TEXAS A&M AGRILIFE EXTENSION

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

Sunflower Bloom-Growth Staging

- **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

Sunflower Bloom-Growth Staging

- **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.sunflowernsa.com/growers/growth-stages/

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.


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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

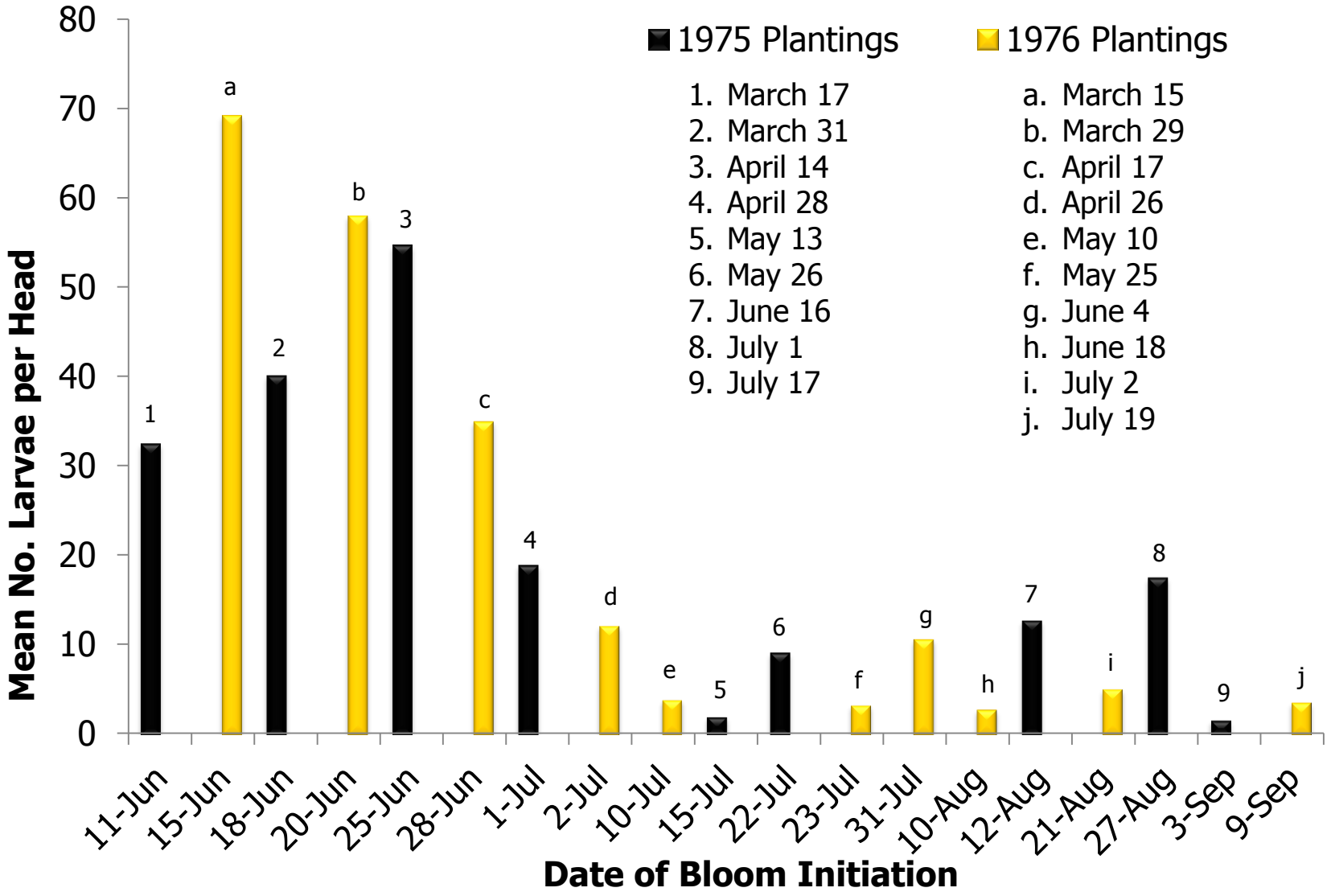
The "Boll Weevil of Sunflowers"—Sunflower Moth

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



Example of Larval Abundance

	Mean Number of SFM Larvae/Head			
Days After 1st Bloom	Field 1	Field 2	Field 3	Field 4
3	0	2	1	0
6	3	0	3	9
9	7	27	2	77
12	38	15	4	220
15	34	28	3	263
18	28	18	3	312
21	13	24	7	215
24	8	23	47	142
27	4	12	71	77
30	---	12	75	---
33	---	13	---	---

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

- "Managing Insect Pests of Texas Sunflower," Texas AgriLife Extension Service, E-579 (2009)
  - 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 Rynaypyr (different formulation) and pyrethroid

