Welcome to Apple IPM

HOW TO SCOUT

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Ministry of
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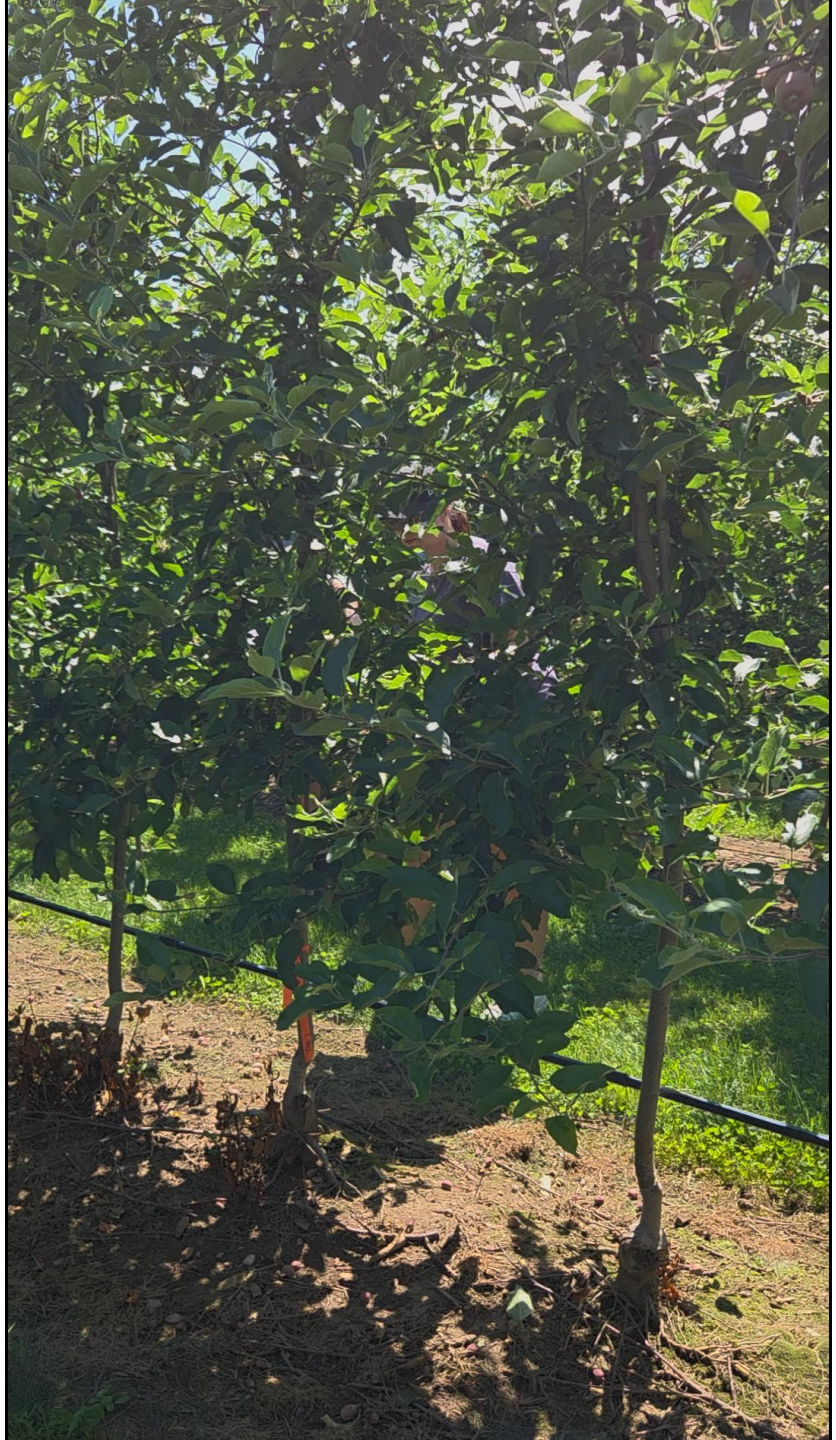
What's In My Scouting Kit?

