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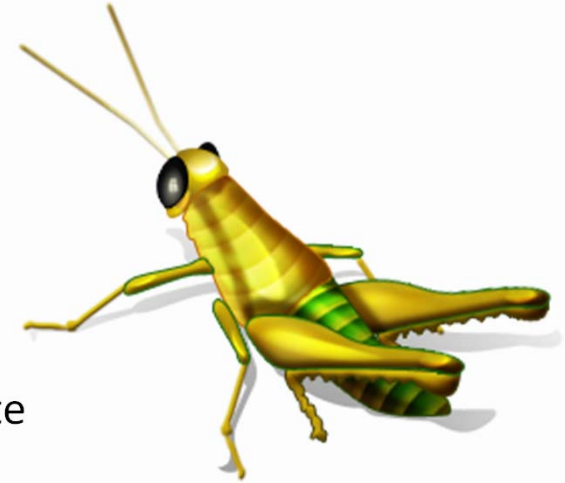
of
Saskatchewan

# Diseases and Insects 2014

Crop Opportunity & Scott Research Update
North Battleford
March 6, 2014

Sherrilyn Phelps, P.Ag.
Saskatchewan Ministry of Agriculture



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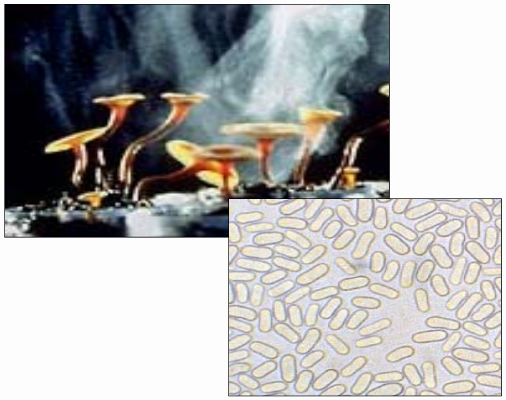
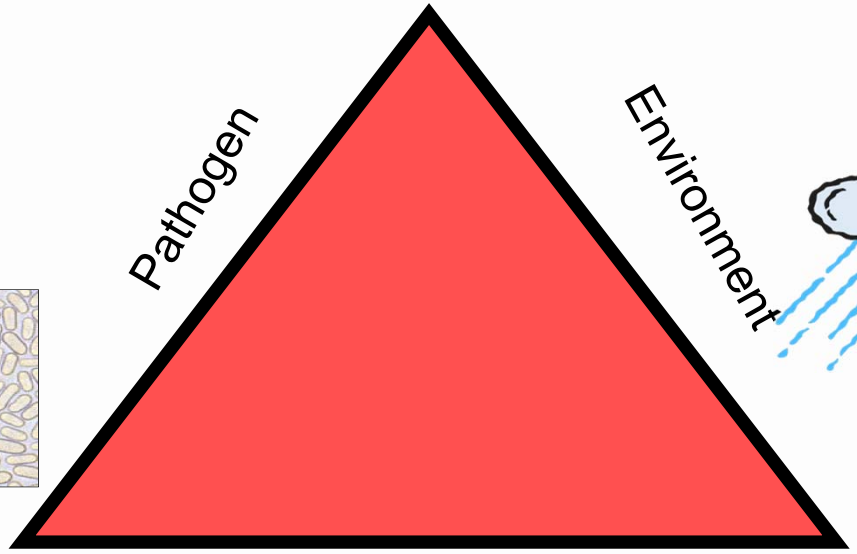
# The Disease Triangle



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# Annual Canola Disease Survey

- Fields volunteered by growers or selected randomly.
- 100 plants per field
  - severity assessed for some diseases
- 268 canola crops surveyed in 2013
- Report will be submitted to the Canadian Plant Disease Survey:
  - http://www.cps-scp.ca/cpds.shtml
- Thanks to everyone who helps out with this survey each year!

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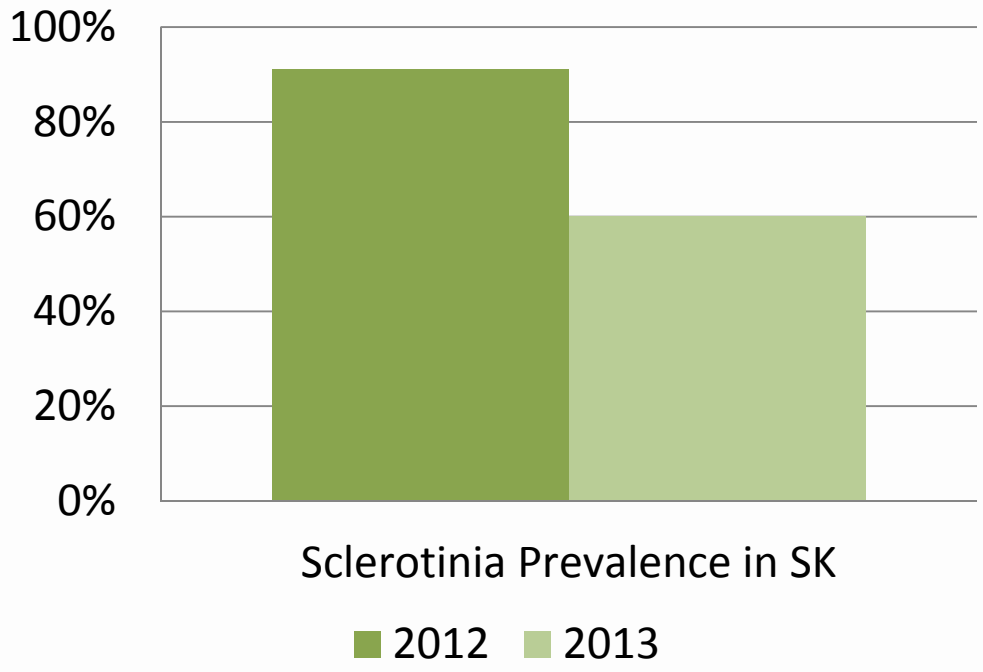
# Sclerotinia




60% of crops surveyed had at least a trace of sclerotinia (91% in 2012).