Besiege, 2013

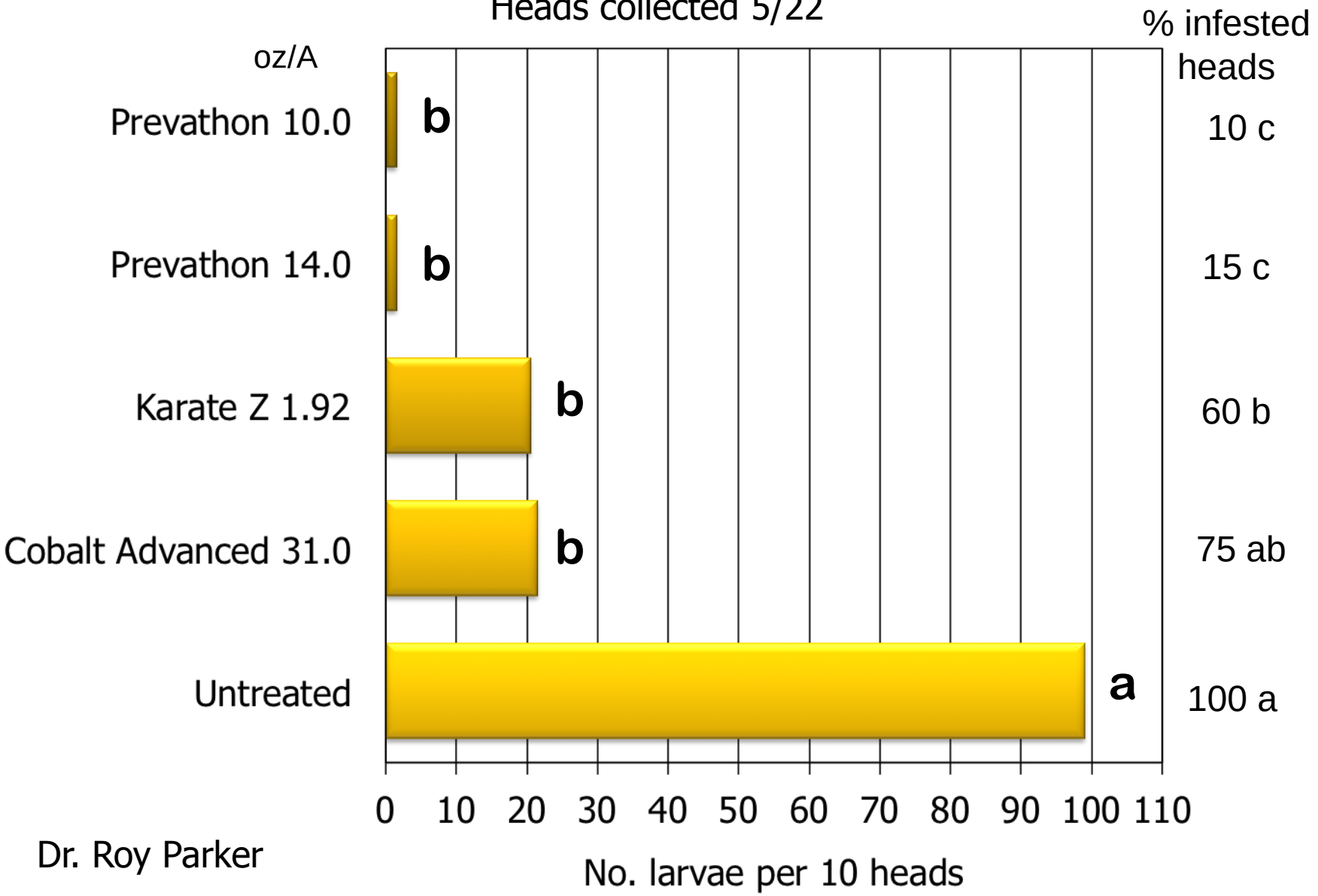
- Syngenta—mix of chlorantraniliprole and pyrethroid (Lambda-cyhalothrin), 6-10 oz/A
- See the special label for sunflower at http://www.cdms.net
- First spray "before pests reach damaging levels"

