A Management Strategy for the Black Pecan Aphid

Ted E. Cottrell
USDA, Agricultural Research Service
Southeastern Fruit & Tree Nut Research Laboratory
Byron, GA
Aphids that Feed on Pecan Foliage

‘Black Aphid’

‘Yellow Aphids’

Black Pecan Aphid (BPA)

Yellow Pecan Aphid (YPA)

Blackmargined Aphid (BMA)
Seasonal Abundance of Aphids

Before mid-July:
If you have a population of ‘yellow’ pecan aphids, you rarely have black pecan aphid issues at that time.

Beware - low populations of ‘yellow’ aphids before mid-July can lead to early black pecan aphid problems, especially on susceptible cultivars.

Seasonal Abundance of Aphids and Aphidophagous Insects in Pecan

James D. Dutcher 1,*, Haider Karar 2 and Ghulam Abbas 3
Insects 2012, 3, 1257-1270; doi:10.3390/insects3041257
Seasonal Trends of Pecan Aphid Populations
R. Flores-Flores and H.W. VanCleave
1975 Proceedings of the TPGA
Pecan Aphids – Seasonal Populations

Increasing populations of yellow pecan aphids lead to increasing populations of natural enemies that eventually suppress the yellow aphids but more importantly, help to hold the BPA in check.
Natural Enemies of Aphids
Lady Beetles
Natural Enemies of Aphids
Lacewings

Images courtesy of numerous photographers (Bugwood.org)
Natural Enemies of Aphids
Images courtesy of numerous photographers (Bugwood.org)
Managing the Black Pecan Aphid

Leaf damage is not just a symptom of BPA feeding.

The black pecan aphid must elicit these yellow feeding spots in order to feed!

*Prevent the development of these yellow feeding spots and you’ve interrupted the expected biological cycle of the aphid.*
Importance of Leaf Chlorosis on Black Pecan Aphid Development and Survival.

Black pecan aphid-induced chlorosis: 1st instar to Adult
Seasonal Life of a Leaf Leading to Senescence

Leaf Age

Early Season

No Senescence

Ethylene-dependent Senescence

Late Season

Ethylene-independent Senescence

Leaf Age

Auxin
Gibberellic Acid
Cytokinin

Ethylene
Jasmonic Acid
ABA

Salicylic Acid

Senescence Retarding Bioregulators

Senescence Promoting Bioregulators
Declining Levels of Senescence-Delaying Plant Bioregulators

Natural Enemies Crash

Increasing Levels of Senescence-Promoting Plant Bioregulators

Pecan Foliage is Primed for BPA to Explode
If levels of senescence-delaying hormones remained higher for a longer period, would the BPA’s ability to elicit chlorotic feeding injury be impacted? **YES!!!!**
## 2016 (similar in 2017) ProGibb LV Plus Orchard Study
Controlling the pecan weevil AND managing BPA

<table>
<thead>
<tr>
<th>Trtmnt</th>
<th>Jul 15 &amp; Aug 4</th>
<th>Aug 19</th>
<th>Aug 23</th>
<th>Aug 31</th>
<th>Sep 14</th>
<th>Sep 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>PG 10</td>
<td>Imdelprd 3oz Carbaryl 5qt</td>
<td>Floncmd 2.8oz Bifenthm 6.4 oz</td>
<td>Imdelprd 3oz Carbaryl 5qt</td>
<td>Floncmd 2.8oz Bifenthm 6.4 oz</td>
<td>Imdelprd 2.8 oz Abamectin 10 oz</td>
</tr>
<tr>
<td>ProGibb 10 oz rate</td>
<td>PG 10</td>
<td>PG 10 Carbaryl 5qt</td>
<td>PG 10 Bifenthm 6.4 oz</td>
<td>PG 10 Carbaryl 5qt</td>
<td>PG 10 Bifenthm 6.4 oz</td>
<td>PG 10 Abamectin 10 oz</td>
</tr>
<tr>
<td><strong>ProGibb 20 oz rate</strong></td>
<td>PG 10</td>
<td>PG 20 Carbaryl 5qt</td>
<td>PG 20 Bifenthm 6.4 oz</td>
<td>PG 20 Carbaryl 5qt</td>
<td>PG 20 Bifenthm 6.4 oz</td>
<td>PG 20 Abamectin 10 oz</td>
</tr>
<tr>
<td>Control</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
2016 ProGibb LV Plus Orchard Study
BPA Adults + Nymphs
BPA Injury with Gibberellic Acid (GA₃) = ProGibb LV Plus
leaf samples collected Sept. 14
Calculating Black Pecan Aphid Leaf Injury
% Chlorotic Leaf Area
September 14, 2016

