

Screening Sunflower Hybrids for Reaction to Infestation by Sunflower Midge & Insecticide Update



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Sunflower Midge - Description

Adults

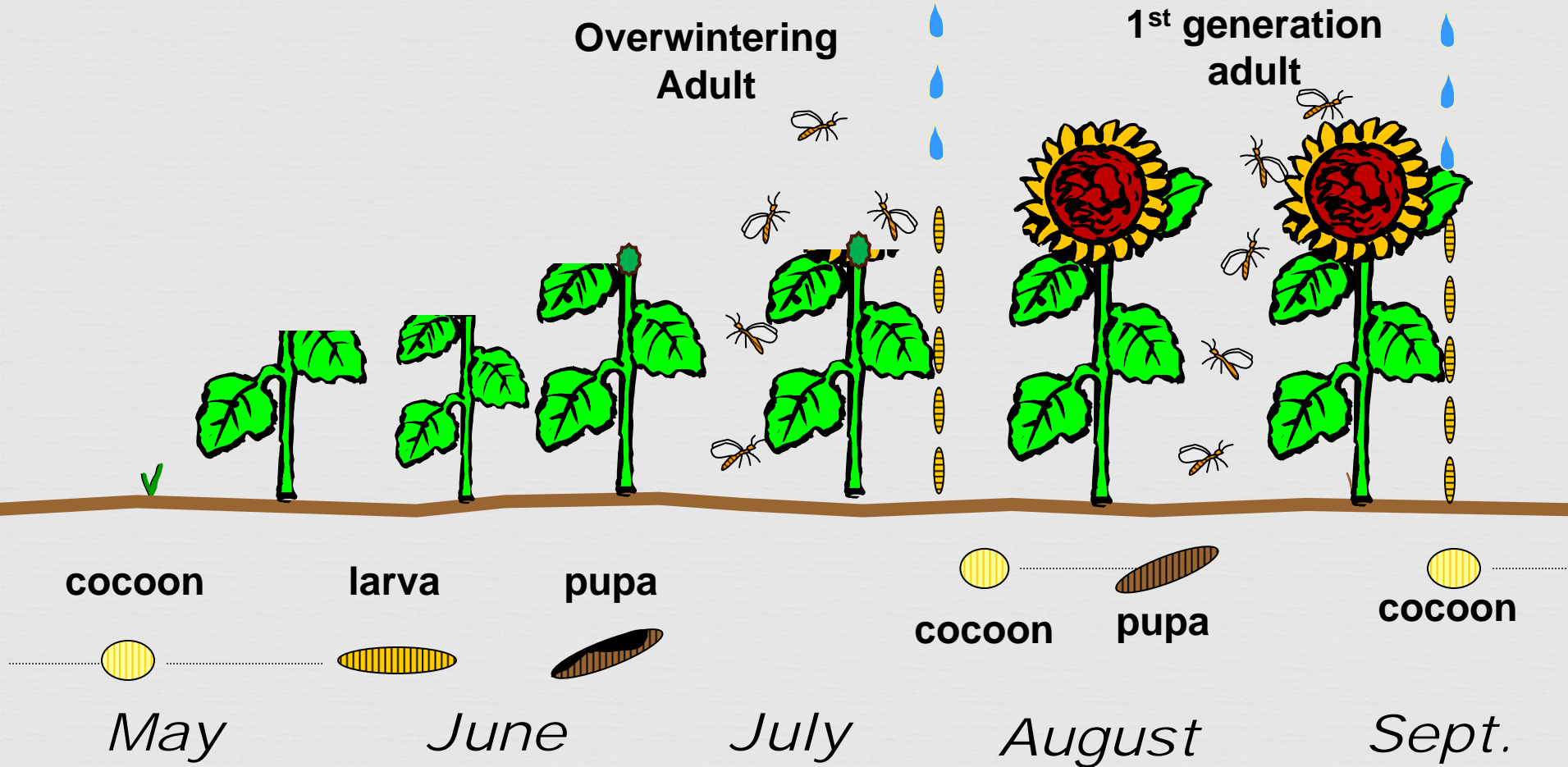


Eggs



Sunflower Midge - Life Cycle

Contarinia schulzi



Sunflower midge larval feeding injury to developing bud



2011 Sunflower Midge Hybrid Evaluation



Mapleton

- Nursery located in area that has had midge damage for 20+ years
- Two planting dates
 - May 25 (later than normal)
 - June 8 (loss due to wet conditions)
- RCB design, 4 reps, Single row plots
- 57 hybrids
 - 17 confections
 - 40 oils

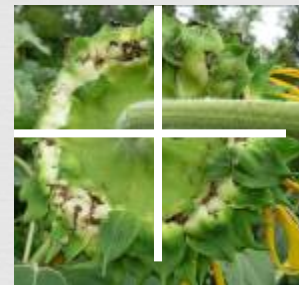
Midge Nursery - Mapleton, ND



2011 Sunflower Midge Hybrid Evaluation



- ☞ Heads evaluated after flowering for visible damage by midge larval feeding.
 - ☞ September 1 - rated
 - ☞ 5 plants per row
 - ☞ 20 total per hybrid
 - ☞ Bracken Scale (0-5)
 - ☞ Necrosis Index (0-5)
 - ☞ Measures necrosis at base of bracts from midge
 - ☞ 5 = 50% or more of each quadrant of the head
 - ☞ Round Index
 - ☞ Measures head deviation from a round shape presented)



(not

Midge Bracken Scale – 0 to 5

∞ 0 – No damage

∞ 1 – Bract damage
evident



Bracken, G.K. 1991. A damage index for estimating yield loss in sunflowers caused by sunflower midge. Can. J. Plant Sci. 71:81-85.