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

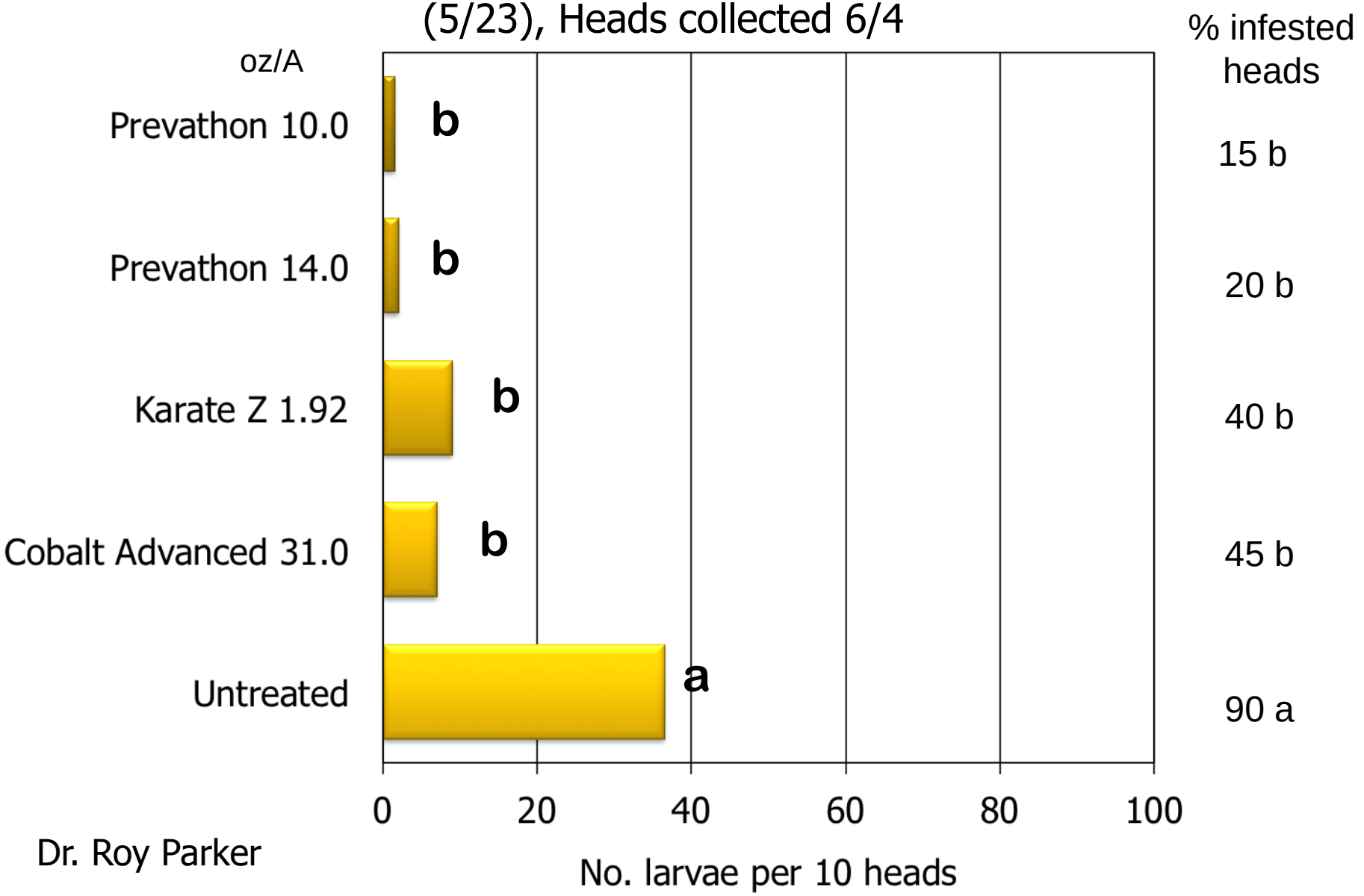
1st application at 4% bloom (4/25), 2nd at 20% bloom (4/30), 3rd at 100% (5/8), Heads collected 5/22



Dr. Roy Parker

2012 SFM larvae in late planted test

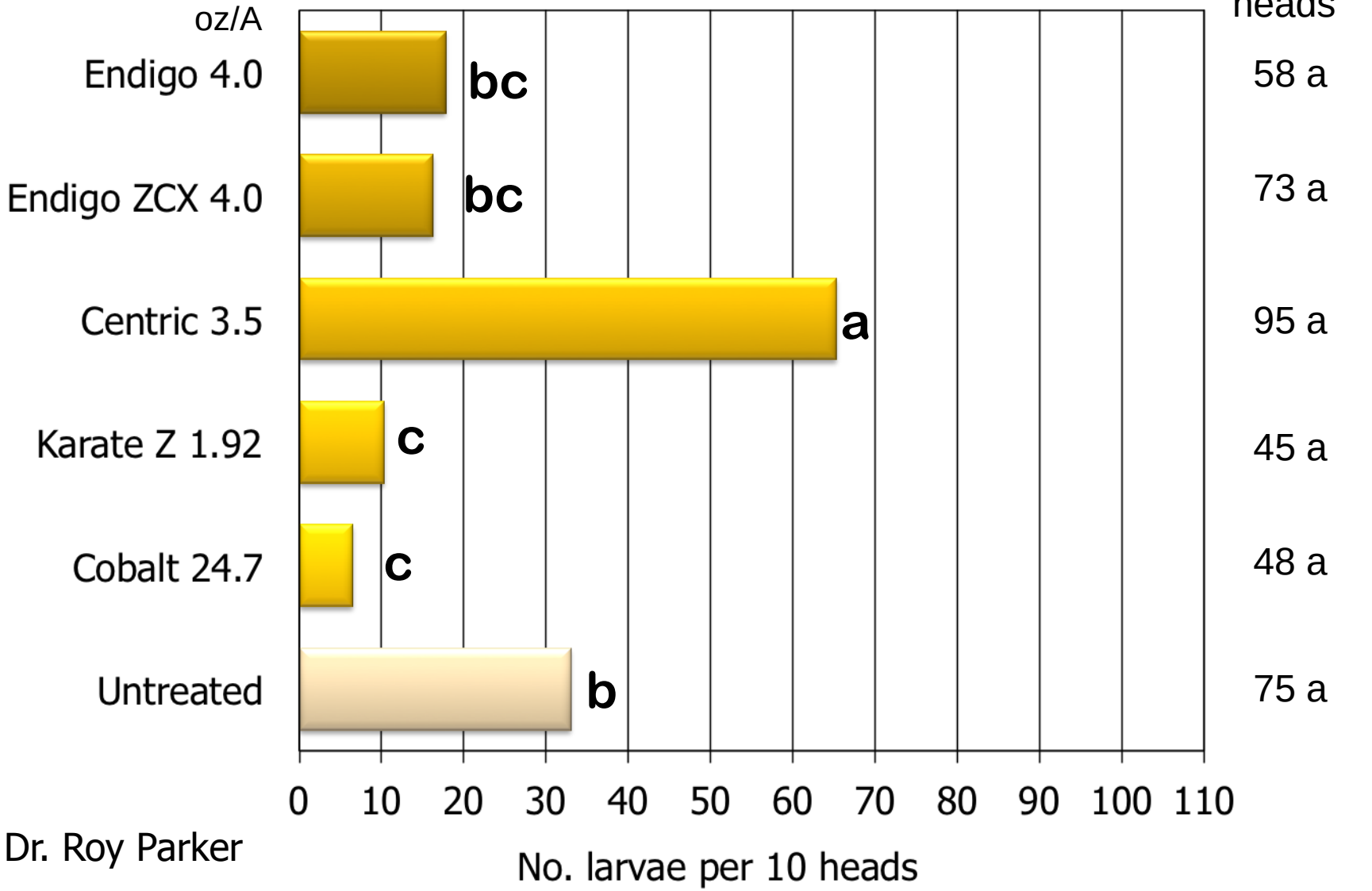
1st application at 15% bloom (5/16) and 2nd at 100% bloom (5/23), Heads collected 6/4



