenses, 3-power	
1	Hole punch	
2	Paintbrushes	
1	Paper clips, jumbo, 100/box	
2	Paper clips, regular, 100/box	
35	Paper plates ✪	
24	Plastic bags, 15 × 7.5 × 38 cm ✪	
1	Pocket Naturalist® Guide, *Bugs & Slugs*	
1	Pocket Naturalist® Guide, *Butterflies & Moths*	
1	Poster set, insect life cycles, 14/set	
1	Poster set, *Conservation*, 4/set	
2	Posters, *Science Safety* and *Outdoor Safety*	
20	Pushpins	
1	Screen	
8	Spoons, metal	
1	Thermometer	
60	Vials, 12 dram, with caps ✪	
25	Zip bags, 1 L	

✪ These items might occasionally need replacement.

Drawer 1—consumable equipment

		Equipment Condition
1	Cotton balls, bag, 100/bag	
147	Labels, removable	
20	Netting pieces, 10 × 10 cm (4" × 4")	
1	Plant fertilizer, liquid, bottle, 118 mL (4 oz.)	
100	Rubber bands, #14	
1	Seed package, *Brassica rapa*, 200/pkg	
1	Seed package, marigolds, 155/pkg	
50	Straws, jumbo	
100	Straws, superjumbo	
1	Sunflower seeds, shelled, bag, 200 g/bag	
16	Vials, 12 dram, with caps	
40	Zip bags, 4 L	

Drawer 2—permanent equipment

1	Butterfly cage with vial holder	
50	Cups, plastic planter, with 2 holes, 90 mL (3 oz.) ✪	
16	Felt pieces, black, 12 × 15 cm (4.75" × 6") ✪	
2	Lamp bulbs, fluorescent cool, 45 cm (18")	
1	Lamp fixture for 2 bulbs, with chains	
1	Lamp frame made from PVC pipe, 20 pieces 6 short pipes, 36 cm long (14") 2 short pipes with hooks, 36 cm long (14") 4 long pipes, 52 cm long (20.5") 8 corner pieces	
16	Marker flags	
1	Tray, planter	
20	Vials, 7 dram, with caps	

✪ These items might occasionally need replacement.

MATERIALS *Supplied by the Teacher*

Each part of each investigation has a Materials section that describes the materials required for that part. It lists materials needed for each student or group of students and for the class.

Be aware that you must supply some items. These are indicated with an asterisk (*) in the Materials list for each part of the investigation. Here is a summary list of those items by investigation.

For all investigations

- Chart paper and marking pen
- Drawing utensils (pencils, crayons, colored pencils, marking pens)
- Glue sticks

1 Overhead-transparency pen

1 Projection system

- Science notebooks (composition books)

32 Scissors

- Transparent tape

For outdoor investigations

1 Bag for carrying materials

1 Camera (optional)

1 Whistle or bell

Investigation 1: Mealworms

- Apple, sweet potato, carrot, or potato

8 Small boxes or berry baskets (optional)

200 Mealworms

1 Paring knife

- Wheat bran

Investigation 2: Brassica Seeds

1 Computer with Internet access

- Cotton swabs (optional)
- Extension cord (optional)
- Graph paper (optional)

8–16 Marigold seedlings

1 Marking pen, permanent (optional)

- Newspaper

- Paper towels

2–4 Pitchers or recycled soft-drink bottles (2 L) or gallon jugs

1–2 Planter pots (optional)

1 Plastic bag, about 4 L

1–2 Planter pots (optional)

1 Potting soil, 4 L (4 qt.)

- Rulers
- String (optional)
- Water

Investigation 3: Milkweed Bugs

- Collecting nets

75 Milkweed bug eggs

- Paper, light-colored (optional)