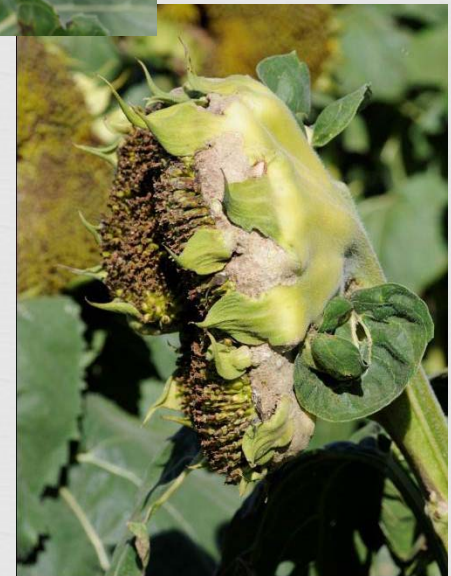
Midge Bracken Scale

- 0 - No damage
- 1 - Bract damage evident
- 2 - Light cupping, receptacle thickening



Midge Bracken Scale

- 0 - No damage
- 1 - Bract damage evident
- 2 - Light cupping, receptacle thickening
- 3 - Moderate cupping, receptacle thickening $\frac{1}{2}$ head diameter



Midge Bracken Scale

- 0 – No damage
- 1 – Bract damage evident
- 2 – Light cupping, receptacle thickening
- 3 – Moderate cupping, receptacle thickening $\frac{1}{2}$ head diameter
- 4 – Extreme cupping to central hole, receptacle thickening $> \frac{1}{2}$ head diameter

