



Another month has flown right by and here is another edition of Hort Snacks, for your educational pleasure. Hopefully the summer has treated you half decently (or better) and you have gotten caught up on the rain, avoided the frozen stuff (both forms) and had a good crop year, with high demand and good prices.

In this edition, you'll find a whole lot of information about Spotted Wing Drosophila, which is developing rapidly into North America's Most Wanted pest, taking spots 1-5 (out of 10). We've been fortunate in recent years to have avoided it, for the most part, but this year, numbers have climbed and incidence is much wider spread than before. Hopefully, our winters will take care of anything overwintering, but growers will have to get used to the need to monitor for and manage this pest. Thanks to Dr. Jim Broatch (and some SK scientists) we have some good information on what is happening in Alberta, as well as some thoughts on how they got here (one of the possible ways).

The remainder represents a wrap up of some of our summer extension work, which can be tough to schedule in, but is always rewarding when it comes to learning and development. You'll also find some information on Late blight, upcoming extension events, and a few other bits and pieces.

As you roll into fall, please feel free to share updates and news, connect with us at events (and register for any one of the MANY events planned through the fall and winter), or send us suggestions for things that you feel you need to learn more about. We'll try and deliver. Good luck with harvest.

Rob Spencer/Dustin Morton, Commercial Horticulture Specialists
 Alberta Ag-Info Centre, Alberta Agriculture & Rural Development
 310-FARM (3276)

Website of the Month

Back Pocket Grower

A consortium of American universities have come together to create this online training database.

<http://backpocketgrower.org/default.asp>



ARD Horticulture Microsite – click the image

In this edition of Hort Snacks

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THINGS TO DO / THINGS TO THINK ABOUT THIS MONTH

Strawberries

- Good soil moisture must be maintained in June bearing strawberries to ensure maximum branch crown and flower bud formation (next year's production)
- Old weeds should be removed this month. Reducing the amount of foliage and trash will facilitate proper placement of herbicides later this or next month. Cultivation between rows to eliminate weeds, incorporation of straw and aeration of the soil should also be done
- Day-neutral strawberry producers often find irrigation for frost protection beneficial during fall months. Very often producers experience 1 or 2 frosty nights in late August-September followed by weeks of "Indian Summer"
 - Frost protection has proved invaluable during this brief period
 - Water releases heat as it freezes on the plant, thereby keeping the plant parts above freezing. Protection can be obtained down to approximately -6.6°C . At temperatures of -1°C at plant level frost may cause slight injury to open flowers. Medium injury may occur to open flowers at temperatures of -2°C . Producers should have accurate thermometers stationed throughout their field, especially in depressional areas
 - Irrigation should commence when temperatures at ground level reach $+1^{\circ}\text{C}$. Ice may not form immediately. Ice formation of 1 cm in thickness may form without serious damage to the plants. Irrigation should continue until the ice melts off the plants. A thermometer in the field at ground level in a location not frost protected may assist in determining field temperature
 - Field warming through the use of irrigation during periods of frost is a relatively inexpensive form of insurance. Much of the year's income can be wiped out in one chilly night. Straw mulch within the row is also a definite asset. Some producers find that fibre/fabric row covers are providing $1-2^{\circ}\text{C}$ frost protection

- Do not apply 2,4-D or Lontrel in September due to flower bud initiation. September is a good time to apply Devrinol or Sinbar to control winter annuals
- Strawberry growers should be making arrangements for obtaining clean rye or wheat straw for mulch this fall. Personally walking farmer's fields to decide how clean (free from weeds) the straw will be might be a good idea prior to purchase.

Apples

- Stop watering/irrigation to encourage shut down and winter acclimation. Apples will continue to grow if water is available

Raspberries

- Prune out spent or fruited canes, as well as weak or diseased canes
- Reduce irrigation this month to encourage hardening
- Consider fall herbicide applications in established plantings – some restrictions apply to certain products (e.g. Casoron)

Saskatoon berries

- Disease pruning and weeding
- If you are planning to rejuvenate (mow-off) your orchard next spring, do not use Casoron this fall

Vegetables

- Remove mature product and cool quickly to ensure maximum post-harvest life
- Field covers can be used to protect crops from fall frosts
- Curing of some crops (potatoes, bulb veg, pumpkins) can help in wound healing and post-harvest lifespan
- Fall planting may be done for some crops (e.g. garlic, spinach, etc.) – timing varies – too late can result in winter injury and poor survival

General / Other

- Mow grass and weeds around plantings to discourage mice as well as reduce insect and disease overwintering sites

Pest Management / Monitoring

- Monitor insects and control if necessary (to reduce overwintering stages)

NEWSLETTER USE RESTRICTIONS

Please feel free to share all or portions of this newsletter with other interested parties.

