



# Evaluation of Wild *Helianthus* Species for Resistance to *Sclerotinia* Stalk Rot

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## INTRODUCTION

The basic goal of this project is to evaluate a broad range of wild *Helianthus* species for *Sclerotinia* stalk rot resistance (Fig. 1). Wild sunflower germplasm is largely unexplored in terms of stalk rot resistance. However, seed dormancy makes the wild species more difficult to work with in field trials than cultivated sunflowers.

Screening efforts will focus on annual diploid *Helianthus* species in the USDA sunflower germplasm collection, primarily the non-*Helianthus annuus* taxa, such as *H. anomalus*, *H. argophyllus*, *H. bolanderi*, *H. debilis* (subspecies *debilis*, *cucumerifolius*, *silvestris*, *tardiflorus* and *vestitus*), *H. deserticola*, *H. neglectus*, *H. niveus* (subspecies *canescens* and *tephrodes*), *H. petiolaris* (subspecies *fallax* and *petiolaris*), *H. porterii*, and *H. praecox* (subspecies *hirtus*, *praecox* and *runyonii*).

Figure 1. Mature sunflower stem colonized by *Sclerotinia sclerotiorum*.



## OBJECTIVES

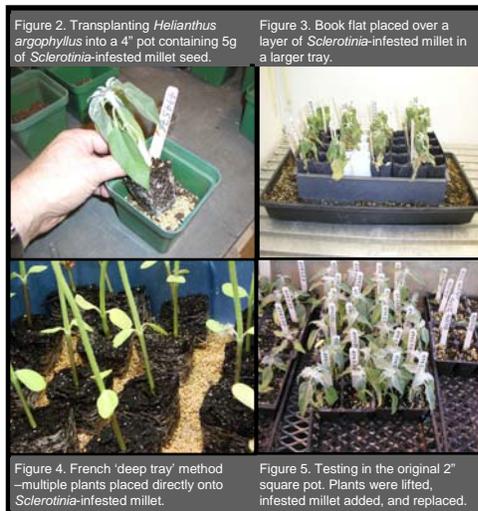
1. Develop a reliable greenhouse screening method using *Sclerotinia*-infested millet seed as inoculum.
2. Evaluate a wide array of wild sunflower germplasm for resistance. Re-test the best performing material in N. Dakota field trials.
3. Increase the number of wild sunflower accessions available in the USDA collection, so that more of the relatively uncommon species are available for evaluation.

## MATERIALS AND METHODS

- Plants grown to 4-6 leaf stage.
- Inoculate soil beneath transplant with layer of *Sclerotinia*-infested millet.
- Record time to first wilt and plant death.
- After 20-24 days; record live plants.

### Variables Being Tested

- Planting container size and shape (Figs. 2, 3, 4, 5).
- Inoculum quantity and placement.
- Plant age at time of inoculation.
- Incubation temperature.



## RESULTS and DISCUSSION

Only preliminary results are available at this time. However, incubation temperature was clearly a critical factor. In growth chamber studies at 21C, 100% of the plants from a susceptible variety wilted and died within an average of 11 days (Fig. 6). At 25C, 40% of the plants of the same variety never wilted, even after 20 days (Table 1).

This is consistent with previous studies which concluded that the optimal range for growth and pathogenesis is 20 to 25C (Tanrikut and Vaughan, 1951; Van den Berg and Lentz, 1968; and Newton et al., 1973). This indicates that greenhouse screening should be avoided during the summer months.

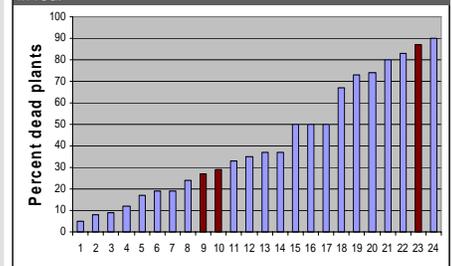
Cultivar	Incubation Temperature	Percentage survival after 20 days	Average days to death
CAR 270	21C	0 a	10.6 a
CAR 270	25C	40 b	13.8 b

## RESULTS and DISCUSSION (continued)

Early screening results from a test panel of assorted species showed a good range of resistance reactions (Fig. 7). The two most resistant accessions were *H. debilis*.



Figure 7. Stalk rot ratings of 21 accessions of assorted species. Resistant (2) and susceptible (1) check hybrids are in red.



## LITERATURE CITED

- Newton, H.C., Maxwell, D.P., and Sequira, L. 1973. A conductivity assay for measuring virulence of *Sclerotinia sclerotiorum*. *Phytopathology*. 63:424-428.
- Tanrikut, S. and Vaughan, E.K. 1951. Studies on the physiology of *Sclerotinia sclerotiorum*. *Phytopathology*. 41:1099-1103.
- Van den Berg, L. and Lentz, C.P. 1968. The effect of relative humidity and temperature on survival and growth of *Botrytis cinerea* and *Sclerotinia sclerotiorum*. *Can. J. Bot.* 47:1007-1010.

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