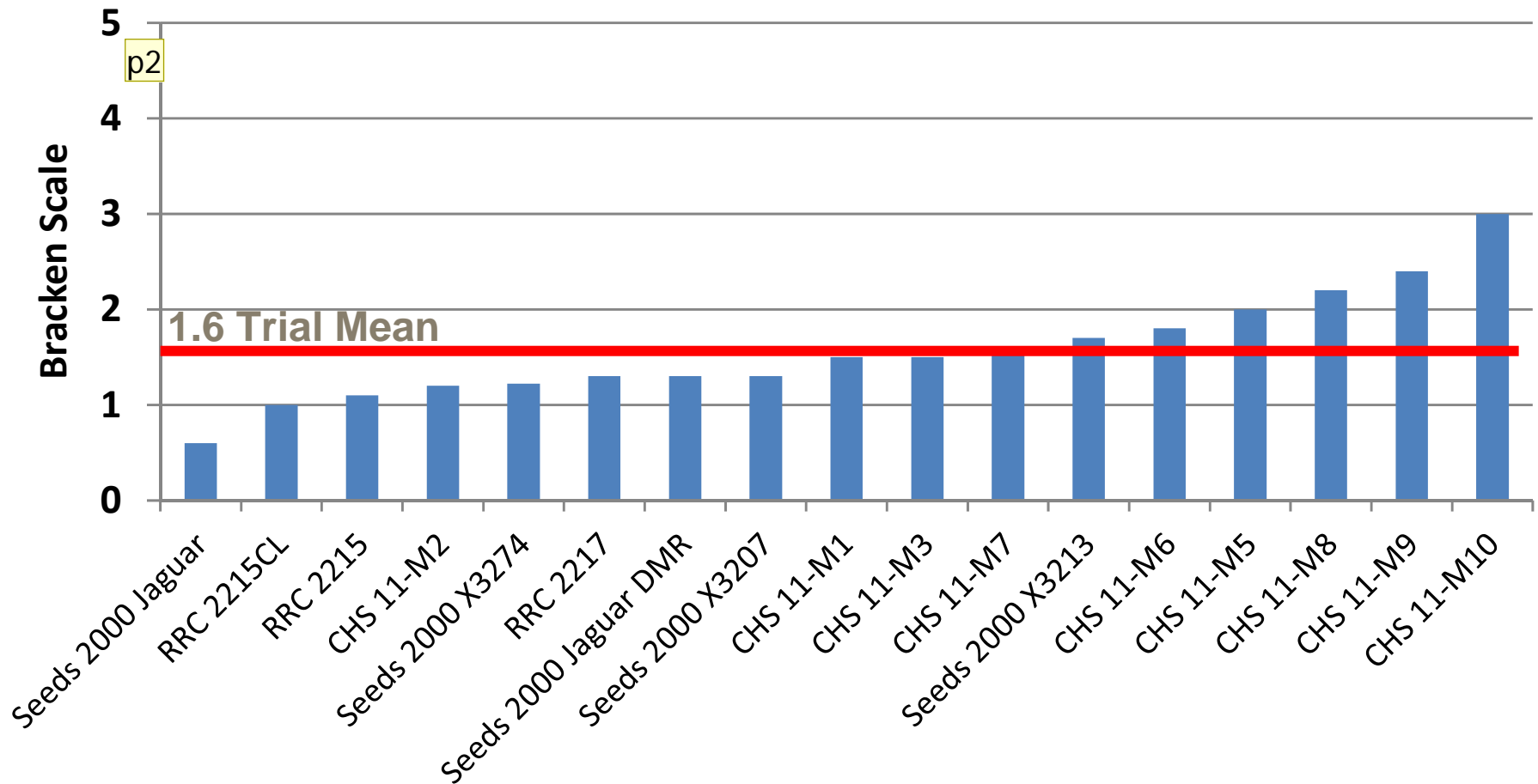


Midge Bracken Scale

- 0 - No damage
- 1 - Bract damage evident
- 2 - Light cupping, receptacle thickening
- 3 - Moderate cupping, receptacle thickening $\frac{1}{2}$ head diameter
- 4 - Extreme cupping to central hole, receptacle thickening $> \frac{1}{2}$ head diameter
- 5 - Head closed & no seeds



2011 Sunflower Midge Hybrid Evaluation Confection Sunflowers



Range of 0.6 to 3.00; 59% had score of <1.6

