Module 7: Invasive Species Management

Duration: 20 minutes

Overview:

Invasive species pose significant challenges to agriculture and biodiversity in Ontario. These species are not native to the region and, when introduced, often outcompete or disrupt local ecosystems, leading to reductions in agricultural productivity and damaging native habitats. In this module, we will focus on strategies for managing invasive species, including early detection, rapid response, biological control, and other integrated pest management (IPM) approaches.

By the end of this module, learners will have a strong understanding of the types of invasive species affecting Ontario agriculture, the threats they pose, and the most effective strategies for controlling and preventing their spread.

Key Topics:

1. Common Invasive Species in Ontario Agriculture

Invasive species in Ontario can be categorized into insects, plants, and pathogens. These species are capable of spreading rapidly and causing significant harm to crops, forests, and ecosystems.

• Emerald Ash Borer (EAB)

The Emerald Ash Borer (Agrilus planipennis) is an invasive beetle native to Asia that targets ash trees, particularly the white, green, and black ash species. EAB larvae tunnel beneath the bark of ash trees, disrupting the flow of water and nutrients, ultimately killing the tree. This pest has devastated ash tree populations across Ontario, which has significant implications for forestry, urban landscapes, and agriculture. In forests and woodlots, the loss of ash trees can reduce biodiversity, while in agricultural settings, the presence of dead or dying trees can affect land use and productivity.





- 1. **Symptoms and Impact**: The telltale sign of an EAB infestation is the presence of "D-shaped" exit holes left by adult beetles, as well as thinning foliage and bark-splitting. Infestations can lead to the collapse of entire ash tree populations.
- 2. **Economic Impact**: The destruction of ash trees impacts forestry, timber industries, and even some crop production areas where ash trees serve as windbreaks or habitat for beneficial insects.

• Asian Longhorned Beetle (ALB)

The Asian Longhorned Beetle (Anoplophora glabripennis) is another invasive insect that targets hardwood trees like maples, birches, and willows. This beetle damages trees by boring deep into the wood, making the trees structurally weak. While the Asian Longhorned Beetle is not yet widespread in Ontario, it poses a significant threat to both urban forestry and the timber industry.

- 1. **Symptoms and Impact**: The main signs of an ALB infestation are large round exit holes, sawdust around the base of the tree, and crown dieback. In severe infestations, trees can die within a few years of being infested.
- 2. **Economic Impact**: The loss of trees from an ALB infestation can damage the timber market, lead to costly tree removal efforts, and negatively affect agriculture by removing windbreaks and impacting pollination for some crops.



• Other Invasive Species

In addition to insects, invasive plant species like kudzu and garlic mustard, and



pathogens like **late blight** in tomatoes, can also cause significant damage. These invasive species tend to outcompete native species, degrade ecosystems, and reduce agricultural productivity. For example:

- 1. Kudzu: A fast-growing vine that can smother crops and native plants.
- 2. **Garlic Mustard**: An invasive plant that disrupts natural vegetation, outcompeting native plants and altering soil chemistry.

2. Management Strategies for Invasive Species

Managing invasive species requires a coordinated and integrated approach, as these pests often spread quickly and resist traditional control methods. Successful management strategies typically include early detection, rapid response, and ongoing monitoring.

• Early Detection

Early detection is critical for preventing the spread of invasive species and minimizing their impact. This involves regular monitoring of crops, forests, and other vulnerable ecosystems. Farmers, foresters, and landowners should be trained to recognize signs of invasive species and report them promptly.

- 1. **Reporting and Surveillance**: Both government agencies and private stakeholders work together to track the spread of invasive species. Reporting platforms, like the Invasive Species Hotline, allow the public to report sightings of suspected invasive pests.
- 2. **Surveys and Monitoring Programs**: Regular surveys and monitoring programs help detect invasive species before they become widespread. For example, traps can be used to monitor EAB and ALB populations, and visual inspections can identify invasive plants.