If you want to use content from this newsletter in other media, please request permission before doing so.



Q: How do you manage your cull product? How do you extract value from "waste" product?

A: There has been lots of interest and reports in the media about countries and companies setting up ways of selling "ugly" or "unmarketable" product to consumers. The key is showing them that the product is still edible and tasty, even if it isn't pretty. Alternatively, processing (a.k.a. value-adding) cull product can produce all sorts of new revenue streams and reduce waste.

Next Month's ? → [How have your marketing activities or market channels changed in the last 5 years?](#)

MENTAL SNACKTIME – Defining Value / Value-adding

“To add value to others, one must first value others”
– John C Maxwell

“Strive not to be a success, but rather to be of value”
– Albert Einstein

“People won’t value your work if you don’t place a value on it” – Dannielle Miller

“Price is what you pay. Value is what you get”
– Warren Buffet

“You don’t get paid for the hour. You get paid for the value that you bring to the hour” – Jim Rohn

“The crucial variable in the process of turning knowledge into value is creativity.” – John Kao

“I can’t change the fact that my paintings don’t sell. But the time will come when people will recognize that they are worth more than the value of the paints used in the picture.” – Vincent van Gogh

Hort Snacks To Go

– Horticulture Winter Webinar Series

Sept 21, 2015 – Dustin Morton (AB Agriculture & Forestry) – *AF Greenhouse energy and material efficiency project*

Oct 19, 2015 – Dr. Chieri Kubota / Mark Kroggel (U of Arizona) – *Hydroponic strawberry production*

Nov 16, 2015 – Grace Fedak (Serviceberry Farms) – *Eco-buffer experiences*

Dec 14, 2015 – Dr. Jim Faust (Clemson University) – *Interactive greenhouse bedding plant and issues diagnostics*

Jan 18, 2016 – Christie Pollack (Christie’s Gardens & Greenhouses) – *Customer service*

Feb 22, 2016 – Dr. Laura Van Eerd (U of Guelph) – *On-farm trialing – soil fertility and cover crops*

Mar 21, 2016 – Dr. Ken Fry (Olds College) – *Encouraging beneficial natural enemies in horticulture crops*

Upcoming Conferences / Workshops

September 2015

- **Hort Snacks in the Field (Saskatoon berry/Processing focus)**
Sept 1, 2015 – Hidden Valley Gardens – Sylvan Lake, AB
www.albertafarmfresh.com
- **Potato Europe 2015**
Sept 2-3, 2015 – Kain (Tournai/Doornik), Belgium
<http://www.potatoeurope.com/>
- **Explore Horticulture (for prospective growers)**
Sept 12, 19, 26, 2015 – Grande Prairie, Red Deer, Lethbridge
See AAF [Coming Events](#)
- **2015 Canada’s Outdoor Farm Show**
Sept 15-17, 2015 – Woodstock, ON
www.outdoorfarmshow.com
- **Hort Snacks-to-Go Webinar**
Sept 21, 2015

October 2015

- **Canadian Greenhouse Conference**
October 6-8, 2015 – Scotiabank Convention Centre, Niagara Falls, ON
www.canadiangreenhouseconference.com
- **CanWest Horticulture Show**
Oct 9-10, 2015 – Tradex – Abbotsford, BC
www.canwesthortshow.com
- **Hort Snacks-to-Go Webinar**
Oct 19, 2015
- **Hort Snacks @ Night – Standard Operating Procedures**
Oct 20-22 – Coaldale/Wetaskiwin/Fairview
- **PMA Fresh Summit International Convention & Exposition**
October 23-25, 2015 – Georgia World Congress Center, Atlanta, Georgia, USA
<http://www.freshsummit.com/>
- **4th Canadian Food Summit**
Oct 26-27, 2015 – Hilton Toronto – Toronto, ON
<http://www.conferenceboard.ca/conf/foodsummit/default.aspx>
- **ISA Prairie Chapter – The Circle of Life – A Tree’s Story**
Oct 19-20, 2015 – Lethbridge Lodge Hotel & Conference Centre – Lethbridge, AB
<http://www.isaprairie.com/2015-isa-prairie-chapter-conference-roots-of-success>