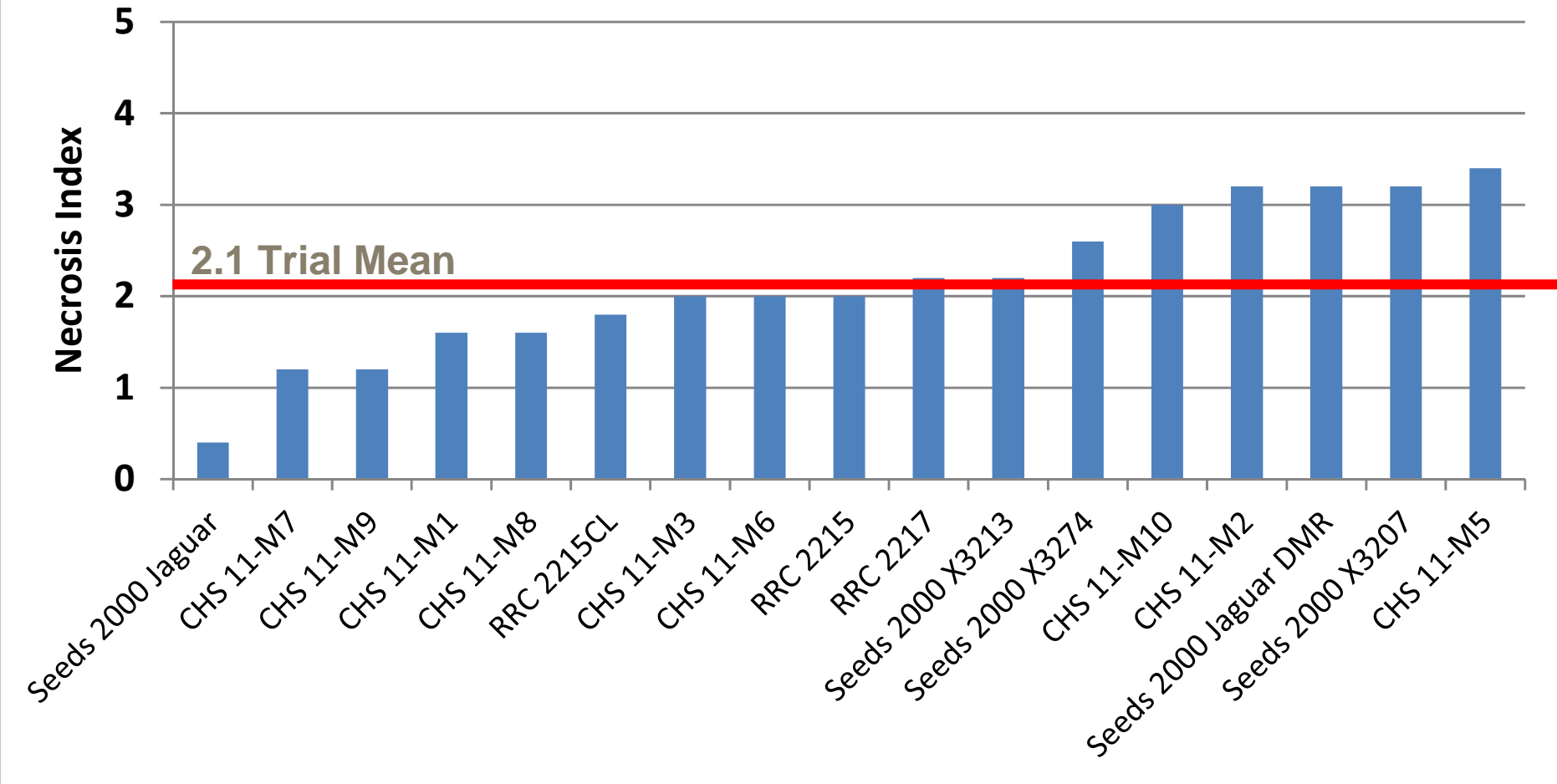
Slide 12

p2

The y-axis on this and subsequent graphs should reflect the absolute range of each scale used (0-5) so that each hybrid presented in the graph can be compared to the full scale range. Otherwise, some hybrids appear to have highly inflated rating values relative to other hybrids. You can change the y-axis properties in Excel by selecting a fixed range and fixed intervals.