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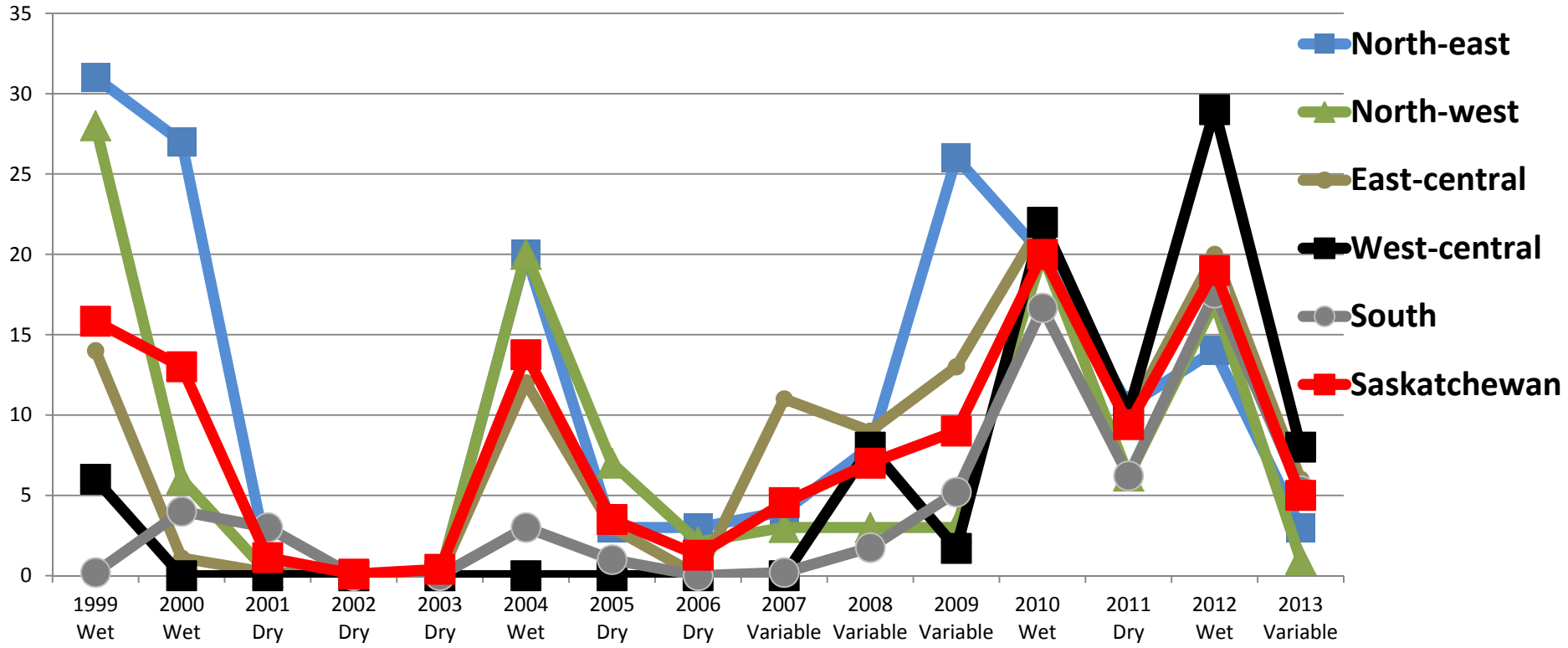
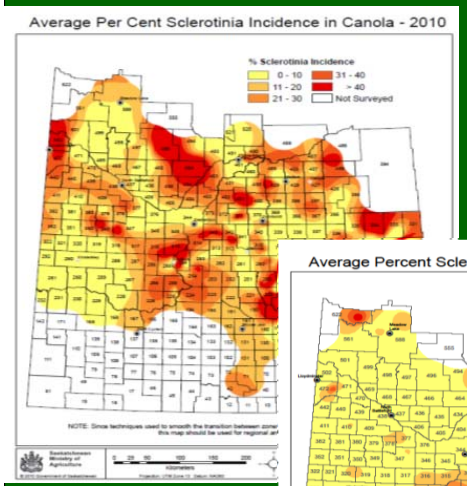
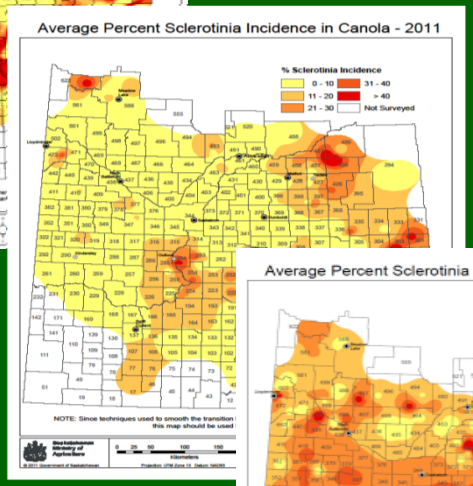
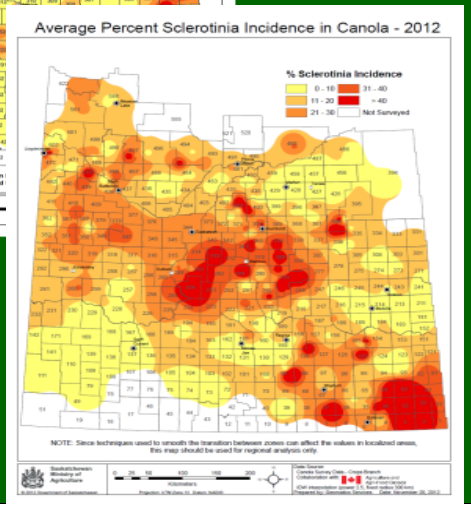
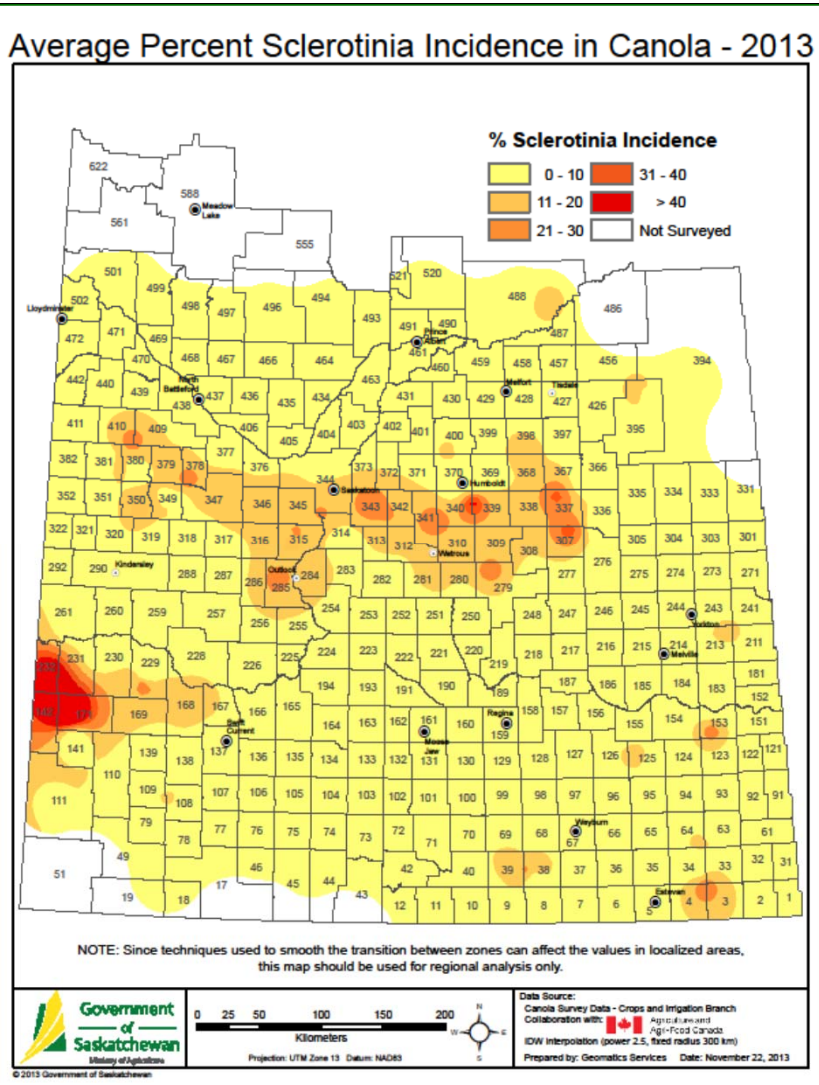
# Trending Sclerotinia Incidence in Saskatchewan (1999-2013)




Average Per Cent Sclerotinia Incidence in Canola - 2010
% Sclerotinia Incidence
0 - 10
11 - 20
21 - 30
31 - 40
> 40
Not Surveyed


Average Percent Sclerotinia Incidence in Canola - 2011
% Sclerotinia Incidence
0 - 10
11 - 20
21 - 30
31 - 40
> 40
Not Surveyed


Average Percent Sclerotinia Incidence in Canola - 2012
% Sclerotinia Incidence
0 - 10
11 - 20
21 - 30
31 - 40
> 40
Not Surveyed


Average Percent Sclerotinia Incidence in Canola - 2013
% Sclerotinia Incidence
0 - 10
11 - 20
21 - 30
31 - 40
> 40
Not Surveyed
Meadow Lake
Lloydminster
Prince Albert
Battleford
Melfort
Tisdale
Saskatoon
Humboldt
Kindersley
Outlook
Wetaskiwin
Melville
Swift Current
Moose Jaw
Regina
Weyburn
Estevan
NOTE: Since techniques used to smooth the transition between zones can affect the values in localized areas, this map should be used for regional analysis only.
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Ministry of Agriculture
0 25 50 100 150 200
Kilometers
Projection: UTM Zone 13 Datum: NAD83
Data Source:
Canola Survey Data - Crops and Irrigation Branch
Collaboration with: Agriculture and Agri-Food Canada
IDW interpolation (power 2.5, fixed radius 300 km)
Prepared by: Geomatics Services Date: November 22, 2013
© 2013 Government of Saskatchewan

# Sclerotinia Check-List

- Developed in Sweden, adapted by Canola Council of Canada
  - ww.canolacouncil.org
- Apply checklist shortly after first flower
  - when 75% of the canola plants have at least 3 open flowers
- Fields scoring >40 will likely benefit from a fungicide
  - Depends on fungicide cost and commodity price.
- Optimum spray window is between 20-30% flowering

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# Apothecia Development


- Part of checklist
- New project – correlate weather patterns with apothecia development to develop predictive model for producers

Canola Science Cluster Project: 2014-2017

**Evaluation of sclerotia depots in canola fields to support sclerotinia risk assessment.**

Dr. Lone Buchwaldt, Agriculture & Agri-Food Canada

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# Blackleg

- Blackleg (stem lesions and/or basal cankers) was observed in 31% of canola crops surveyed.
- Overall low severity.

Keep an eye on it!

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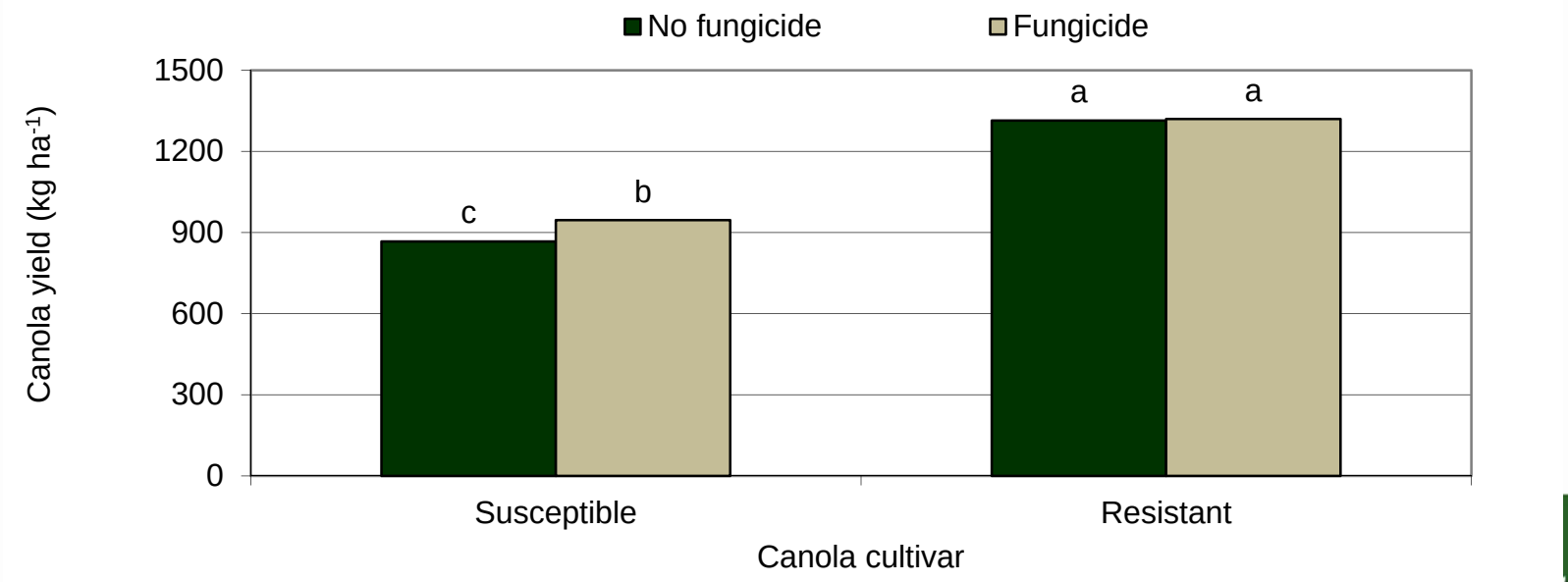
# Fungicide (blackleg timing) on canola yield (kg/ha)




