Control of Potato Virus Y for Seed Potato Production: Mineral Oils

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Potato Virus Y Background

- Potato Virus Y (PVY) is one of the most important viruses impacting potato production
- PVY is vectored by aphids in a non-persistent manner – the virus is carried on the aphid mouthpart for a short period of time
- PVY is spread as aphids insert their mouthparts (probing) in infected plants and then move to uninfected plants
- If aphid vectors are not controlled the virus can spread rapidly
- Most insecticides are not effective at controlling PVY spread by aphids because they do not kill aphids quickly enough to prevent probing into clean plants

Symptoms

- Leaf mottling with dark and light green or yellow patches
- Leaf crinkling and curling
- Stunting of plants
- Dropping of lower leaves (palm tree appearance)
- Vein necrosis
- The type and severity of symptoms depends on the potato variety (e.g. leaf mottling is clearly noticeable in Yukon Gold but difficult to detect in Russet Norkotah)

Damage

- Infected plants produce fewer and smaller tubers
- Early dying of infected plants
- PVY infection can reduce yield; for each 1% increase in PVY incidence yield can be reduced by 0.1805 t/ha in commonly grown varieties such as Russet Norkotah, Russet Burbank and Shepody (Noite et al. 2006, Plant Disease 88: 248-252)

Management

- Use certified clean seed
- Avoid planting potatoes near alternate hosts for aphids and PVY such as tomatoes and peppers
- Control weed hosts such as nightshades which are also alternate hosts for aphids and PVY
- Control volunteer potatoes (which may be infected with PVY)
- Avoid mechanical damage to the plants (as PVY can also be transmitted mechanically via machinery)
- Prevent transmission by aphids

Mineral Oil Trial

- Mineral oils are a potential tool for both conventional and organic seed potato production in BC
- Mineral oils have been shown to:
  1) alter aphid feeding behaviour
  2) have a direct insecticidal effect on aphids
  3) alter the virus-aphid interaction and disrupt virus transmission.
- Based on anecdotal and limited research an effective program is to spray a 1% solution of paraffinic mineral oil weekly starting at the beginning of the season

Methods (Treatments, Plot Description and Pest Inoculation)

- A field trial was conducted in a commercial potato field in 2012
- The trial consisted of three treatments (each replicated 6 times):
  1) Superior 70 Oil (Registered for PVY control in Canada)
  2) Purespray Green Spray Oil 13E (potential organic option)
  3) Water Control
- Plots were 4 rows wide X 8m long
- Plots were sprayed weekly, starting at full emergence until top kill (via mowing), for a total of 7 sprays; treatments were applied with a backpack sprayer
- PVY infected potatoes and aphids (10/plot) were also introduced to the trial area to insure both PVY and aphid pressure.

Methods (Assessments)

- PVY pressure in the plot was determine prior to treating the plot (leaf testing)
- No significant effect of the oil treatments on the total number of aphids over the course of the trial (Fig. 1)
- No PVY transmission to leaves or tubers in any of the trial plots, including the Water Control over the course of the trial.
- This is most likely due to the low numbers of winged aphids which are the primary vectors of PVY.

Results

- No significant effect of the oil treatments on the total number of aphids over the course of the trial (Fig. 1)
- No PVY transmission to leaves or tubers in any of the trial plots, including the water Control over the course of the trial.
- This is most likely due to the low numbers of winged aphids which are the primary vectors of PVY.

Next Steps

- Based on experience in both national and local trials, small field plots do not appear to be an effective way of evaluating mineral oil for PVY control
- National trials are planned for 2013-2015 to evaluate mineral oil in large plots (e.g. 10 rows X 10 m); efficacy of different rates of mineral oil and combinations with conventional insecticide will to be examined