November 2015

- **Saskatchewan Green Trades Conference**
Nov 4-5, 2015 – Saskatoon Inn, Saskatoon, SK
<http://www.saskgreenhouses.com>
- **Hort Snacks-to-Go Webinar**
Nov 16, 2015
- **Potato Growers of Alberta Annual General Meeting**
Nov 17-19, 2015 – The Sheraton – Red Deer, AB
www.albertapotatoes.ca
- **Green Industry Show & Conference**
Nov 19-20, 2015 – BMO Centre at Stampede Park, Calgary, AB
Garden Centre Bus Tour
Nov 18, 2015 – Calgary area
www.greenindustryshow.com



HortSnacks-to-Go: 2015/2016 Webinar Series



To register call Dustin Morton at
403-742-7571 or email at
dustin.morton@gov.ab.ca

September 21 (3 PM MST) –

Dustin Morton, Alberta Agriculture and Forestry
Dustin will be discussing the results of an Alberta Agriculture and Forestry project looking at greenhouse energy and material efficiency and how best to manage these in your greenhouse operation.

October 19 (3 PM MST) –

Dr. Chieri Kubota and Mark Kroggel, University of Arizona

Long popular in Japan and Europe, hydroponic strawberry production has largely been ignored in North America. Chieri and Mark are looking to change this with their plant breeding and research and will discuss some of what they've discovered along the way.

November 16 (3 PM MST) –

Grace Fedak, Serviceberry Farms

Grace Fedak has been growing some of the best strawberries in Alberta for over 20 years on her heavily treed Strathmore area farm. As her shelterbelts have aged, Grace has begun to switch them to eco-buffers and will talk about her successes and failures along the way.

December 14 (3 PM MST) –

Jim Faust, Clemson University

Jim is an associate professor of Floriculture at Clemson University and an expert in the area of diagnostics. Over the hour webinar, he'll be running an interactive "Name that problem" with some bedding plant and greenhouse issues he has seen over his career.

January 18 (3 PM MST) –

Christie Pollack, Christie's Gardens and Greenhouses

As owner of Christie's Gardens and Greenhouse in High Prairie, Christie Pollack is passionate about customer service. She'll discuss how to engage even your most problematic clients without alienating and provoking them.

February 22 (3 PM MST) –

Dr. Laura Van Eerd, University of Guelph

Laura is an associate professor at the University of Guelph in the area of soil fertility and cover crops. A proponent of on-farm trialing, she will tell you what you need to set up your own on farm trialing so you get the biggest bang for your buck from new products and techniques.

March 21 (3 PM MST) –

Dr. Ken Fry

Ken is a world renowned entomologist and is passionate about the role of beneficial insects in cropping systems. He'll be talking about how to encourage these natural enemies in your horticultural crops to improve your crop health and ultimately your bottom line.

Getting into Farming Information Session *For the Aspiring Farmer*

Agriculture and Forestry

Session topics include:

- Overview of Agriculture
- Business Planning
- Personal Assessment
- Financial
- Land
- Resources/Education

October 20, 2015

Airdrie – Agriculture Centre
97 East Lake Ramp NE, Airdrie, AB

October 22, 2015

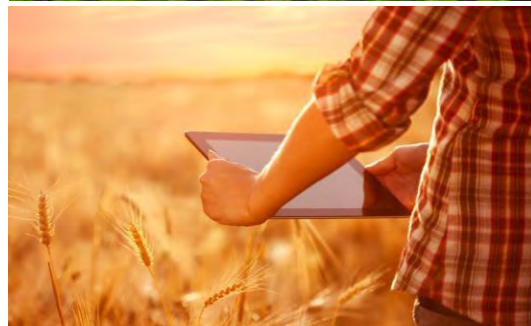
Leduc – Agriculture and Forestry
6547 Sparrow Drive, Leduc, AB

Time

9:00 a.m. to 3:30 p.m.
(registration starts at 8:30 a.m.)

Cost: \$25/person (includes lunch)

***To register call the Ag-Info Centre at
1-800-387-6030***



Return your unwanted or obsolete pesticides and livestock medications

Farmers: safely dispose of your unwanted agricultural pesticides and livestock/equine medications from **October 26-30, 2015** at one of the following locations, *for no charge*.

