

TITLE: Insects-ploration

OBJECTIVES:

- To discover what insects are in our field and whether they are beneficial or pests.
- To consider various ways to deal with pests and attract beneficials.

TIME REQUIRED: 1 hour

MATERIALS:

- Hand lenses and bug boxes
- Insect identification guides
- Flip chart and markers
- Insect scavenger hunt cards
- Backpack sprayer and any bio insecticides (Surround, bt...)
- Big and small clear plastic cups
- Some examples of different insects that are common on the farm with different mouth parts and other characteristics
- ID sheets of beneficial insects and pests

DIRECTIONS:

- Have the group define what they think an insect is; record their definition on a flip chart, making a column for characteristics which apply to insects and a column which does not apply to insects. After they have finished, label the columns as either insects or non-insects. Highlight the major characteristics of insects. Introduce any additional characteristics that are not on the list.
 - Six legs
 - Compound eyes
 - Exoskeleton (insects are usually relatively small, otherwise the weight of their exoskeleton might crush them. In the movie Men in Black there are enormous insects. This could never happen in real life).
 - 2 sets of wings (most)
 - Life cycle
 - 3 body parts (head, thorax, abdomen)
 - A life cycle that involves either simple (egg nymph, adult) or complete (egg, larva, pupa, adult) metamorphosis
- The life cycle of insects is one of their defining characteristics. Ask the crew to define the life cycle of an insect*. On the flip chart, trace the lifecycle as they define it, helping them along if they need it.

*Use a specific example from the field, maybe something that is abundant that year, so that participants can directly relate. For example, last year there were a lot of Colorado Potato Beetles (CPB) in the field, so we used the CPB as an example. The youth were intimately familiar with each stage of the beetle life cycle, whether they knew it or not, because they were responsible for picking the pests off the plants. If they can't find an example from the field, every kindergarten student learns the life cycle of the Monarch Butterfly.

- Have the crew list positive and negative impacts of insects. As they speak list the + and - on the flip chart. Make sure to highlight the necessity of insect

pollinators in the production of almost all fruits on the farm. Talk about the different ways insects kill or damage plants (attack the roots, suck the sap, eat the leaves, girdle stems, damage fruit by puncturing, eating or laying eggs, inhibit pollination).

- Ask the group to list what we do on the farm to attract or frustrate/eliminate insects. As they speak make a two column (attract, frustrate/eliminate) list on the flip chart. Show them any tools or organic pesticides we use on farm (backpack sprayer, Surround spray, bt). Ask them what other methods might be used in backyard gardens, on small, conventional farms and on industrial farms. Mention IPM (integrated pest management) if you have time.
- Do scavenger hunt activity.

Activity 1: Insect Scavenger Hunt

- Tell the group that they are going to do an insect scavenger hunt. They are going to have 10-15 minutes (or however much time you have left in the workshop) to find as many insects as they can that answer the clues on the cards. The cards are worth different points, and the object is to get more points than any of the other crews. Cards with a higher point value are more difficult.
- Divide the group into teams. Give each youth one scavenger hunt card and a big and small plastic cup (they fit in to each other). Start with the 1 point cards first. Explain that when they find the item on their card, they must bring the insect(s) back to you to verify that it answers the clue. If it does, you will give them another card. At the end of the day you will announce how many points each team scored.
- Leave some time at the end for the teams to look at what they found. Have them look at the insects with the lenses and look up any insects that they are not sure of in the ID books.

Scavenger Hunt Cards

1. Find a beneficial insect. 1 point
2. Find an insect that eats plants (has chewing mouth parts). 2 points
3. Find an insect that pollinates plants. We would have almost no fruit on the farm without insect pollinators. 1 point
4. Find a pest that can be controlled by Surround Spray. 3 points
5. Find three life stages of an insect. 5 points
6. Find an insect larva that lives in the soil. 2 points
7. Find a beneficial insect that preys on insect pests. 2 points
8. Find evidence of insect damage on a plant. 1 point
9. Find an insect larva (caterpillar) that will become a moth or butterfly. 4 points
10. Find an insect with no wings. 1 point
11. Find an insect that harms plants by sucking sap from the leaves or stems. These insects have a mouth that looks like a straw. 2 points
12. Find an insect that lives in the soil. 3 points
13. Find an insect that is preyed on by other insects. 3 points
14. Find an invertebrate that lives in the soil and is NOT an insect. 2 points
15. Find an insect that drinks nectar. 1 point
16. Find an insect that can be controlled with bt. 2 points
17. Find an orange/brown beetle that has black spots on its back and is a pest. 4 points
18. Find an insect that depends on camouflage for protection. 4 points
19. Find a caterpillar that feeds on dill, parsley or carrot greens. 4 points
20. Find an insect that harms cucumber plants by spreading disease to the plants as it feeds. 2 points
21. Find a tiny insect that feeds on the leaves of greens, eggplants and tomatoes. You can protect these crops from this pest with row covers. 3 points

Answer Sheet for the Scavenger Hunt Cards

1. Find a beneficial insect. 1 point **lady bug, dragonfly, bee, praying mantis, lace wing, butterfly, braconid wasp**
2. Find an insect that eats plants (has chewing mouth parts). 2 points **grasshopper, tomato hornworm and other caterpillars, Colorado potato beetle, Mexican bean beetle, flea beetle, Japanese beetle**
3. Find an insect that pollinates plants. We would have almost no fruit on the farm without insect pollinators. 1 point **bees, flies, butterflies**
4. Find a pest that can be controlled by Surround Spray. 3 points **cucumber beetle, squash vine borer, squash bug**
5. Find three life stages of an insect. 5 points **Colorado potato beetle- egg, larva, adult**
6. Find an insect larva that lives in the soil. 2 points **Japanese beetle, cutworm**
7. Find a beneficial insect that preys on insect pests. 2 points **ladybugs and lacewings prey on aphids, spined soldier bugs, braconid wasp**
8. Find evidence of insect damage on a plant. 1 point
9. Find an insect larva (caterpillar) that will become a moth or butterfly. 4 points
10. Find an insect with no wings. 1 point **ant, larval stages of insects**
11. Find an insect that harms plants by sucking sap from the leaves or stems. These insects have a mouth that looks like a straw. 2 points **aphid, leafhopper**
12. Find an insect that lives in the soil. 3 points **ant, ground beetle**
13. Find an insect that is preyed on by other insects. 3 points **aphid,**
14. Find an invertebrate that lives in the soil and is NOT an insect. 2 points **nematode, sow bug, millipede, centipede, spider, earthworm**
15. Find an insect that drinks nectar. 1 point **butterfly, bee, moth**
16. Find an insect that can be controlled with bt. 2 points **Colorado potato beetle, Mexican bean beetle**
17. Find an orange/brown beetle that has black spots on its back and is a pest. 4 points **Mexican bean beetle**
18. Find an insect that depends on camouflage for protection. 4 points **leafhopper, cabbage worm, tomato horn worm, cabbage lopper, corn earworm**

19. Find a caterpillar that feeds on dill, parsley or carrot greens. 4 points
Swallowtail
20. Find an insect that harms cucumber plants by spreading disease to the plants as it feeds. 2 points
cucumber beetle
21. Find a tiny insect that feeds on the leaves of greens, eggplants and tomatoes. You can protect these crops from this pest with row covers. 3 points
flea beetle