8 Paper clips, jumbo

- Paper towels

1 Pitcher or recycled soft-drink bottle, 2 L

- String (optional)
- Water

1 White paper, large sheet

8 White paper, recycled, 8.5" × 11" (optional)

Investigation 4: Silkworms

1 Flat box or lid, large

8 Card stock pieces, 8.5" × 11" (optional)

1 Corrugated box or clear plastic box, medium-sized

2 Egg cartons, paper

1 Leaf, damaged by insect

- Mulberry leaves

1 Paper towel

1 Plastic bag to fit over shoe box

1 Shoe box or other small cardboard box

50 Silkworm eggs

2 White paper, large sheets

- Zip bag, 1L

Investigation 5: Butterflies

- 1 Camera (optional)
- 1 Computer with Internet access
- 2 Construction paper pieces, 1 red or orange and 1 any color
- 1 Flower
- 1 Mallow plant or fresh mallow leaves (optional)
- 1 Marking pen, permanent
- 1 Measuring spoon, 1.25 mL (1/4 tsp.)
- • Microscopes (optional)
- 1 Orange, fresh (optional)
- 5–10 Painted lady butterfly larvae in medium
- • Paper towels
- 1 Paring knife (optional)
- 1 Projection system
- 8 Scratch paper, quarter sheets
- • Sugar
- • Water

PREPARING *the Kit for Your Classroom*

Some preparation is required each time you use the kit. Doing these things before beginning the module will make setup quicker and easier.

1. Check consumable materials

A number of items in the kit are listed as consumable and will be used up during the investigations (seeds, rubber bands, straws, labels, large zip bags). Some permanent items will wear out or eventually get used up (planter cups, paper plates, cardboard pieces, plant fertilizer). Items that cannot be reused for the particular FOSS investigation may be usable in another part of the curriculum. Before throwing items out, consider ways to recycle them and get your students involved in this process.

2. Plan ahead for obtaining insects

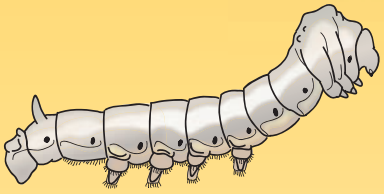
Some of the insects used in the module can be obtained from local sources. We encourage you to do this, as it will be more economical and ensure healthier insects.

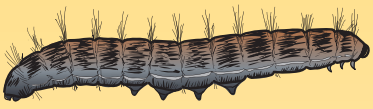
Delta Education sells coupons for all four of the insects used in this module. Coupons for the different insects are available separately, so you can perhaps get some insects locally and purchase coupons for others. A coupon provides enough insects for one class using the **Insects and Plants Module**. Because each coupon is redeemed separately, you receive the insects on the schedule that you plan. It is important that you plan ahead. Allow 4 weeks to receive your insects after you send in the coupon. You can also redeem your insect coupons by faxing them to Delta at 1-800-282-9560.

Mealworms. Larvae of the *Tenebrio* beetle can be purchased from local bait shops and pet stores. Purchase 200 large golden mealworms. Order the extra-large golden mealworms (they will pupate quickly).

NOTE: Don't order "giant" or "king" mealworms. These large mealworms are interesting but require a very long time to complete a life cycle.

Milkweed bugs. Eggs must be purchased from a biological supply company. Purchase a culture of about 75 eggs. The milkweed bugs used in this module were specifically bred for classroom use, and they eat sunflower seeds, not milkweed seeds. Be sure to start from eggs.





Silkworms. Eggs can be purchased at a number of biological supply houses. Order 50 eggs. You may know a colleague who collected eggs last year and has some to share. You can save the eggs that the moths produce for next year's class by storing the eggs in the refrigerator.

Painted lady butterflies. Caterpillars can be purchased at a number of biological supply houses. Purchase five to ten larvae. The larvae arrive in a small cup with a supply of food medium that looks a lot like guacamole. The larvae should stay right in the little cup until they pupate.

3. Plan for insect food

Each kind of insect will need a different kind of food. The Getting Ready section in each investigation provides all the details. Plan ahead to make sure you have the appropriate food.

- Mealworms and adult beetles eat wheat bran and need a source of moisture (carrot, apple, potato, sweet potato).
- Milkweed bugs (at all stages) eat raw, shelled sunflower seeds provided in the kit.
- Silkworm larvae eat fresh mulberry leaves only. They arrive with a package of synthetic food (see next step), but they do much better on fresh mulberry leaves.
- Painted lady butterfly larvae eat a medium shipped with them. To raise a second generation of larvae, find a source of fresh mallow or hollyhock leaves.
- Painted lady butterfly adults eat sugar water or juice from oranges.