Monday, October 26

Fort MacLeod	Crop Production Services 403-553-3774
Benalto	Benalto Ag Services 403-746-2012
Oyen	Richardson Pioneer 403-664-2620
Dunmore	Richardson Pioneer 403-527-6600

Tuesday, October 27

Bow Island	Crop Production Services 403-545-6806
Magrath	Richardson Pioneer 403-758-3162
Hanna	Fox Lake Agro 403-854-2820
Olds	Richardson Pioneer 403-556-3222

Wednesday, October 28

Lethbridge	Cargill 403-327-4380
Crossfield	Crop Production Services 403-946-4588
Taber	Crop Production Services 403-223-2807
Drumheller	Kneehill Soil Services 403-823-4600

Thursday, October 29

Caresland	CHS Inc. 403-934-4644
Craddock	CHS Inc. 403-733-3529
Linden	Kneehill Soil Services 403-546-4050
Vauxhall	Crop Production Services 403-654-4464

Friday, October 30

Picture Butte	Crop Production Services 403-732-4585
Brooks	Crop Production Services 403-362-2072
High River	Crop Production Services 403-652-3500
Hussar	Richardson Pioneer 403-787-3931

* Obsolete pesticides and livestock/equine medications will be accepted from 9 a.m. until 4 p.m. at each site on the date indicated.

Program supported by:



For more information, please call CleanFARMS at 877-622-4460 or visit www.cleanfarms.ca

Hort Snacks in the Field / Hort Snacks on Wheels – Lessons Learned

There are few tools that are better for helping growers see new opportunities and learn new things than being out in a field and/or touring and quizzing a fellow grower. The level and rate of learning escalates exponentially as each participant ask questions of each other, shares their experiences and provides insights into the discussion. Tours are a chance for participants to pick up quick tips and major lessons in a short amount of time. If you are trapped on a bus with other people, you increase the learning and discussion by a factor of 3.

Over the summer of 2015, there have been 3 “in-field” events where participants of all types gathered to learn from each other and from a host operation. Here are some of the things that we learned during the course of the events. Please note these aren’t comprehensive lists, just the things that we (the government guys) heard and picked up on.

Hort Snacks in the Field – Erdmann’s Gardens and Greenhouse – July 2015 – Vegetables & IPM focus

- Pests can come at you from all sorts of directions – you have to use a variety of tools to successfully manage them
- Constant vigilance
- If at first you don’t succeed (with something), take a logical and informed approach to trying it again, so that you can work out the kinks – include the experts in the process
- Having reliable family/partners/staff is critical to success
- No research will tell you as much about a new chemical, new planting technique or new variety as trying it out on your own farm
- Nothing is ever going to be perfect, so do it as well as you possibly can and be proud of it
- Partnering with local institutions (government, non-profit, or otherwise) shouldn’t be a burden and may enhance your bottom line
- Knowing who to call when something goes wrong can save you a lot of time in an emergency



Mixed veg field with insect traps

Hort Snacks in the Field – Solstice Berry Farm – August 2015 – Saskatoon Berry focus

- Sometimes plans take a long time to come to fruition and they can shift, change and morph a fair bit along the way – you still end up making changes to them, even after you hit a milestone
- Something that seemed massive and “way more than you’ll ever need” when you think of it and put it in, usually isn’t big enough eventually
- Invest in good equipment
- Make concrete plans
- Make sure your plans have achievable milestones along the way – milestones are there to show you how far you’ve come
- You can never be undereducated and should never stop learning
- A quality product is worth something
- Always plan to the highest standard so you’re never surprised and always able to get your product to market

Participants touring Saskatoon berry orchard



Participants discussing greenhouse production at Kathy's Greenhouse



- Never be afraid of investing in technology that is going to make your life easier, more efficient, make you more money (actually more money, not in a snake oil sort of way) or give you more time for the important things in life
- Even the smallest things can change a job from mind numbing to enjoyable (music, people, etc.)