Dr. Roy Parker

2012 SFM larvae in Syngenta Test

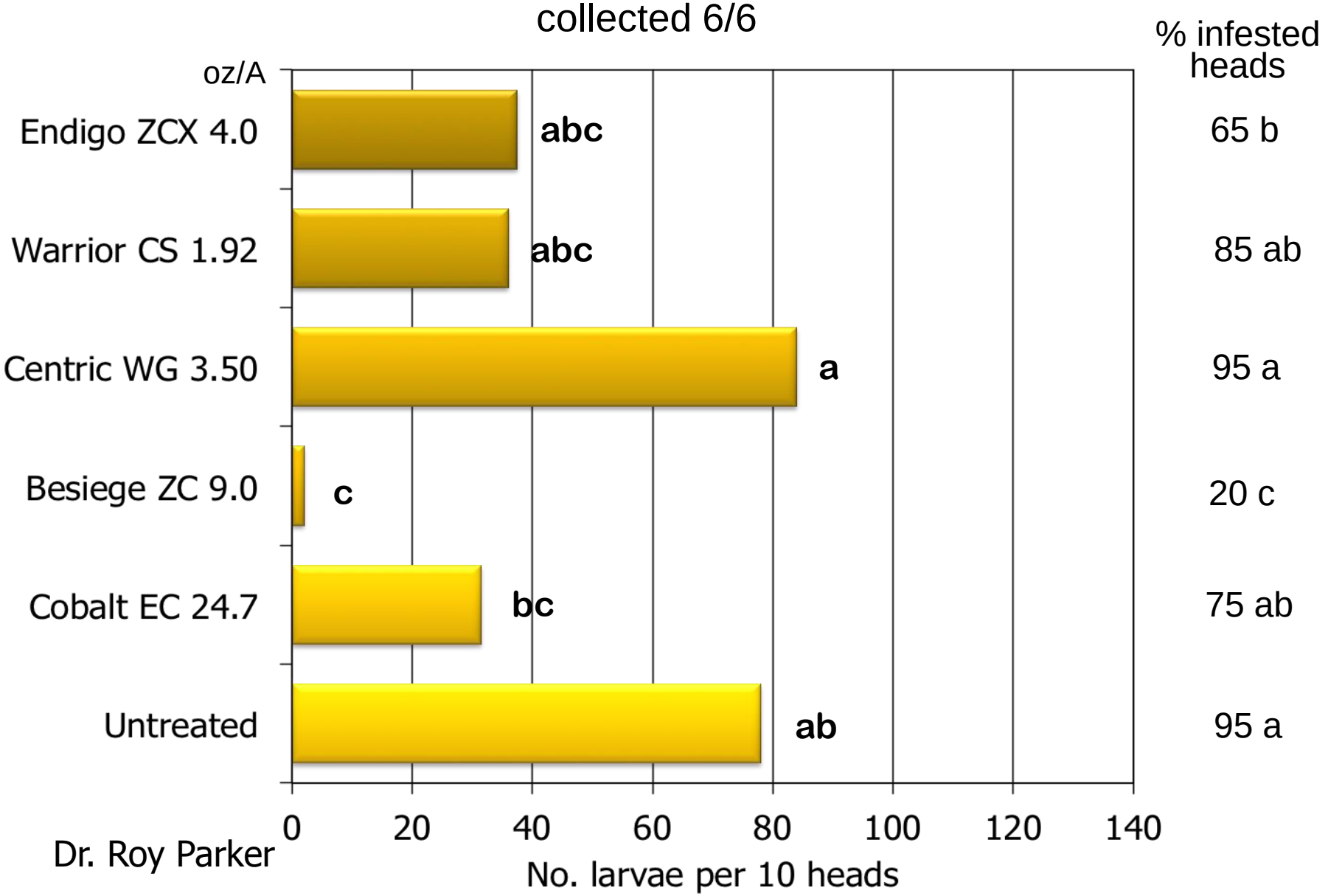
1st application at 15% bloom (5/16) and 2nd at 100% bloom (5/23),
Heads collected 6/4