16-20x hand lens	Collection bags and vials	Counters	Flagging tape	Waterproof marker
Traps / lures	Tapping tray	Paper clips	Saran wrap or wax paper	Spray bottle
Pocket knife	Pruners	Shovel or trowel	Soil probes	Record-keeping system
Orchard maps	Resource materials	Weather loggers	Bleach &/or wipes	Biosecurity

16-20x hand lens


Collection bags and vials



Counters

Flagging tape


Saran wrap
or wax paper


Spray bottle


Pocket knife


Shovel or trowel


Pruners


Soil probes

Resource materials

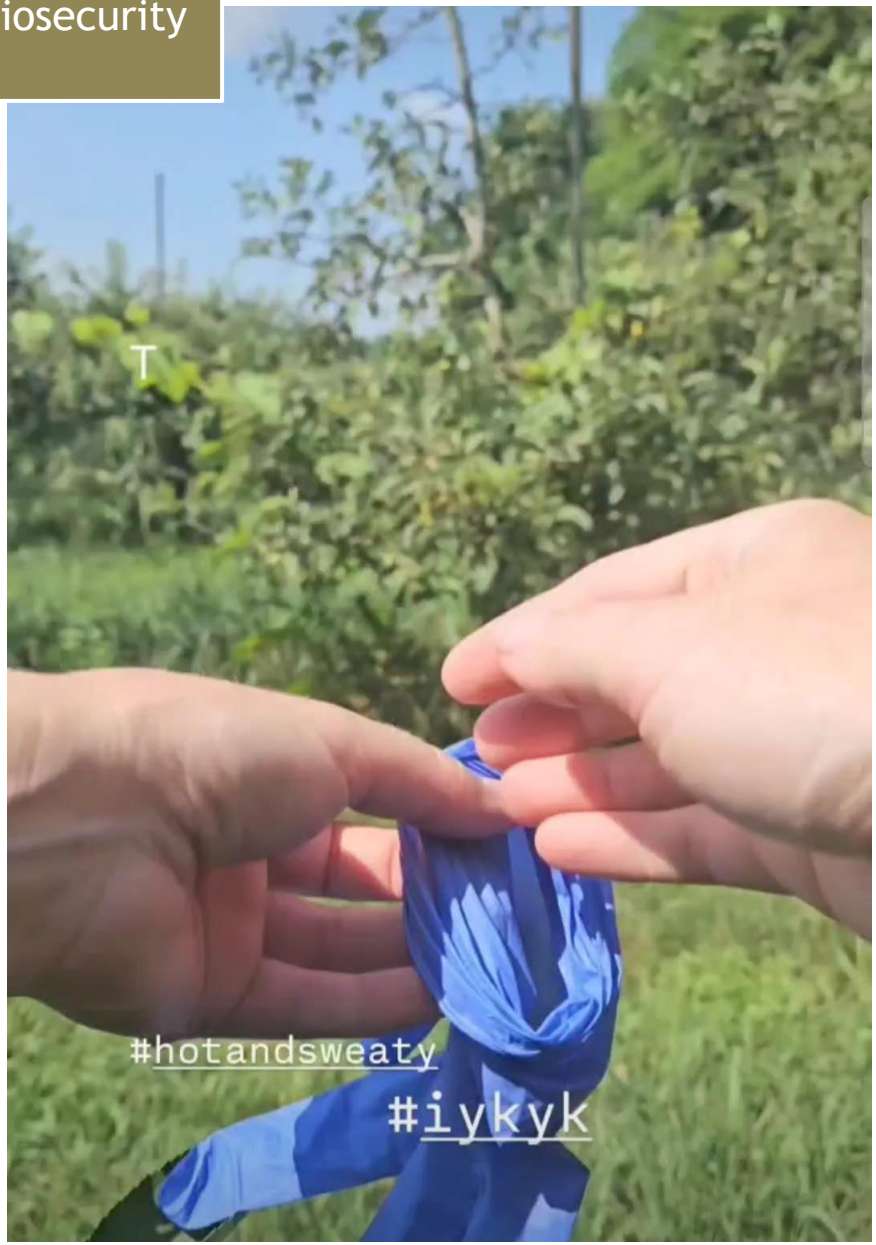
Review pest control calendars to know when certain pests and/or beneficial insects will be active