Participants touring Solar Gardens



Hort Snacks on Wheels – Saskatchewan Greenhouse Bus Tour (various locations – August 2015)

- Don't be afraid to fail (repeatedly)
- Passion can carry you a long way and sell a lot of plants
- Put reliable people in charge of different parts of your operation
- Rely on your family/staff/managers to carry forward your shared vision
- Diversification is key AND powerful
- Investing in people and equipment can save a lot of \$\$\$
- Even if getting product from somewhere else may be cheaper, it may not allow you to provide the level of quality and service that you want/need to provide to your customers
- Innovation is the product of practice and experience
- Keep learning and growing
- Watch the trends and don't be afraid to drop stuff that isn't profitable
- As wonderful as altruism is, your business is just that; a business and it MUST make

Solar Gardens oil tasting house



money

- Never be ashamed of being successful
- Don't be afraid to fail (again!)
- If you've been a garden centre in the past, that doesn't mean you have to be a garden centre in the future; adapt and thrive!
- Find realistic ways to motivate your staff, whether that is an increase in pay, pizza parties, etc. Celebrate their successes
- Back to altruism; never forget the community that has made you what you are. Give back to your community and be generous and your business will be rewarded
- People may pay for a product but they'll generally pay far more for an experience
 - Never underestimate how far people will drive for said experience!
- Have a succession plan and follow through – allow the next generation to put their own spin on things
- In the end, it's just a business and isn't worth tearing a family apart over
- Know your target market, demographic, how they buy, what they buy, where they buy, when they buy – know your customer!!!
- Always, always plan breaks on a long trip – smokers get antsy!

Wide selection of succulents



Flood floors at U of S Greenhouses

Left = Dutch Growers empty sales area

Right = Wilson's Greenhouse – nursery area



End-of-Season Checklist for Managing Late Blight

In the summer of 2013, late blight was confirmed in parts of Southern Alberta and spread eastward through that region. In 2014 & 2015, with the intent of returning to late blight-free status, increased awareness efforts were instituted in both the industry and the public. Everyone was encouraged to increase early and season long monitoring of fields, gardens and greenhouses in order to protect crops from late blight, as well as have a quicker response to any perceived infections. As the 2015 season starts to head towards the finish line, 1 case of late blight was caught early in Alberta, with nothing since. Spore levels are steady; therefore, it is recommended that all growers of potato or tomato (commercial or home garden) take specific steps to prevent the carryover of disease into future years, as a number of valuable crop industries in Alberta could be impacted by repeated outbreaks.

In the late parts of the growing season, ensure that plants die down quickly using top-killing treatments such as chemical desiccant (diquat) or mechanical treatments.

At the end of the growing season, gardeners should dispose of all above-ground plant materials (stems and foliage), whether infected or not, either by burial, freezing or composting. The purpose is to ensure that living tissues do not survive the winter and will break down completely, thus preventing carryover of the late blight pathogen. Avoid placing infected materials in uncovered compost piles as spores may be produced and spread the disease to nearby plantings of susceptible crops. Piles may be covered with a tarp until the materials have frozen and are completely dead.

Since tubers represent the primary method of disease carryover in potatoes in Alberta, every effort should be made to prevent the survival of infected tubers. Recognize that some of the recently prevalent strains of the late blight pathogen are more aggressive on tubers. Carefully grade and sort harvested potato tubers in an effort to remove any infected tubers. Commercial seed growers should be prepared to further grade seed tubers in the spring, and mancozeb-based seed treatments should be applied to try and protect developing crops from seed-borne late blight.

Culled tubers should be disposed of in such a way as to encourage them to breakdown over winter. Culled tubers can be fed to livestock or may be chopped, incorporated and buried, or can be placed in covered piles until they freeze completely. Ensure that potatoes do not volunteer (grow in another crop).

The late blight pathogen normally cannot survive away from living tissues. While the disease can survive for a time on tomato fruit, spores will not carry over on tomato seed. The disease can be introduced on living tomato transplants that are brought in from areas where late blight survives the winter.

In Alberta, the late blight pathogen does not survive or overwinter in the soil, so growers should not worry about re-infection by planting in or adjacent to a field where late blight has occurred, provided there are no surviving tubers that could reintroduce the disease through infected volunteer plants. However, rotating between locations is always recommended, whenever possible, to prevent the build-up of other diseases.

All growers should take the time to assess the past growing season and the level of risk of late blight infection or re-infection that they will face for the next growing season. Determine where disease might have come from and put preventative measures in place to protect against infection. It is in EVERYONE'S best interest to manage late blight, as this is a community disease. It is also critical that everyone take an active role in submitting suspect material to improve detection and management.

