West Texas Sunflower Insects

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Sunflower Production in Pictures

- Some of the most important things you need to know about sunflower production in Texas
R4: The inflorescence (flower) begins to open. When viewed from directly above immature yellow petals (these are actually not flowers) are visible. (You are looking at the back side of these soon-to-be showy ray petals.)

Some producers see this initial yellow color and tend to include these as “in bloom” when determining stage of growth and % bloom for timing sunflower (head) moth sprays.
R5: This stage is the beginning of true physiological flowering. The stage is divided into sub-stages depending on the percent of the head area (disk flowers) that has completed or is currently flowering (e.g., R5.3 is 30%, R5.8 is 80%, etc.).

- R5 is based on head area, not the fractional distance from the edge to the center, e.g. if the head is flowered in about 30% from the outside edge the total area of the outside 30% of the head is about 50% of the total head area, hence R5.5).

For a full-season guide to sunflower stages of growth:
- [http://www.ag.ndsu.edu/pubs/plantsci/rowcrops/a1145.pdf](http://www.ag.ndsu.edu/pubs/plantsci/rowcrops/a1145.pdf)
Sunflower Bloom Stages (Page 1)

Upper left: Pre R4, no ray petals showing yet on the face of the head.

Upper right: Early R4, bracts are starting to pull back, and you can see the back side of the ray petals.

Lower left: Mid R4, bracts are further pulled back, you can see the raw petals more.

Lower right: Late R4, back side of ray petals are fully exposed, and are starting to lift off the face of the head but not yet erect. This head is still not at physio-logical bloom, but will be the next morning.

The sunflower heads depicted here are not “in bloom” and would technically not be counted in actual sunflower % bloom.
Sunflower Bloom Stages (Page 2)

Upper left:  R5.0, some ray petals now stand erect and part of the face is exposed. In a close up view there is actually 1 floret (disk flower) that is in bloom just above thumb tip.

Upper right:  R5.05, all ray are now erect or open and there are florets around the outside edge of the head that have started flowering.

Lower left:  R5.1, all the way around the outside edge of the head there are disk flowers in bloom, about 10% of total area of the face of the sunflower.

Lower right:  R5.5, about half of the total area of the face of the head is or has already bloomed. The darker erect structures are about ¼” in length, and they bloomed in the morning the picture was taken.
Individual Head Bloom vs. Field Bloom

- The previous slides describe the opening of the sunflower head to expose the true (disk) flowers and the initiation of physiological bloom. This is the bloom for an individual head.

- **Field Bloom is determined differently.** In this case it is a measure of **ALL** sunflower heads that are in any stage of physiological bloom, regardless of the degree of bloom an individual head is in. All blooming heads are counted equally toward Field Bloom whether just at initial bloom (R5.0), late bloom (R5.9), or even completed bloom.

- For timing of sunflower (head) moth sprays use Field Bloom to gauge decisions about your initial application.
Sunflower Moth Larval Damage

This is especially detrimental to confectionary.
And Ultimately

*Rhizopus* Headrot

“Styrofoam Bricks!”
Are these pictures worrisome?

☐ Don’t let them be—just be informed

☐ The good news is that the sunflower moth is manageable—We know:
   ☐ How to scout (if we don’t just automatically spray, our apologies to IPM practices)
   ☐ When to spray
   ☐ What to use
   ☐ To follow up to ensure the first spray is OK

☐ This just happens to be a major downfall of too many inexperienced, first time, or “a-couple-of-days-too-late” growers
Easy Way to Ruin Sunflower

- In our experience this is the #1 problem in Texas sunflower production.

- Stated a different way, the most likely stumbling block that turns a decent crop into something sub-optimal, and in worst cases, a failure.
The “Boll Weevil of Sunflowers”—Sunflower Moth

Too many growers “never knew” about this insect before growing, or if they did they sprayed too late—It will lead to major crop damage if not controlled.

The moth you scout for—early dawn or nearly dark!

The larvae feeding leads to seed damage and fungal infection.
### Sunflower Moth Planting Date – Moth Densities

**Mean No. Larvae per Head**

<table>
<thead>
<tr>
<th>Date of Bloom Initiation</th>
<th>1975 Plantings</th>
<th>1976 Plantings</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 17</td>
<td></td>
<td>a. March 15</td>
</tr>
<tr>
<td>March 31</td>
<td></td>
<td>b. March 29</td>
</tr>
<tr>
<td>April 14</td>
<td></td>
<td>c. April 17</td>
</tr>
<tr>
<td>April 28</td>
<td></td>
<td>d. April 26</td>
</tr>
<tr>
<td>May 13</td>
<td></td>
<td>e. May 10</td>
</tr>
<tr>
<td>May 26</td>
<td></td>
<td>f. May 25</td>
</tr>
<tr>
<td>June 16</td>
<td></td>
<td>g. June 4</td>
</tr>
<tr>
<td>July 1</td>
<td></td>
<td>h. June 18</td>
</tr>
<tr>
<td>July 17</td>
<td></td>
<td>i. July 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>j. July 19</td>
</tr>
</tbody>
</table>

