Inoculation Methods for Efficient, Large Scale Field Evaluations of Sunflower for Resistance to Diaporthe helianthi and D. gulyae

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Background

- Two main *Phomopsis/Diaporthe* species:

  D. helianthi (DH) and D. gulyae (DG)

- Multiple secondary species
- All previous studies done with *D. helianthi*
- Both species infect leaves, then spread along petiole to stem

Objectives

- Compare aggressiveness of DH and DG in field inoculations
- Find most efficient method for large scale inoculations

Methods

- 3 isolates of *D. helianthi* and 3 of *D. gulyae*
- 4 inoculation times: pre-bloom (22 July) to post-bloom (3 Sept.) --- 2 wk intervals
- 1 CHS confection hybrid, at Grandin ND
- 3 reps of 2 row plots … 30 plants inoculated

- Inoculum- 1 cm diameter Oatmeal Agar plug
- Stem wounded and agar plug wrapped with Parafilm
- Date 1 wounded with push-pin, Dates 2,3 & 4 wounded with ice-pick

Methods

- Toothpicks for fourth inoculation date

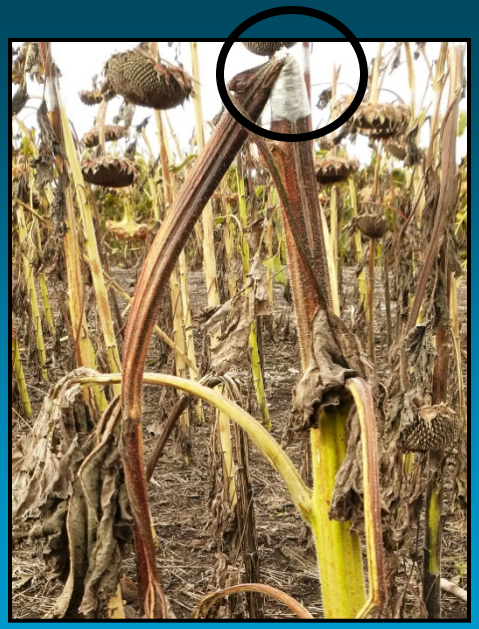
Half-pint Mason jar filled 1/3 with potato dextrose broth

Toothpicks serve as wicks, & mycelium covers tips in 7 days (no pycnidia)