If you have questions regarding identifying or dealing with late blight, or wish to submit a sample for testing, please contact 310-FARM (3276) for assistance.

For more information on late blight, consult the following document – FAQ – Late Blight of Potatoes and Tomatoes.

Spotted Wing Drosophila Update (with submissions by Dr. Jim Broatch)

In 2010, the Canadian Food Inspection Agency (CFIA) identified Spotted Wing Drosophila (SWD – *Drosophila suzukii*) from one trap in Red Deer, Alberta. From 2011 to 2015, traps have been set out in locations across Alberta to determine populations of SWD and to monitor for population changes. No SWD were collected in 2011 and 2012. In 2013, low levels of SWD (<3-4/trap) were captured and identified in traps in Central Alberta in late August and mid-September. Captures were in raspberry crops, although other potential host crops are also present in the capture sites. In 2014, 12 production sites were surveyed across Alberta for SWD (as well as other pests). 2 kinds of traps (Contech – apple cider vinegar; Solida – dual lure) were established in June and removed in September. The monitored crops were mainly plantings of raspberry, strawberry and Saskatoon berry, but also included haskap, currant and cherry. Captures were subsampled and no SWD were identified in 2014. Fruit was sampled in August and did not yield any SWD adults.

In 2015, both the ACV and dual lure traps were utilized. No captures of SWD were found until late July, when a few males were caught in Central Alberta. In early/mid-August the capture numbers (male and female) increased, and included low level counts in Southern Alberta and the Peace Region. Numbers also increased in all areas. Adult captures were predominantly in raspberry, sour cherry and Saskatoon. At that time, fruit production was nearing the end at most sites and control options would be very limited, but we did collect fruit samples from all areas. We have had adults emerge from raspberry, but not other fruits as yet. Although adult captures included traps in other fruits, the baited traps could have attracted flying adults from the adjacent raspberry production.

Alberta participated in the five (5) SWD Emergency Use Registrations in 2014 and 2015 in case producers required control options. For 2016, it is recommended that producers familiarize themselves with SWD biology, trapping and control options available. We are not sure if the SWD overwinter or are introduced (through contaminated fruit or weather systems). We will likely apply for funding in 2016 to expand the SWD survey and investigate the possible biology of SWD in Alberta. Along with that, we would anticipate an expanded surveillance early in the season in attempts to identify any early population and control requirements.

BC reported high levels of SWD in fruit in 2015. Their production requires rigorous surveillance/control, as no larvae are allowed in fruit going to processors. In Alberta, most of our production is u-pick or local processing and thus control decisions will be at the local producers' judgement. There will be several chemical control options available in 2016, including a few organic control registrations.

Bigger picture of the situation

It was expected that SWD populations would eventually arrive from our close fruit-producing neighbor, British Columbia. Fruit that is infested with SWD could be brought into Alberta by travellers or distributors who purchased the produce in BC (e.g. cherries) and then dispose of unwanted/over-ripe material as they visit or travel through Alberta. The most likely location for these pest populations to establish would be at local fruit production locations, tourist stops or urban locations in Alberta. At the same time, various atmospheric phenomena play a considerable part in the wide dispersal of insects, and we can't rule out SWD dispersal through wind or weather systems.

This year (2015) SWD captures were reported in most other provinces, with increases in provinces that had had their first captures in the past 3 years. Captures were earlier in AB, and were more widespread. Manitoba has confirmed their SWD population, whereas Saskatchewan has been doing extensive monitoring.

Information about SWD

- **Main crops affected**
 - Highest risk crops = Raspberries, blackberries, blueberries, cherries, strawberries (JB less than DN), nectarines
 - Lower risk crops
 - Grapes, pears, peaches
- **Common factors contributing to high risk**
 - Softer fruit (skin) = threat
 - Later season
- **Why is SWD a serious concern?**
 - Attacks a broad range of crops
 - Attacks whole, healthy fruit (whereas other *Drosophila* species only affect damaged or overripe fruit)
 - High reproductive potential
 - Multiple generations
 - New invasive species



**Adult female SWD –
note – saw-toothed ovipositor**
– Photo by Patty Reid



**Adult male SWD – note –
spotted wing**
Photo by Patty Reid

Spotted Wing Drosophila Update (with submissions by Dr. Jim Broatch) – continued

- **Why is SWD a serious concern?**
 - New invasive species
 - Very low industry/consumer tolerance
 - Rapid geographic spread
 - No silver bullet