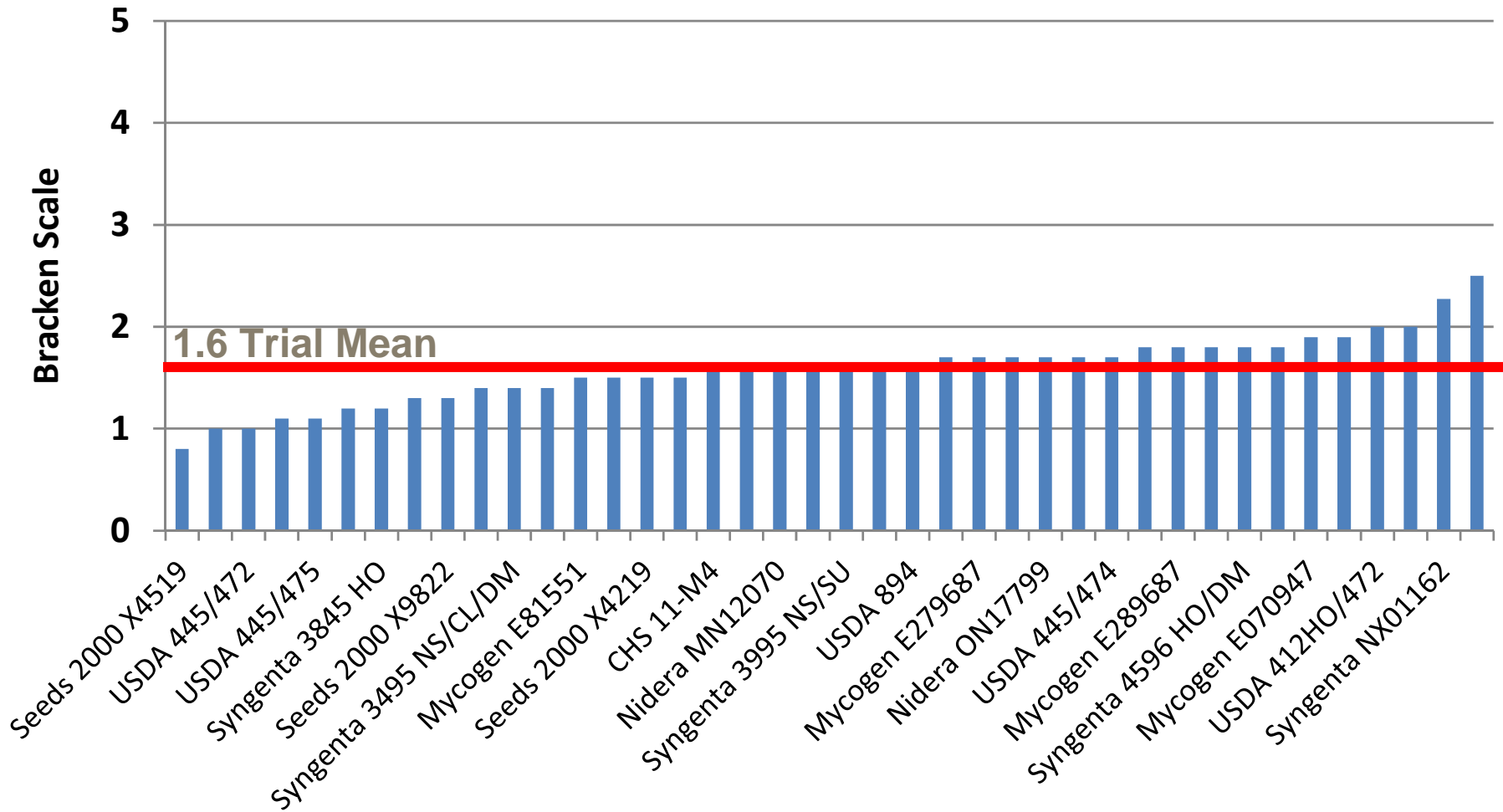
patrick.beauzay, 1/9/2012

2011 Sunflower Midge Hybrid Evaluation Confection Sunflowers



Range of 0.4 to 3.4; 53% had score of < 2.1

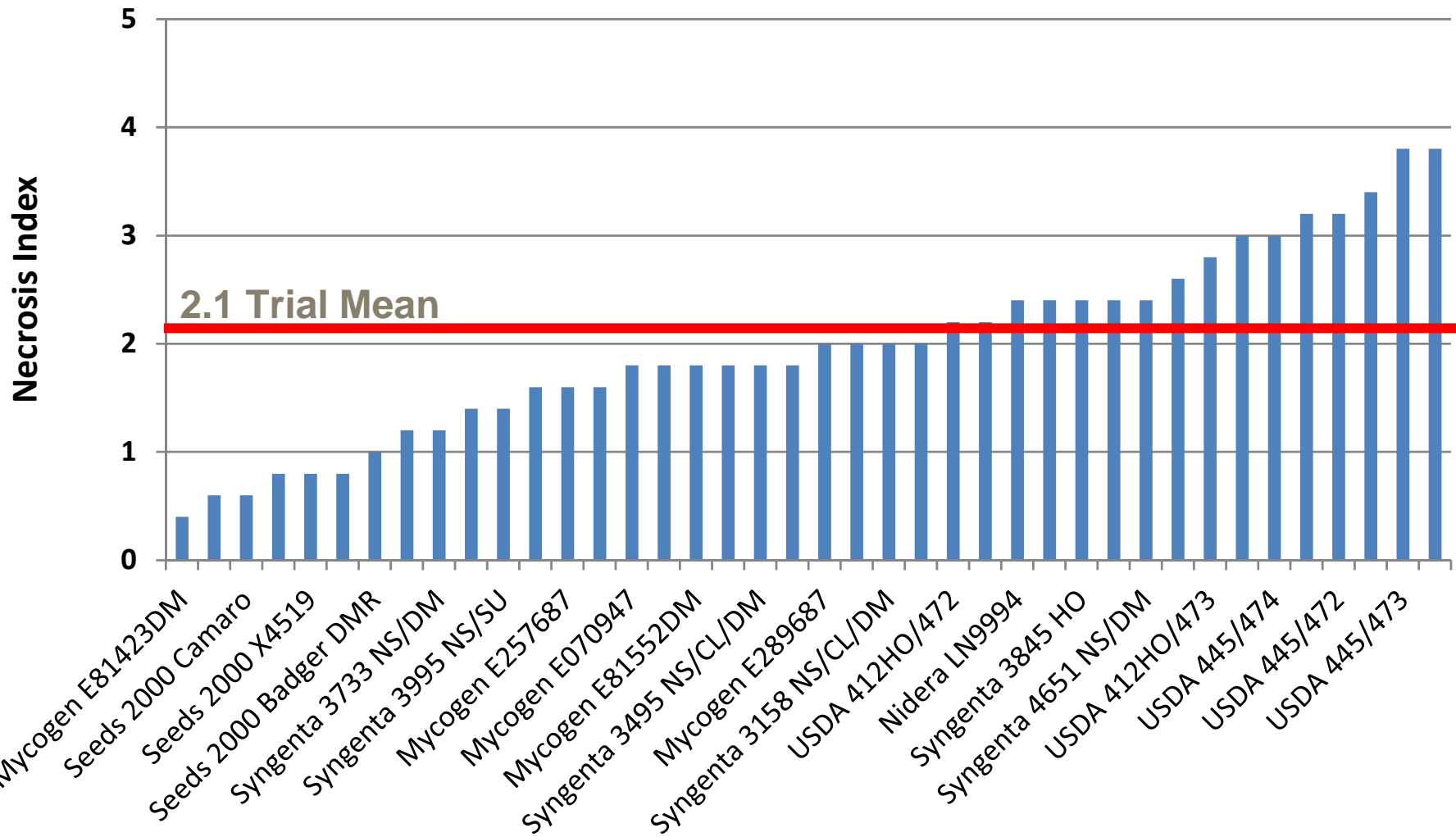
2011 Sunflower Midge Hybrid Evaluation Oil Sunflowers