Kutcher, et al. Mean of 9 site-years of data 1999-2003, Melfort and Scott, SK

# Clubroot

## Visual Symptoms

- Wilting, stunting, yellowing, premature ripening
- Root Galls

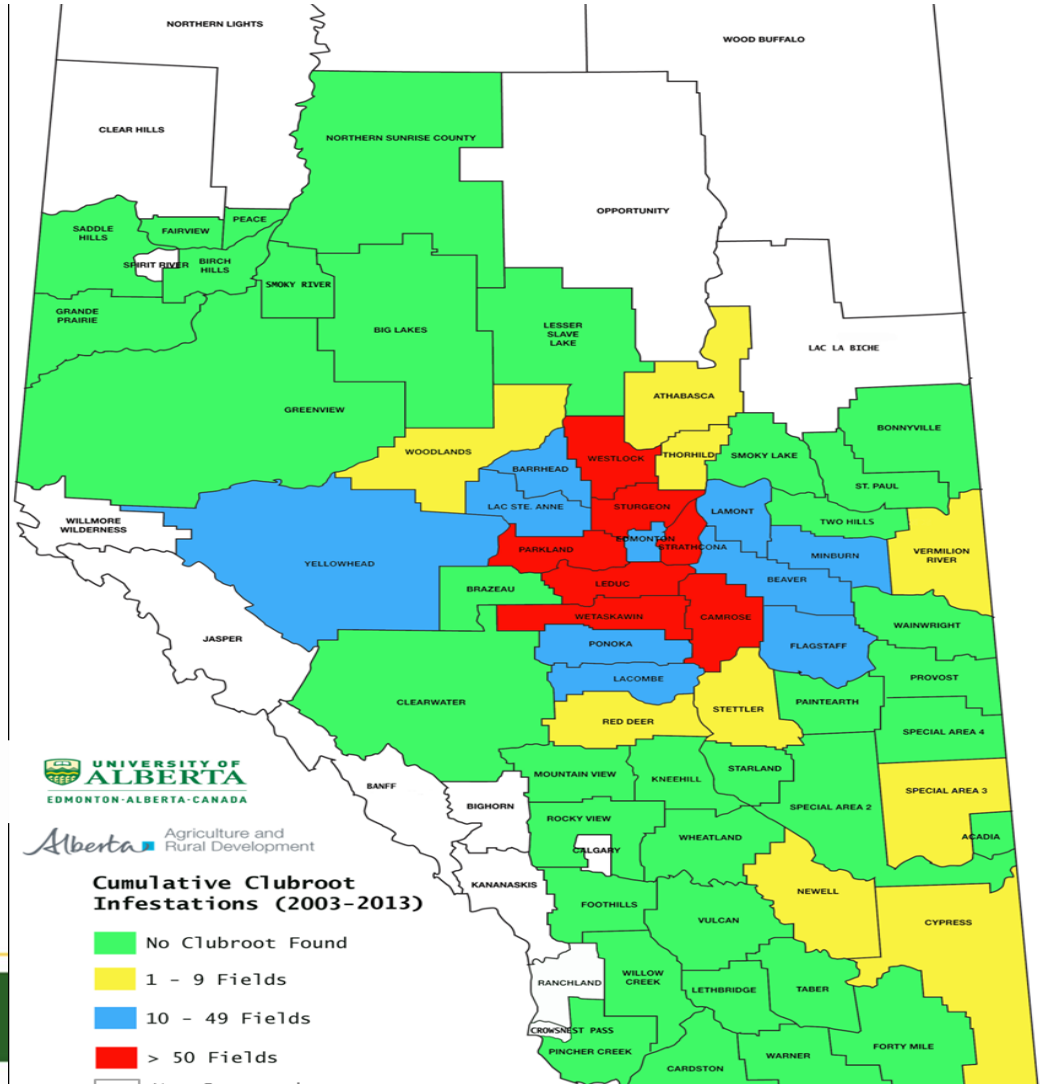
## DNA Testing

- Soil or plant roots - PCR test

## Clubroot Confirmation

- need symptoms in a plant and + DNA

Clubroot symptoms in Alberta




# SK - 4 positives

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# Key Clubroot Messages:

- Prevention
  - Know risks of introduction
  - Base sanitation on risk – remove obvious soil
  - Monitor access to fields
- Identify clubroot early
- Develop a clubroot management plan
- Work with your municipality

# Cereal Diseases: 2014

- Seed Quality – not as much an issue
- Concern for:
  - Leaf Spot Complex
  - Rusts
  - Fusarium Head Blight
  - Ergot

# Fusarium

- Many species involved
- Timing of infection determines disease:
  - Infect seedlings/crown = seedling blight, root rots, crown rot, etc
  - Infect head = FHB
- Pathogen present in soil, crop residue and can be introduced on seed
- Seedling infections do not cause FHB but are source of infected residue for next year

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# Fusarium Head Blight

- Affects kernels in cereal heads
  - wheat, barley, oats, rye, corn, canary seed, forage grasses, triticale
- Caused by complex of *Fusarium* species
  - Critical one = *F. graminearum*
    - Greatest yield reductions
    - Toxin in grain

# FHB infection process in wheat

Inoculum Increase

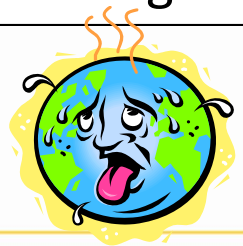
Head Emergence

Infection

Symptoms

4-7 days prior = spore production.

3-6 days = begin flowering



7-14 days = colonizes head and mycotoxin produced. New infections.

# Pea Diseases

- Mycosphaerella Blight / Ascochyta Blight

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# oot rot / root rot

Foot rot (Ascochyta)

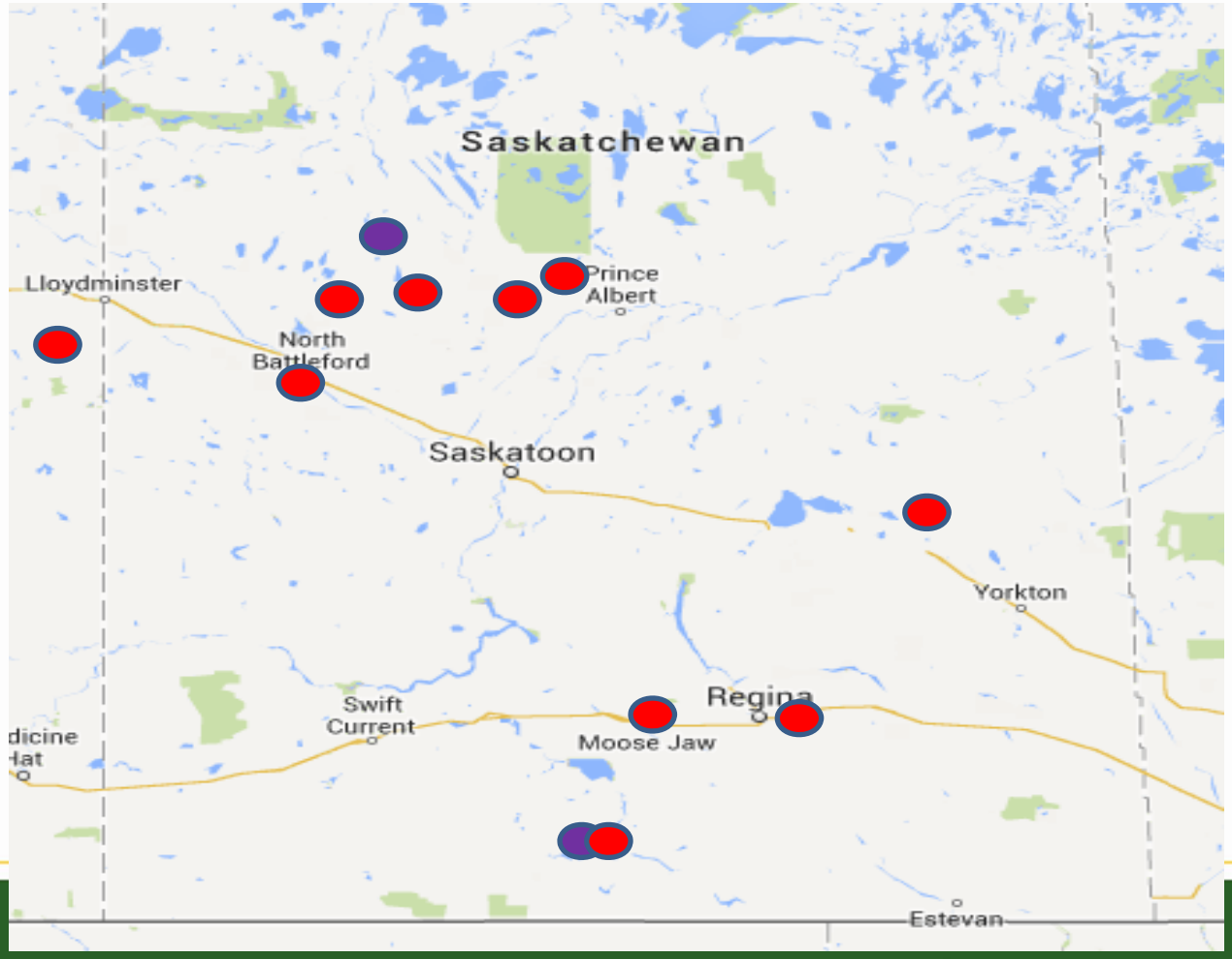
Root rot (Fusarium, Rhizoctonia, Pythium or Aphanomyces)

- Severe epidemics under cool, wet conditions
- 30 to 50% yield losses have been reported
- Some can infect at any stage

