

Sunflower Head Rot Screening Nursery

INTRODUCTION

For the past three seasons, sunflower germplasm has been evaluated for susceptibility to *Sclerotinia* head rot at the North Dakota State University Carrington Research Extension Center. Entries consist of production hybrids and experimental lines submitted by seed companies. Resistant and susceptible checks are included. Individual heads are inoculated with *Sclerotinia* ascospores and plots are misted frequently to provide favorable conditions for disease development. After several weeks of incubation, inoculated heads are evaluated for head rot symptoms.

MATERIALS AND METHODS

Planting Date: 5 June 2002
 Seeding Rate: 60,000 seeds / acre, thinned to 20,000 after emergence
 Plot Size: 1 row (30") x 25'
 Design: Randomized Complete Block
 - 1, 2, or 3 reps / entry



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MATERIALS AND METHODS (CONT.)

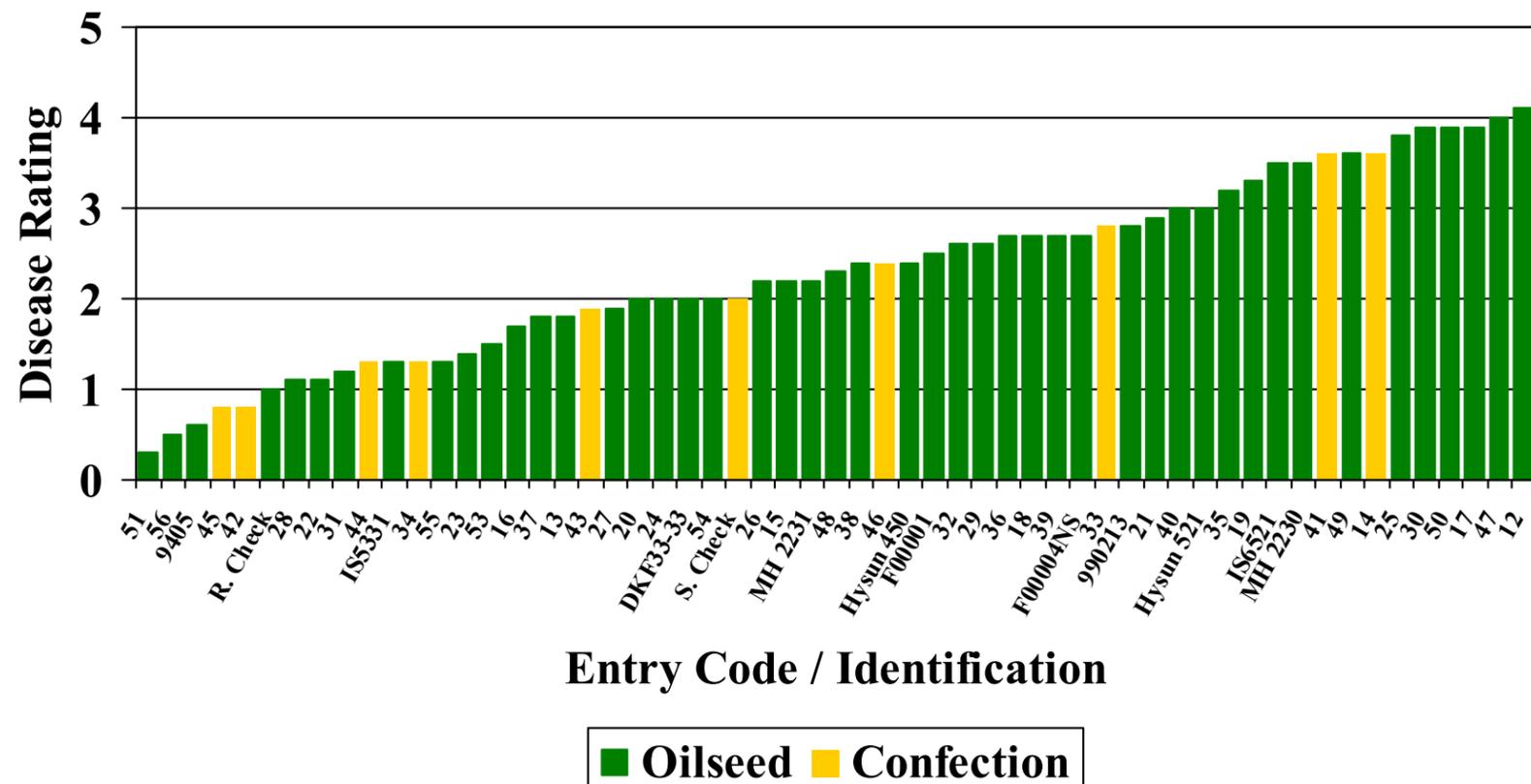
Susceptible Check: A standard confection hybrid
 Resistant Check: The best entry in the 2000 head rot screening nursery
 Disease Inoculation: In most cases, 10 heads per plot (each head inoculated once)
 Inoculation Dates: 15, 21, or 28 August (to encompass differences in maturity)
 Misting: 3 minutes every half hour for 5 weeks
 Evaluation: Individual heads, 5 weeks after inoculation
 Disease Rating Scale:
 0 = No symptoms
 1 = 0 – 12.5% of head showing symptoms
 2 = 12.5 – 25% of head showing symptoms
 3 = 25 – 50 % of head showing symptoms
 4 = 50 – 100% of head showing symptoms
 5 = 100% of head showing symptoms
 Calculations:
 Disease Rating = Mean disease rating of all inoculated heads (up to 10 heads / plot and from 1 to 3 reps)
 Disease Incidence = % of inoculated heads showing symptoms



RESULTS AND DISCUSSION

- ◆ Variability among plants and reps was again high (C.V. = 67%).
- ◆ Mean disease ratings of the 56 entries in the 2002 nursery ranged from 0.3 to 4.1, with 5 entries numerically superior to the resistant check (Fig. 1).
- ◆ The correlation between disease rating and disease incidence was highly significant (0.924). However, exceptions do exist and both criteria should continue to be evaluated.
- ◆ Of the 10 confection sunflower entries, 2 were among the best 10% of all entries for disease rating and 4 were among the best 25%, indicating promising germplasm within this group.
- ◆ Disease ratings were lower with later inoculation dates. This may be an indication of higher resistance in germplasm with longer maturity or may be an artifact of less favorable conditions for disease development later in the season.

Figure 1. *Sclerotinia* ratings of commercial sunflower entries, Carrington, 2002.



SUMMARY

To date, substantial progress has been made in developing the infrastructure (water delivery and misting systems) and methodology (inoculation and evaluation) for conducting a head rot screening nursery. Each year, new lessons are learned and new questions arise. Additional work on methodology is needed to maximize labor and land inputs and to increase the precision of the results.

Progress toward resistant commercial hybrids is difficult to assess from the results of the screening nursery, since entries vary from year to year. Also, more and more entries are experimental lines and not released hybrids. A line may show promise as a source of disease resistance in a breeding program, but may lack other traits needed in a commercial hybrid. However, there are signs of progress. The best of the 82 entries in the first screening nursery in 2000 was used as the resistant check in 2001 and 2002. Eighty-five entries were evaluated in 2001 and 56 in 2002. In both years, several entries were rated more resistant than the resistant check. Promising germplasm does exist, in both oilseed and confection types.

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