**Graph Notes:**
- Bars labeled with lowercase letters indicate significant differences in larval densities among planting dates.
- Black bars represent 1975 plantings, yellow bars represent 1976 plantings.
## Example of Larval Abundance

<table>
<thead>
<tr>
<th>Days After 1st Bloom</th>
<th>Field 1</th>
<th>Field 2</th>
<th>Field 3</th>
<th>Field 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>27</td>
<td>2</td>
<td>77</td>
</tr>
<tr>
<td>12</td>
<td>38</td>
<td>15</td>
<td>4</td>
<td>220</td>
</tr>
<tr>
<td>15</td>
<td>34</td>
<td>28</td>
<td>3</td>
<td>263</td>
</tr>
<tr>
<td>18</td>
<td>28</td>
<td>18</td>
<td>3</td>
<td>312</td>
</tr>
<tr>
<td>21</td>
<td>13</td>
<td>24</td>
<td>7</td>
<td>215</td>
</tr>
<tr>
<td>24</td>
<td>8</td>
<td>23</td>
<td>47</td>
<td>142</td>
</tr>
<tr>
<td>27</td>
<td>4</td>
<td>12</td>
<td>71</td>
<td>77</td>
</tr>
<tr>
<td>30</td>
<td>---</td>
<td>12</td>
<td>75</td>
<td>---</td>
</tr>
<tr>
<td>33</td>
<td>---</td>
<td>13</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
Sunflower Moth

- Threat for 7-10 days beginning with initial bloom when pollen becomes available
  - Second spray when needed 5-7 days later (but not for low yields in dryland)
- Don’t get caught!—Hybrids bloom fast, from 5% to 75% bloom in 2-3 days if warm
  - Don’t wait until 2-5% bloom to contact your airplane; get on the spray schedule
- Uncontrolled larvae eventually burrow into head destroying seed—increasing susceptibility to *Rhizopus* head rot
Sunflower Moth Spraying


http://agrilifebookstore.org for view/print/download color copy

Sunflower moth treatment strategies

Historical ‘By the Book’ suggestions
Current ‘By the Book’ suggestions
Industry recommendations & practices
Sunflower Moth Spraying

Current “By the Book” (Extension’s insect guide)

- Spray at 15-25% bloom ‘when moths are in the field’, Count any head as blooming when any of the ray flowers are opening and disk flowers are exposed (R5.0).

- No statement on how many moths (threshold is presence, not number)

- Apply first pyrethroid (possibly with added chlorpyrifos for quick knock down)

- Downside: Still no room for error; moths still have 1-2 days to freely lay eggs on many heads?

- Result: Still have potentially damage if late
Sunflower Moth Spraying

- Industry practices & recommendations #1

- Spraying earlier (~5% bloom, i.e. 1-2 days earlier) & lower moth threshold—this minimizes mistakes, may provide better results, allows room for delayed spraying

- Makes the spraying decision sooner (which allows more time to schedule spraying)

- **Downside:** Could you spray too early? If you spray this early, would you lack chemical residue in 5-7 days, or be forced to spray a second time (esp. dryland)?

- **Result:** No method is immune to failure, but industry widely believes this approach offers protection against common pitfalls (spraying too late, more time to act if it appears first spray was not effective), possible better control (?)
Sunflower Moth Spraying

Industry practices & recommendations #2

- Spraying earlier and **automatically** (~5% bloom, i.e. 1-2 days earlier)

- Makes the **spraying decision** sooner (which allows more time to schedule spraying)

- **Downside:** Again, could you spray too early, and lack chemical residue later? Did you in fact need to spray, especially for late-planted sunflower (thereby an unnecessary expense)? It is wise to still know what level of moth was in the field (might influence decision on whether to spray a second time)

- **Result:** No method is immune to failure, but at least you can’t say you didn’t spray.
Sunflower Moth Spraying & IPM

☐ Is it unthinkable to suggest spraying sunflower for sunflower moth without scouting

☐ However, industry experience suggests that as a group we might be better off if we sprayed automatically because of the mistakes that can occur (pyrethroids and chlorpyrifos are cheap)