Agar plug –
no wound

Toothpick inoculation – note lodging
an most plants

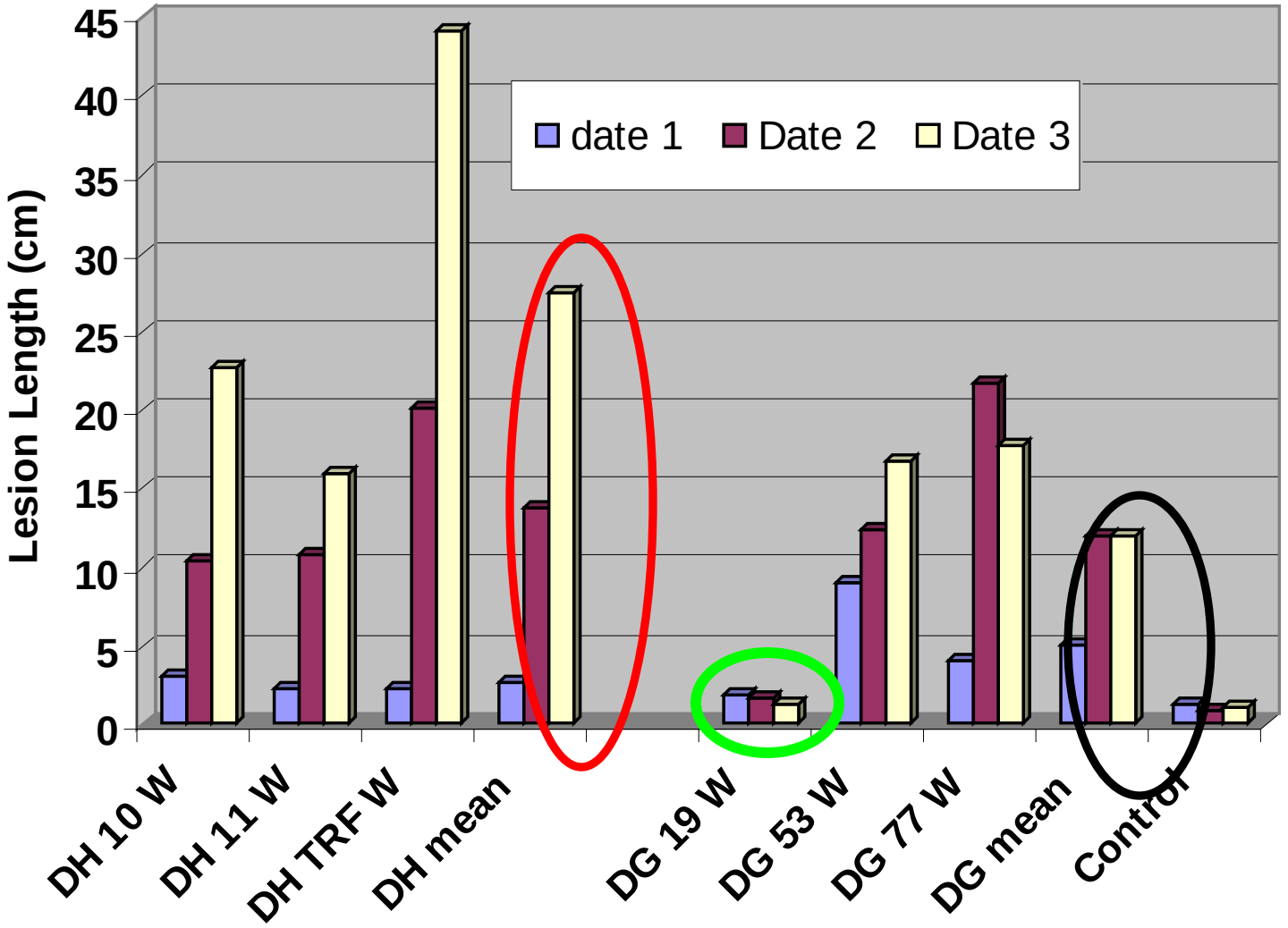
Toothpick control



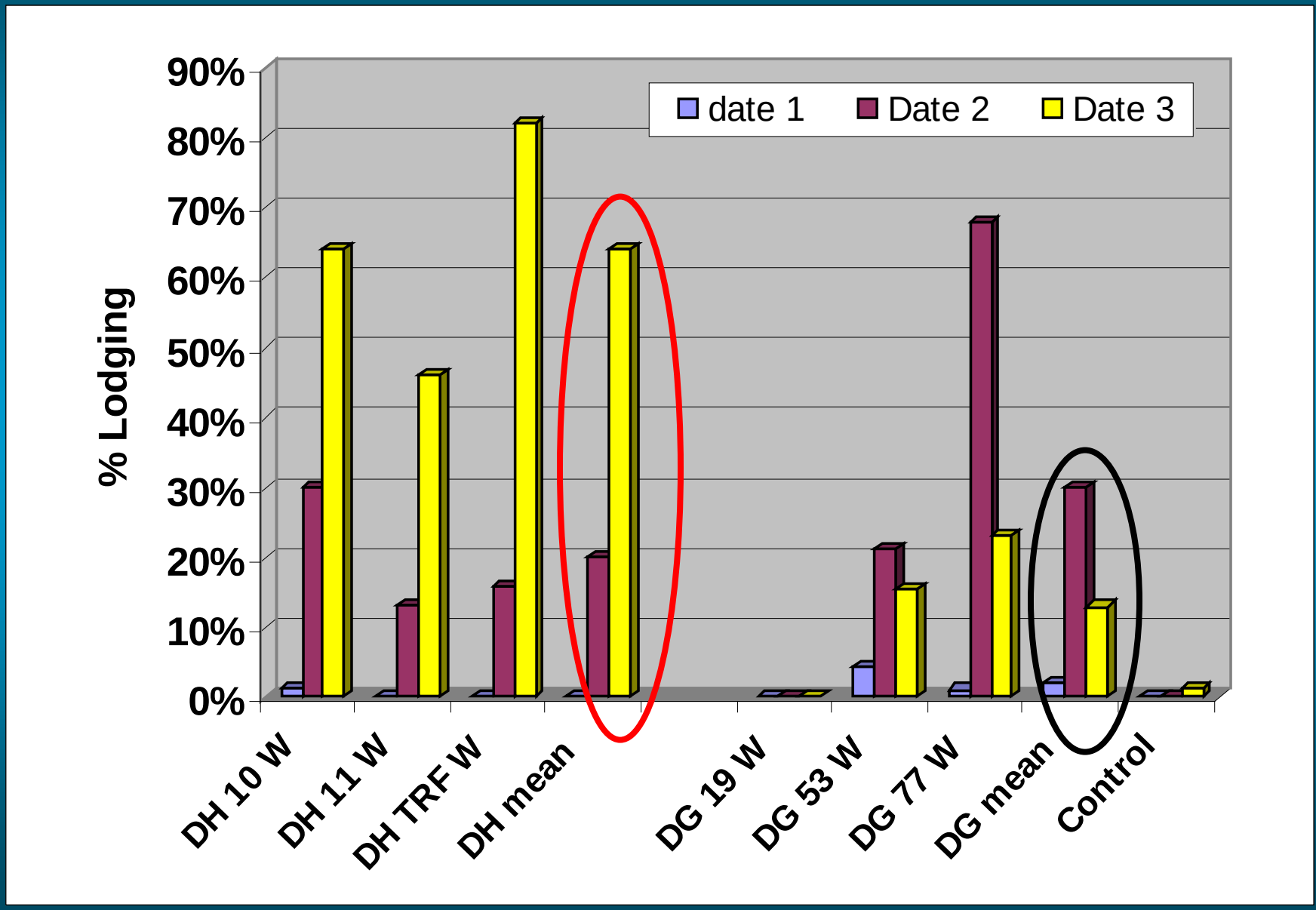