Range of 0.6 to 2.5; 40% had score of < 1.6

2011 Sunflower Midge Hybrid Evaluation

Oil Sunflowers



Range of 0.4 to 3.8; 60% had score of < 2.1

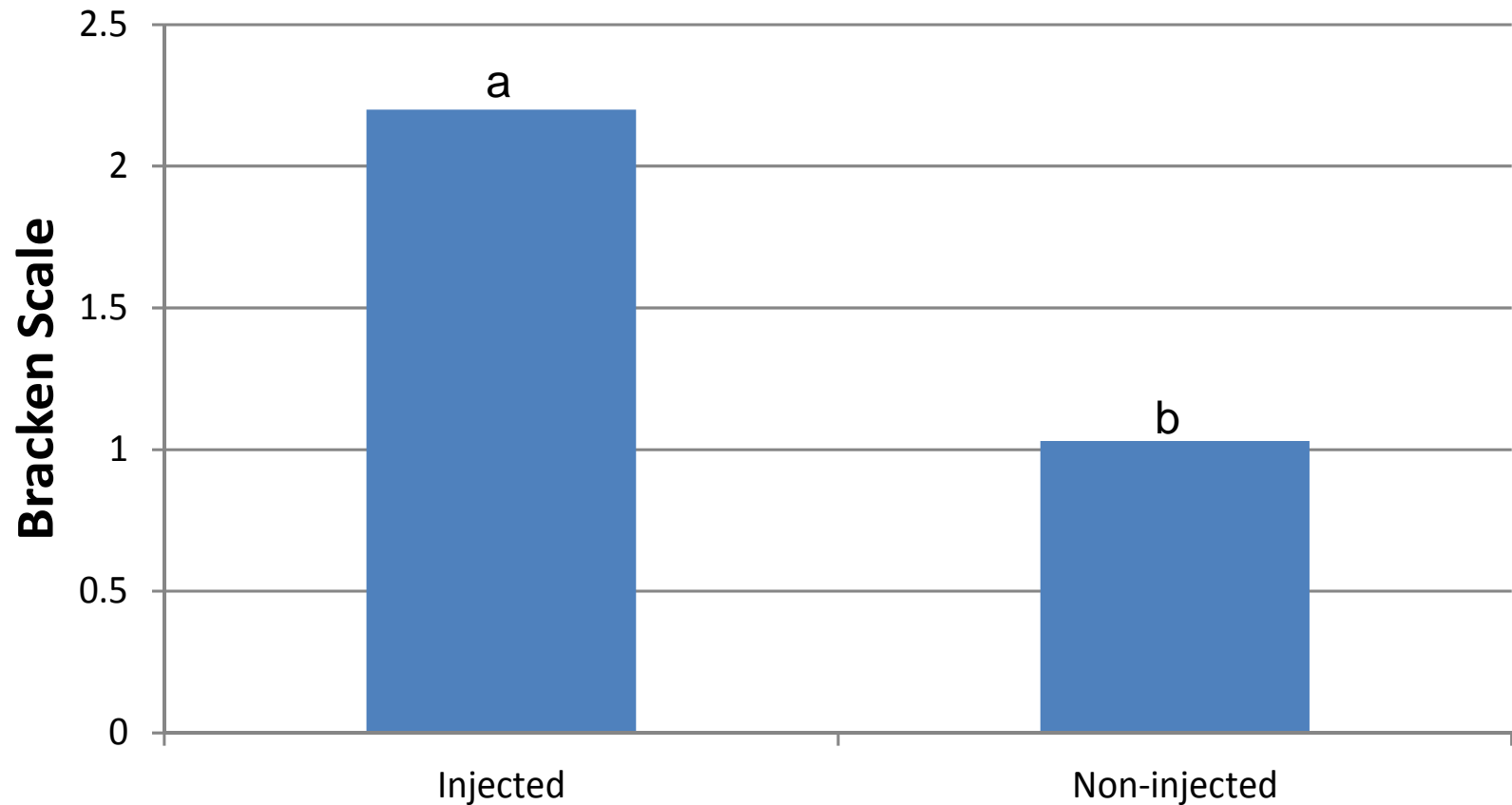
2011 Sunflower Midge Hybrid Evaluation



- ☞ Injected five heads with 2,4-D in 1st rep to compare Bracken Scale ratings
 - ☞ Used techniques developed by Brewer et al. 1994 *J. Econ. Entomol.* 87: 245-251
 - ☞ 4.5-5 cm bud diameter
 - ☞ 10mM concentration per bud
 - ☞ 3 injections per bud