☐ It is commonly thought “If you have head damage it means you sprayed too late”
  ☐ This discounts that truly sometimes a spray doesn’t work
  ☐ Or the moth flight was before bloom or late
Prevathon, 2013

- Active ingredient, chlorantraniliprole (Rynaxypyr), from Dupont

- “Softer” chemical; does not affect honeybees and other beneficials

- See supplemental label for further information

- Ignore label’s minimum 2 gallons water per acre, go with at least 3 gpa, preferably 4
Prevathon, 2013

- “Translaminar” movement of insecticide to feeding larvae

- No activity on adults so scouting after your first spray doesn’t mean much

- 10 to 14-day spray interval (though supplemental label says 7 days, use MSO additive)

  - Extension & Dupont agreement, December 2013: initial spray of 14 oz./A at 1% bloom and then 14 oz./A again in 7-10 days (a single initial 20 oz./A application may not be enough)

- What about the cost – about $1.00 per fl oz
Prevathon, 2013

- See the special label for Texas at http://www.cdms.net
- First spray earlier (initial bloom) than pyrethroid alone (5-20% bloom)
- Initial data compared to pyrethroid, which kills beneficials, demonstrates lower larval counts in the head for Prevathon
- First impression from Texas A&M AgriLife Extension entomologists: results are good, mixed thoughts on excluding pyrethroid until more data is collected
  - Besiege, from Syngenta, is a mix of Rynapyr (different formulation) and pyrethroid
Besiege, 2013

- Syngenta—mix of chlorantraniliprole and pyrethroid (Lambda-cyhalothrin), 6-10 oz/A

- See the special label for sunflower at http://www.cdms.net

- First spray “before pests reach damaging levels”
Belt (Bayer), 2013

- First spray same time as pyrethroid
- Like Prevathon, this does not kill adults either, but kills young feeding larvae; does not have movement within the plant
- Ignore label’s minimum 2 gallons water per acre, go with at least 3 gpa, preferably 4
- First impression from Texas A&M AgriLife Extension entomologists: results are good, mixed thoughts on excluding pyrethroid until more data is collected
  - Limited data suggests good control, reduction in feeding larvae
2012 SFM larvae in early planted test

1st application at 4% bloom (4/25), 2nd at 20% bloom (4/30), 3rd at 100% (5/8),
Heads collected 5/22

Dr. Roy Parker
2012 SFM larvae in late planted test

1st application at 15% bloom (5/16) and 2nd at 100% bloom (5/23), Heads collected 6/4

oz/A
Prevathon 10.0  b
Prevathon 14.0  b
Karate Z 1.92   b
Cobalt Advanced 31.0  b
Untreated       a

% infested heads
15 b
20 b
40 b
45 b
90 a

Dr. Roy Parker

No. larvae per 10 heads
2012 SFM larvae in Syngenta Test

1st application at 15% bloom (5/16) and 2nd at 100% bloom (5/23), Heads collected 6/4

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No. larvae per 10 heads</th>
<th>% infested heads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endigo 4.0</td>
<td>bc</td>
<td>58 a</td>
</tr>
<tr>
<td>Endigo ZCX 4.0</td>
<td>bc</td>
<td>73 a</td>
</tr>
<tr>
<td>Centric 3.5</td>
<td>a</td>
<td>95 a</td>
</tr>
<tr>
<td>Karate Z 1.92</td>
<td>c</td>
<td>45 a</td>
</tr>
<tr>
<td>Cobalt 24.7</td>
<td>c</td>
<td>48 a</td>
</tr>
<tr>
<td>Untreated</td>
<td>b</td>
<td>75 a</td>
</tr>
</tbody>
</table>

Dr. Roy Parker
2013 SFM larvae in Syngenta Test
1\textsuperscript{st} application at 2\% bloom (5/17) and 2\textsuperscript{nd} at 98\% bloom (5/22), Heads collected 6/6

<table>
<thead>
<tr>
<th>Product</th>
<th>No. larvae per 10 heads</th>
<th>% infested heads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endigo ZCX 4.0</td>
<td>abc</td>
<td>65 b</td>
</tr>
<tr>
<td>Warrior CS 1.92</td>
<td>abc</td>
<td>85 ab</td>
</tr>
<tr>
<td>Centric WG 3.50</td>
<td>a</td>
<td>95 a</td>
</tr>
<tr>
<td>Besiege ZC 9.0</td>
<td>c</td>
<td>20 c</td>
</tr>
<tr>
<td>Cobalt EC 24.7</td>
<td>bc</td>
<td>75 ab</td>
</tr>
<tr>
<td>Untreated</td>
<td>ab</td>
<td>95 a</td>
</tr>
</tbody>
</table>