INSECT PESTS	Life stage	# of gene-rations	Phenology: Half inch green	Tight cluster	Pink	Bloom	Petal fall (calyx)	Early summer	Mid summer	Pre-harvest
Mullein plant bug	Larvae	2								
Spring-feeding caterpillars	Larvae	Various								
Spotted tentiform leafminer	Larvae in mines	2-3								
Green apple aphid	Colonies	14-15								
Rosy apple aphid	Colonies	3								
Redbanded leafroller	Larvae	2+								
Tarnished plant bug	Adults	2-4								
European red mite	Motile forms	6-8								
Obliquebanded leafroller	Larvae	2								
Plum curculio	Adults	1-3								
White apple leafhopper	Nymphs	1-3								
Codling moth	Adults	1-2								
European apple sawfly	Larvae/ adult	1								
San Jose scale	Crawlers	1								
Twospotted spider mite	Motile forms	6-8								
Woolly apple aphid	Colonies	9-10								
Apple maggot	Adults	1								
Oriental fruit moth	Adults	3-4								
Potato Leafhopper	Nymphs	2-4								
Dogwood borer	Adults	1								

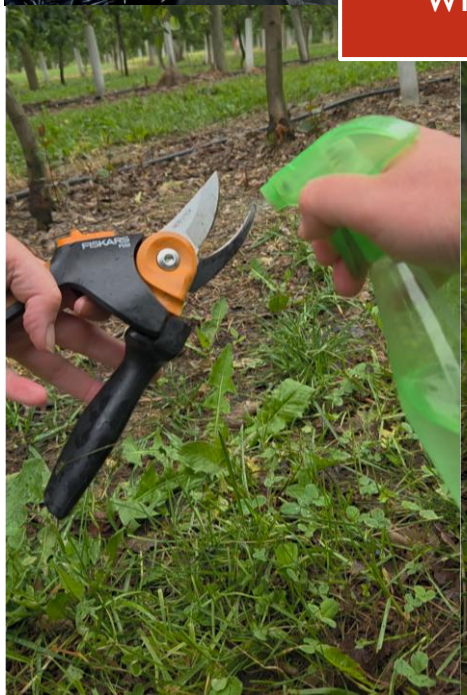
APPLE DISEASES	Phenology: Dormant	Silver tip	Green tip	Half inch green	Tight cluster	Pink	Bloom	Petal fall calyx	Early sum-mer	Mid sum-mer	Pre-harvest
Powdery mildew											
Apple scab											
Rust diseases											
Flyspeck											
Sooty blotch											
Fire blight											
Blossom end rot											
Black rot											
Canker diseases											
Blister spot											

APPLE BENEFICIALS	Life stage	# of generat ions	Phenology: Tight cluster	Pink	Bloom	Petal fall (calyx)	Early summer	Mid summer	Pre-harvest
Phytoseiid mites	Eggs and motile forms	4-6							
Stigmaeid/ Yellow mites	Eggs and motile forms	3-4							
Red velvet mites									
Spiders	Motile stages	1							
Lady beetles	Larvae and adults	1							
Stethorus punctum	Adults	2-4							
Gall midges	Larvae	3-4							
Hover flies	Active stages	Various							
Tachinid flies	Larvae and adults	Various							
Stink bugs	Larvae and adults	1-2							
Assassin bugs	Larvae and adults	1							
Mullein plant bug	Larvae and adults	2							
Bees and bumble bees	Active stages	1							
Ichneumonid parasitic wasps	Adults	Various							
Braconid and chalcid wasps	Adults	Various							
Lacewings	All stages	2-3							