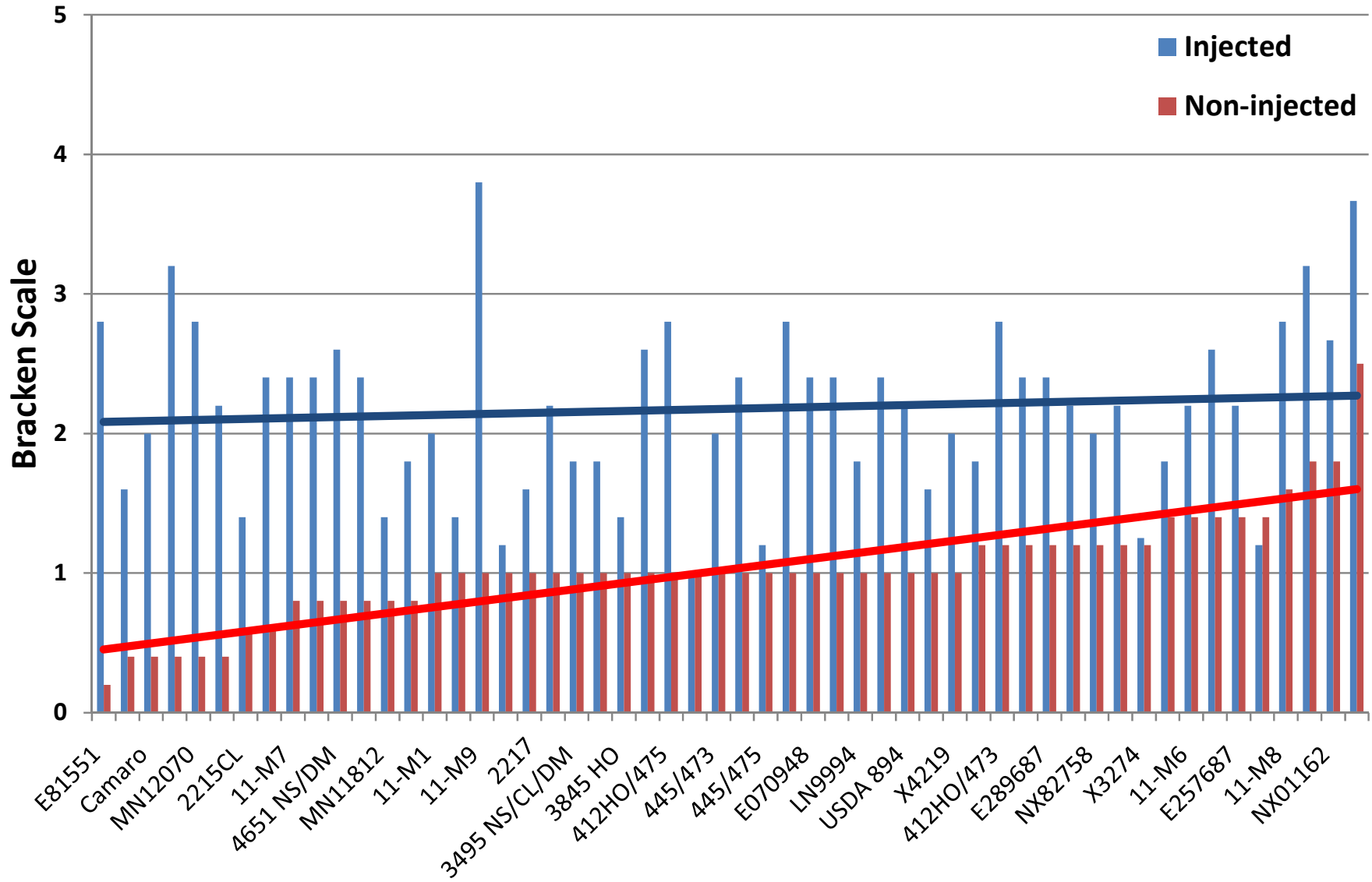


2,4-D Injected versus Non-injected Buds



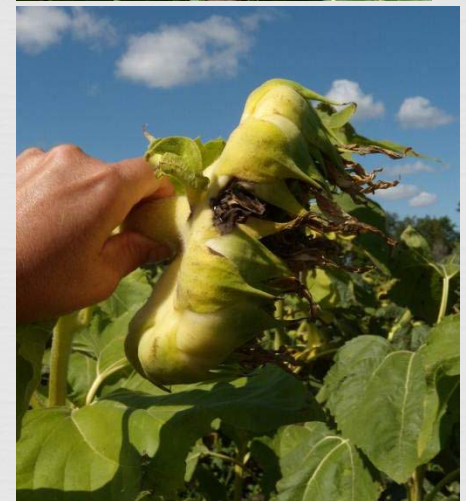
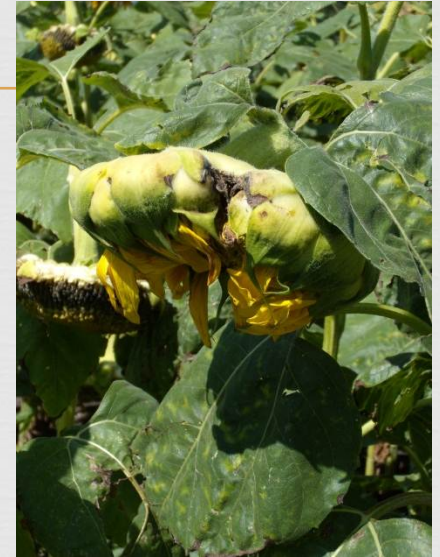
Fisher's LSD; $P \leq 0.05$

Comparison of 2,4-D injected versus non-injected Buds for Screening Sunflowers for Tolerance to Sunflower Midge



2011 Results

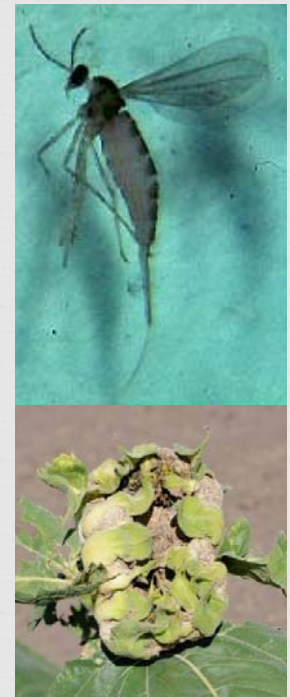
- ☞ Tolerant or resistant varieties observed
 - ☞ Published in NDSU Extension publications
- ☞ 2,4-D injected Bud Study
 - ☞ Observed differences among varieties
 - ☞ Majority of hybrids had 2x higher Bracken Scale in 2,4-D injected buds compared to non-injected buds.
 - ☞ Due to varietal differences or to difference in size and growth stage of head when injected
 - ☞ Low sunflower midge pressures making comparisons difficult
 - ☞ Needs further testing



Sunflower Midge

'Best' Pest Management

- ☞ Use tolerant hybrids
- ☞ Use a late planting date
 - ☞ Stagger budding dates
- ☞ Insecticides tested are ineffective
 - ☞ Long emergence period of adult midge
 - ☞ Sunflower buds susceptible for 3 weeks
- ☞ Weather – soil moisture
- ☞ 'Midge' area
 - ☞ Most midge survive and move to nearby fields



2011 Insecticide Efficacy Testing



☞ Insecticide timing:

- ☞ R5.1 (10% of disk flowers open)
- ☞ Applied August 5

☞ Modes of Actions:

- ☞ Pyrethroid (Group 3a) – esfenvalerate
 - ☞ Asana XL at 9.6 fl oz per acre
- ☞ Chlorantraniliprole (Group 28) - DuPont™
 - ☞ Prevathon™ (RynaXypyr®) at 9.8 & 13.3 fl oz per acre
 - ☞ HGW86 (Cyazypyr™) at 3.4-13.5 fl oz per acre with/without MSO