D. gulyae lesions

D. helianthi lesions

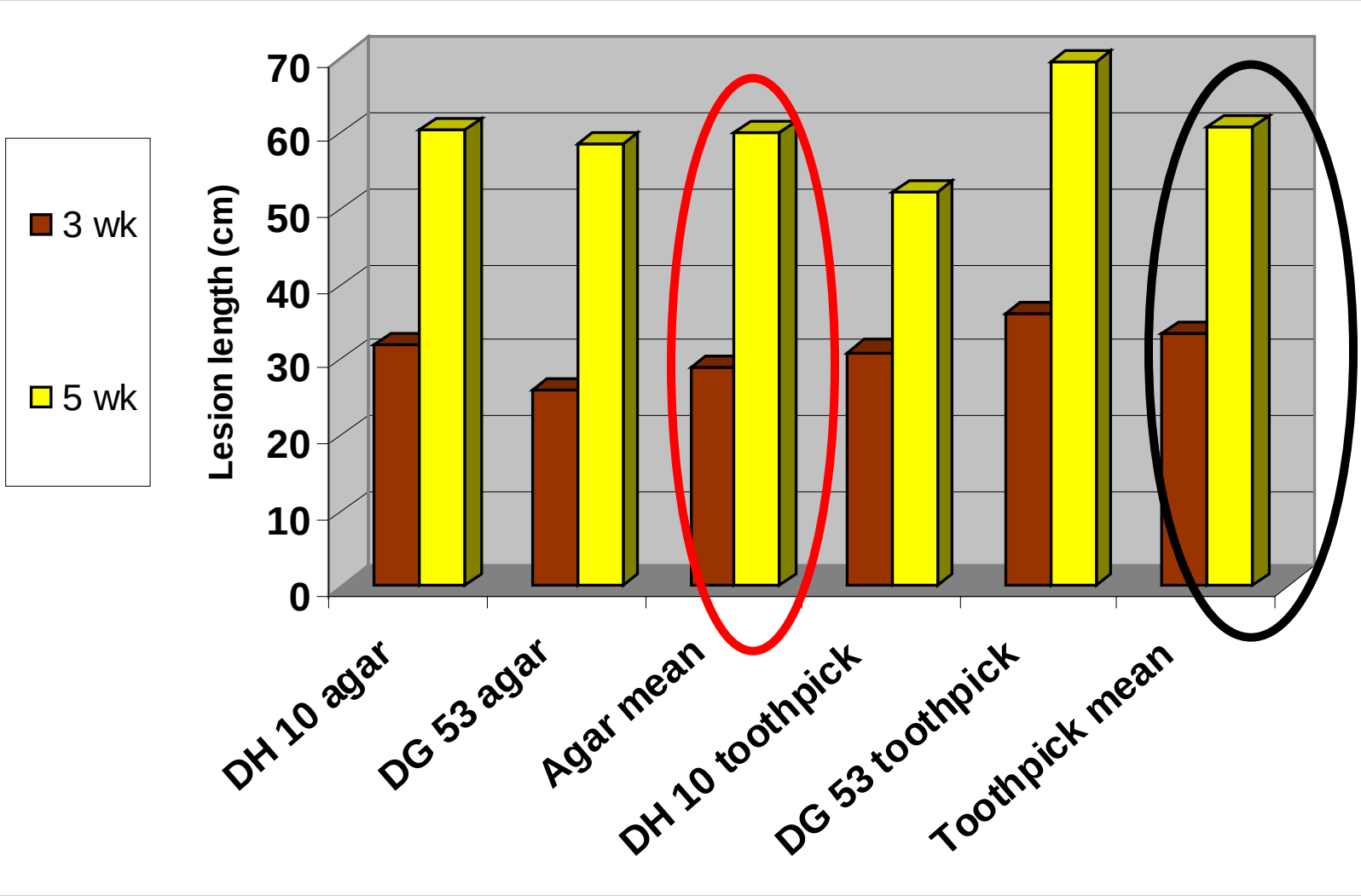
Lesion Development of *Diaporthe helianthi* (DH) & *D. gulyae* (DG) at three inoculation dates