• Rapid Response Plans

Once an invasive species is detected, it is crucial to implement rapid response plans to control its spread. These plans often include quarantine measures, physical removal, and targeted treatments to eradicate the pest before it can establish a larger presence.

- Quarantines and Movement Restrictions: When an invasive species is detected, quarantines can be enforced to limit its movement to other areas. For example, the movement of infested firewood or plant material may be restricted to prevent spreading pests.
- 2. **Physical Removal**: This can include the removal of infected trees, plants, or soil to stop the spread of invasive species. For example, infested ash trees might be cut down and destroyed to prevent the EAB from spreading to healthy trees.
- 3. **Trapping and Pesticides**: For insect pests like EAB and ALB, traps (e.g., pheromone or sticky traps) can be used to capture and monitor pest populations. When necessary, pesticide applications may be used, although these are often considered a last resort.

• Biological Control

Biological control involves using natural predators or pathogens to control



invasive species. While this approach is more commonly used with insect pests, it can be effective when carefully managed.

- 1. **Natural Predators**: For example, parasitic wasps have been used to control EAB populations. These wasps target EAB larvae, reducing their numbers and limiting damage to ash trees.
- 2. **Pathogens**: In some cases, beneficial fungi or bacteria may be used to infect and kill invasive pests. For example, fungi that target the Asian Longhorned Beetle larvae can reduce the beetle population and prevent tree damage.
- 3. **Challenges**: Biological control can be tricky to implement, as it is important to ensure that the introduced predator or pathogen does not itself become invasive or harm non-target species.

3. Case Study: Emerald Ash Borer in Ontario

The **Emerald Ash Borer (EAB)** is one of the most destructive invasive species in Ontario, with devastating consequences for ash tree populations. To combat this pest, the government and local farmers have worked together to implement a multi-faceted management strategy.

- Early Detection and Monitoring: Ontario has implemented widespread monitoring programs, including the use of trap trees, which attract EAB and allow for early detection. Local governments and agricultural organizations also use pheromone traps to monitor EAB populations.
- Rapid Response and Quarantine: When an infestation is detected, quarantines are often enacted to restrict the movement of firewood or other potentially infested materials. Additionally, trees in heavily infested areas are removed and destroyed to reduce pest spread.
- **Biological Control**: A key component of EAB management has been the introduction of **parasitic wasps** such as *Tetrastichus planipennisi* and *Oobius agrili*, which parasitize EAB larvae. These natural enemies help control EAB populations without causing further harm to the environment. The use of parasitoids has been a promising strategy in managing EAB long-term.
- Public Awareness and Education: The Ontario government has also focused on educating the public about how to recognize EAB infestations and report them. This has helped facilitate early detection and rapid action in infested areas.

4. Homework/Challenge

- Assignment: Choose an invasive species that is affecting Ontario agriculture or forestry. Propose an IPM-based strategy for its management. Your strategy should include the following components:
 - 1. **Early Detection**: Methods for identifying and reporting the invasive species.
 - 2. **Rapid Response Plan**: Immediate actions to be taken upon detection of the species, including quarantines and physical removal.
 - 3. **Biological Control**: Recommendations for using natural predators or pathogens to control the invasive species.



- 4. **Monitoring and Follow-up**: How to monitor the effectiveness of the management strategy and adjust as necessary.
- 5. Your proposal should be detailed, citing specific methods or tools that could be used, and you should also consider the potential risks and challenges associated with the strategy.

Conclusion:

Invasive species present a growing threat to agriculture and biodiversity in Ontario. Managing these species requires early detection, rapid response, and a combination of control strategies such as exclusion, physical removal, and biological control. By implementing integrated pest management strategies, farmers and landowners can reduce the impact of invasive species on agricultural productivity and the environment. Through collaborative efforts and ongoing monitoring, Ontario can protect its natural ecosystems and agricultural resources from the spread of harmful invasive species.