Biosecurity



Bleach &/or wipes



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Monitoring Procedure

How to Look

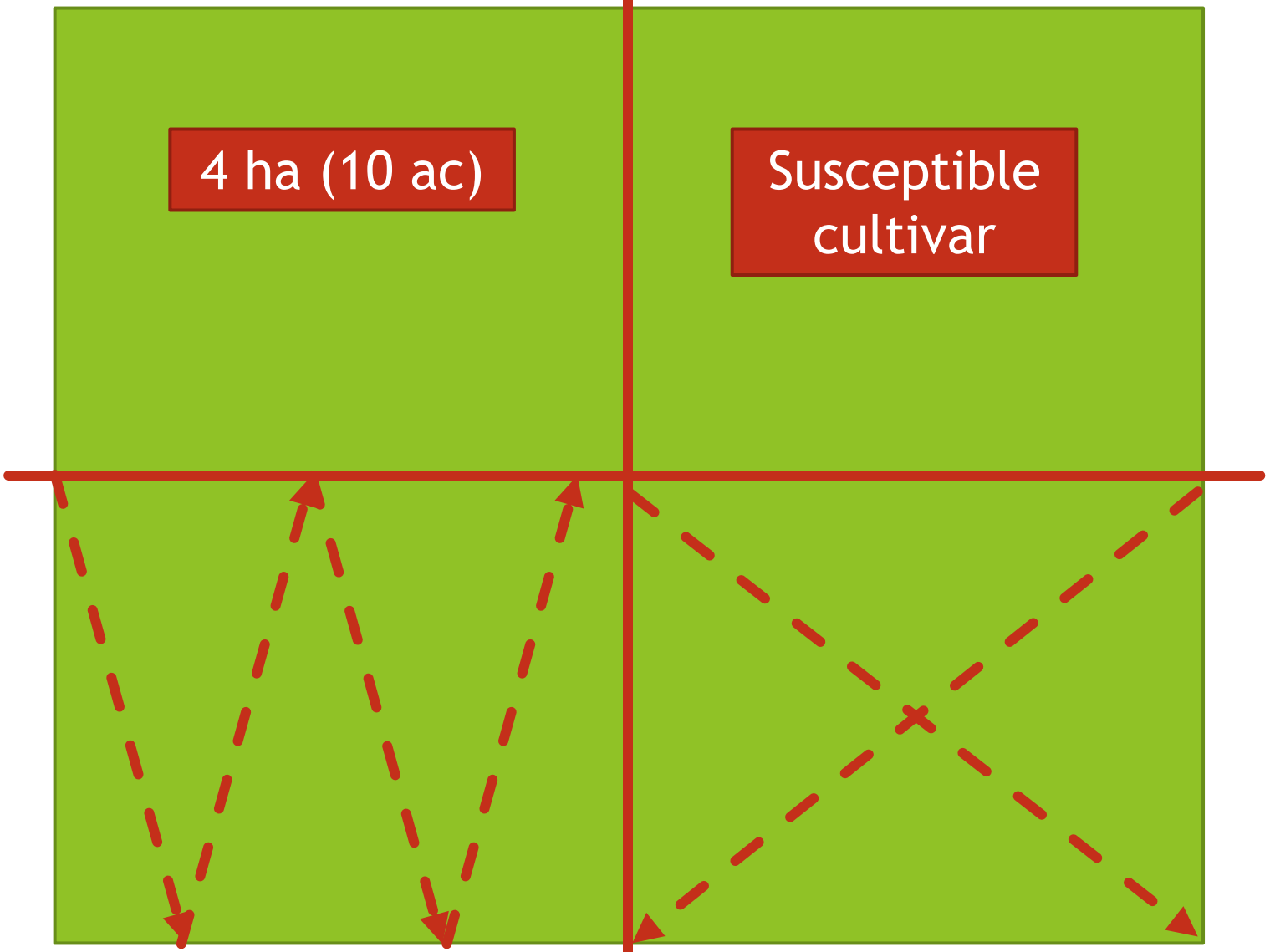
Where to Look

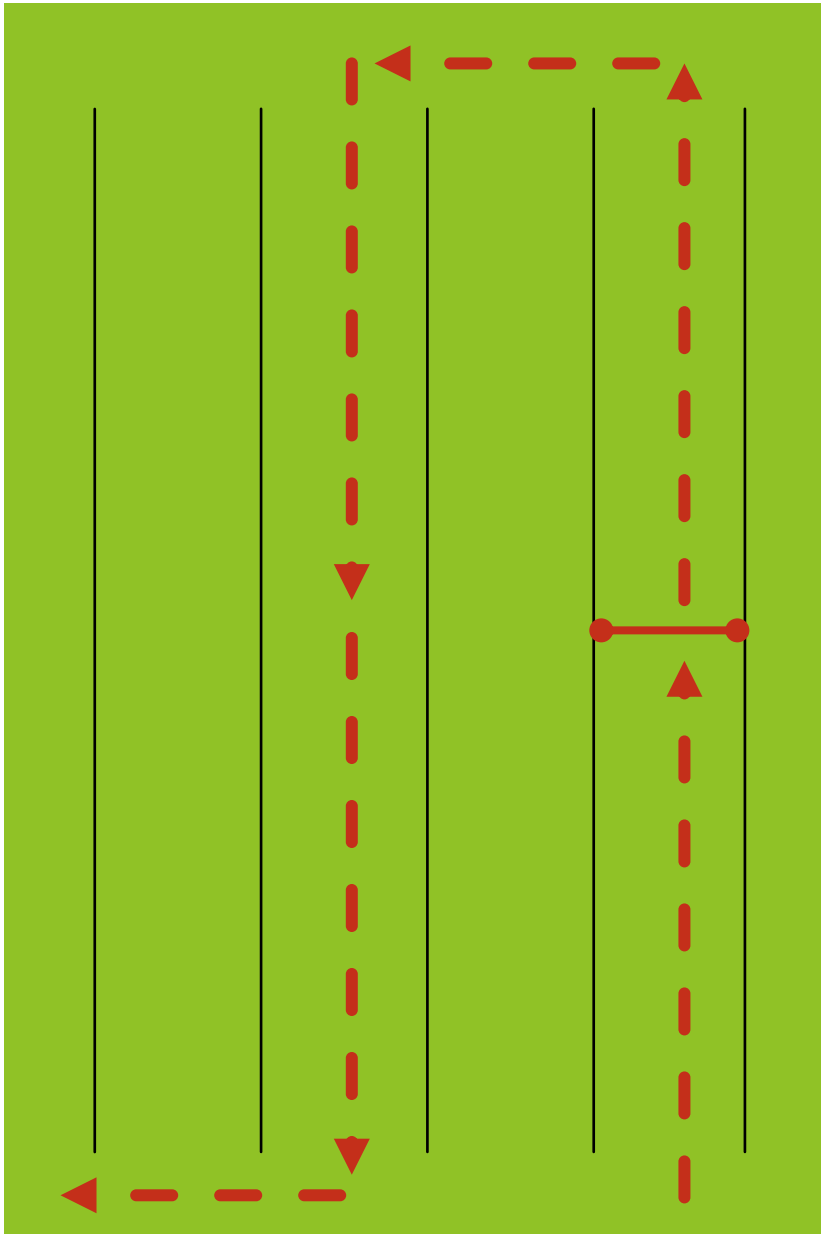
Monitoring Procedure

- Monitor at least once a week
- Monitor same time each day
- Keep light behind you
- Move randomly across orchard to get accurate idea of pest pressure
- Scout perimeter and interior of orchard

Monitoring Procedure

- Stand back and look for patterns or issues
- Get close and examine fruit clusters, underside of leaves and inside of canopy
- If sampling, look away from tree when taking a leaf or fruit


4 ha (10 ac)
Susceptible cultivar



If can’t move between rows due to trellis wires…

Monitoring Techniques

Trapping

Tapping

Visual observation

Trapping

- Place traps in the orchard before pest activity
- Hang within tree canopy as recommended for the pest being monitored
- Follow recommended density for target pest
- Place some near the border and some within interior
- Traps should be checked regularly – at least weekly

Ontario AppleIPM

GUIDELINES FOR USING INSECT PHEROMONE AND VISUAL TRAPS IN ORCHARDS

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Pheromone traps should be placed 50-100 m apart. Check traps twice a week, recording trap count and removing insects from the trap. Replace pheromones throughout the season, referring to manufacturer's instructions on how long pheromones last. Be sure to place traps in orchard prior to insect flight.

