



Forestry Suppliers Lesson Plan

Insect Study

Forestry Suppliers' Entomology F.I.E.L.D. Kit™
Fundamental Investigation of the Environment Leading to Discovery™
Study Kit Correlated to National Science Education Content Standards

If you're interested in insect study for classroom activities, consider the Forestry Suppliers' Entomology F.I.E.L.D. Kit. Use the kit for the exercises outlined in this Lesson Plan, as well as other related activities (see "Further Studies" section for a few ideas).

This F.I.E.L.D. Kit is available exclusively from Forestry Suppliers and includes some of the items used in this lesson plan. All kit items may also be purchased individually. Call our Sales Department at 1-800-647-5368 or visit us on the web at www.forestry-suppliers.com.

Fields of Study:

- Entomology
- Environment
- Biology
- Ecology

National Science Education Content Standards Correlation

Grades	A	B	C	D	E	F	G
K-4	✓		✓				
5-8	✓		✓				
9-12	✓		✓				



Entomology Kit Contents		Stock Number 36846			Required For This Lesson Plan		
Qty.	Description	K-4	5-8	9-12	Stock Number		
3	Standard Insect Storage Boxes	✓	✓	✓	53800		
3	Pinning Blocks				53730		
3	Entomological Forceps	✓	✓	✓	53806		
3	Killing Jars				53737		
1	Box Insect Pins, Size 3	✓	✓	✓	53734		
1	Glassine Envelopes, Pack of 100	✓	✓	✓	53761		
6	Plastic Tubes, 25 dram	✓	✓	✓	53762		
6	Handheld Magnifiers	✓	✓	✓	61233		
3	Magnifier Boxes - 3x, 1-1/2" x 1-1/2"				53745		
1	Aspirator	✓	✓	✓	53758		
3	Spreading Boards, White	✓	✓	✓	53749		
3	Insect Nets - 36" Handle, 30" Deep, 13" Diameter	✓	✓	✓	53672		
1	National Audubon Society Guide to Insects and Spiders	✓	✓	✓	61304		

Background

Bugs - some are rather beautiful with bright colors scattered across their bodies. Others are a little scary looking as they crawl through grass and leaves with the potential to pinch or sting. Specific insect types are needed by plants because these help carry out the pollination process. Without the help of these insects, some plant species could not survive. Some insects play a specific part in spreading pollen, and it is that insect alone that fulfills this role.

Insects are creatively equipped with protective coloration and shape. The color and shape can create a protective camouflaging effect or resemble the image of a predator. Some species emit a pungent odor that keeps predators away. Most birds will stay away from bugs that are red, black, or orange. Birds learn that these colors usually mean a bad taste. Some bugs even play "dead." This provides a good self-defense mechanism since many predators will not eat an insect that won't move.

There are thousands of different insect species. Some crawl and some fly. Insects make their homes in aquatic and land environments. Insects can be found in very warm or cold places. Some bugs will eat the pages of a book or the remains of your lunch.

The basic anatomy of all insects consists of three body regions: head, thorax and abdomen. The head functions basically for food and sensory intake and processing of information. The thorax provides structural support for three pairs of legs and, if present, one to two pair of wings. The abdomen functions in digestion and reproduction.

We could not survive very well without the help of beneficial insects, and we sometimes find it difficult to live with the insects we consider "pests." To really understand the important role insects play in our total environment, we must study their structure, behavior and environments. Begin your study by looking for bugs within your own environment and backyard.

Procedure

1. Select three outdoor collection sites, with one being an aquatic area such as a stream, lake or pond. Students should be supervised at all times.
2. Using an insect sweep net, collect insects present by sweeping the net across and through grasses and leaves. Looking under logs, on trees and shrubs, as well as in top layers of soil may result in the collection of several insect species.
3. Using an appropriate net, collect aquatic insects from the surface of the water source. Look at the water's edge as well.
4. Place collected insects in a collection container such as a jar or bottle with a re-sealable lid. The size of the collection container will depend on the number of insects expected to be collected.
5. Take care not to damage the insect's body when collecting insects and placing them in or removing them from the container. Entomological forceps will help protect insects.

