Coming to an app store near you:
Cereal Aphid Manager App!

Soils and Crops March 6th, 2018 Saskatoon, Sk.

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The trouble with aphids in cereals?

All female, “Born pregnant”, birth live clones,

High popns = 12/tiller (ET), cereals < soft dough reduce yield
Average number per head in Melfort wheat

- **No. aphids**
- **No. lady beetles**
- **Aphidius mummies (parasitoids)**

**Max ET of 15 aphids/head exceeded**

**Medium milk stage: yield danger!**
Average number per head in Melfort wheat

- No. aphids
- No. lady beetles
- Aphidius mummies (parasitoids)

Sweep net: 34

Medium milk stage: yield danger!

Max ET of 15 aphids/head exceeded

Sample date:
- 22-Jul-15
- 04-Aug-15
- 11-Aug-15
- 18-Aug-15

No. aphids
No. lady beetles
Aphidius mummies (parasitoids)
**Dynamic Action Threshold (DAT)**

**Conventional action threshold (CAT)**
The number of aphids that in one week will EXCEED Economic Threshold (ET)
And trigger an insecticide treatment

The CAT does not account for controlling pressure of natural enemies
...recommendations are often to “look around for natural enemies and mummies”...with no quantification or measure of their impact (my personal opinion)

**Dynamic Action Threshold (DAT)** incorporates suppressing effects of predators and parasitoids as Natural Enemy Units (NEUs)

\[
\text{NEU} = (n_i \cdot V_i)
\]

12-15 aphids/head Johnston and Bishop 1987
Survey: Saskatchewan and Manitoba

Surveys:

Aphid species?
Natural enemies?

© Martin Jeuland
Cereal aphids in cereal crops: (Homoptera: Aphididae)

- **English grain aphid** (EGA)
  *Sitobion (Macrosiphum) avenae* (F.)
- **Birdcherry-oat aphid** (BCO)
  *Rhopalosiphum padi* (L.)

<table>
<thead>
<tr>
<th>Colour Morph and Species</th>
<th>Total Number of Aphids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitobion avenae green</td>
<td>4506</td>
</tr>
<tr>
<td>Sitobion avenae red</td>
<td>1067</td>
</tr>
<tr>
<td>Rhopalosiphum padi</td>
<td>1717</td>
</tr>
</tbody>
</table>

Total: 7290
Predators: Ladybeetles

*Coccinella septempunctata* (Linnaeus)
Adult eats 48 aphids/day = Voracity (V)
Larvae eats 72 aphids/day (Rautapaa, 1976)

*Hippodamia tredecimpunctata* Linnaeus
Larval V=~59 aphid/day, Adult: 26/day (Malyk, 1971; Michels and Flanders, 1992)
Predators: Green lacewings (larvae)

*Chrysoperla carnea* (Stevens)
*Chrysopa oculata* Say
V≈30 aphids per day
(Aqueel et al., 2014; Burke and Martin, 1956; Simpson and Burkhardt, 1960)
Predators: Minute Pirate Bugs

*Orius tristicolor* (White)
V of larvae = 8 aphids/day
V of adults = 11 aphids/day (Hallett et al. 2014)
Predators: Damsel Bugs

*Nabis americoferus*

V nymphs = 19 aphids/day
V adults = 19 aphids/day
(Simpson and Burkhardt, 1960)
Parasitoids: *Aphidius avenaphis* (Fitch)

2015, 2016, 99% *A. avenaphis*

60% hyperparasitism

60:40 female:male

*V* = 7 aphids per day

(Wist, unpublished)
Cereal aphid DAT equation

\[ N_t = \Sigma_{i=1}^{t} \left[ \left( (N_0 e^r - 100NEU_i) + (N_0 - 100NEU_i) e^r \right) / 2 \right] \]

- predicts how many aphids are removed per day
- The equation that runs the app’s predictive function

*Aphidius colemani* (Aphidiinae)
App as a tool:
Scouting, education, reducing insecticides, Protecting beneficials

Beta test
2017
Setting up a field

1. Basement
   - Tyler Wint
   - AAFC SRDC
   - Wheat
   - September 25, 2017

2. Office
   - Tyler Wint
   - AAFC SRDC
   - Wheat
   - September 28, 2017

3. Regina
   - Tyler Wint
   - AAFC SRDC
   - Barley
   - October 19, 2017
Starting out

Date and Time: Oct 11, 2017 05:11 PM
Observer: Tyler Wist
Zadok Growth Stage: 8a – Early Dough Development

Note: If the crop stage is at or above 8b - Late Dough Development, there is no risk to cereal crops from aphids. Making an observation set is not necessary.