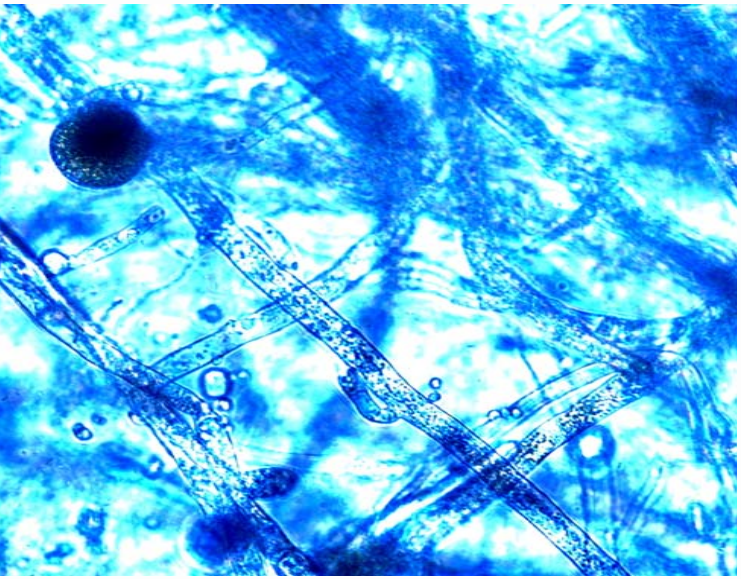
# hanomyces ot Rot

arch initiated by
ne Banniza, Cheryl
Crop Development
re, U of S

- Root samples (July, pea, lentil, vetch and clover)
- Soil samples for growth chamber study




sy of Cheryl Cho, Crop
pment Centre



Courtesy of SF Hwang, Alberta Ag

ce of *Aphanomyces* could be
ed visually from EVERY region
d (lentil and pea).
of the pathogen was confirmed
-PCR (for 7 of 11 sites).

sy of Cheryl Cho, Crop
pment Centre

Assiniboia soil: Normal watering
Sterilized soil vs Unsterilized soil

S. Boechler

# ssiniboia soil (waterlogged)
# terile (no disease) vs Non-sterile

sy of Cheryl Cho, Crop
opment Centre

M. Tetreault

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# ow Important is Aphanomyces?

*kely* present throughout the province.

ed treatments are not affective against root rots

sease severity is higher under wet conditions

esistance:

- Cereals and oilseeds are not hosts.
- Tolerance is available in chickpea and faba bean
- Breeding R for other legumes is possible.
- resistance exists in alfalfa varieties already.

sting capability should be available soon?

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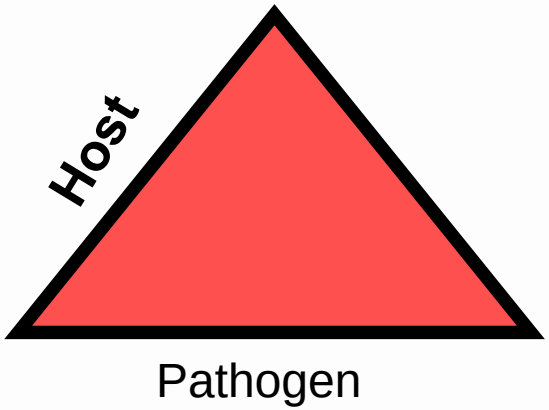
# Disease Decisions for 2014

- Hosts
  - Rotation
  - Variety

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# A. Rotations

## ess effective if:

- wind-borne spores - Ascochyta, FHB
- wide host range - Sclerotinia

## ore effective if:

- High infection from stubble – cereal leaf diseases blackleg
- Specific to certain crops - blackleg

# B. Variety Choice

Cereals – leaf diseases, rust, smut, *Fusarium (?)*

Canola – sclerotinia, clubroot, blackleg

Pulses – ascochyta/mycosphaerella, PM

Lodging, height, maturity

# K Varieties of Grain Crops

Wheat

cteristics of Varieties

| | Site-Years Tested | Yield Test Category (% CDC Buteo) | | | | Agronomic Characteristics | | | | | Disease Resitance | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Low Moisture Potential | | High Moisture Potential | | Winter Survival | Maturity Class | Protien Content (%) | Plant Height (cm) | Resistance to Lodging | Stem Rust | Leaf Rust | Stripe Rust | Bunt | FHB |
| **stern Red Winter** | | | | | | | | | | | | | | | |
| ou/ac) | | 40 | 60 | 80 | 100 | VG | M | 12.4 | 88 | F | G | G | VP | VP | G |
| | 160 | 108 | 102 | 99 | 97 | F | L | +0.1 | 0 | G | VP | VP | VP | F | F |
| | 26 | 105 | 100 | 98 | 96 | G | M | +0.3 | -5 | VG | VG | G | G | VP | VG |
| | 60 | 103 | 102 | 100 | 99 | F | E | +0.3 | -10 | VG | F | F | F | F | VP |
| y ● | 29 | 113 | 107 | 104 | 102 | F | M | +0.5 | -13 | VG | G | F | G | VP | F |
| | 219 | 100 | 98 | 98 | 98 | F | L | -0.2 | +3 | VG | VG | G | G | VP | VP |
| | 74 | 98 | 102 | 104 | 104 | G | M | +0.2 | +1 | G | VG | VG | G | P | VP |
| | 178 | 105 | 102 | 100 | 99 | VG | M | -0.2 | +2 | G | P | P | VP | VP | P |
| | 145 | 105 | 103 | 101 | 100 | VG | L | -0.3 | -1 | VG | VP | VP | P | VP | VP |
| **stern General Purpose** | | | | | | | | | | | | | | | |
| | 144 | 110 | 107 | 105 | 105 | G | M | -0.4 | -7 | VG | VG | G | --- | VP | VP |
| | 71 | 113 | 107 | 103 | 101 | G | E | -0.9 | -9 | G | VG | VG | VP | VP | VP |
| | 116 | 108 | 103 | 103 | 101 | VG | M | -0.6 | 0 | F | P | P | --- | VP | --- |
| * | 369 | 103 | 102 | 102 | 102 | F | E | -0.6 | -15 | VG | G | G | VP | VP | VP |
| | 235 | 108 | 103 | 103 | 101 | G | M | -1.2 | +5 | G | G | P | VP | VP | P |
| | 116 | 110 | 105 | 104 | 102 | VG | M | -1.6 | +5 | G | P | P | --- | VP | --- |
| | 35 | 103 | 105 | 106 | 107 | VG | M | -1.4 | -3 | G | P | P | G | VP | VP |
| | 114 | 115 | 110 | 108 | 105 | VG | M | -0.4 | +6 | F | VG | VG | G | VP | P |
| an | 104 | 115 | 112 | 109 | 108 | G | M | -2.1 | +2 | F | P | P | VP | VP | --- |
| | 200 | 103 | 102 | 100 | 100 | G | M | -0.6 | -7 | VG | VG | G | --- | VP | --- |
| | 66 | 115 | 110 | 108 | 106 | G | M | -0.9 | -1 | G | G | G | G | VP | --- |

nore in-depth yield analyses go to: *www.usask.ca/agriculture/plantsci/winter_cereals/variety-selector/index.php*

**ge:** For more detailed information go to *http://www.wheatworkers.ca/FowlerSite/winter_cereals/WWModel.php*

**gan** has an awnless head and soft white kernels. **Sunrise** has soft red kernels.

e August 1, 2013, the Canadian Grain Commission advises that the varieties **CDC Clair, CDC Harrier, CDC Kestrel**, and **CDC Raptor** will be moved Canada Western Red Winter class to the Canada Western General Purpose class.

e August 1, 2014, **CDC Falcon** will be moved from Canada Western Red Winter class to Canada Western General Purpose class.

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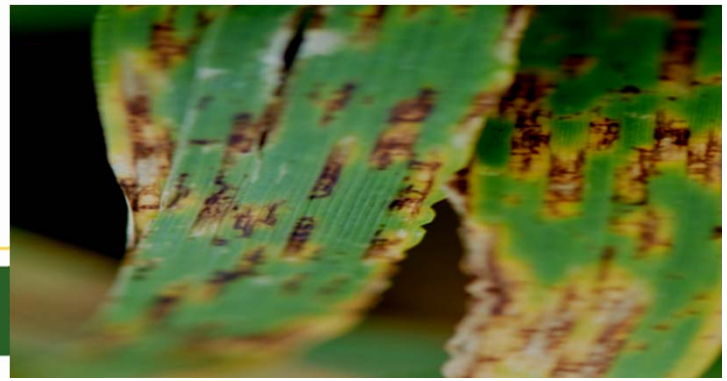
# C. Identify Disease = Scout

- See symptoms before apply fungicide
  - Ascochyta blights
  - Leaf spots in cereals
  - Powdery mildew in pea
- Forecast for fungicide application before see symptoms
  - Sclerotinia – use checklist
  - Fusarium head blight



# D. Treat/Prevent

Fungicides:

- May need more than one application
  - 10-14 days protection
  - rotate active ingredients
- Contact vs systemic fungicides
- Protect healthy tissue does not repair damage
- Apply to the tissues you want to protect
  - Typically do not move from one leaf to another
  - Target upper canopy leaves

Picture from Kelly Turkington, AAFC

# Timing is important

Cereal Leaf Spots

- tan spot, spot blotch, net blotch, stagnospora, septoria
- Wheat – protect top 2 leaves
- Barley – protect top 3 leaves

FHB

- Wheat – early flowering ideal (heading to 50% flower - 7-10 days window )
- Barley –just before or at head emergence

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# Timing is Important

- Sclerotinia (canola)
  - 20-50% bloom stage
  - 30% bloom ideal
  - When crop is yellowest
- Sclerotinia (pulses)
  - Early flower or 7-14 days after 1st fungicide application or when see symptoms

# oliar Fungicides (Grain Crops)

| Reasons to Spray | Reasons Not to Spray |
| --- | --- |
| pected yield loss ($) >cost of fungicide | expected yield ($) < cost of a fungicide |
| expected net return = ++ | expected net return = --- |
| avourable environmental conditions | Less favourable environmental conditions |
| poor rotation | good rotation |
| susceptible variety | resistant variety |