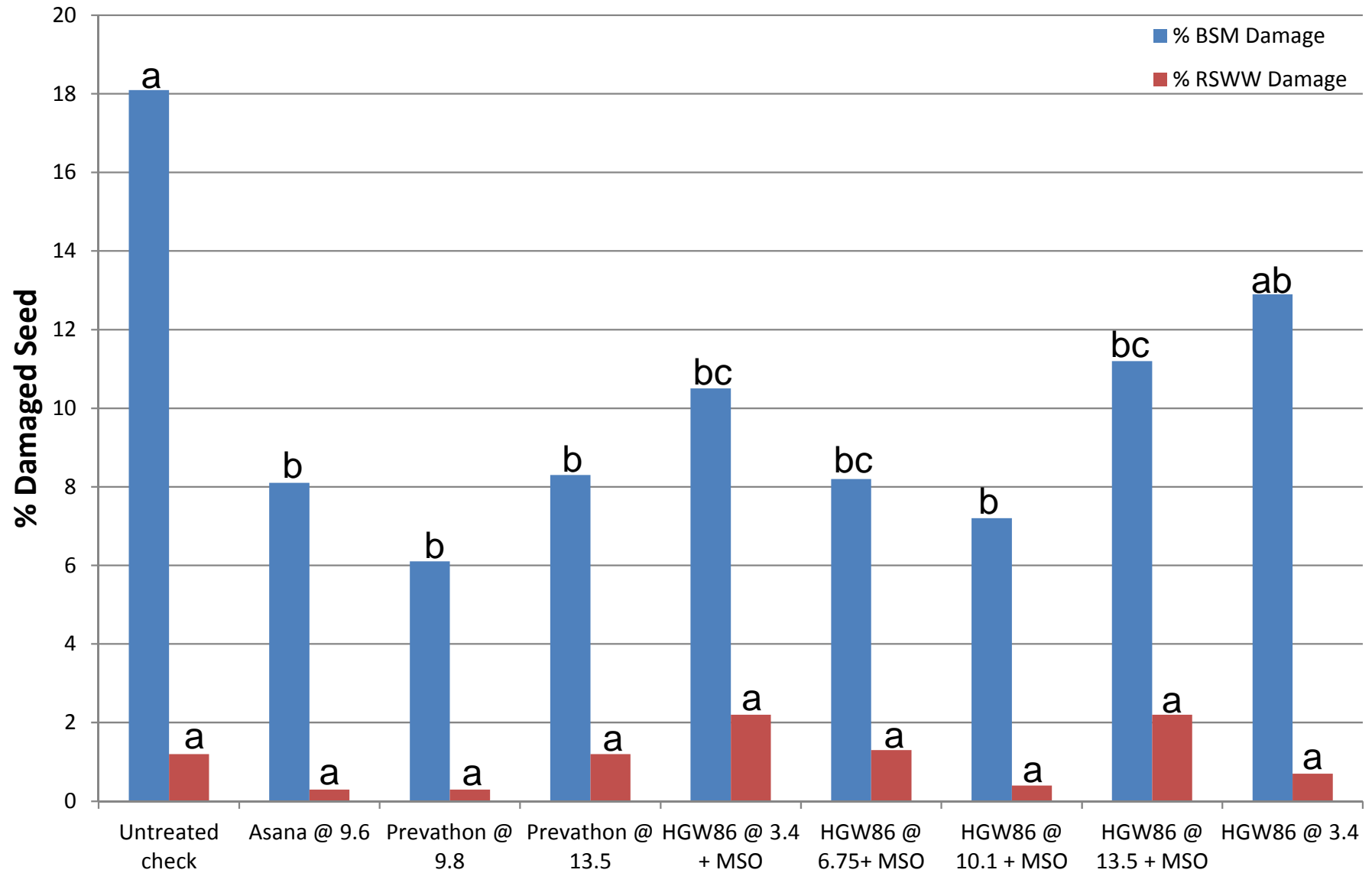
Banded sunflower moth



Red sunflower seed weevil



2011 Insecticide Trial - Percent Damaged Seed for Banded Sunflower Moth (BSM) and Red Sunflower Seed Weevil (RSSW)



Fisher's LSD; $P \leq 0.05$

2012 NDSU Crop & Pest Report

Free to subscribers with email but **MUST SIGN-UP ON WEBSITE!!!**

<http://www.ag.ndsu.edu/cpr>

The collage features several pages from the 2012 NDSU Crop & Pest Report, dated July 14, 2011. The pages are overlapping and tilted at various angles.

- Top Left Page:** "plant science" section with the heading "OPTIONS FOR PREVENTED PLANTING ACRES". It discusses the spring of 2011 and options for prevented planting acres.
- Top Middle Page:** "soils" section with the heading "RECIPE FOR HIGHER WHEAT PROTEIN". It provides instructions for UAN application to increase wheat protein.
- Top Right Page:** "entomology" section with the heading "SOYBEAN APHIDS INCREASING!". It discusses the economic threshold for soybean aphids and the importance of scouting.
- Middle Left Page:** "around the state" section with a map of North Dakota and a table of contents for the "Wheat Midge Trap Catches" by county.
- Middle Right Page:** "weeds" section with the heading "SCOUTING FIELDS TO DETERMINE HERBICIDE EFFECTIVENESS". It provides guidelines for scouting fields after herbicide application.
- Bottom Left Page:** "plant pathology" section with the heading "SMALL GRAIN DISEASE SURVEY: JULY 4 - JULY 8". It reports on the results of a survey conducted in North Dakota.
- Bottom Right Page:** "entomology" section with a photograph of soybean aphids on the underside of a leaf. The caption reads: "Soybean aphids on undersides of leaf. Note casted white skins of aphid (Photo courtesy of P. Beaucourt)".
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