6. Observe and identify the insect initially by viewing the insect with a magnifying lens. Then, view using a stereoscope microscope.
7. Make observations concerning the following characteristics:
 - Presence of wings, if so one or two pair
 - Abdomen with tails or without tails
 - Shape of forewings
 - Hind legs modified for jumping or not
 - Noting these characteristics will enable you to correctly classify the insect using a reference book or field guide.
8. If the insect is dead after a positive identification has been completed, dispose of it properly. If the insect is still living, release it in an appropriate manner. All collected insects should be handled with care.
9. In attempting to identify aquatic insects, remember that you may find various life cycle stages of insects in an aquatic environment. Carefully look for insect larvae as well as other stages of development.
10. Record observations concerning the various species found at all sites. If possible have students sketch drawings of insects, noting color, relative size and any specific behavior observed.
11. Students should also make observations concerning the differences in insect populations among the selected test sites.

These lesson plans are provided for the benefit of science educators and can be freely downloaded from our web site at www.forestry-suppliers.com. If you have an idea or other suggestions for future lesson plans, we'd like to hear from you! Send an e-mail to fsi@forestry-suppliers.com.

Further Studies

- Students can group insects into basic categories:
 - Aquatic
 - Land
 - Winged
 - Not winged
 - Rigid body frame
 - Soft body frame
- Students can research the following topics:
 - Life cycle of insects
 - Body structure
 - How insects breathe
 - Typical life span
 - Beneficial qualities
- Students can obtain materials from the teacher and complete the following experiment:
 1. Obtain meal worms and culture using different diet sources to analyze weight gain effects.
 2. Follow culturing instructions and vary diet within appropriate nutritional needs of worms. Divide into groups: a control group and at least three experimental groups.
 3. Initially weigh each worm in each group. Record weights and repeat weighing every five days until worms begin to pupate.
 4. Record observations, including behavior. Attempt to culture organisms until beetles emerge.
 5. Release adult beetles in an appropriate manner. This experiment offers an

excellent opportunity to observe the life cycle of an insect.

Rubric

- Students should be able to describe the location and function of the main body parts of an insect.
- Students should be able to identify insects as aquatic or land, and if not in adult form, identify the life cycle form.
- Students should be able to categorize insects as beneficial or as pests.

Assessment

- Teacher will quiz students on the role of insects within the food chain, aquatic or land.
- Teacher will have students sketch the general body form of an insect.
- Teacher will have students give summary of organisms found in the aquatic source as well as within the land sites.

Content Standards Covered

- A** Science as inquiry
- Abilities necessary to do scientific inquiry
 - Understanding about scientific inquiry
- C** Life Science
- Characteristics of organisms
 - Life cycles of organisms
 - Organisms and environments

Required Materials

The following items are required to complete all the activities in this lesson plan and are available from Forestry Suppliers, Inc.

Insect Net	53672
Collecting Jar	53737
Folding Pocket Magnifier	61122
Entomological Forceps	53806
Basic Water Sampler	77222
Aquatic Sampler	53755
Microscope	61049

Additional Materials Needed

Supplied by Teacher/Student(s)

Selection of Collection Sites
 Data Recording Sheet

Optional Items

Optional Items that can be used to enhance the lesson plan are available from Forestry Suppliers, Inc.

Riker Mount	53742
Insect Pins	53731
Spreading Board	53764
LaMotte Leaf Pack Flash Cards	76609
Peterson Insects of North America	59850
Audubon Butterflies	61312
LaMotte Leaf Pack Experiment Kit	76605
LaMotte Bug Kit	76606
Student Insect Collecting & Mounting Kit	53729

Background

Bugs - who needs them? We humans do. We really could not live without certain species of insects; however, we certainly do not want to live closely with some bugs! Certain insects serve as "clean up" organisms and play a major part in the decomposition and decaying process of dead plants and animals. Beneficial insects, such as the ladybird beetle, aid farmers in reducing the pest population. On the other hand, some species affect our lives in a very negative way by destroying food crops, property and carrying diseases. Pests such as mosquitoes carry serious diseases that can easily enter the human population.