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# nsects


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# Cabbage Seedpod Weevil

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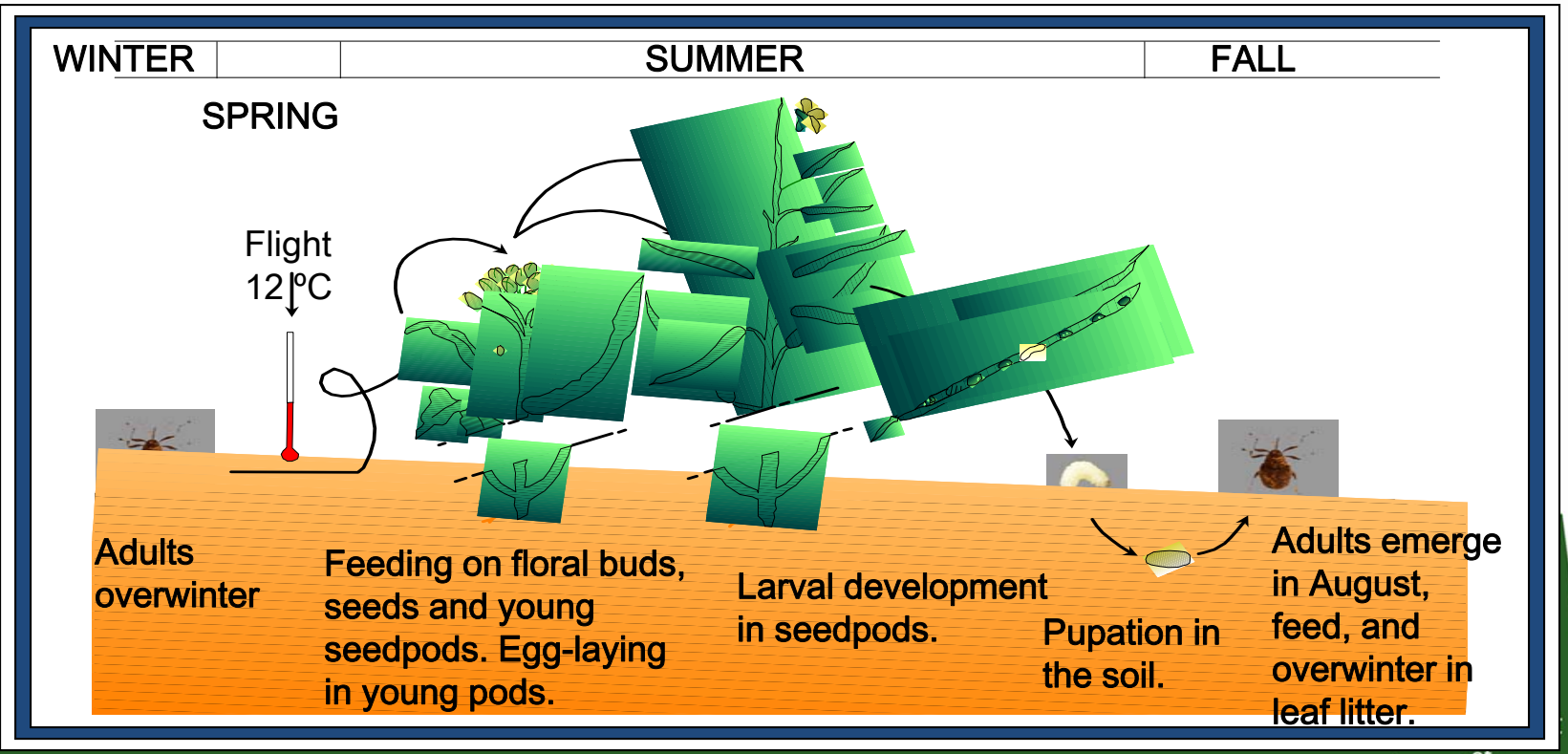
# Cabbage Seedpod Weevil Life History



# Cabbage Seedpod Weevil Life Stages


Adult


Egg


Larva


Mature Larva


Pupa

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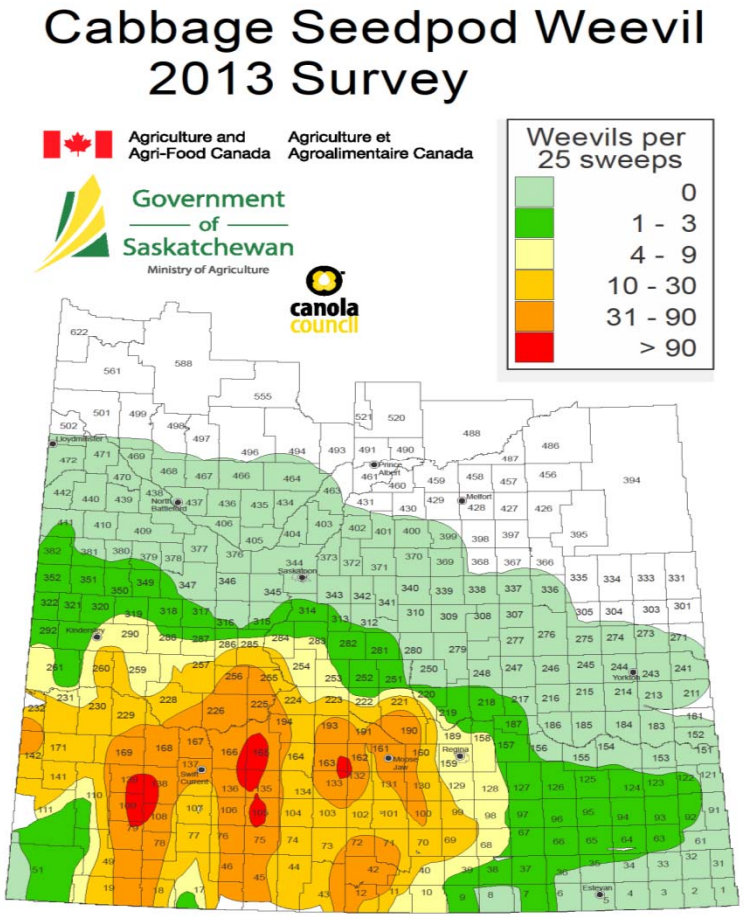
ecord year for
bbage seedpod
eevil in
skatchewan

gher populations

pansion N of the
Sask. River

pansion E into
aditional" canola
owing areas

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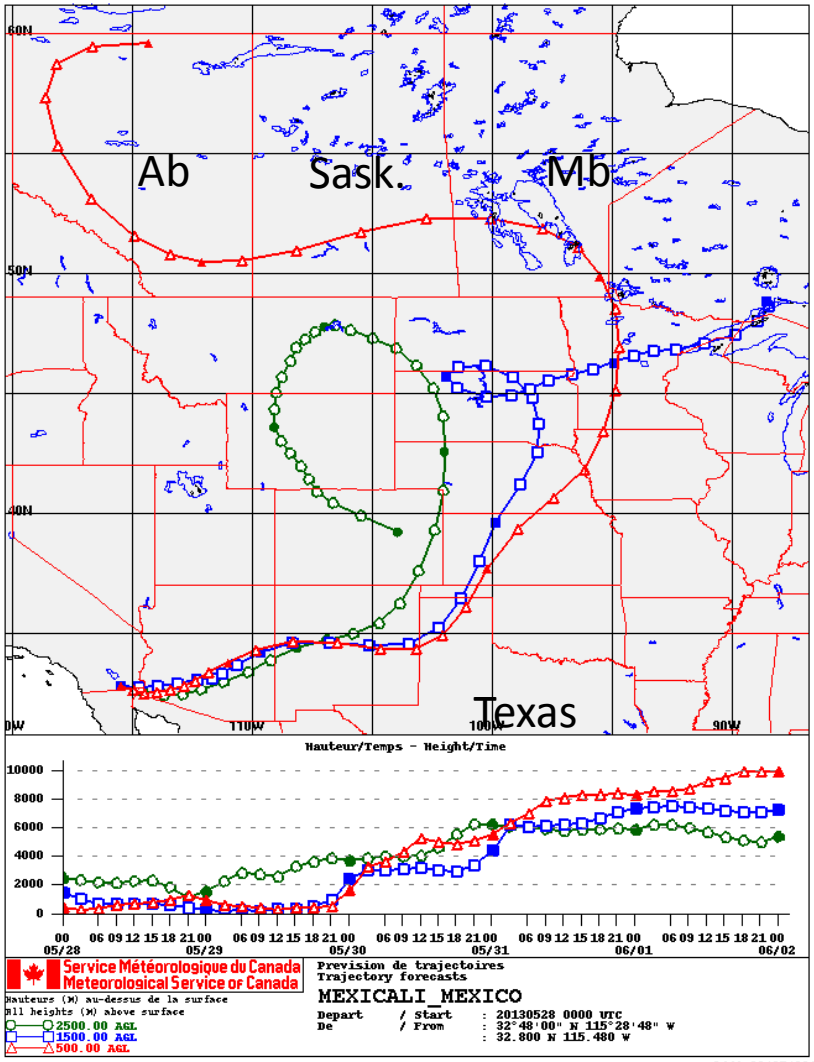
# iamondback
# oth

nds originating
m the south later
2013 (3rd week in
y) vs. 2012 (early
ril)

14 – wait and see

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# er leafhopper (*Macrolestes quadrilineatus)*