ProGibb 20 oz
ProGibb 10 oz
Standard
Control
<table>
<thead>
<tr>
<th>Standard</th>
<th>Control</th>
<th>ProGibb 10 oz</th>
<th>ProGibb 20 oz</th>
</tr>
</thead>
</table>

BPA Injury with Gibberellic Acid (GA$_3$)
leaf samples collected Oct. 5, 2016
% Chlorotic Leaf Area
October 5, 2016
2017 ProGibb LV Plus Orchard Study
BPA Adults + Nymphs

Aphids per Leaf

- ProGibb 20 oz (green)
- ProGibb 10 oz (red)
- Control (white)
- Standard (yellow)

Dates:
- 1-Jul
- 15-Jul
- 29-Jul
- 12-Aug
- 26-Aug
- 9-Sep
- 23-Sep
- 7-Oct

Arrows indicate treatment dates:

- 1-Aug
- 15-Aug
- 29-Aug
- 12-Sep
- 26-Sep
- 1-Oct
BPA Injury with Gibberellic Acid (GA₃)
leaf samples collected Aug 26, 2017
% Chlorotic Leaf Area
August 26, 2017
BPA Injury with Gibberellic Acid (GA$_3$)
leaf samples collected September 28, 2017

Standard  Control  ProGibb 10 oz  ProGibb 20 oz
Just in case you were wondering......

% Chlorosis to Induce Leaflet Abcision
Falling leaflets collected Sept. 15 and Oct. 17, 2016
# Seasonal Black Pecan Aphid Management Awareness

<table>
<thead>
<tr>
<th>Month</th>
<th>Black Pecan Aphid Concern Level</th>
<th>Management Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>April to mid-June</td>
<td>NONE – VERY LOW</td>
<td>None</td>
</tr>
<tr>
<td>Mid-June to Mid-July</td>
<td>If low/moderate yellow aphid populations are present - VERY LOW</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>If no yellow aphid populations present, beware early black pecan aphid – <strong>CAUTION!</strong></td>
<td>BPA control <em>likely</em> needed</td>
</tr>
<tr>
<td>Mid-July – Late Sept</td>
<td>BPA increase is imminent – <strong>WARNING!!</strong></td>
<td>BPA control needed</td>
</tr>
<tr>
<td>Early Oct – Frost</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
## ProGibb LV Plus

<table>
<thead>
<tr>
<th>PEST</th>
<th>PESTICIDE</th>
<th>MOA</th>
<th>AMOUNT PER ACRE</th>
<th>REI/PHI (Hours or Days)</th>
<th>TIMING AND REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Pecan Aphid</td>
<td>SAME INSECTICIDES AS FOR YELLOW APHIDS or chlorpyrifos Lorsban, generics</td>
<td>1B</td>
<td>Check label</td>
<td>24 H/</td>
<td>Black pecan aphids may cause damage as early as May but are usually a serious problem only in late season. Damage appears as yellow spots on leaflets. Damaged spots later turn brown and 2-4 damaged spots per leaflet can cause leaflet drop. Carefully check all compound leaves on 10 terminals per tree, on at least 10 trees per orchard for the presence of black pecan aphids. Prior to July 1, treat if 25% of terminals have 2 or more black aphids. After July 1, treat if 15% of terminals have more than one black aphid and nymph clusters are found. Concentrate checks on susceptible cultivars such as Schley, Sunner and Gloria Grande. Be sure to check all compound leaves on each terminal examined. Gibberellic acid is a plant growth regulator that prevents damage from black pecan aphid feeding and inhibits establishment in the orchard. It does not affect aphids directly and will not control any other pest, including yellow aphids. Three applications should be made at 2-week intervals, beginning in mid-July, applying 10 oz each time.</td>
</tr>
<tr>
<td>gibberellic acid</td>
<td>N/A</td>
<td>10 oz</td>
<td>N/A</td>
<td>Gibberellic acid is a plant growth regulator that prevents damage from black pecan aphid feeding and inhibits establishment in the orchard. It does not affect aphids directly and will not control any other pest, including yellow aphids. Three applications should be made at 2-week intervals, beginning in mid-July, applying 10 oz each time.</td>
<td></td>
</tr>
</tbody>
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## Yellow Aphids