Dr. Roy Parker

2013 SFM larvae in Syngenta Test

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



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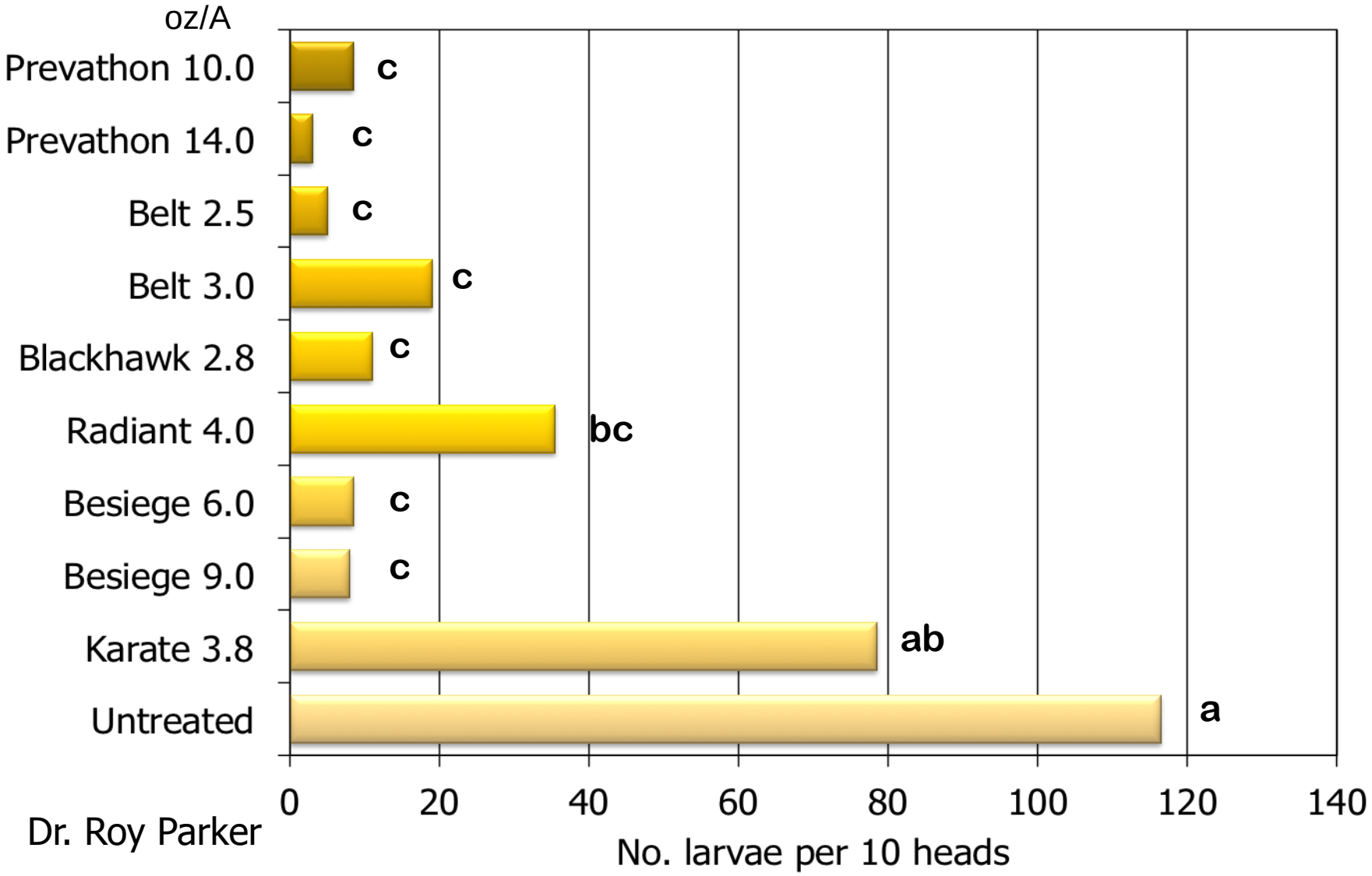
2013 SFM Larval Insecticide Evaluation

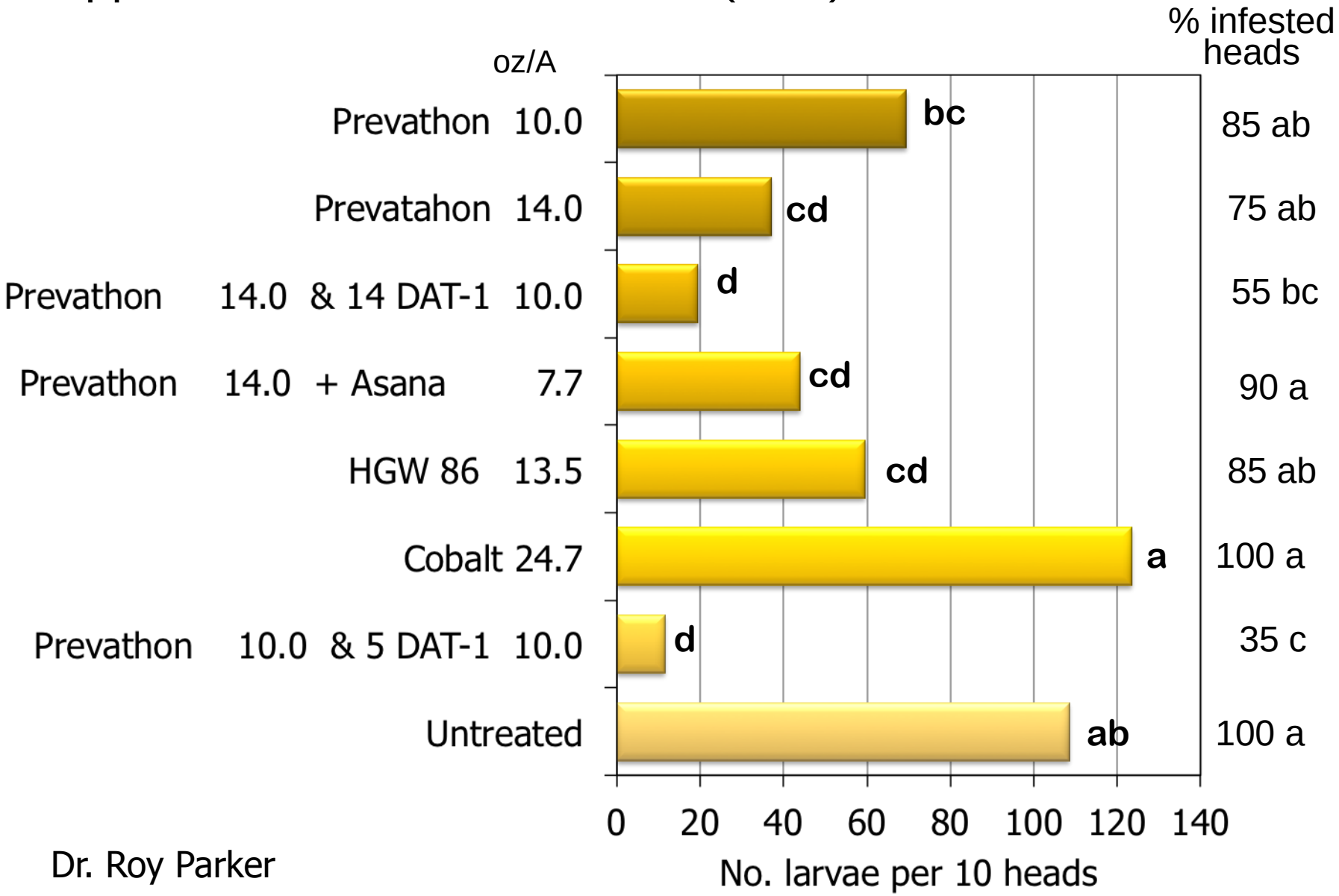
1st application at 2% bloom (5/17) and 2nd at 98% bloom (5/22), Heads collected 6/10