Aster yellows

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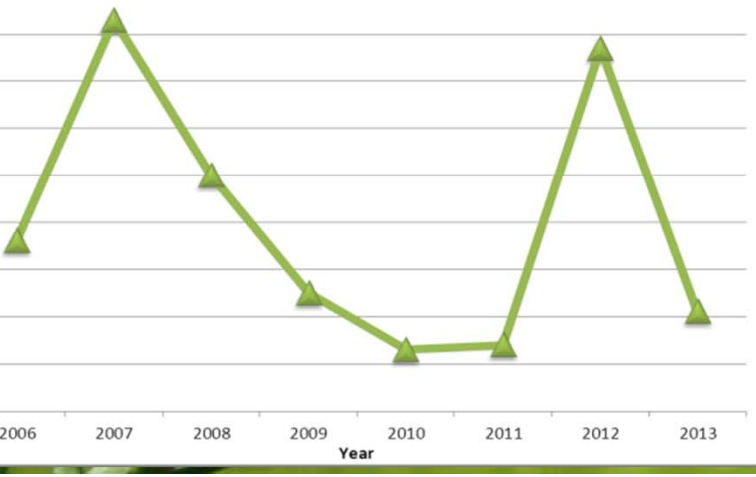
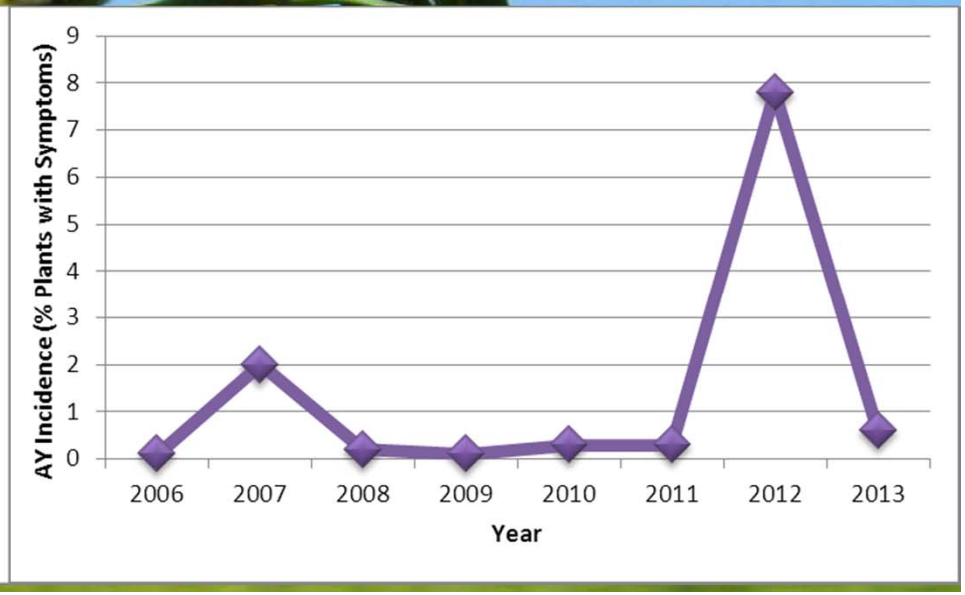
# er Yellows

## Prevalence 2006-2013




## Incidence 2006-2013




Compendium of Barley Diseases

# rasshoppers

Melanoplus bivittatus
(Two-striped)

photo - Dan Johnson

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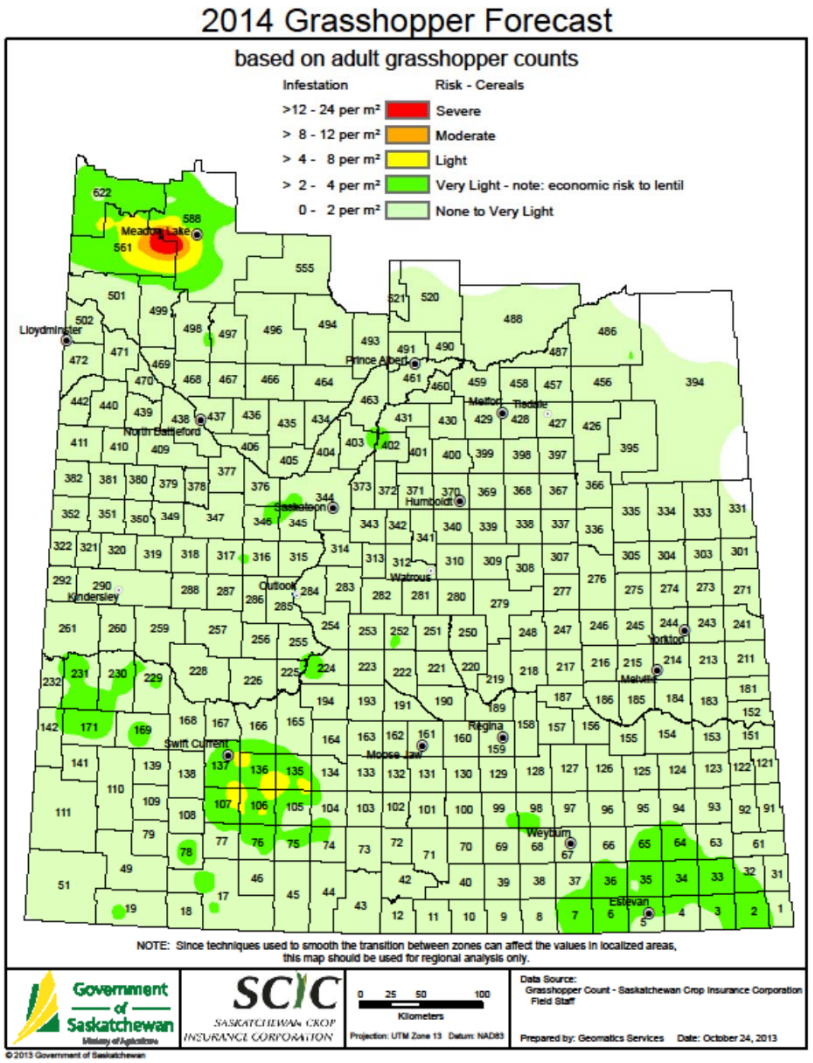
# Grasshoppers

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-horned
pper is often seen
and May (no
).

# Non-pest Grasshopper Species

The following indicates **non-pest** grasshoppers:

- with knobs on antenna
- adult early in season
- with red, yellow or orange wings
- any seen before May 25
- any that sing loudly while sitting
- any that crackle when they fly

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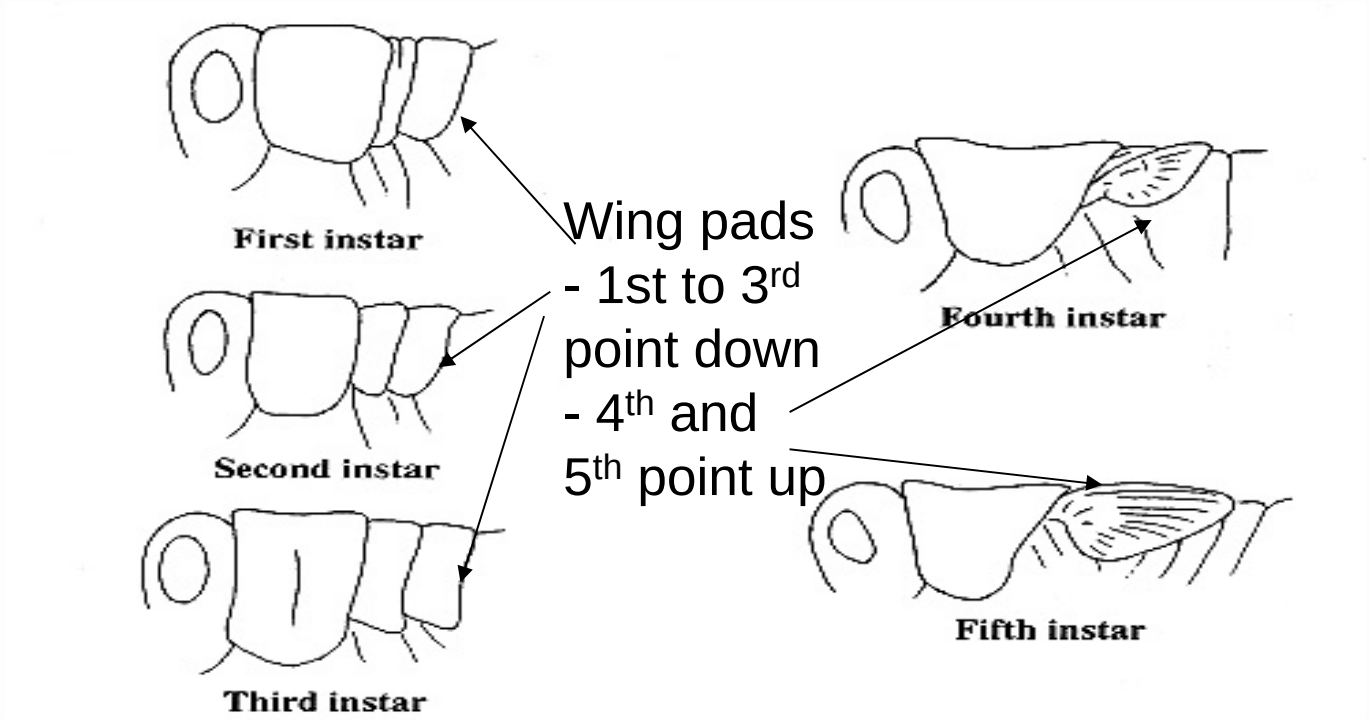
# Immature Grasshoppers

