

Scouting for Insect Pests

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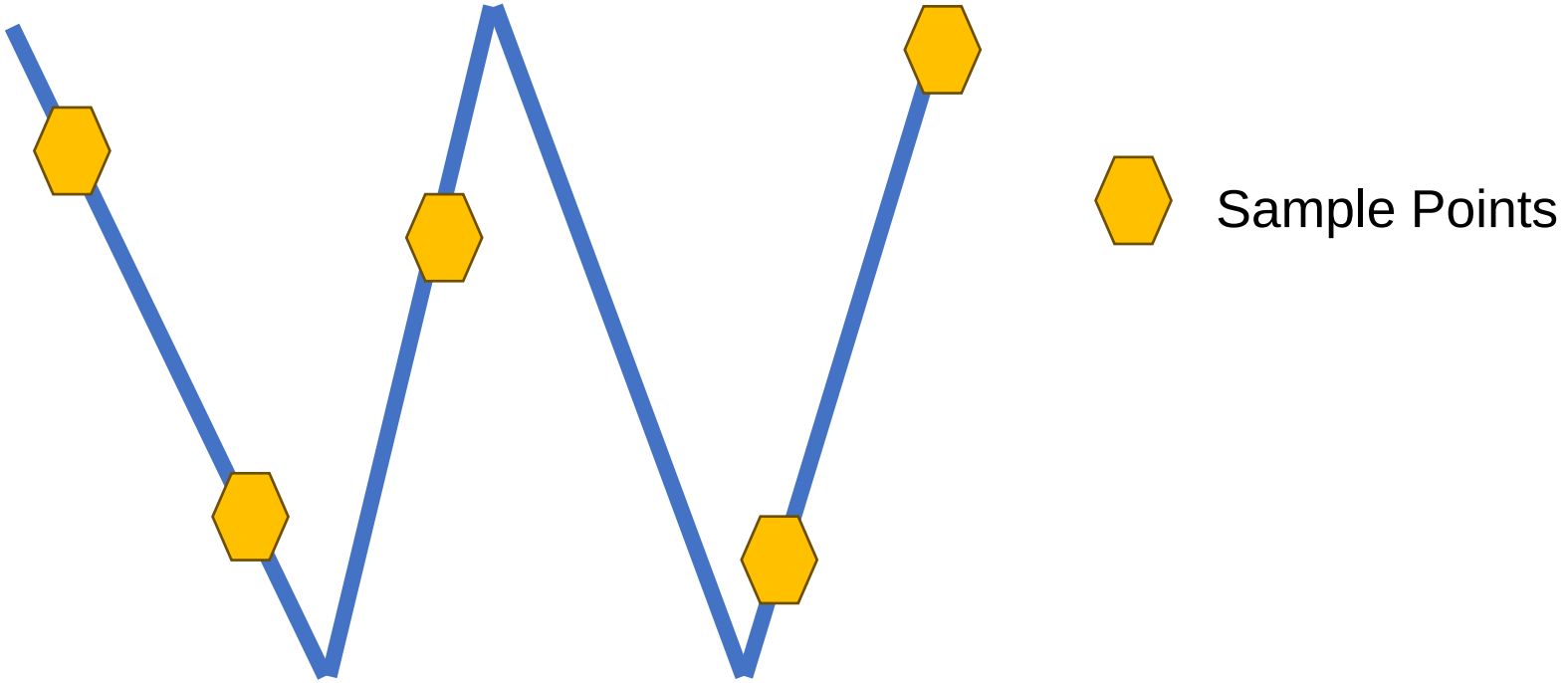
INSECT PEST MANAGEMENT

Outline

- Insect pests of potatoes
- Monitoring Techniques
- Control Options

SCOUTING A FIELD (should be Random)



- Walk in a W pattern and sample in 5-6 locations 4-5 plants per location

Colorado potato beetle (*Leptinotarsa decemlineata* (Say))

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Overwintered adults emerge in the spring and begin feeding and laying eggs

The eggs hatch and pass through 4 larval instars

Fourth instar when ready will drop to the ground and pupate

Emerge as adults in mid to late August and begin feeding on mature plants before moving to the hedgerow to overwinter

Colorado potato beetle (*Leptinotarsa decemlineata* (Say))

- Overwinters as an adult in the hedgerows around fields
- Adults may be present before potatoes emerge
- Defoliation can reduce yield
- Four larval instars
- Third and Fourth instar causes the most damage
- Pupate in the soil mid to late July
- Summer adults appear early to mid August

Scouting for Colorado potato beetle (*Leptinotarsa decemlineata* (Say.))