Insects come in all sizes and shapes. Specific bugs possess beautiful coloration which aids in protecting against certain predators. Birds tend to avoid insects with red, black or orange coloring. Birds associate these colors with a foul taste. Certain insects release an unpleasant odor to ward off an enemy, while others play dead. Playing dead provides a good self defense mechanism since many predators refuse to eat an insect that will not move. The smallest insect can defend itself and deter a large predator.

There are over one million species of insects. The body of an insect is simply divided into three body regions: head, thorax and abdomen. The head functions basically for food and sensory intake and processing of information. The thorax provides structural support for three pair of legs and if present, one to two pair of wings. The abdomen functions in digestion and reproduction.

Insects survive in some of the most extreme conditions and climates on earth - climates and conditions that humans cannot tolerate very well. Insects have been a part of human history as long as there has been human life. Some bugs were revered for the "luck" they were thought to bring, such as a cricket on the hearth.

Whether beneficial or pest, all insects play an important role in the total ecosystem. To better understand this importance, students need to be keenly aware of the species that inhabit their local aquatic sources and land areas.

Procedure

1. Select three outdoor collection sites with at least one being an aquatic area. A stream, lake or pond will serve the objectives well. Students should be supervised at all times.
2. Using an insect sweep net, incorporate a "sweeping" motion throughout all grassy areas at the land site and the water's edge of the aquatic site. Carefully overturn fallen tree branches or logs, looking for insects in the larvae or adult form.
3. When insects are found, each should be carefully placed in a jar or collection container. Entomological forceps should be used to avoid crushing or breaking the insect's body.
4. At the aquatic site, use an appropriate style net to sweep across the surface of the water and collect insects such as water skimmers. Using the net, collect below the surface as well. This sampling may yield younger, developing types of

insect species. Also look at the water's edge for insects. Follow the instructions in Step 3 for handling collected insects.

5. Aquatic insects may need to be placed in a small amount of water while stored temporarily in a collection container. Also make sure adequate ventilation is provided.
6. Initially view insects using a magnifying lens, then use a stereoscope microscope for additional viewing.
7. Begin classifying and identifying each insect, recording characteristics while making observations using the following criteria:
 - Presence of wings - if so, one or two pair
 - Abdomen with tails or without tails
 - Shape of forewings
 - Hind legs modified for jumping or not modified
8. Using an insect identification guide and following the list given in Step 7, you should be able to positively identify the collected insects.
9. In identifying collected aquatic specimens, various development stages may be represented and extra time will be needed in positively identifying these.
10. Have students sketch the insects they have observed, noting specific characteristics. Also note overall body shape, wings and coloration.
11. Students should record observations concerning the differences in population composition among the selected test sites.

These lesson plans are provided for the benefit of science educators and can be freely downloaded from our web site at www.forestry-suppliers.com. If you have an idea or other suggestions for future lesson plans, we'd like to hear from you! Send an e-mail to fsi@forestry-suppliers.com.

Further Studies

- Students should complete research concerning the following topics:
 1. Insects as disease vectors
 2. Role of Ladybird beetles in the reduction of aphids and other pests
 3. Effect of genetically engineered crops on insects (beneficial)
- Students can obtain materials from the teacher and complete as a class project the following experiment:
 1. Obtain meal worms and culture using different diet sources to analyze weight gain effects.
 2. Follow culturing instructions and vary diet within appropriate nutritional needs of worms. Divide into a control group and at least three experimental groups.
 3. Initially weigh each worm in each group. Record weights and repeat weighing every five days until worms begin to pupate.
 4. Record all observations including behavior. Attempt to culture organisms until beetles emerge.
 5. Release adult beetles in an appropriate manner. This experiment offers an excellent opportunity to observe the life cycle of an insect.
- Students can select two other aquatic sites for collection and make comparisons.