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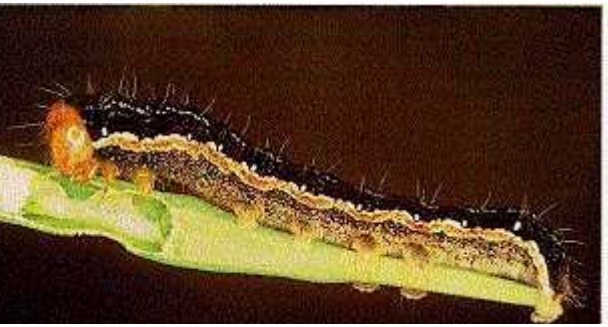
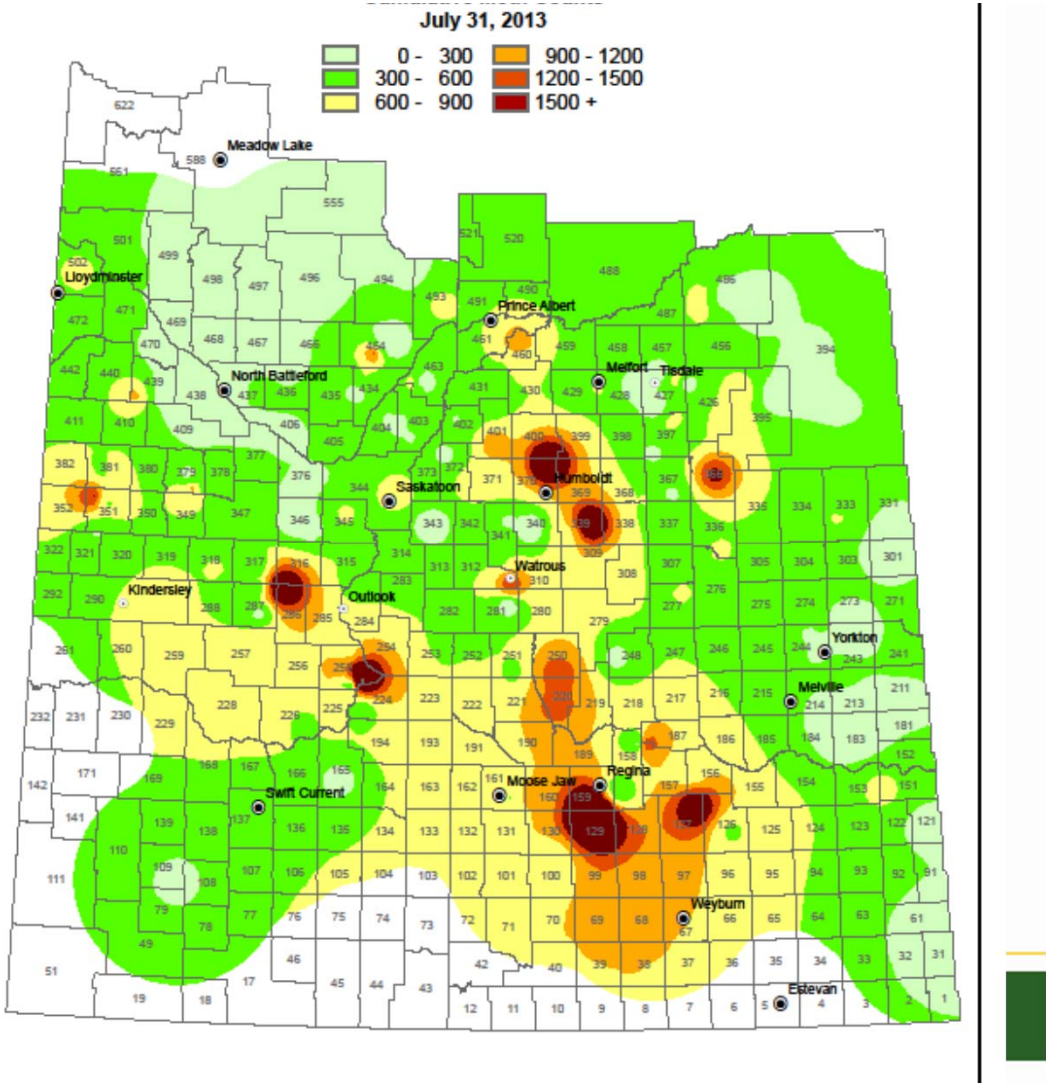
# rtha armyworm

Populations decreased in 2013

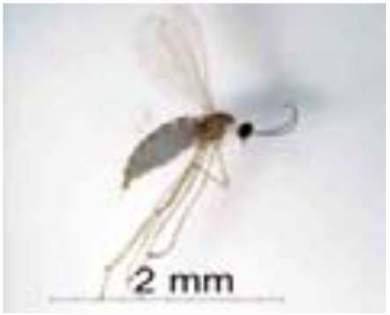
Last year of current outbreak?

- For most areas





# Swede Midge




sent in the Province for more than 5 years
previous history in canola on the Prairies until 2012
tors affecting swede midge
Moisture – higher moisture favours midge
Temperature – mild winter 2011-12
Existing populations – over-winter as cocoons in the soil
Number of generations (3 to 4 overlapping generations
ported in Ontario)
search – surveys to determine distribution
- biology, economic threshold, management

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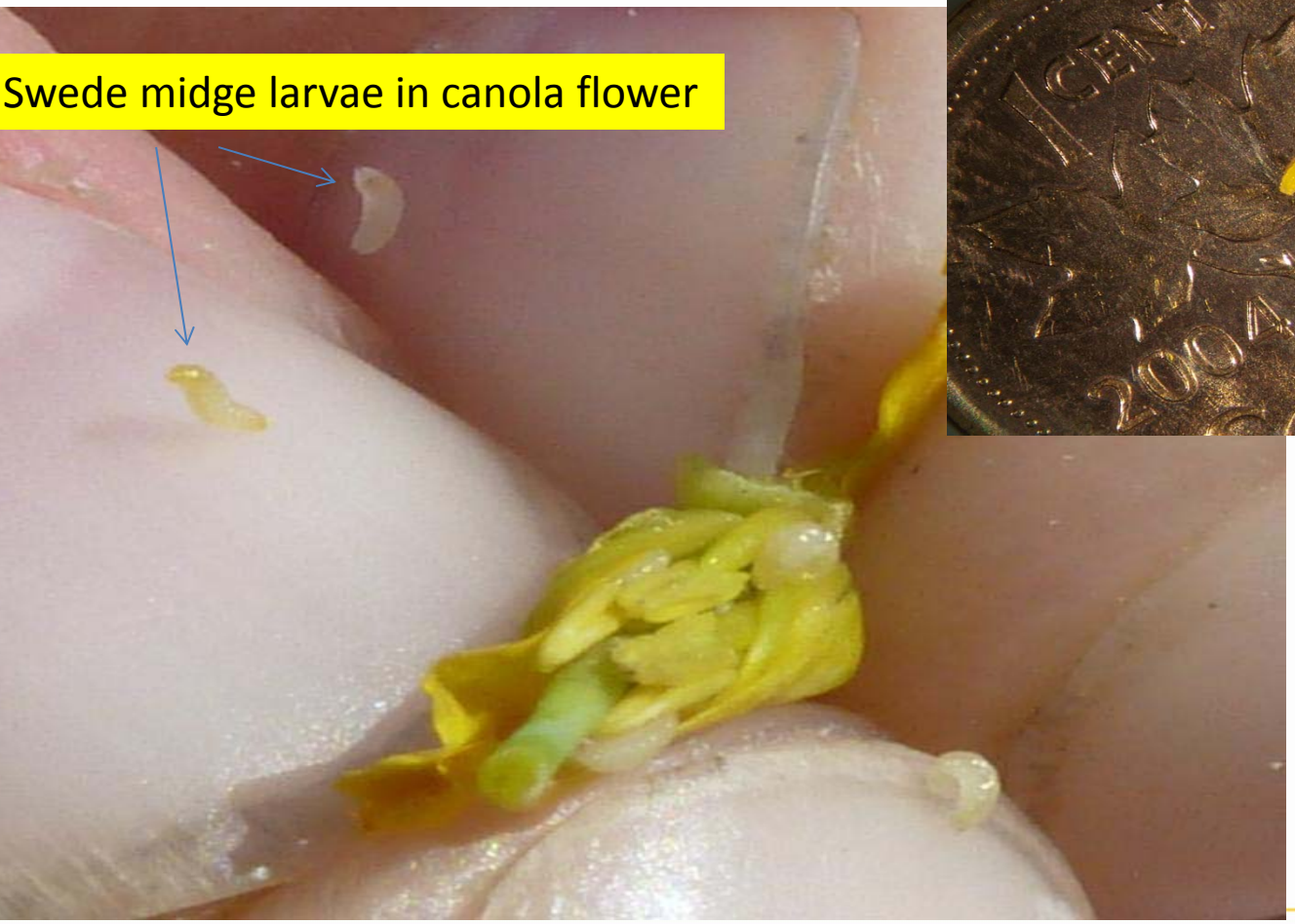
wede midge damage
canola (Ontario) –
mage to growing point
bouquet" of pods

Petals ‘glued’ together

Saskatchewan symptoms:

- florets affected
- Most severe damage in field margins

Swede midge larvae in canola flower

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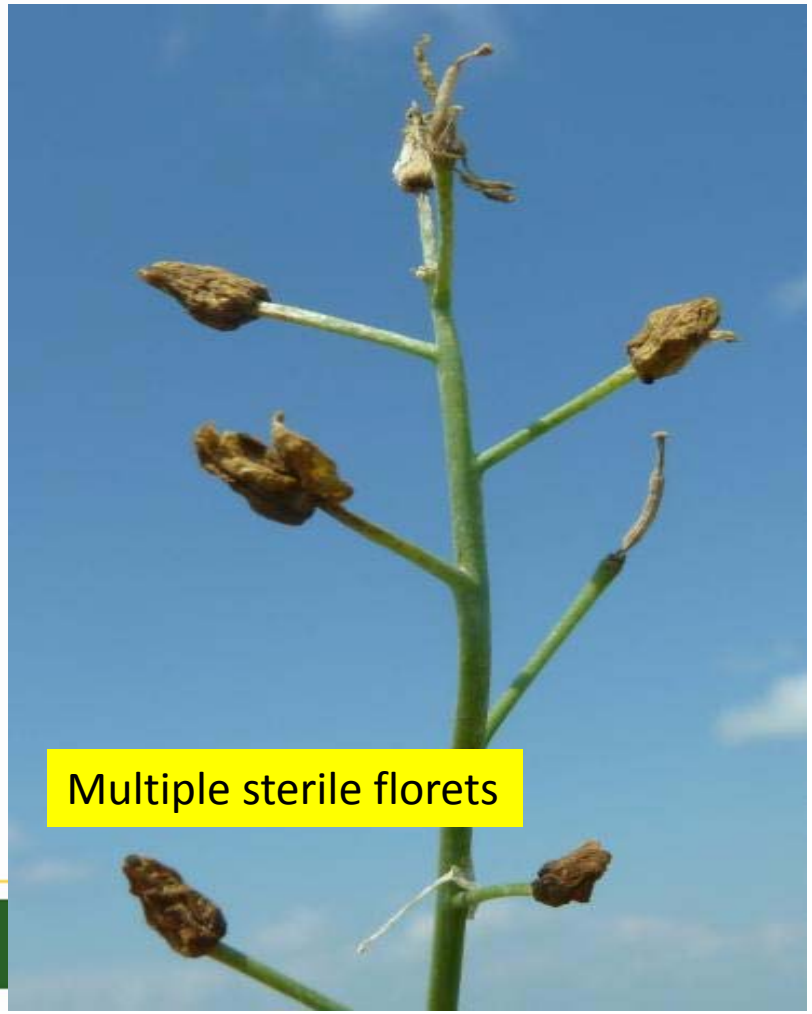
Sterile floret -
petals retained and dessicated


Multiple sterile florets

ede midge
Multiple
generations

- 4 in Ontario
- 3 in Sask.?

