Module 3: Insect Pest Identification and Monitoring

Overview:

In this module, we will delve into the identification and monitoring of insect pests, a critical aspect of integrated pest management (IPM). Understanding the characteristics of harmful and beneficial insects, knowing how to monitor pest populations effectively, and setting action thresholds based on pest densities are all essential skills for managing pest outbreaks in agriculture. By the end of this module, learners will be able to identify common insect pests in Ontario agriculture, implement appropriate monitoring techniques, and understand when intervention is necessary based on population levels.

Key Topics:

1. **Common Insect Pests in Ontario Agriculture**
   Insects are among the most common and damaging pests in agricultural systems. Below are some of the most prevalent insect pests affecting Ontario crops:
   - **Aphids**: Aphids are small, soft-bodied insects that typically feed on the sap of plants. They are often found in large colonies on the undersides of leaves or new growth. Aphids can cause significant damage to crops by:
     - **Stunting plant growth**: Aphids remove plant sap, which weakens plants and stunts their growth.
     - **Transmitting plant diseases**: Many species of aphids are vectors for plant viruses, which can cause further damage to crops.
   - Aphid infestations are common in crops such as **soybeans, tomatoes, and peppers**. Management strategies often involve monitoring, natural predators like ladybugs, or the use of insecticides when thresholds are exceeded.
   - **Corn Rootworm**: Corn rootworm larvae are notorious for damaging corn crops in Ontario. The larvae feed on corn roots, which weakens the plants, causing them to become more susceptible to environmental stress (like drought or wind). This results in reduced yield and, in severe cases, can cause the plants to fall over (lodging). There are two main species of corn rootworm in Ontario: **Western Corn Rootworm** and **Northern Corn Rootworm**.
     Management of corn rootworm may include:
     - **Crop rotation**: Planting non-corn crops (like soybeans) in rotation with corn can disrupt the pest's lifecycle.
     - **Bt corn**: Genetically modified corn varieties that are resistant to rootworm larvae.
     - **Chemical treatments**: Used only when infestations reach harmful levels.
   - **Cabbage Moths/Worms**: The larvae of moths like the **cabbage white butterfly** are common pests of cruciferous crops such as **cabbage, kale, broccoli, and cauliflower**. These caterpillars feed on the leaves of these plants, causing significant damage and affecting crop yields. As they feed, they can also

introduce pathogens to the plants, increasing the risk of disease.
Effective control measures for cabbage worms include:

- **Physical control**: Removing and destroying affected leaves or using row covers to prevent moths from laying eggs on plants.
- **Biological control**: Releasing natural predators, such as parasitic wasps, to target cabbage worms.
- **Insecticides**: Used as a last resort when populations exceed manageable levels.

OMAFA (Ontario Ministry of Agriculture, Food, and Agribusiness) has published some great tools for use in identifying pest in field and greenhouse crops:

chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ontario.ca/files/2022-10/omafra-agronomy-guide-for-field-crops-chapter-15-en-2022-10-13.pdf

https://www.ontario.ca/page/mite-pests-greenhouse-crops-description-biology-and-management

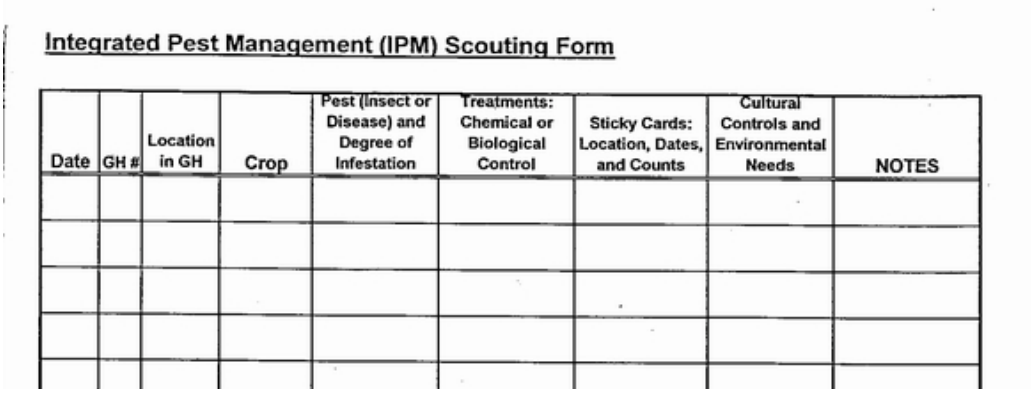
2. **Insect Monitoring Techniques**
   Effective pest management relies on accurate and timely monitoring. Monitoring allows farmers to detect pest populations early, track their growth, and decide when to implement control measures. Common insect monitoring techniques include:
   - **Traps**: Trapping is one of the most widely used methods for monitoring insect populations. Different types of traps are used depending on the target pest:
     - **Sticky traps**: These are used to capture flying insects, such as aphids, whiteflies, and leafhoppers. The insects are attracted to the bright color of the trap and become stuck on its surface (right)