Dr. Roy Parker

2013 SFM larvae in Dupont Test

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



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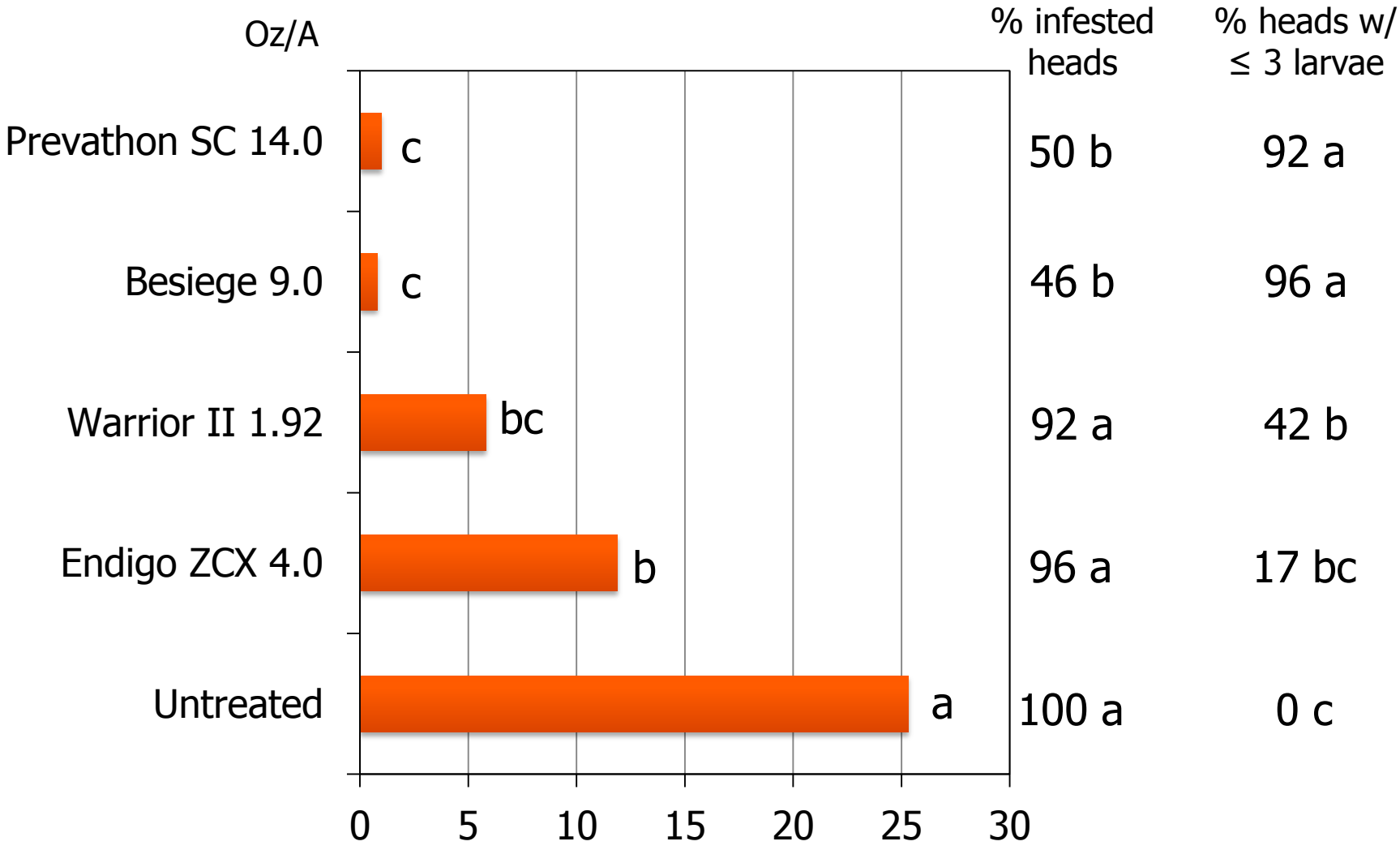
2014 Sunflower Moth Test