4. Plan for use of synthetic food for silkworms

Getting fresh mulberry leaves in the late fall and winter months is nearly impossible, as mulberry trees are deciduous. If you are doing this investigation in the winter, there is an alternative food. With every order of silkworm eggs, you will be sent a half-pound of dry silkworm chow. Each bag of the dry powder comes with detailed instructions on the back of the package. Make sure your hands are clean when handling the cooked chow, as silkworms are susceptible to bacterial problems if their food is not kept sterile.

Preparation requires hot tap water and a heat source, such as a microwave oven or stovetop. Mix water and the dry powder, and bring it to a boil. Pour the hot mixture onto a sheet of plastic wrap. When it is cool, wrap it, and store it in the refrigerator. When firm, the silkworm chow can be sliced and fed to the

SAFETY NOTE

Mealworms ordered from Delta Education may be shipped in wheat bran. Be aware of any students with allergies to wheat bran.

hungry larvae. The cooked silkworm chow can be stored in the refrigerator for 1–2 months in an airtight container.

But remember, if you are raising silkworms in the spring, summer, or early fall, fresh leaves are the best food source.

5. Acquire potting soil

Purchase a 4 L bag of potting soil for each class using the module. Look for packaged soil that is high in humus.

6. Plan for basins and planter tray

The one 8 L rectangular basin (not clear) in the kit is used to dispense the soil to students. The one plastic tray in the kit holds 32 small planter cups with drainage holes. The two clear plastic basins (6 L) are used to culture the mealworms.

7. Order Wisconsin Fast Plants®

Brassica rapa seeds for Wisconsin Fast Plants® are very special seeds available only from biological supply companies and through Delta in the FOSS replacement-part catalog. The seeds are packaged in quantities for two class uses. To order more seeds, refer to the FOSS replacement-part catalog.

The *Brassica rapa* seeds were developed at the University of Wisconsin and are widely used in education at many levels. There is a phone hotline for teachers who are using the seeds and have questions about their growth or need more information for extension activities. That hotline is 1-800-462-7417. The link to the website can be found in the Resources by Investigation section on FOSSweb.

It's a good idea to test the seeds if the packages have been opened or if the date on the package is more than 2 years old. Plant five of each kind of seed in separate planter cups with soil according to the instructions in each investigation. You should get 80% germination. If less than four seeds of any kind sprout, order new seeds.

8. Practice lamp and frame set up

The brassica plants need continuous light throughout their life cycle. A fluorescent lamp fixture with two cool-white bulbs and a stand is included in the kit. Inventory the parts and practice setting it up as described in Getting Ready for Investigation 2, Part 1.

9. Familiarize yourself with two sizes of vials

There are two sizes of vials in the kit. The smaller one is called the 7-dram vial, and it is used exclusively in Investigation 2 to water the brassica seeds in the planter cups. There are 20 7-dram vials in the kit.

The larger vial is the 12-dram vial, and there are 60 of them in the kit as permanent equipment. The larger vial is used as a home for the mealworms, as a shelter for the milkweed bug eggs, as a drinking fountain in the class butterfly cage, and to temporarily house insects found outdoors.

There are also 16 larger vials that are considered consumable (for two classes). The vial is considered consumable when it is used as a water fountain in the milkweed bug habitats, as the students might want to maintain the milkweed bug habitats for the rest of the year, long after you have finished with the rest of the kit.

10. Provide a lamp for warmth

Insects' life cycles are greatly influenced by temperature, as described in the background of each investigation. If your classroom is cold, provide an incandescent lamp with a 60–75-watt lamp to provide warmth so the insects will go through their life cycle more quickly.

11. Plan for disposing of insects

If you are successful, you will end up with lots of healthy insect cultures. You should never release any of the insects that you culture. They would probably not survive, yet any organism not native to your local environment might upset the local ecological balance. Organisms can be terminated by putting them in a freezer for a day. Insects that you collect from local areas should be returned to their natural habitats.