     - **Pheromone traps**:
       These traps use sex pheromones to attract and capture male insects. Pheromone traps are particularly effective for monitoring pests like the **apple maggot fly**, **corn earworm**, and **codling moth**.
     - **Light traps**: These attract night-flying insects, such as moths, using a light source. Light traps can help monitor the presence and abundance of nocturnal insect pests.

- **Visual Inspections**: Visual inspections are a direct method of detecting pest damage. Farmers regularly check plants for signs of insect activity, such as:
  - **Chewing damage**: Holes or irregular shapes in leaves, stems, or fruits, which are characteristic of caterpillars and beetles (cabbage moth damage, left).
  - **Sucking damage**: Wilting, yellowing, or speckling of leaves caused by sap-feeding insects like aphids, whiteflies, and leafhoppers.
  - **Excrement or frass**: Insect droppings found on leaves or in the soil around plants may indicate the presence of pests such as caterpillars or beetles.

- **Scouting**: Scouting involves walking through fields at regular intervals to visually assess pest populations. This method can provide a good indication of pest density and can be especially useful in larger fields where other monitoring methods might not be practical. During scouting, the following should be checked:
  - **Plant health**: Look for signs of insect feeding or damage, including discolored or deformed leaves and stunted growth.
  - **Pest counts**: Count the number of pests on a set number of plants (e.g., 50 plants in a given area). This helps estimate the overall pest population and determine whether control measures are needed.

Example Crop Scouting Report:



Integrated Pest Management (IPM) Scouting Form

Date	GH #	Location in GH	Crop	Pest (Insect or Disease) and Degree of Infestation	Treatments: Chemical or Biological Control	Sticky Cards: Location, Dates, and Counts	Cultural Controls and Environmental Needs	NOTES

3. **Thresholds for Action**
   Understanding action thresholds is essential for making informed decisions about when to intervene with pest control measures. Thresholds are the population levels of a pest or the amount of damage caused by a pest that justifies the use of control methods. Thresholds help prevent unnecessary pesticide use and ensure that interventions are

made only when pest populations reach a level that can cause economic harm. Action thresholds vary by crop and pest but typically take into account:
    - **Crop value**: The potential economic loss from pest damage.
    - **Pest behavior**: The ability of the pest to spread or cause damage rapidly.
    - **Damage level**: The severity of the damage caused by the pest.
4. Examples of action thresholds in Ontario agriculture:
    - **Soybeans**: For pests like **defoliating caterpillars** (e.g., armyworms), an action threshold might be when **30%** or more of the plant's leaves show visible damage. At this level, pest control methods may be necessary to prevent significant yield loss.
    - **Corn**: For **corn rootworm** larvae, action thresholds may be based on the level of root damage or the number of larvae present. If more than a certain number of larvae are found in the soil, action may be needed, including the use of Bt corn or soil insecticides.
5. **Examples of Monitoring Strategies**
    - **Cabbage Root Maggot Control**: The cabbage root maggot is a serious pest of crops like cabbage and broccoli. Farmers can use **yellow sticky traps** to monitor the adult fly populations, as these flies are attracted to the color yellow. Once trap counts exceed action thresholds, farmers may apply **biological controls** such as **parasitic nematodes** or **insecticides**. Parasitic nematodes infect the maggot larvae in the soil, reducing their population without harming beneficial insects or the environment.
6. **Homework/Challenge**
    - **Assignment**: Visit a local farm or garden and conduct a pest monitoring activity. Focus on identifying any insect pests that may be present, and use the techniques described in this module to document their presence. Take note of whether the pest population is above or below action thresholds. If possible, provide a recommendation for pest management based on the population levels you observe. You should also identify any beneficial insects present and assess how they might contribute to pest control in the area.

Conclusion

In this module, we have focused on the identification and monitoring of insect pests in Ontario agriculture. Through understanding common insect pests like aphids, corn rootworms, and cabbage worms, as well as the techniques used to monitor their populations, you are now equipped to assess pest pressures and determine when control measures are necessary. By integrating monitoring with action thresholds, farmers can implement more efficient and targeted pest management strategies, reducing the need for excessive pesticide use while maintaining crop health and productivity.