Pest	Tentiform leafminer (optional)	Oriental fruit moth	European apple sawfly	Codling moth	Dogwood borer	Oblique-banded leafroller	Apple maggot
Type of trap	Ice-cream carton + pheromone lure + plastic sticky grid	Pheromone lure + trap	White sticky 3D trap	Pheromone lure + trap	Pheromone lure + trap	Pheromone lure + trap	5 yellow boards with essence of apple
# traps per site	2	5	3	4	4	4	5
When to place in orchards	Half inch green	Late April	Tight cluster	Bloom	Late June	Petal fall	3-4 weeks after petal fall
Arrangement in orchard	1st generation: place traps	At least two rows from edge of	Currently, monitoring is only	Upwind from wild or abandoned	Optimal height is 1.2m.	Upwind from wild or abandoned	Place in outer row of trees, facing wild or

Trapping

- Pheromone traps
  - Presence/absence, first sustained flight, peak activity, verify program
  - Used in conjunction with degree day models to determine best timing for control measures
- Pheromones are volatile chemical attractants produced by insects to communicate with their own species
  - Use in traps typically mimic sex pheromones and attract males
- Avoid cross-contamination

Diamond trap

- Oriental fruit moth
- Codling moth
- Obliquebanded leafroller
- Dogwood borer
- Leafminer

Delta trap

- Can be re-used with same pest
- Removable liner
- Same pests as diamond trap plus apple leafcurling midge

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- Removable liner
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San Jose scale

Trapping

- Visual attractants
  - Provide visual stimulas
  - Indicate presence, relative abundance, development stage
    - Apple maggot
    - European apple sawfly

Monitoring Techniques

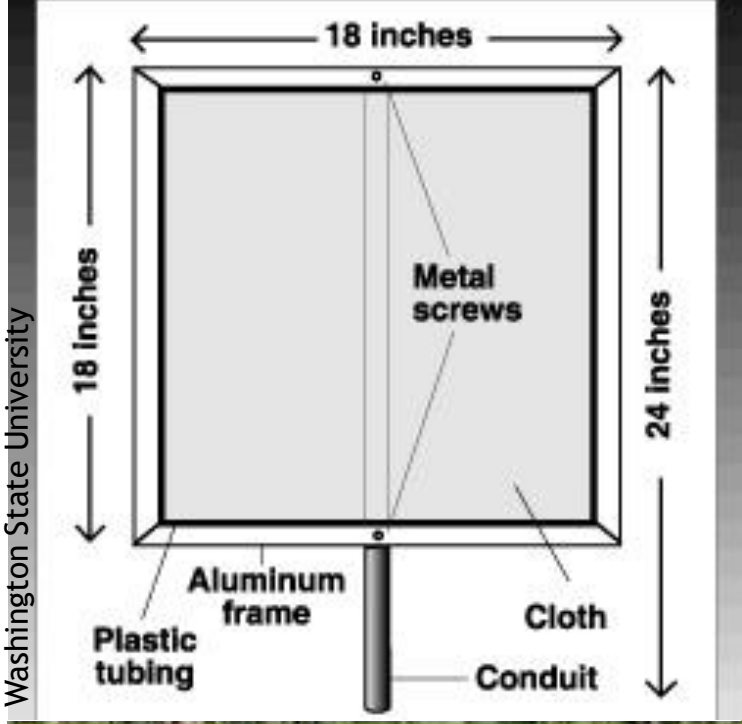
Trapping

Tapping

Visual observation

Tapping

- Used to monitor insects such as aphids, mites, mullein bug, spring feeding caterpillars, plant bug and beneficial insects
- Tray held beneath branch and rapped sharply with padded stick
- 2-3 raps on single branch dislodges insects onto trap where they can be observed
- Look quickly!
- Random in block on different trees than visually assessing