- Using the Forestry Suppliers' Entomology F.I.E.L.D. Kit, students can collect and mount specific selected insects for preservation. Students should be encouraged to specifically classify all collected insects.
- Students can study the younger life forms of aquatic insects by using the LaMotte Leaf Pack Experiment Kit.

Rubric

- Students will be able to describe the body form of an insect.
- Students should be able to discuss the role of beneficial insects.
- Students should be able to sketch three of the insects that they have collected, noting specific coloration, presence of wings and abdominal structure as well as giving correct classification.

Assessment

- When given a sample specimen, the student should be able to explain the steps taken in classifying an insect and do so correctly.
- Teacher will quiz students concerning the function and place within an ecosystem of a beneficial insect and a pest.
- Teacher will have students summarize the basic body forms of common insects.

Content Standards Covered

- A** Science as inquiry
 - Abilities necessary to do scientific inquiry
 - Understanding about scientific inquiry
- C** Life Science
 - Structure and function in living systems
 - Populations and ecosystems
 - Diversity and adaptations of organisms

Required Materials

The following items are required to complete all the activities in this lesson plan and are available from Forestry Suppliers, Inc.

Insect Net	53672
Collecting Jar	53737
Folding Pocket Magnifier	61122
Entomological Forceps	53806
Basic Water Sampler	77222
Aquatic Sampler	53755
Microscope	61049

Additional Materials Needed

Supplied by Teacher/Student(s)

Selection of Collection Sites
 Data Recording Sheet

Optional Items

Optional Items that can be used to enhance the lesson plan are available from Forestry Suppliers, Inc.

Riker Mount	53742
Insect Pins	53731
Spreading Board	53764
LaMotte Leaf Pack Flash Cards	76609
Peterson Insects of North America	59850
Audubon Butterflies	61312
LaMotte Leaf Pack Experiment Kit	76605
LaMotte Bug Kit	76606
Student Insect Collecting & Mounting Kit	53729

Background

Bugs! Who needs them? We humans do. We really could not live without certain species of insects; however, we certainly do not want to live closely with some bugs! Certain insects serve as “clean up” organisms and play a major part in the decomposition and decaying process of dead plants and animals. Beneficial insects, such as the ladybird beetle, aid farmers in reducing the pest population. On the other hand, some species affect our lives in a very negative way by destroying food crops and property as well as carrying diseases. Pests such as mosquitoes carry serious diseases that can easily enter the human population.

Insects come in all sizes and shapes. Specific bugs possess beautiful coloration which aids in protection against certain predators. Birds tend to avoid insects with red, black or orange coloring. Birds associate these colors with a foul taste. Certain insects release an unpleasant odor to ward off an enemy, while others play dead. Playing dead provides a good self defense mechanism since many predators refuse to eat an insect that will not move. The smallest insect can defend itself and deter a large predator.

There are over one million species of insects. The body of an insect is simply divided into three body regions: head, thorax and abdomen. The head functions basically for food and sensory intake and processing of information. The thorax provides structural support for three pair of legs and, if present, one to two pair of wings. The abdomen functions in digestion and reproduction.

Insects survive in some of the most extreme conditions and climates on earth - climates and conditions humans could not tolerate very well. Insects have been a part of human history as long as there has been human life. Some bugs were revered for the “luck” they were thought to bring, such as a cricket on the hearth.

Currently, there is much concern over the depletion of our rain forests for many reasons. These environments serve as the home for some insects that can be disease vectors. As modern civilization encroaches upon the most pristine environments, some species that would have remained undisturbed become a new threat to the health of the surrounding human population.

Whether beneficial or pest, all insects play an important role in the total ecosystem. To better understand this importance, students need to be keenly aware of the species that inhabit their local aquatic sources and land areas.