All mandatory fields are identified by an *
Scouting pattern
Aphid counts

At 3/3/2018, 12:18:58 PM
For Saskatoon

Warning
This crop is past the risk of further damage from aphids.

Walk to a point in the field that represents the highlighted spot in the W formation, about 30m away from the nearest point.

Observation Points In Set

1 Add Observation Point
2 Add Observation Point
3 Add Observation Point
4 Add Observation Point
5 Add Observation Point
Scouting pattern
Aphid counts

At 3/3/2018, 12:43:58 PM
For Saskatoon barley

Walk to a point in the field that represents the highlighted spot in the W formation, about 30m away from the nearest point.

Observation Points in Set
1. Add Observation Point
2. Add Observation Point
3. Add Observation Point
4. Add Observation Point
5. Add Observation Point
### Aphid counts

- **English grain aphid**
  - Count: 25

- **Birdcherry-oat aphid**
  - Count: 1

- **Greenbug**
  - Count: 0
Aphid counts

English grain aphid
Count: 25

Bird cherry-oat aphid
Count: 1
Aphid counts

Long, black cornicles

Long, black antennae

Black “knees” and “feet”

Body colour can vary from a bright yellow-green to red.
Natural enemies

Seven-spotted ladybeetle — adult
Count: 0

Seven-spotted ladybeetle — larva
Count: 0

Thirteen-spotted ladybeetle — adult
Count: 0

Thirteen-spotted ladybeetle — larva
Count: 0
Natural enemies

Green lacewing — larva
Count: 0

Damselbug
Count: 0

Minute pirate bug
Count: 0

Brown aphid mummy
Count: 0

Black aphid mummy
Count: 0
Recommendation

In Saskatoon barley
Recommendation for 3/3/2018

Economic Threshold

Four aphid economic thresholds and their recommendations based upon your field scouting are provided. You choose which recommendation to follow based on your tolerance to aphid pests. The economic threshold of 12 aphids per head is recommended for Western Canada and is highlighted.

5 aphids per tiller
Sample another 25 tillers.

10 aphids per tiller
Sample another 25 tillers.

Recommended action
12 aphids per tiller
Sample another 25 tillers.

15 aphids per tiller
Sample another 25 tillers.

Set #: 1 At 12:43:38 PM
Total Aphids: 366
Average aphids per tiller (observed): 14.6
Summary (based on 1 / 1 sets):
Observer(s): Tyler Wist
Total Aphids: 366
English grain aphid: 360 (98.4%)
Birdcherry-oat aphid: 5 (1.4%)
Greenbug: 1 (0.3%)
Average aphids per tiller (observed): 14.6
Average aphids per tiller (in 7 days): 46.4
Total Natural Enemies: 2

Aphids can arrive any time during the growing season. Therefore, you should continue inspecting fields regularly until late dough stage, when aphids can no longer affect yield.
Recommendation

Spray now, aphid numbers are high enough. To increase certainty, sample another 25 heads.

10 aphids per tiller
Spray now, aphid numbers are high enough. To increase certainty, sample another 25 heads.

Recommended action
12 aphids per tiller
Spray now, aphid numbers are high enough. To increase certainty, sample another 25 heads.

15 aphids per tiller
Sample another 25 tillers.

Set #: 1 At 10:27:55 AM
Total Aphids: 390
Average aphids per tiller: 15.6

Set #: 2 At 10:37:15 AM
Total Aphids: 424
Average aphids per tiller: 17.0

Summary (based on 2 / 2 sets):
Observer(s): Tyler Wist
Total Aphids: 814
Average aphids per tiller: 16.3
Total Natural Enemies: 35
Seven-spotted ladybeetle — adult : 7
Seven-spotted ladybeetle — larva : 7
Thirteen-spotted ladybeetle — adult : 3
Thirteen-spotted ladybeetle — larva : 3
Green lacewing — larva : 3
Danselbug : 3
Minute pirate bug : 3
Brown aphid mummy : 3
Black aphid mummy : 3

Aphids can arrive any time during the growing season. Therefore, you should continue inspecting fields regularly until late dough stage, when aphids can no longer affect yield.
Government of Canada Branding

- Follows the “look and feel” of a Government of Canada document
Government of Canada Branding

- Follows the “look and feel” of a Government of Canada document: en français
CAM will be available soon

- End of March 2018 launch date
- Apple and Android operating systems
- FREE download from the Apple store and Google Play
Acknowledgments

• Project funding from Pesticide Risk Reduction Centre of the Pest Management Centre c/o Cezarina Cora (PRR15-040)
• A multitude of summer students
• Techs of the Wist lab at AAFC Saskatoon
• Elham Karimi, Team Lead Application Services NCR ISB
• AAFC Saskatoon
Thank you and Questions

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