Dr. Roy Parker
2013 SFM Larval Insecticide Evaluation

1\textsuperscript{st} application at 2\% bloom (5/17) and 2\textsuperscript{nd} at 98\% bloom (5/22), Heads collected 6/10

Dr. Roy Parker
### 2013 SFM larvae in Dupont Test

1 application all trts at 2% bloom (5/17), Heads collected - 6/6

<table>
<thead>
<tr>
<th>Treatment</th>
<th>oz/A</th>
<th>% Infested Heads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevathon</td>
<td>10.0</td>
<td>85 ab</td>
</tr>
<tr>
<td>Prevatahon</td>
<td>14.0</td>
<td>75 ab</td>
</tr>
<tr>
<td>Prevathon 14.0 &amp; 14 DAT-1</td>
<td>10.0</td>
<td>55 bc</td>
</tr>
<tr>
<td>Prevathon 14.0 + Asana</td>
<td>7.7</td>
<td>90 a</td>
</tr>
<tr>
<td>HGW 86</td>
<td>13.5</td>
<td>85 ab</td>
</tr>
<tr>
<td>Cobalt</td>
<td>24.7</td>
<td>100 a</td>
</tr>
<tr>
<td>Prevathon 10.0 &amp; 5 DAT-1</td>
<td>10.0</td>
<td>35 c</td>
</tr>
<tr>
<td>Untreated</td>
<td></td>
<td>100 a</td>
</tr>
</tbody>
</table>

Dr. Roy Parker
2014 Sunflower Moth Test
1st application at 70% bloom (6/5) and 2nd at 100% bloom (6/10)

Dr. Roy Parker
Heads collected 6/17
SFM Lubbock - 2015 Trostle
1% Bloom Aug. 15th, Sample Date August 31st

Avg. no. Larvae per 6 heads
**Bottom Line—Sunflower Moth**

- Whatever approach you choose:

1) Do your best to achieve uniform emergence, hence uniform bloom

2) Two weeks prior to probable spray, get a commitment from applicator and make sure chemicals are on hand

3) Do scout at first bloom anywhere in the field (if you are a first-time grower, get help)

4) Aerial spray—minimum 3 gal/A, hopefully a little more

5) Follow-up scouting a from 3 - 4 days after first spray to ensure you get kill to know if moths are still present
Other Insects in TX Sunflower

- Soybean stem borer in sunflower (Dectes texanus Leconte); adult is Longhorn beetle; also known as sunflower stem borer or sunflower stalk girdler
- Sunflower headclipping weevil
Stem Borer (*D. texanus*)

- Occasional high incidence (e.g., 2001); often not noticed until plants lodge
- Egg laying near petioles, single larvae burrows in pith, often found late in season in base of plant
- Girdles plant at soil line from inside out; backfills bore hole with plant fibers, frass
Adult Long-horn beetle
(*Dectes texanus*)
This is the soybean stem borer larvae, about ¾”, maybe 1” long that girdles the sunflower stalk from the inside out, leaving a neat cut or break. Rarely ever more than one per plant.
Photo: F. Peairs, Colorado State University
Stem Borer (*D. texanus*)

- No pheromone traps, hard to scout, no control recommendations at this time
- Incidence appears higher near/after soybeans enough that we don’t recommend soy after sunflower or vice versa
- Observations suggest lodging potential increases with higher plant populations
- Be ready to harvest
Sunflower headclipping weevil

- Adult weevil is metallic black – ¼ inch long with long “snout”
- Female girdles the head about 1 to 2 inches below the head and lays eggs in the girdled head, then the head falls to the ground.
- Economic infestations have not been noted in Texas, but 2%-3% damage has been observed.
- Kansas – ET is 10% or more of flower heads have been clipped and weevils still active
Sunflower headclipping weevil

Photo: W. Cranshaw – Colorado State University
Sunflower headclipping weevil

Photo: W. Cranshaw – Colorado State University
Other Misc. Items

- Red/gray seed weevil?
- Banded sunflower moth?

- Many companies now treat all hybrids with CruiserMaxx; Bayer also uses a package of treatments (can’t remember their insecticide)
Seed Treatments

- Gaucho, Poncho, CruiserMaxx (which also includes fungicide)
- The latter two can add significant cost to seed
- Generally 45 days of protection is about the limit of expected protection
- Some protection from wireworms but not carrot beetle
Stem weevil

- Diverse observations on this being a problem
  - National Sunflower Association annual surveys haven’t shown much activity
  - Seed company production finds this to be a common problem
- Furadan no longer available for control
- Seed treatments are not effective
- SW larval rates drop significantly after mid June planting dates — (Carl Patrick, retired AgriLife Extension entomologist)