1st application at 70% bloom (6/5) and 2nd at 100% bloom (6/10)

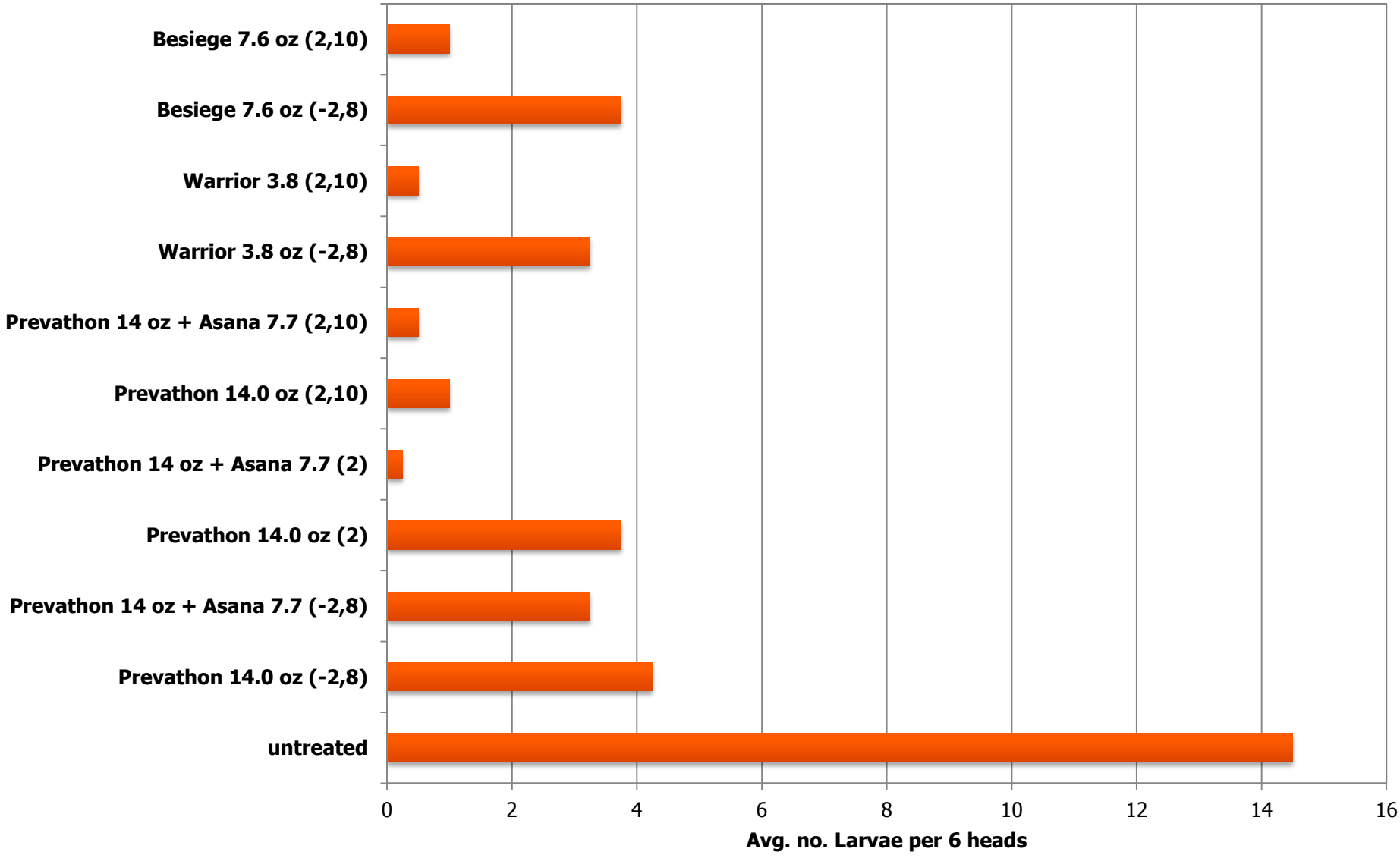


Dr. Roy Parker

Heads collected 6/17

SFM Lubbock - 2015 Trostle

1% Bloom Aug. 15th, Sample Date August 31st



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

"Managing Insect Pests in Texas Sunflower," Dr. Ed Bynum, Texas AgriLife Extension—Amarillo (2009)

AgriLIFE EXTENSION
Texas A&M System

Managing Insect Pests of Texas Sunflowers

E-579
7-09

Ed Bynum
Extension Entomologist
The Texas A&M System

Insect pests are often a major limiting factor in Texas sunflower production. Of the 30 insect species recorded on sunflower in Texas, about 13 are considered potentially major pests. The sunflower moth is the major common pest of sunflower. Stem weevils, seed weevils, the stalk girdlers, and thistle caterpillar are of secondary importance, although they can be quite serious when abundant.

Both oilseed and non-oilseed (confectionary) sunflowers are grown in Texas. The small, black seeds of oilseed sunflower contain 38 to 50 percent oil. They are processed into sunflower oil and also used as bird feed. Confectionary sunflower seeds are usually large with black and white stripes. They are used for human consumption in a variety of food products.