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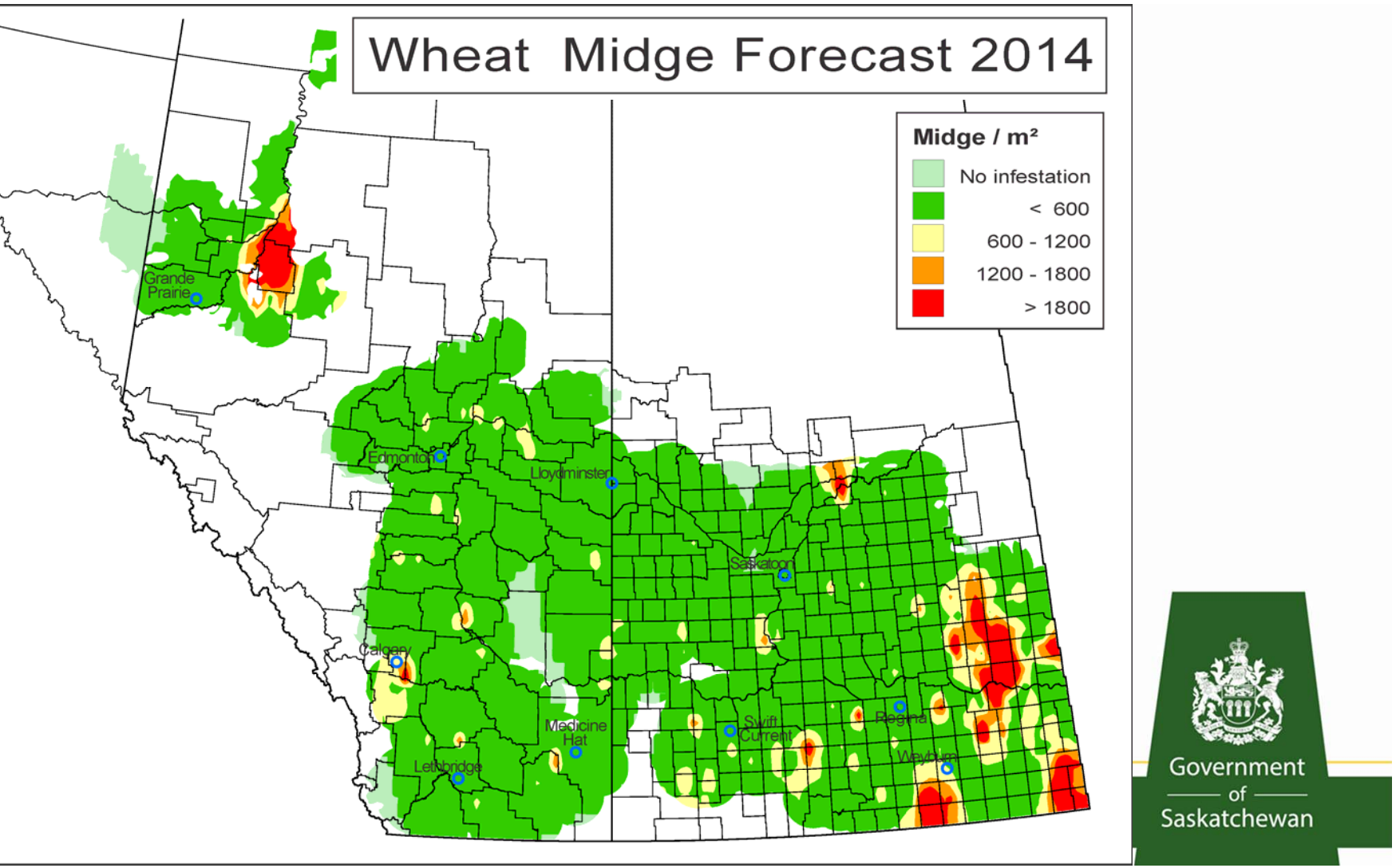
# heat Midge

## lonitoring

- Susceptible stage – head becomes visible until the crop flowering (anthesis)
- During anthesis resistance increases due to increase of ferulic acid in head

Start of susceptibility

Wheat no longer susceptible

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# Cutworms

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# Cutworm ID

Hardened head capsule and thoracic plate

Crochets (velcro like hooks on abdominal legs

# New Research on Cutworms

- Develop molecular tools for species identification
- Improved knowledge on:
  - life histories of various species on the Prairies (e.g. dingy cutworm, bristly cutworm)
  - Natural enemies – parasites and diseases
- Improved extension tools for producers and agrologists

Supported by the Canola Council of Canada through the Canola Agronomic Research Program (CARP) / SaskCanola

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# ea Beetles

ow growing conditions
the spring
eed treatments effective
r set period (21-35 DAS)
liar sprays required in
me cases

# ed Flea
# les

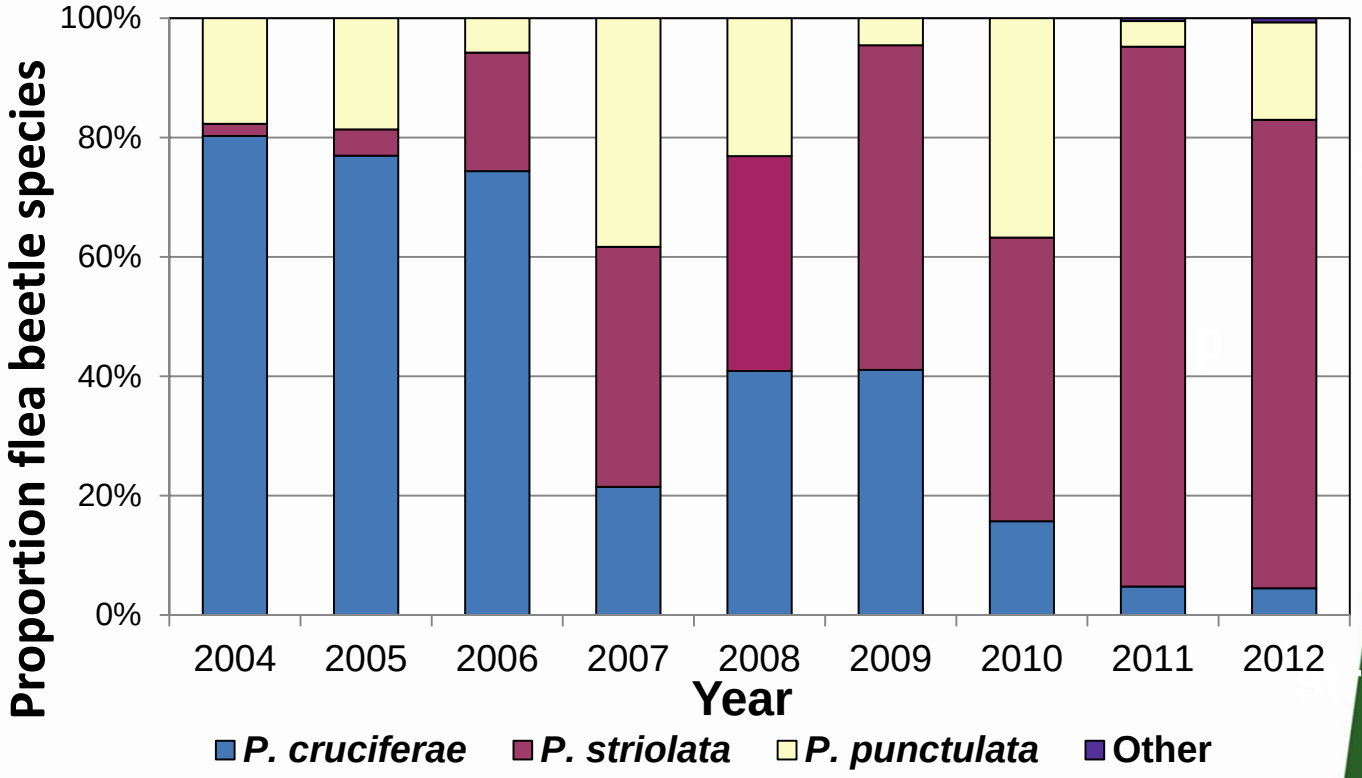
ecies shift”

ped flea beetle

mbers increasing

most areas

# ea beetle species April-June, Saskatoon Research Centre




Source – Dr. Julie Soroka, Agriculture and Agri-Food Canada, Saskatoon

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# Summary for 2014

- Weather will dictate disease pressure
- Variety choice important for leaf diseases
- Fungicide applications if crop yield potential is good and risks are high
- Insects – scout regularly
- Watch PHI with pesticides
- If in doubt send it out (in…to get ID)

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## stry Crop Protection Laboratory

ab handles:

- Disease Diagnosis: visual & plated
- Clubroot: visual and DNA (soil)
- Insect and weed ID
- Herbicide Injury
- Herbicide Resistance Testing

Honourable Lyle Stewart, Minister of Agriculture, during the grand opening of the PCR lab in Regina

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