Spotted Wing Drosophila & Other Threats

Alberta Farm Fresh School 2016
Olds, AB

Outline

- SWD
- Late Blight
- Swede Midge
- BMSB
- Others?

Spotted Wing Drosophila

- Drosophila suzukii
- Vinegar fruit fly

There are lots of different fruit flies out there
- Most vinegar flies only attack overripe, decaying, fallen fruit (present in late summer)

SWD – Why are we concerned?

- SWD attacks intact, ripening fruit
- High reproductive potential
- Low consumer tolerance
- Continues to spread very rapidly across a wide geographic area
- All regions in Alberta

Spread of SWD

- First ID’d as a pest in 2008 in California
- Quickly moved into Florida, Oregon & Washington in 2009
- Confirmed in British Columbia in 2009
- Found in significant numbers in 2010
- Discovered in Alberta in 2010
- Now found in most Canadian provinces

Alberta Situation – SWD

- Trapping/monitoring since 2010
- Found in low levels in all traps across Alberta in 2015
- Typically later season captures
- Main monitored crops = raspberry, strawberry, Saskatoon berry
- Captures in 2015 in raspberry, sour cherry and Saskatoon berry
Host Crops - SWD

- Alberta
  - Strawberry, raspberry, Saskatoon berries?, black currant?, sour cherries?, Haskap?
  - Other host crops (cultivated & wild)
    - Cherries, peaches, plums, nectarine, honeysuckle, apricot, blueberry, blackberry, grape, elderberry, dogwood, Oregon grape, etc.

Spotted Wing Drosophila

- Higher risk host crops?
  - Softer skinned fruit
  - Later season crops
    - Raspberries and Day neutral strawberries

Spotted Wing Drosophila - Adults

- 2-3mm light yellow-brown flies with red eyes
- Males
  - Single black spot on the end of each wing
- Females
  - No spots, but distinctive saw-like ovipositor (egg-laying device)

Drosophila suzukii female VS male character summary:
**SWD – Life Cycle**

- **May spread by:**
  - Windblown adults (shorter distances)
  - May be some long distance movement based on wind trajectory analysis in 2015
  - Transportation of infested fruit (long distances)
- **Overwinter as adult flies**
  - Not known if overwinters in AB conditions
    - Definitely possible in specific microclimates
  - Can tolerate high heat and cold winters

**SWD – Life Cycle**

- **Adults may be present from June to November** (in some areas)
  - Prefer warmer conditions (20-30°C)
- **Females lay eggs inside intact, ripening fruit**
  - Lay over 350 eggs
  - Eggs develop into larvae in 1-3 days

**SWD – Life Cycle**

- **Larvae hatch and feed within the fruit**
  - Mature within about 2 weeks
- **Pupae stay within or on the fruit**
  - Up to 2 weeks
### SWD – Symptoms / Damage

- Females saw through the intact flesh
  - Pinprick-size holes are visible in the soft areas of the fruit
- Larvae hatch and feed within the fruit
  - Fruits soften where feeding is occurring
  - Multiple larvae accelerates fruit collapse
- **Fruit becomes unmarketable**
- Disease may develop in infested fruit

### SWD – Monitoring / Trapping

- **Monitor for adults from mid-late May onwards**
- **Use baited traps**
  - Apple cider vinegar OR
  - Yeast & Sugar
- **Trapping started in AB in 2011**
  - **Up to 12 locations across province**

### Example SWD Trapping Kit

- **Contech trap**
- **Apple Cider Vinegar**
- **Strainer**
- **Alcohol**
- **Wash bottle**
- **Funnel**
- **Vials/Lids**
- **Wooden stakes**
- **Electrical tape (to attach trap to stake)**
- **Permanent marker**
- **Transport tub**
- **SWD info sheets**
- **Vial tray**

**Note:** Sunken flesh, oviposition holes, larvae & pupae.
SWD – Management

- Ensure good sanitation
  - Clean up leftover or fallen fruit
    - In field, in storage, on equipment
    - Bury (12+ inches), freeze, solarize
    - Composting IS NOT effective
  - Cool harvested fruit to slow larval development

SWD – Management

- Apply registered insecticides to control adult flies
  - Apply if trapping indicates presence
  - May need to spray to keep things from transferring to later crops
- Chemical choices
  - Most effective = pyrethroids, organophosphates, spinosads
  - Not effective = neonicotinoids

Late Blight

- Phytophthora infestans
- Affects all aboveground parts, plus infects tubers
- Requires living tissues to overwinter
- Serious disease of Solanaceous plants
  - Primary Hosts
    - Potatoes
    - Tomatoes
  - Secondary Hosts
    - Eggplant, peppers, petunia
    - Solanaceous weeds (nightshade, wild tomato)

Life Cycle of Late Blight

- Needs 2 mating types
- Needs free water for germination

In Season:

US-23 (A1) in AB this last season
### Late Blight Strains

<table>
<thead>
<tr>
<th>Strain</th>
<th>Preferred Host</th>
<th>Metalaxyl Resistance</th>
<th>Mating Type</th>
<th>Environment</th>
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<tbody>
<tr>
<td>US8</td>
<td>Potato</td>
<td>Resistant</td>
<td>A2</td>
<td>Wet / Cool</td>
</tr>
<tr>
<td>US11</td>
<td>Potato</td>
<td>Resistant</td>
<td>A2</td>
<td>Wet / Cool</td>
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<td>US22</td>
<td>Tomato</td>
<td>Susceptible</td>
<td>A2</td>
<td>Moist / Warm</td>
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<tr>
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<td>Tomato/Potato</td>
<td>Susceptible</td>
<td>A1</td>
<td>Dry / Hot</td>
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<tr>
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<td>Potato</td>
<td>Intermediate</td>
<td>A1</td>
<td>Moist / Warm</td>
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<tr>
<td>CA15</td>
<td>Potato</td>
<td>Susceptible</td>
<td>A2</td>
<td>?</td>
</tr>
</tbody>
</table>

Table by Dr. Larry Kawchuk, AAFC

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**Dark, water-soaked lesions**

**Lesions are not contained by leaf veins**

**Lesions may have a yellow edge**

**Lesions become brown & brittle within a couple of days**

**Lesions are not contained by leaf veins**

**Lesions move in from leaf tip or margin**

**LB on tomato**

**Lesions move in from leaf tip or margin**

**LB on tomato**
Sporulation may occur under moist conditions – on older lesions.

Plants may be rapidly defoliated & die.

Lesions may also develop on stems, tomato fruit or potato tubers.

Disease develops rapidly in field.

Rot penetrates deeply.

Rot may have a reddish-brown colour.

Disease may spread to healthy tubers in storage.
Late blight tuber rot

LB on tomato fruit –
Note – sporulation on surface

Conditions Favouring Disease Development

- Moderate temperatures & wet/humid conditions
  - 16-21°C day / 10-16°C night

- Extended periods of leaf wetness favour spore germination & lesion development
  - Dew
  - Irrigation

Management Strategies

- Prevent overwintering on living tissues
- Avoid introduction of infected materials
  - Manage cull piles
  - Use clean seed potatoes
  - Use care when bringing in transplants from other regions where late blight may exist

Conditions Favouring Disease Development cont’d

- Disease transfers from infected living tissues
  - Tubers (seed potatoes, cull piles)
  - Volunteer potatoes or weeds
  - Transplants (tomatoes)

- Spores are spread through:
  - Wind (many miles – 50+)
  - Rain/water splash – in field
### Management Strategies

- Dispose of infected material as soon as detected
  - Bury / freeze infected tissues
  - Tarp compost piles
- Top kill to reduce tuber infection & continued spread
- Cull potato tubers heavily before storage

### Management Strategies

- Plant resistant tomato varieties
  - *Mountain Magic*, *Defiant PHR*, *Mountain Merit*, and *Iron Lady*
- Control volunteers and Solanaceous weeds
- Adjust plant density to reduce humidity
- Water using drip or flooding to reduce wetting foliage
- Apply PROTECTIVE applications of fungicides

### Late Blight is a "Community Disease"

#### Swede Midge

- *Contarinia nasturtii*
- Tiny, light-brown flies
  - Larval feeding causes gall formation = unmarketable plants
- Affects cruciferous crops
  - Cole crops – cabbage, broccoli, etc.
  - Canola
  - Mustard
  - Cruciferous weeds

#### Swede Midge

- Why are we concerned?
  - Serious pest in other areas of the world
  - Increasing across Canada
    - 1st found in 2000 in ON, now found up to Saskatchewan
  - Vegetable crop losses reported to be as high as 85%
  - We have a over 6 MILLION acres of one of the host crops in Alberta
What Swede Midge does...

- Larvae feed near growing points & between tightly compressed leaves and petioles
- Secretions break down tissues
  - Secretions = toxic to the plant
- Tissues react causing misshapen plants and plant parts

Swede Midge – Management

- Select less susceptible plant types (e.g. cabbage vs broccoli)
- Buy/use clean transplants
- Maintain a crucifer-free rotation for 2+ years
  - Crop hosts AND weeds
- Avoid growing very near other host crops
- Destroy infested crops to reduce potential to harbour SM
- Systemic insecticides would be effective at controlling larvae and adults
Brown Marmorated Stink Bug (BMSB)

- *Halyomorpha halys*
- Wide host range (over 300 species)
  - Fruit, vegetable, ornamental and agricultural crops
  - Feeding by nymphs and adults = necrotic spots at feeding sites

BMSB – Why are we concerned?

- Invasive alien species
  - Native to Asia
- Serious pest of fruit, veg and agriculture crops in the mid-Atlantic region of the USA
- Has been found in most of the United States
  - Not necessarily established and causing issues in every state
- Has been found in RVs coming from United States to Alberta
  - Hitchhikers from milder areas

Pheromone traps

- Monitor for early detection
- Ensure clean, pest-free plant material
- Pesticide applications = limited efficacy

OTHER PESTS?
**Other pests?**

- Cherry fruit fly
- Carrot weevil
- Carrot rust fly
- Garlic diseases

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**QUESTIONS???

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