Because the sunflower has a relatively short growing season, it is suitable primarily as a spring-planted crop or as a second crop after wheat. Sunflower can be an alternative crop where plantings of other crops have been destroyed by wind, sand, rain or hail. Drought tolerance makes sunflower an attractive dryland crop and an alternative in areas with limited irrigation. Sunflower also responds well under full irrigation.

Cultural practices that help reduce insect problems include crop rotation, modified planting dates, weed control, volunteer and wild sunflower control and tillage. However, the judicious use of insecticides is often required for successful sunflower production in Texas. Producers should be able to identify the insect pests that reduce sunflower yield and know when those pests are most likely to occur during the growth of the plant. They should also understand pest biology and the control measures that are most effective.

Insect pests infesting the head

Sunflower moth

Lepidoptera: Pyralidae, *Homoeosoma electellum* (Hulst)

The sunflower moth, also called the head moth, is the single most important sunflower pest in Texas. Sunflower moth infestations are usually heaviest early in the growing season, with another smaller moth flight possible later in the season. The adult is a small, slender, silver-to-buff gray moth about ½ inch long. It is most often seen resting on sunflower heads during the blooming period, especially in early morning and early evening.

Figure 1. Sunflower moths (photo by Scott Russell).

Figure 2. Sunflower moths (photo by Scott Russell).

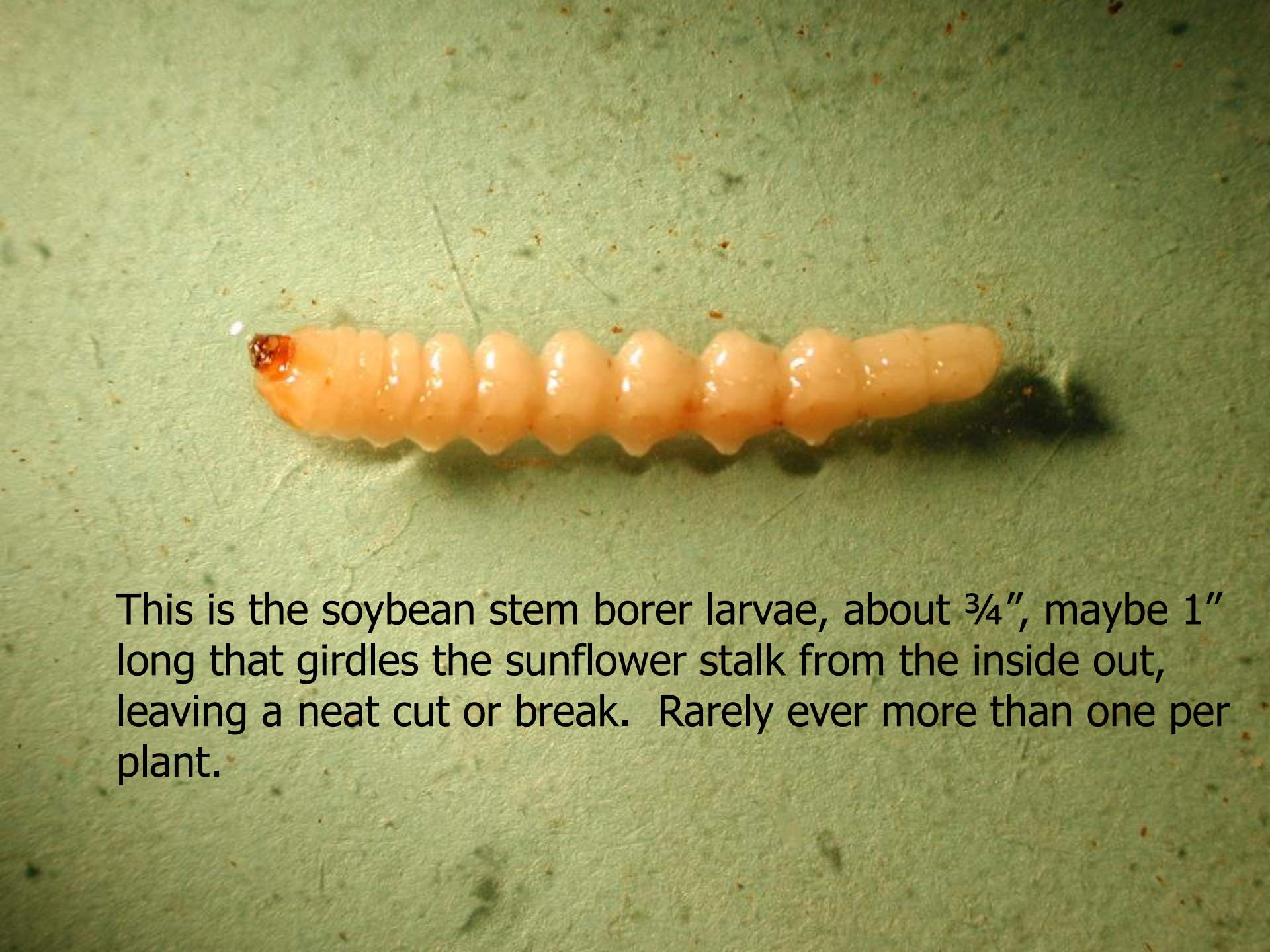
Other Insects in TX Sunflower

- 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

Photo: J. P Michaud – Kansas 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)