

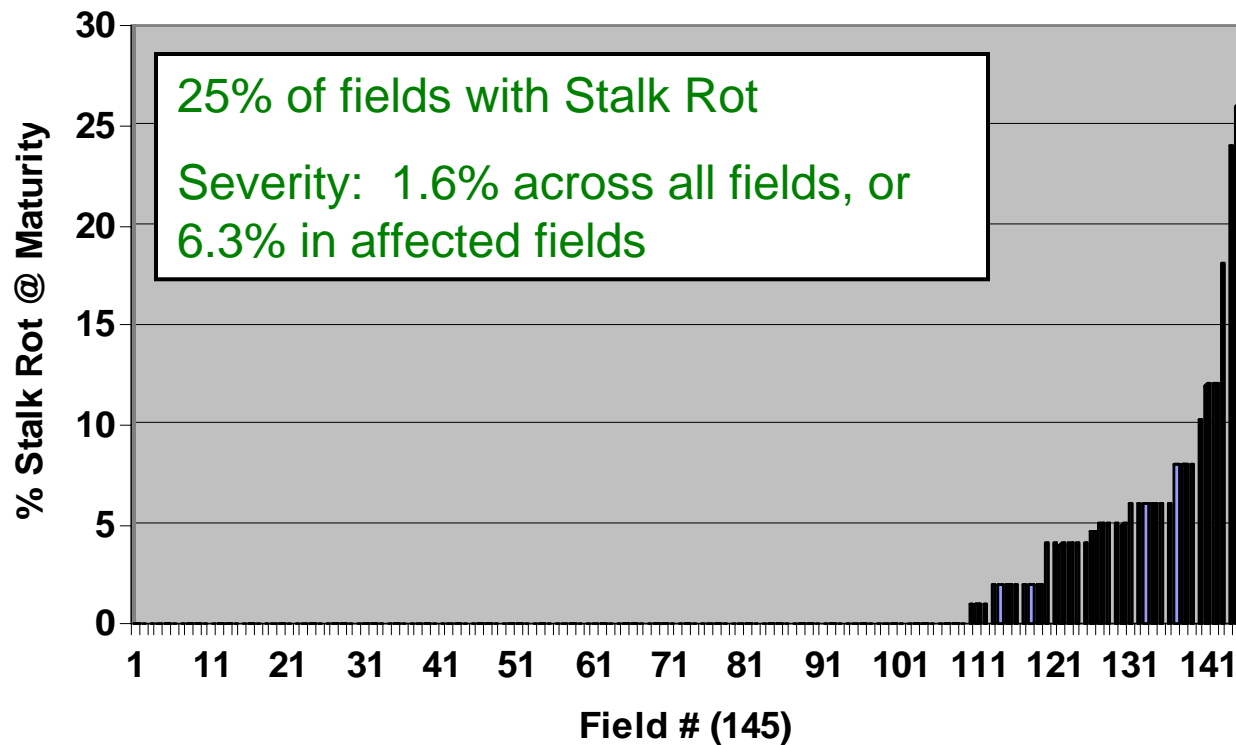
A photograph of a sunflower field. The sunflowers are in various stages of maturity. Some are fully open with bright yellow heads, while others are wilting and their heads are drooping. The stems of the wilting plants appear thin and brittle, characteristic of Sclerotinia stalk rot. The background shows a dense field of sunflowers under a bright sky.

Sclerotinia Stalk Rot :
Commercial Hybrids and USDA Plant
Introductions in 2007 Field Trials

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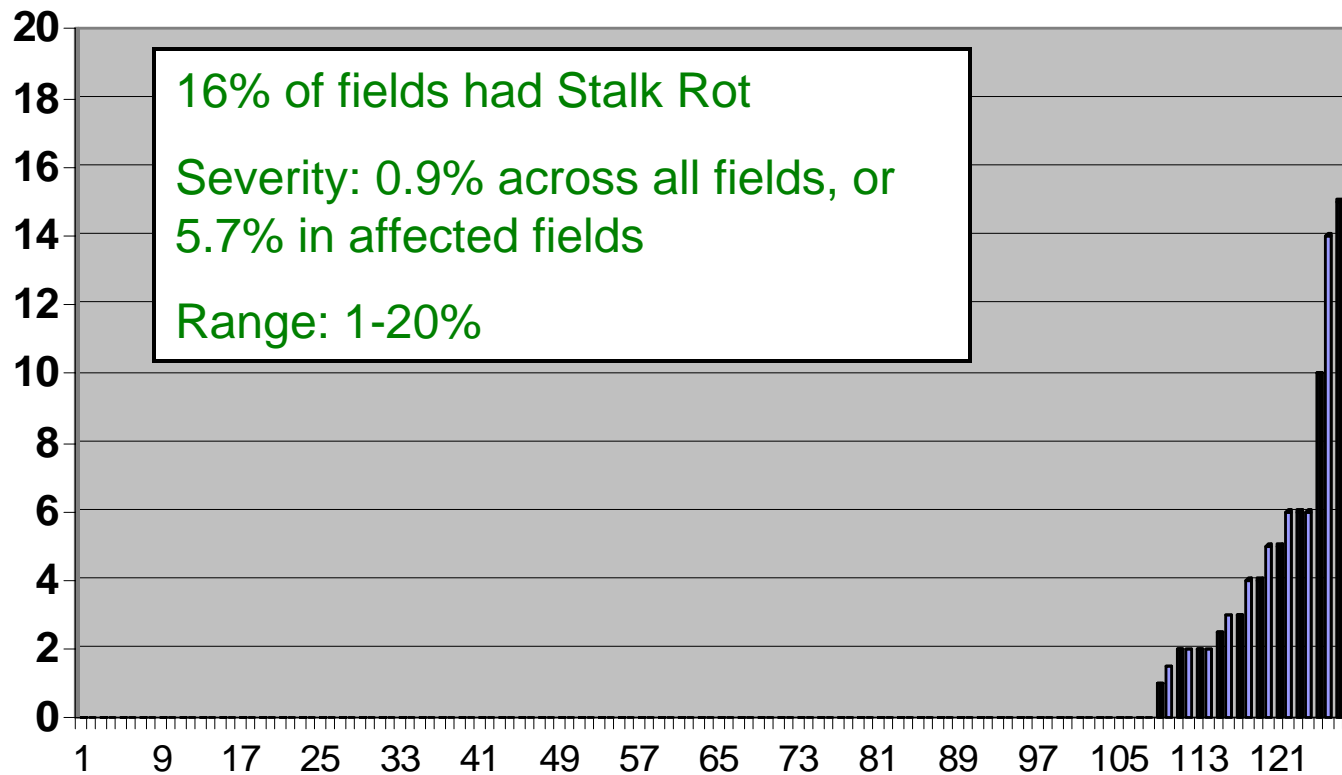
Sclerotinia Stalk Rot Incidence 2005