Monitoring Techniques

Trapping

Tapping

Visual observation

Visual observations

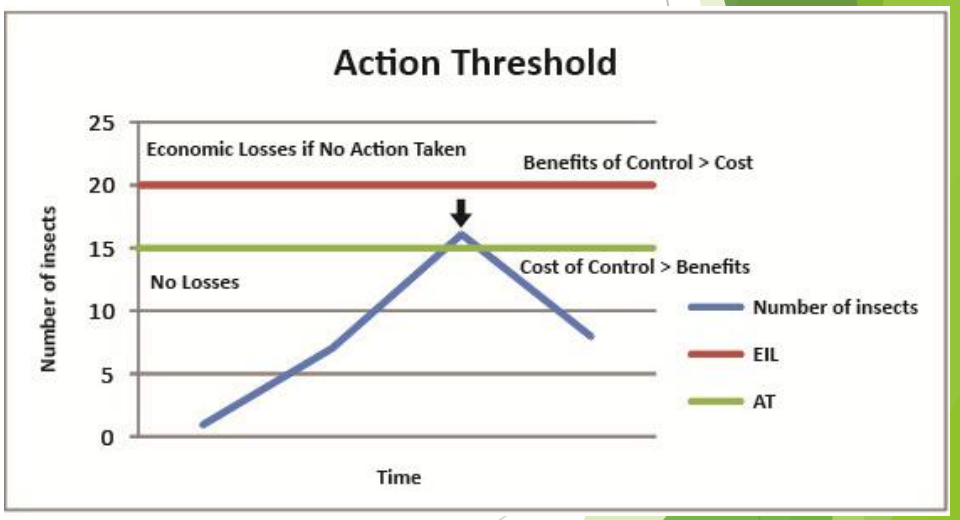
- Presence/absence of pest and beneficial
- Terminals, fruit buds or developing fruit
- Monitor for damage since pest not often present
- Standard:
  - 10 terminals per tree, 10 trees
  - 5 fruit or fruit buds per tree, 10 trees
  - 2 leaves per tree, 25 trees

The Threshold Story

- Scouting reports are decision tools – not just observations!
- Translate field counts into management triggers
  - **Pest presence ≠ action required**
  - Thresholds help answer: *Do I act now, wait, or reassess?*
- Focus on population levels + crop stage + conditions
  - Depends on type of damage (ie., fruit vs leaves vs trunk)
  - Direct pests generally lower than indirect pests

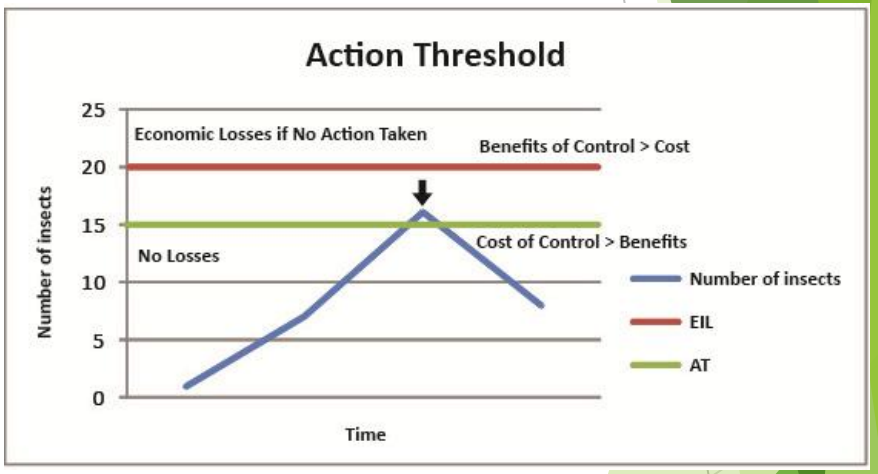
Economic Injury Level (EIL)

- The **lowest pest population density** that will cause **economic damage**
  - Cost of injury = cost of control
- Biological + economic calculation
- Influenced by:
  - Cultivar value
  - Input / control cost
  - Pest damage potential
  - Market tolerance (e.g., fresh vs processing)



Action Threshold (AT)

- The pest level at which **control action should be taken** to prevent reaching the EIL
- Always set below EIL
- Accounts for:
  - Pest growth / infection rate
  - Spray coverage
  - Weather delays
  - Cultivar susceptibility



EIL = “too late” vs AT = “act now”

Interpreting Scouting Reports

Look for:			
Pest density (e.g., mites/leaf, aphids/terminal)	Distribution (hot spots vs uniform)	Presence of natural enemies	Crop stage susceptibility

Then ask, is it:		
Below threshold? *Monitor*	Approaching threshold? *Increase scouting frequency*	At/above threshold? *Plan/control*

Thresholds have not been developed or validated for all pests in Ontario

Useful Resources

Ontario Crop Protection Hub

ontario.ca/cropprotection

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ontario.ca/cropipm