- Adults usually walk or fly to the fields
- Infestation starts from the perimeters
- Sample entire plants, adults can be anywhere
- Egg masses on the underside of leaves
- Young larvae on lower parts of plant; older larvae are higher up
- Resistance to insecticides is a major concern

Scouting for Colorado potato beetle

- Sample 30 – 50 plants
- Count spring adults, eggs, small larvae, large larvae and summer adults
- Calculate means for each of the above except eggs
- Calculate the economic threshold using average numbers

Scouting for Colorado potato beetle

ECONOMIC THRESHOLD CALCULATION

CPBE = Spring adults x 1+ Small Larvae x 0.125 + Large Larvae x 0.333 + Summer adults x 0.625

Economic threshold 1.5 - 2 CPBE

Other control measures

Biological Control

Pathogens:
Beauveria bassiana

Predator: *Podisus maculiventrus*

Mechanical Control

Plastic lined trench

Bug vacuum/beetle eater

Aphids

Potato Aphid

- First species to colonize
- Poor vector of PVYo and PLRV

Buckthorn Aphid

- Colonizes mid-July
- Vectors PVYo

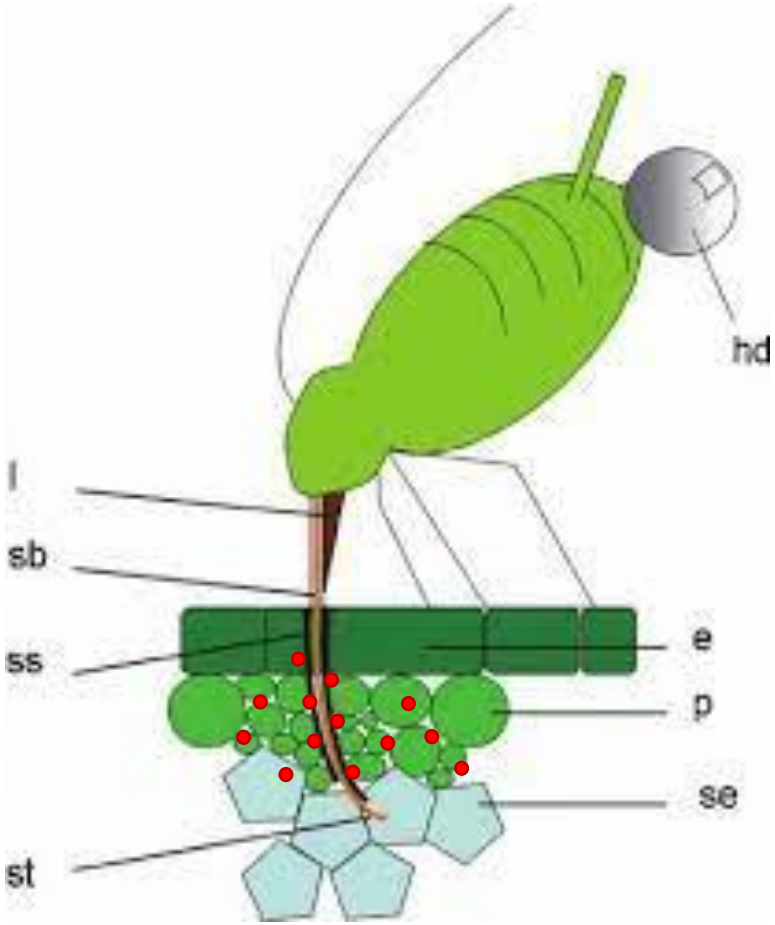
Foxglove Aphid

- Colonizes mid-summer
- Vector PVYo

Green Peach Aphid

- Late July or early August
- Vectors PVYo and PLRV

Aphids



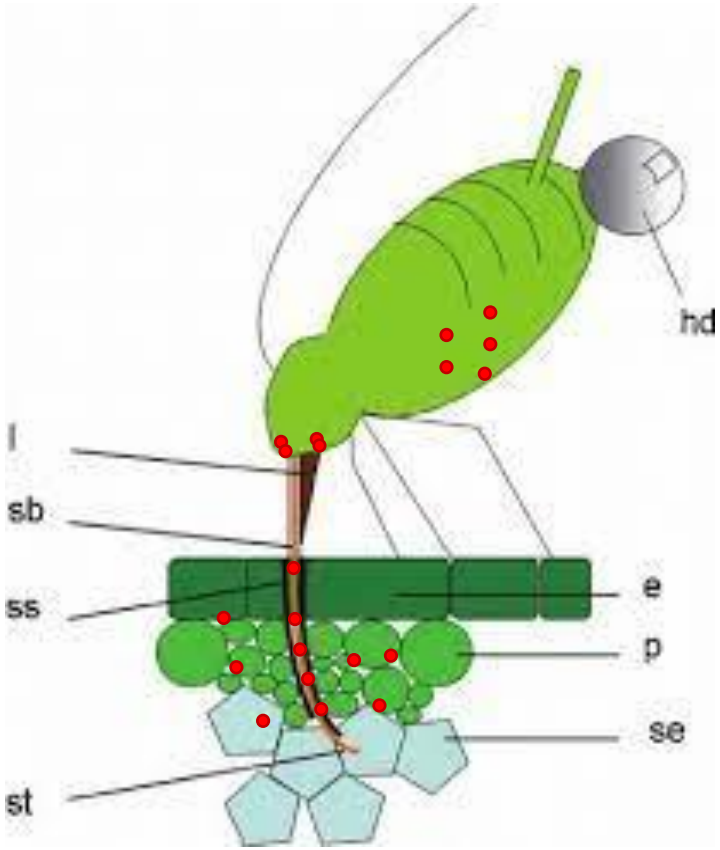
Two virus transmission methods

1. Non- Persistent transmission e.g.PVY

PVY particles are quickly acquired and are stylet-borne. aphids are capable of transmitting the virus for only a short period of time after acquisition, usually just a few minutes or hours

Oils sprayed on the plant leaves clean the stylet of the aphid removing the virus particle as it is extracted or inserted into the plant tissue.

Aphids



Two virus transmission methods

2. Persistent and Circulative transmission – PLRV

when aphids acquire a persistent virus, there is a period of latency between acquisition and the aphid being able to transmit the virus to a new plant. Once infected the aphids remain infectious for the rest of their lives and can transmit the virus each time they feed on another plant

Green Peach Aphid is a good vector of PLRV

Impact of Aphids on Yield and Control Options

- Aphids reduce yield through feeding damage