Lodging (%) due to *Diaporthe helianthi* (DH) & *D. gulyae* (DG) at three inoculation dates



Lesion length of *Diaporthe helianthi* (DH) & *D. gulyae* (DG) produced by agar plug/wound compared to toothpick inoculation at 3 and 5 wks post inoculation



Results - Summary

- Agar plug worked very well (w/o rain or irrigation).
- Wounding necessary, and deeper wound (ie. push pin vs. ice pick) produced quicker and larger lesion development.
- Wrapping with *Parafilm* **VERY** time consuming.
- Toothpick inoculations took *¼ time* compared to agar plug/Parafilm wrap.
- In present study, DH more aggressive than DG (DH lesions av 28 cm vs DG lesions at 12 cm) ….. But depends upon isolates chosen !

RUMOR: Tom is retiring.

- TRUE
- As of Monday, 3 Feb., 2014…. after 35 years with the USDA, I will, reluctantly, hang up my hat.

Many Thanks are due to -

- *USDA Sunflower Unit* -
  - I've worked with 12 scientists over those 35 years, and a dozen technicians
  - Special thanks to the six technicians who've worked side-by-side with me (Butch MacArthur, Scott Radi, Megan Ramsett, Nikolay Balbyshev Chris Misar, and Michelle Gilley)

Many Thanks are due to -

- *NDSU coworkers* -
  - I have been part of the Plant Pathology department, worked with extension pathologists, advised graduate students, and brainstormed with researchers.
  - Thanks to Branch Station personnel at Carrington, Langdon, Oakes, Hettinger, and Minot.

Many Thanks are due to -

- *Colaborators at other universities-*
  - I've had the pleasure of working with researchers at U MN (Crookston & St. Paul), SDSU, U NEB-Scottsbluff, Iowa State, and NC State.

  Other USDA colaborators at:

  - *Ames, IA; Beltsville, MD; Jackson, TN, Stillwater, OK*

Many Thanks are due to -

- *National Sunflower Association-*
  - To all the staff, past and current, who have provided not only funding for research, but encouragement & direction to me and other researchers.

Many Thanks are due to -

- *Many, many people with sunflower & chemical companies*
  - Our unit's productivity (and mine) would be greatly deminished without all the assistance I've received from many companies. My hat's off to you. I hope the experience has been reciprocal.

Many Thanks are due to -

- *Foreign scientists & students -*
  - I've had the pleasure & benefit of hosting researchers from many countries (from Australia to Yugoslavia).
  - In turn, many of these same people have hosted me, and we have had many joint, international research efforts.

In conclusion -

- I owe the success, and pleasure, of my career experiences, to many, many people…. some of whom are also retired, but many of you are in the audience.

- Thank you , one and all.