Management Suggestions

- Monitor from early season through to end of harvest
- Control applications may be necessary if SWD populations are detected while harvest is still occurring or if later crops are present
- Sanitation is critical – practice removal picking; don't leave ripe or overripe fruit on the plants

Wind trajectory analysis for introduction of Spotted wing drosophila (SWD) to Alberta

[prepared by Dr. Jim Broatch (AAF), Dr. Owen Olfert (AAFC) and Ross Weiss (AAFC)]

SWD appeared in Red Deer and Lethbridge during the week of July 10-17, 2015. It was reported from Peace River on July 23, 2015. Potential source from the BC Okanagan.

Note: *D. suzukii* has been reported from the Pacific Northwest (PNW) since 2009. Since this could have been a potential source, I have included results for RT's passing over the PNW and crossing Lethbridge and Olds.

Reverse trajectories (RT) were queried from a region extending south from 49.5 to 50.3N and 119.85 to 119.7W (refer to image).

RT's were tracked to the following RT locations (closest available):

- Lethbridge – Lethbridge
- Red Deer – Olds
- Peace River - Wanham and Rycroft

Results:

- Lethbridge: Between April 1 and August 20th, 16 RT's, passing over the defined area crossed Lethbridge. The following RT's may have been potential introduction dates:**
 - June – 9, 11, 23, 25, 27, 29
 - July – 13 and 14
 - PNW source –
 - June 1-10, 12, 13, 18, 19-30
 - July 1, 3, 11, 12, 13, 14, 15, 16, 21-29, 31
- Red Deer (Olds): Between April 1 and August 20th, 34 RT's, passing over the defined area crossed Olds. The following RT's may have been potential introduction dates:**
 - June – 1, 18, 19, 20, 21, 26, 28
 - July - 1, 16
 - PNW source -
 - June – 1, 3-5, 18-21, 25-27, 30
 - July 1, 3, 11-14, 16, 21, 25, 26, 28
- Peace River - Between April 1 and August 20th, 1 RT, passing over the defined area cross Rycroft and 0 RT's crossed over Wanham in June or July. The following RT's may have been potential introduction dates:**
 - June – 1 (Rycroft),
 - July – 0



Southern BC source: It is possible that SWD may have been introduced to Peace River from southern AB. RT's crossing southern AB and moving north occurred in June (4, 20) and July 21. It may be possible that RT's moved from southern BC to central AB in mid-June (18-20) and were transported north on June 20th. It may also be possible that mid-July introductions to Lethbridge and Olds (July 13, 14, 16) may have moved north on July 21.

Spotted Wing Drosophila

Drosophila suzukii

Crops Affected:

Domestic fruit hosts = strawberry, raspberry, blueberry, cherries, peaches, plums, nectarine, honeysuckle, apricot, blackberry, table grape, hardy kiwi;

Wild fruit hosts = elderberry, dogwood, Oregon grape, currant, mulberry, etc.

Potential other Alberta host crops – sour cherries, black currant, Haskap / Blue honeysuckle

Life Cycle:

- Higher risk host crops = softer skinned fruit; later season crops
- Adults = 2-3 mm light yellow-brown flies with red eyes
 - Males have a single black spot on the end of each wing
 - Females have no spots but have a distinctive, saw-like ovipositor (egg-laying device)
- Adults may be present from June until November (in some areas) – present year round in warmer areas (e.g. BC)
 - 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
 - Larvae hatch and feed within the fruit, maturing within approximately 2 weeks
 - Pupae stay within or on fruit for up to 2 weeks
- May be spread by windblown adults (shorter distances) or transportation of infested fruit (long distances)
- Overwinter as adult flies
 - Not known to overwinter in Canadian Prairie conditions, however definitely possible in certain microclimates (next to buildings with heat leakage, etc.)
 - Can tolerate high heat and cold winters

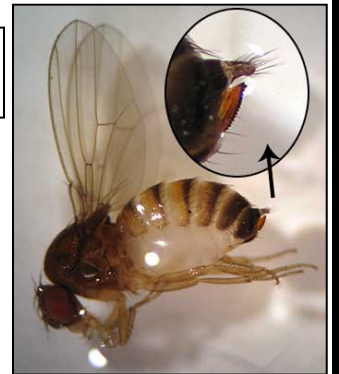
Adult male SWD – Note wing spots –

Photos by Sheila Fitzpatrick - AAFC



Adult female SWD – Note saw-like ovipositor

– Photos by Sheila Fitzpatrick - AAFC



Symptoms:

- Females saw through intact flesh to lay eggs
 - Results in pinprick-sized holes visible in the soft areas of the fruit
- Larvae feeding within the fruit
 - Fruits soften and collapse when feeding is occurring
 - Rate of collapse is accelerated by multiple larvae
- Fruit becomes unmarketable
- Diseases may develop in infested fruit

Monitoring:

- Monitor for adults using baited traps from mid-May onward
- Traps are baited with apple cider vinegar OR yeast and sugar
- Traps are placed in different areas where adult flies might be found
 - Producing fields
 - May rotate traps into different crops as they reach maturity
 - Locations with ripe fruit – e.g. waste/cull areas; market areas
- Fruit can also be tested for infestation

Management:

- Monitor to determine the presence and changes in numbers of adults
- Ensure good sanitation in fields
 - Clean up leftover or fallen fruit
 - In field, in storage, on equipment
 - Bury 12 inches deep, freeze or solarise infested fruit
- Cool harvested fruit quickly to slow larval development
- Apply registered insecticides to control adult flies
 - Apply if trapping indicates presence
 - May need to reduce transfer of populations to later crops
 - Product Choice
 - Most effective active ingredients = pyrethroids, organophosphates, spinosads
 - Neonicotinoids are not effective



Fruit damaged by SWD – Note sunken flesh, oviposition holes, larvae & pupa

Photos by BCMAF, OMAFRA, OSU



Early Blight

Causal Organism: *Alternaria solani*

Crops Affected: potato, tomato, pepper, eggplant, solanaceous weeds

Disease Cycle:

- Fungus persists in crop residues, soil, infected tubers or on other alternate host plants (e.g. weeds)
- Spores are produced and can be introduced onto leaves through contact with the soil and through wind or water splash
- Water is generally required for germination to occur and infection occurs directly through the leaf tissue (wounds are not required)
- Spore production and germination is favoured by cool, moist or dewy nights or alternating wet and dry conditions (e.g. irrigated situations)
- Secondary infections can occur on the plant, resulting in a more rapid increase of symptoms
- Typically a disease of older, dying plants (can be a top-killer for early maturing crops)
- Tubers are infected through contact with spore-infested soil, typically in conditions that favour significant foliar spore production
 - Spores do not move into the soil
 - Tubers are not infected prior to harvest
 - Wounds are required for tuber infection

Symptoms:

- Initial symptoms are small brown pinhead-like lesions on older leaves
- Circular lesions increase in size, becoming 3-10mm across
- Lesions consist of a series of concentric rings of dead tissue, creating a lesion that resembles a bulls eye pattern
 - Tissues may collapse, leaving a hole in the middle
- Lesions are delimited (contained) by large leaf veins and are usually bordered by yellow chlorotic margins
- Heavy infections can result in significant loss of leaf area, which can affect yields
- Leaves do not usually fall off
- Stressed or older tissues are more susceptible
- Tubers can have dark, sunken, circular areas surrounded by raised borders which increase in size during storage
- Tuber lesions typically remain superficial and are brown and leathery

Management:

- Ensure that debris and crop residues are worked under to encourage breakdown
- Ensure plants are not stressed or weakened through insufficient or excessive fertility, drought, or other stressors
- Maintain a rotation of at least 2-3 years; this includes other solanaceous crops
- Control solanaceous weeds to prevent alternate hosts
- Apply protective applications of registered fungicides when first early lesions are noted on lower leaflets
- Vine killing of later crops can reduce spore populations prior to harvest, which may reduce tuber infection
- Harvest only mature tubers (if possible)
- Avoid injury or wounding of tubers during harvest and post-harvest handling
- Avoid handling in wet soil
- Ensure that tubers have good skin set and have time to cure prior to long term storage as this reduces infection and the development of lesions on tubers
- Cool conditions in long-term storage will slow disease development



Photos by Robert Spencer



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Early Blight symptoms on potato – Whole plant with older leaves yellowing and developing lesions

Early blight lesions – note concentric rings due to lesions being contained by leaf veins; slight yellow halo may be visible