- Primary concern is their potential to transmit PVY and PLRV
- Concern for seed potatoes grown near table and processing fields

Non persistent viruses

Oils sprayed on the plant leaves clean the stylet of the aphid removing the virus particle as it is extracted or inserted into the plant tissue.

Persistent viruses

Spray appropriate insecticide to control the aphid

Scouting and trapping

- Check the top, middle and lower leaves of a plant and count number of aphids

- Yellow pan traps
  - Early detection of green peach aphid a good vector for PLRV a persistent virus.

Monitor the information provided by the aphid alert system run by the province.

Potato Flea Beetle (*Epitrix cucumeris* (Harris))

- Overwinters as an adult
- Leaves have a shot hole appearance
- Defoliation can reduce yield
- Larvae feed on root hairs but damage is not economical
- Summer adults appear after mid August

Scouting for flea beetle damage

Count number of shot holes on fourth terminal leaf (counting down from the apex of the plant) observe % of leave eaten

Damage Low = 0-5%, Medium =5-10% and high = > 10% leaf area eaten

Control options should be considered when damage exceeds 10%.

European corn borer *Ostrinia nubilalis* (Hubn.) Adults

European corn borer (*Ostrinia nubilalis* (Hubn.))

- Overwinters as a mature larvae in potato stalks
- Adults appear early to mid July
- Egg masses seen about the mid to end of July
- Larvae and damage seen end of July into August

European corn borer *Ostrinia nubilalis* (Hubn.) Egg Mass

European corn borer *Ostrinia nubilalis* (Hubn.) Damage to potato stalk

Stem with larva and entry hole

European corn borer *Ostrinia nubilalis* (Hubn.)
Damage to potato stalk

European corn borer *Ostrinia nubilalis* (Hubn.) Overwintering

European corn borer *Ostrinia nubilalis* (Hubn.)

- In general damage looks worse than it is
- Damage to stalk weakens plant
  - wounds are entry points for disease organisms
- - wind will break the stalks
- - damage to stalks interrupts the flow of nutrients and water
- Damage to late maturing varieties can be more severe

European corn borer *Ostrinia nubilalis* (Hubn.)