Procedure

1. Select three outdoor collection sites, with at least one being an aquatic area. A stream, lake or pond will serve the objectives well. Students should be supervised at all times.
2. Using an insect sweep net, incorporate a “sweeping” motion throughout all grassy areas at the land site and the water’s edge of the aquatic site. Carefully overturn fallen tree branches or logs, looking for insects in the larvae or adult form.

3. When insects are found, each should be carefully placed in a jar or collection container. Entomological forceps should be used to avoid crushing or breaking the insect’s body.
4. At the aquatic site, use an appropriate style net for sweeping across the surface of the water to collect insects such as water skimmers. Using the net, collect below the surface as well. This sampling may yield younger developing types of insect species. Also look at the water’s edge for insects. Follow the instructions in Step 3 for handling collected insects.
5. Aquatic insects may need to be placed in a small amount of water while stored temporarily in a collection container. Also make sure adequate ventilation is provided.
6. View insects using a magnifying lens first, then use a stereoscope microscope for additional viewing.
7. As you begin classifying and identifying each insect, record characteristics while making observations using the following criteria:
 - Presence of wings, if so one or two pair
 - Abdomen with tails or without tails
 - Shape of forewings
 - Hind legs modified for jumping or not modified
8. Using an insect identification guide along with the list given in Step 7, you should be able to positively identify the collected insects.
9. In identifying collected aquatic specimens, various development stages may be represented, and extra time will be needed in positively identifying these.
10. Have students sketch the insects that they have observed, noting specific characteristics. Also, note overall body shape, wings and coloration.
11. Students should record observations concerning the differences in population composition among the selected test sites.

These lesson plans are provided for the benefit of science educators and can be freely downloaded from our web site at www.forestry-suppliers.com. If you have an idea or other suggestions for future lesson plans, we’d like to hear from you! Send an e-mail to fsi@forestry-suppliers.com.

Further Studies

- Students should complete research concerning the following topics:
 - West Nile Virus - mosquitoes as carriers.
 - Role of ladybird beetles, lace wings and monarch butterflies as beneficial insects.
 - Effect of genetically manipulated plants and crops on pests and beneficial insects.
 - Insects as disease vectors.
- Using the Forestry Suppliers, Inc. Entomology F.I.E.L.D. Kit, students should attempt to collect specific types of insects, taking note to include the common major families.
- Students should complete research concerning the native insect species found in their geographical area.

Rubric

- Students will understand the importance of beneficial insects within an ecosystem.
- Students will be able to classify common insects found within the local environment.
- Students should be able to identify insects found in the local aquatic ecosystem, including the immature forms.

Assessment

- Teacher will quiz students concerning the species present in the local land and aquatic environments.
- Teacher will have students sketch and label drawings of three aquatic and land insects found.
- Teacher will ask students to classify and identify five insects when provided with limited information and a reference guide.

Content Standards Covered

- A** Science as inquiry
- Abilities necessary to do scientific inquiry
 - Understanding about scientific inquiry
- C** Life Science
- Interdependence of organisms
 - Matter, energy and organization in living systems
 - Behavior of organisms

Required Materials

The following items are required to complete all the activities in this lesson plan and are available from Forestry Suppliers, Inc.

Insect Net	53672
Collecting Jar	53737
Folding Pocket Magnifier	61122
Entomological Forceps	53806
Basic Water Sampler	77222
Aquatic Sampler	53755
Microscope	61049

Additional Materials Needed

Supplied by Teacher/Student(s)

Selection of Collection Sites
 Data Recording Sheet

Optional Items

Optional items that can be used to enhance the lesson plan are available from Forestry Suppliers, Inc.

Riker Mount	53742
Insect Pins	53731
Spreading Board	53764
LaMotte Leaf Pack Flash Cards	76609
Peterson Insects of North America	59850
Audubon Butterflies	61312
LaMotte Leaf Pack Experiment Kit	76605
LaMotte Bug Kit	76606
Student Insect Collecting & Mounting Kit	53729