Education Module: Good vs. Bad Bugs

Age Target: 7 – 9

Overview: This module is designed for slightly older children. After introducing the difference between 'good' and 'bad' bugs, the module focuses on five common bugs (2 good, 3 bad) and introduces kids to how they can interact in a positive or negative way with crop production. This information is further reinforced through an interactive game where kids are divided into 5 groups and the name of one of the five bugs is put on their back. They then have to ask each other questions based on the information they have learned from the fact sheets to figure out which type of the 5 bugs they are which they are able to take home with them.

Includes:
- Fact Sheet: Good vs. Bad bugs
- Fact Sheet: Lady Beetle (Ladybug)
- Fact Sheet: Praying Mantis
- Fact Sheet: Hornworm
- Fact Sheet: Pepper Maggot
- Fact Sheet: Stink Bug
- Signs for Game
- Name Sheets for Game
- Feedback Form

Instructor Requirements: Tape

For more information about the benefits of integrated pest management, please visit www.croplifecanada.ca/foodforthought. This site contains an interactive game – Farmer Frank's Farming Challenge – which lets kids become a farmer grow their own online apple crop.

Good vs. Bad Bugs

Yes, bugs are creepy and crawly and sometimes scary, but believe it or not, some bugs are considered to be very helpful!

Insects are **EVERYWHERE**! About 75% of all animals known to man are insects. Just one area of forest soil (the size of two adult footprints) may contain over 30,000 insects! Insects are essential to life on our planet, as they are a vital part of ecosystems. Some bugs are more beneficial to the necessities of life than others.

Good insects include those bugs which help out nature in the following ways:

- **Decomposers/Recyclers:** Insects can act as natural recycling agents when they help to decay food
- **Pollinators:** 80% of the world's plants are dependent upon insects for pollination, which is key for plants' survival
- **Pest Controllers:** Many insects feed on other insects that destroy plant crops
- **Food Sources:** Many fish, birds, mammals and reptiles rely on insects as their main source of food
- **Good insects include**: Lady Beetles and the Praying Mantis

Harmful bugs include those bugs which harm the human food supply:

- Sometimes, insects can **consume or significantly destroy plant crops**
- Insects damage plants that provide us with **fiber for fabric** which makes up the clothes we wear
- Insects damage the world's **timber supply**
- Insects can **transmit disease** to animals, plants and sometimes even humans
- **Harmful insects include**: maggots, stink bugs, hornworms

Food producers in Canada have learned how to deal with harmful insects and also how to use beneficial insects to their advantage to ensure they can produce the appropriate amount of food to allow Canadians a wide variety of fresh food. For example:

- Farmers learn to **recognize beneficial insects** and how to **distinguish them from pests.**
- Farmers will then use the **appropriate method for dealing with pests**, for example, applying a special pesticide that will ensure the crops can grow pest-free.
- Farmers **maintain ground cover** as a supply of alternate shelter for many pests, therefore they won't have to invade the growing crops.
- Farmers must **monitor and record** what they see in their crop each season to track the various positive and negative insect visitors so the farmer can best prepare for the next farming season.

Lady beetle (Family: Coccinellidae)

- Known to everyone as ladybugs - even if they are male!
- Lady Beetles are found worldwide, with over 4,500 different species.
- Name comes from “Beetle of our Lady”, recognizing their role in saving crops.
- Two-spotted and seven-spotted variety are often seen in Canada.
- Lady Beetles are basically shaped like 1/2 of a pea.
- Aphids (small bugs that harm crops), such as scales and mites are a Lady Beetle’s favourite food.
- The female beetle deposits her eggs in aphid colonies.
- Almost as soon as they hatch, the beetles attack the aphids, helping get rid of pests.
- The Lady Beetle lives on plants frequented by aphids, including roses, oleander, milkweed and broccoli.
- Birds attempt to eat Lady Beetles but because of their "bad taste" the beetles are not ingested.
- As a defence, Ladybug adults will fall to the ground and "play dead."
- They also can secrete a bad tasting fluid from the joints in their legs.

Praying Mantis (Family: Mantidae)

- The way they hold the front of their bodies makes them look like they are “praying”.
- The name "mantis" comes from the Greek word for 'prophet'.
- The biggest varieties can grow up to 15 cm long.
- They are carnivorous insects that almost always start eating the insect while it is still alive.
- They are the only predator fast enough to catch mosquitoes and flies.
- Praying Mantis are terrific pest exterminators. They help keep down the population of bugs that are a threat to farming.
- Praying mantis have voracious appetites and will eat a variety of insects including aphids, grasshoppers, fruit flies, house flies, moths and crickets.
- The Mantis is the only insect that can turn its head all the way around (180 degrees).
- The female will devour part of her own mate if she feels like it.