- Adults can be sampled with pheromone baited traps
- Sample bottom 2/3 of plant, stalks and underside of leaves for egg masses
- Threshold is 2 egg masses per plant 10 plants (cumulative)
- Sample at least 4 different areas in the field
- Flag egg mass and check a week later. Apply control when eggs are at black head stage

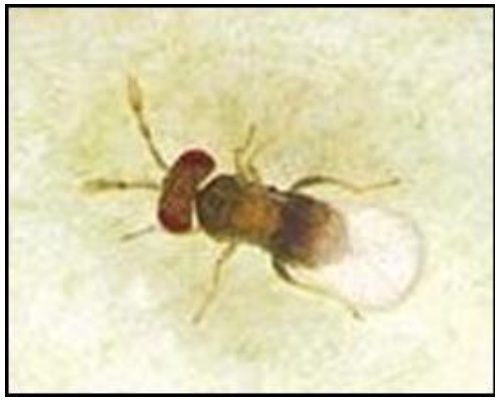
Pheromone trap

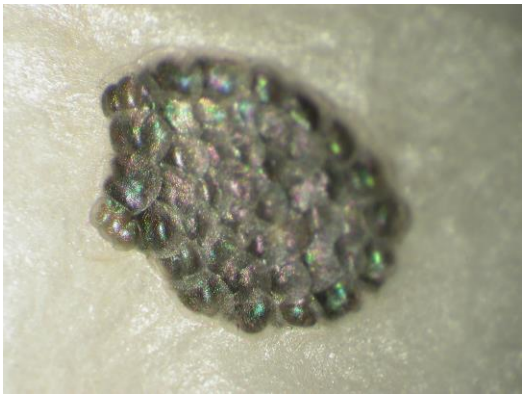
Egg mass at black head stage

Control of European corn borer *Ostrinia nubilalis*

Mechanical control

Biological control





Wireworms

- Larvae are found in the soil
- They live for five years as larvae
- Feed on the roots and potato tubers
- Monitor populations before planting potatoes
- Bait trapping in April or mid September
- Threshold is 1-2 larvae per bait

Control Measures for Wireworms

Use bait traps to Monitor larval population traps

Plant brown mustard or Buckwheat as rotation crops prior to potatoes

Nelt Trap to reduce egg laying females population

Chemicals available can be applied at planting

Leafhoppers

- Have three life stages, Eggs – nymphs – Adults
- Eggs are laid on the underside of leaves
- Adults and nymphs have piercing mouthparts that are inserted into the plant during feeding
- They can also transmit viruses
- Weeds can be a source of infestation

Leafhoppers

- Found in late August
- Usually not a problem
  - except in hot dry conditions
- Feeding results in hopper burn; initial yellowing at tips and margins of leaflets, eventually leaf margins die and roll inwards
- Damage may cause yield loss
- Sometimes yellowing of the leaves can be mistaken for herbicide damage

Leafhoppers

Sampling

Whole plant sampling

Sample 5 plants in 10 random sites per field.
The 5 plants must be from different rows.

Threshold

- Number of LH per 50 plants/stems:
- Adults: 10–15 and/or
- Nymphs: 25

Leafhoppers fly/ jump very quickly when disturbed. They are very tiny and may be difficult to see

Tarnished plant bug (*Lygus lineolaris* (Beauvois))

- Three life stages, eggs - nymphs – and adults generally copper coloured with a mottled appearance and triangle with a black dot on its back
- Adults and nymphs have piercing mouthparts that are inserted into the plant during feeding
- Prefer weeds, lambsquarters, pigweed, goldenrod, chickweed etc.
- Migrate from weeds into the crop.

Tarnished plant bug (*Lygus lineolaris* (Beauvois))

- Generally, not a major problem except in dry conditions when they move form drying weeds to the crop
- Introduces a toxin when feeding resulting in leaves curling or with holes at the base of leaves.
- Heavy infestation can result in yield loss.
- Check surrounding weeds or an adjacent alfalfa field before it is harvested.
- There is no threshold for TPB.

Biological control agents

Lady beetles

Lady Beetle larva

Lady Beetle Pupa

Ground beetle

Soldier bug adults and nymphs feeding on CPB larvae and eggs

Control Options

- Chemical Control
  - Foliar vs systemic (e.g seed piece treatment)
  - Other Options!
- Physical Control (e.g. removal of debris)
- Cultural Control (e.g. crop rotation)
- Biological Control (e.g. predators, parasitoids)
- Resistant Varieties




Thank you for listening

Contact information

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