12. Check insect posters

The kit contains laminated life-cycle posters for the insects studied. Teacher masters 24–37 are paper copies of these posters in black and white. Use these to replace the laminated posters if they are damaged or lost.

13. Prepare life-cycle charts for each insect

The wrap-up discussion for the last part of each investigation involves making a separate chart on a large piece of paper—a life-cycle chart of the structures and behaviors of the insect at each stage. The class completes one summary life-cycle chart for each insect. Prepare a summary chart for each of the insects the class will study in the module, but don't write in the names of the stages on the chart initially. That should be done with the class.

BEETLE LIFE CYCLE		
Stage	**Structures**	**Behaviors**
Larva	head segments legs	eats a lot crawls over others
Pupa	looks like a mummy	very little movement
Adult	head thorax abdomen wings legs	crawls but won't fly

Sample Summary Chart

14. Photocopy notebook sheets

You will need to make copies of science notebook sheets before each investigation. See Getting Ready for Investigation 1, Part 1, Step 11, for ways to organize the notebook sheets for this module. If you use a projection system, you can download electronic copies of the sheets from FOSSweb (www.FOSSweb.com).

15. Plan for word wall and pocket chart

As the module progresses, you will add new vocabulary words to a word wall or pocket chart and model writing and responding to focus questions. See Investigation 1, Part 1, Step 10, for suggestions about how to do this in your classroom.

16. Review indoor and outdoor safety rules

Two safety posters are included in the kit—*Science Safety* and *Outdoor Safety*. You should review the guidelines with students and hang the posters in the room as a reminder. Getting Ready for Investigation 1, Part 1, Step 17, offers suggestions for this discussion. Emphasize that materials do not go in mouths, ears, noses, or eyes. Encourage responsible actions toward other students.

Be aware of any allergies that students in your class might have, particularly allergies to wheat (mealworms eat wheat bran) and pollen. Before going outdoors, check to see if any students have allergies to any insects or plants, and be prepared with appropriate first aid. Students with latex allergies should not handle rubber bands.

17. Plan for letter home and home/school connections

Teacher master 1, *Letter to Family*, is a letter you can use to inform families about this module. The letter states the goals of the module and suggests some home experiences that can contribute to students' learning. Space is left at the top so you can copy the letter onto your school letterhead.

There is a home/school connection for every investigation. Check the last page of each investigation for details, and plan when to make copies and send them home with students.

18. Obtain books from library

Check your local library for books related to this module. Visit FOSSweb for a list of appropriate trade books.

19. Check FOSSweb for resources

Go to FOSSweb to review the print and digital resources available for this module.

ELL NOTE

You might want to print out the FOSS equipment photo cards (from FOSSweb) to add to the word wall to help students with vocabulary.

NOTE

The ***Letter to Family*** and ***Home/School Connections*** are also available electronically on FOSSweb.

CARE, *Reuse, and Recycling*

When you finish teaching the module, inventory the kit carefully. Note the items that were used up, lost, or broken, and immediately arrange to replace the items. Use a photocopy of the Kit Inventory List and put your marks in the "Equipment Condition" column. Refill packages and replacement parts are available for FOSS by calling Delta Education at 1-800-258-1302 or by using the online replacement-part catalog (www.DeltaEducation.com).

Standard refill packages of consumable items are available from Delta Education. A refill package for a module includes sufficient quantities of all consumable materials (except those provided by the teacher) to use the kit with two classes of 32 students.

Here are a few tips on storing the equipment after use.

- Sort and inventory small items and secure them in plastic bags.
- Remove labels and save all vial caps and planter cups.
- Use the bottle brush and hot water to clean the vials, planter cups, and other containers. Be sure they are completely dry before storing them in the kit.
- Make sure posters are stored flat on the bottom of the box.

The items in the kit have been selected for their ease of use and durability. Small items should be inventoried (a good job for students under your supervision) and put into zip bags for storage. Any items that are no longer useful for science should be properly recycled.