Hornworm (Family: Sphingidae)

- Gets its name from the prominent horn on its head.
- Known for its distinctive seven or eight white lines down the side of its body.
- As an adult, they transform into hawk moths.
- Hornworms are a pest for farmers as they eat leaves right down to almost nothing.
- In Canada, they most likely feed on tobacco or tomatoes.
- The larvae of the tobacco hornworm can become so chemically dependent on tobacco plants that they will starve to death rather than eat anything else.
- They are also often found on eggplant, pepper and potato crops
- Plants with hornworms will be seen with many stems and leaf veins, but with the leaf surfaces completely removed.
- The hornworm can virtually defoliate even large plants.
- The adult is gray or brown in color with a wing spread of 3 to 5 inches and 5-6 pairs of yellow or orange spots on the abdomen.

Pepper Maggot (Family: Tephritidae)

- **The Pepper Maggot hurts eggplants and tomatoes in addition to peppers.**
- **The female lays its eggs right inside the pepper (it prefers fleshy red peppers).**
- **The young, white larvae (or babies of the maggot) will feed on the tissues inside of the fruit for about 18 days, eventually breaking through the skin.**
- **Damage from this insect can be devastating, as high as 90% of a crop.**
- **The adult transforms into a brightly coloured yellow striped fly.**
- **Pepper Maggots can be kept away by selecting proper fields, planting early, examining fields regularly, timing and applying insecticides properly and immediately destroying the crop on completion of harvest.**
- **The Pepper Maggot emerges from the soil and is mainly active from June to August.**

Stink Bug (Family: Pentatomidae)

- Oozes a foul smelling fluid from a pore on each side of their body to discourage predators.
- Has a shield shaped body, often with very colourful markings.
- The Stink Bug damages tomatoes, alfalfa, cereals, soybeans, beans, and peas.
- They puncture the skin of the plant with their mouths and suck out plant juices.
- Stink Bugs can decimate crops and cause huge crop losses.
- Stink Bugs rely on bacteria that aid the insect in the production of nutrients.
- Stink Bugs are good fliers and can be recognized by a large triangular shape on their back.
- Generally green or brown body colour
- Stink Bugs have a long, thick beak (piercing, sucking mouth part) held between the legs.
- Adult Stink Bugs of various species are active from spring through late fall.
- The eggs are laid in masses of 20-30 and are barrel-shaped.
- If numbers of Stink Bugs in a farmer's field become too great, an entire crop can fail.

Activity:
WHICH BUG AM I?

Instructions:

1) **Begin with an introduction, teaching the students about these five bugs and the difference between good bugs vs. bad bugs in relation to a farmer's crop management, using the fact sheets provided.**
2) **Post the signs with the names/photos of each of the bugs at different areas – kids will be gathering under their appropriate bug.**
3) **Once the lesson is complete and students have learned about each bug, line the students up in a straight line with their backs facing you.**
4) **There is one bug listed on each back card (5 bugs in total).**
5) **Using tape, stick one of the bug signs on each child's back – don't let them see what type of bug they are.**
6) **Make sure there are equal numbers of each type of bug (or as close to equal as possible).**
7) **Rules for playing the game:**
    - **Kids will mingle with each other asking *YES or NO questions only*, trying to figure out what kind of bug they are (the bug posted on their back).**
    - **Kids may ask only one question of each fellow student about what bug they are, then they must move on to the next student until they correctly guess what bug they are (i.e. do I lay eggs inside of peppers? Or Am I a good bug?)**
    - **Once they have guessed correctly, they will run to their area with the sign of their bug and the first group to have all of their bugs present wins! Make sure to tell students first how many students are in each bug group.**

Lady beetle (Family: Coccinellidae)

Praying Mantis (Family: Mantidae)

Hornworm (Family: Sphingidae)

Pepper Maggot (Family: Tephritidae)

Stink Bug (Family: Pentatomidae)

Lady Beetle

Praying Mantis

Hornworm

Pepper Maggot

Stink Bug

We would appreciate your assistance as we work to improve current and create materials for educational uses across Canada.

Did you use this module?

- ☐ Yes
- ☐ Yes, but adapted some of the materials
- ☐ No

If you did not use the material, why not?

- ☐ Received it too late
- ☐ Was not applicable to the age group I was teaching
- ☐ Did not find the topics interesting
- ☐ The module was too short
- ☐ The module was too long
- ☐ The module took too long to prepare for

How useful was this module?

- ☐ Very User Friendly
- ☐ User Friendly
- ☐ Not User Friendly

Was the information in the module age appropriate?

- ☐ Yes
- ☐ No

Did the kids find the information and activities interesting?

- ☐ Yes
- ☐ No

Was there the right mix between academic material and interactive activities?

- ☐ Yes
- ☐ No
- ☐ Not Applicable

Which comments do you think apply to the design of the module?

- ☐ I like it
- ☐ Simple to understand
- ☐ Not enough graphics
- ☐ The copy on pages needs to be easier to understand
- ☐ Professional
- ☐ Needs more bells and whistles
- ☐ Boring
- ☐ Needs to be more scientific
- ☐ Needs to be more interactive

Any other comments you would like to share?

Please either fax back to 416-482-2292 or mail to:

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