### FOLIAR APPLICATIONS

<table>
<thead>
<tr>
<th>PESTICIDE</th>
<th>MOA</th>
<th>AMOUNT</th>
<th>REI/PHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assail 30SG</td>
<td>4A</td>
<td>2.5-9.6 oz</td>
<td>12 H/</td>
</tr>
<tr>
<td>clothianidin</td>
<td>4A</td>
<td>3-6 fl oz</td>
<td>12 H/</td>
</tr>
<tr>
<td>flonicamid</td>
<td>9C</td>
<td>2-2.8 oz</td>
<td>12 H/</td>
</tr>
<tr>
<td>flupyradifurone</td>
<td>4D</td>
<td>7.0-10.5 oz</td>
<td>4 H/ 7 D</td>
</tr>
<tr>
<td>imidacloprid</td>
<td>4A</td>
<td>See label</td>
<td>12 H/</td>
</tr>
<tr>
<td>pymetrozine</td>
<td>9B</td>
<td>4 oz</td>
<td>12 H/</td>
</tr>
<tr>
<td>pyridaben</td>
<td>21</td>
<td>5.2-10.67 oz</td>
<td>24 H/</td>
</tr>
<tr>
<td>sulfoxaflor</td>
<td>4C</td>
<td>1.5-2.75 oz</td>
<td>12 H/ 7 D</td>
</tr>
<tr>
<td>thiamethoxam</td>
<td>4A</td>
<td>2-2.5 oz</td>
<td>12 H/</td>
</tr>
<tr>
<td>tofenpyrad</td>
<td>21A</td>
<td>17-27 oz</td>
<td>12 H/</td>
</tr>
</tbody>
</table>

### SYSTEMIC APPLICATIONS

<table>
<thead>
<tr>
<th>PESTICIDE</th>
<th>MOA</th>
<th>AMOUNT</th>
<th>REI/PHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admire Pro</td>
<td>4A</td>
<td>7-14 fl oz</td>
<td>12 H/</td>
</tr>
</tbody>
</table>

Yellow aphids may be present in orchards throughout the growing season. Populations are usually highest in April-May and again in August-September. In early season, **DO NOT** treat yellow aphids if they are the only insect problem. Rely on beneficial insects to suppress early season populations.

In prolonged dry periods, lower, chronic aphid populations may require treatment to prevent the build-up of unacceptable levels of honeydew and sooty mold. **WEEKLY SCOUTING IS VERY IMPORTANT IN TIMING APHID SPRAYS, ESPECIALLY IN LATE SEASON.** Rotate among classes of insecticides between treatments to avoid resistance development.

It is suggested that pyrethroid materials (cypermethrin, bifenthrin, etc.) not be used, alone or in combination, in early- or mid-season applications.

Many generic formulations of imidacloprid are available. Read label carefully for recommended rate. Imidacloprid alone may not control yellow and black-margined aphids.

Admire can be applied through a drip irrigation system, as an emitter spot application, or as a shank-in emitter adjacent application. **See label for complete details.** Apply Admire only to orchards where drip irrigation has been established for at least 5 years.

**DO NOT** apply more than 1 application of Apta, no more than 27 oz/A/season.

Use the 14 oz rate for black pecan aphid control.
A Black Pecan Aphid Spray Program

Mid-July: 10 oz ProGibb LV Plus

Aug. 1: 10 oz ProGibb LV Plus

Mid-August: If spraying for pecan weevil, 10 oz ProGibb LV Plus and an aphicide. *Scout for mites.*

Sep. 1: If spraying for pecan weevil, 10 oz ProGibb LV Plus, an aphicide and a miticide (*if needed*).

Mid-September: If spraying for pecan weevil, 10 oz ProGibb LV Plus, an aphicide and a miticide (*if needed*).

**Remember:** For the aphicides, switch between products with different IRAC numbers for resistance management.
Acknowledgments

• Funding from the Georgia Agricultural Commodity Commission for Pecan – Thank You!!

• USDA Collaborators – Dr. Bruce Wood (retired) and Dr. Xinzhi Ni (Tifton).

• Technical support – Mason Anderson, Merry Bacon, Rebekah Hartley, Chace Morill, Saleah Starks.