2005 All State SF Survey



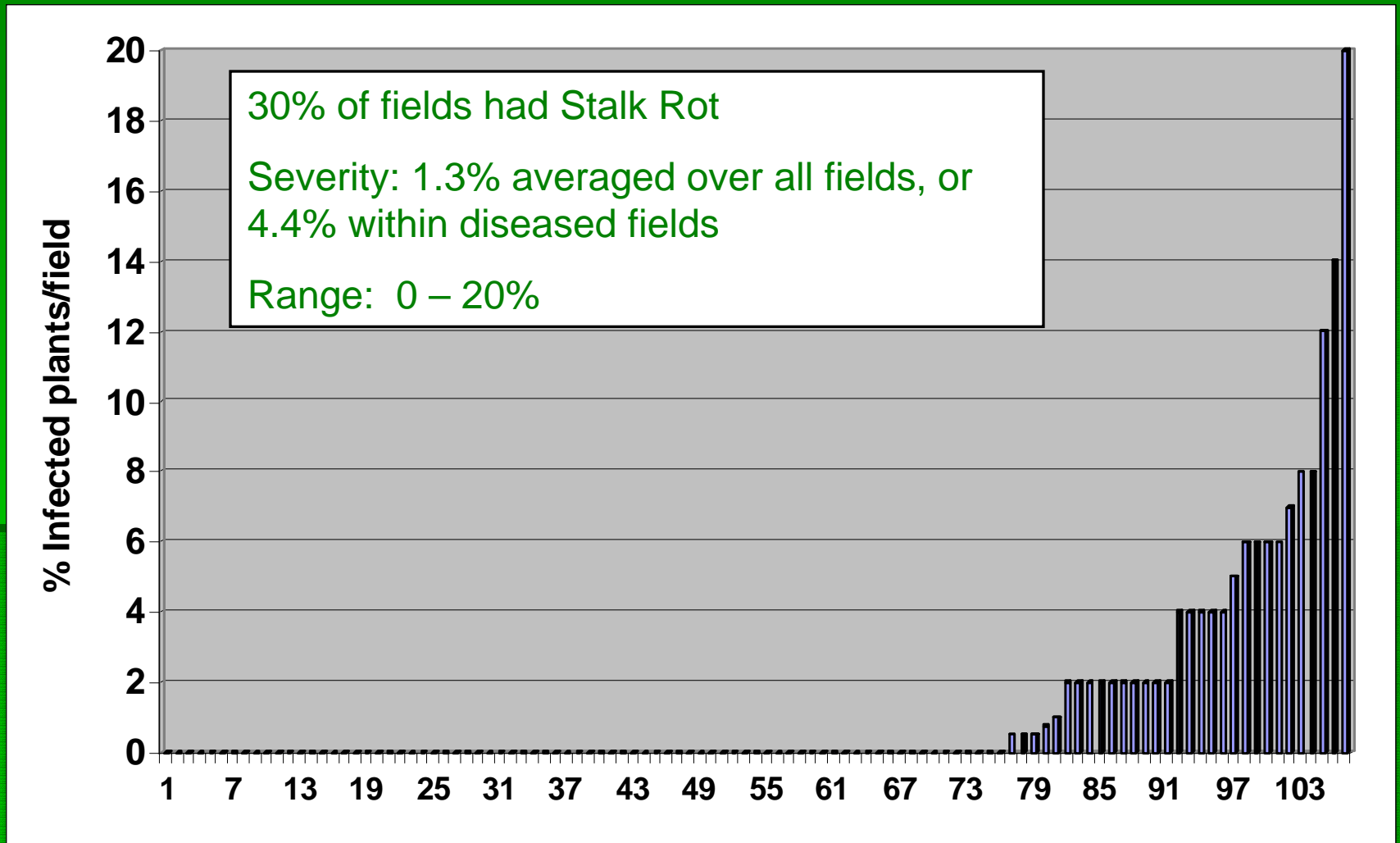
Sclerotinia Stalk Rot Incidence 2006

2006 Sclerotinia Stalk Rot Incidence



134 fields in ND, SD and MN

Sclerotinia Stalk Rot Incidence 2007



Sclerotinia Stalk Rot Testing

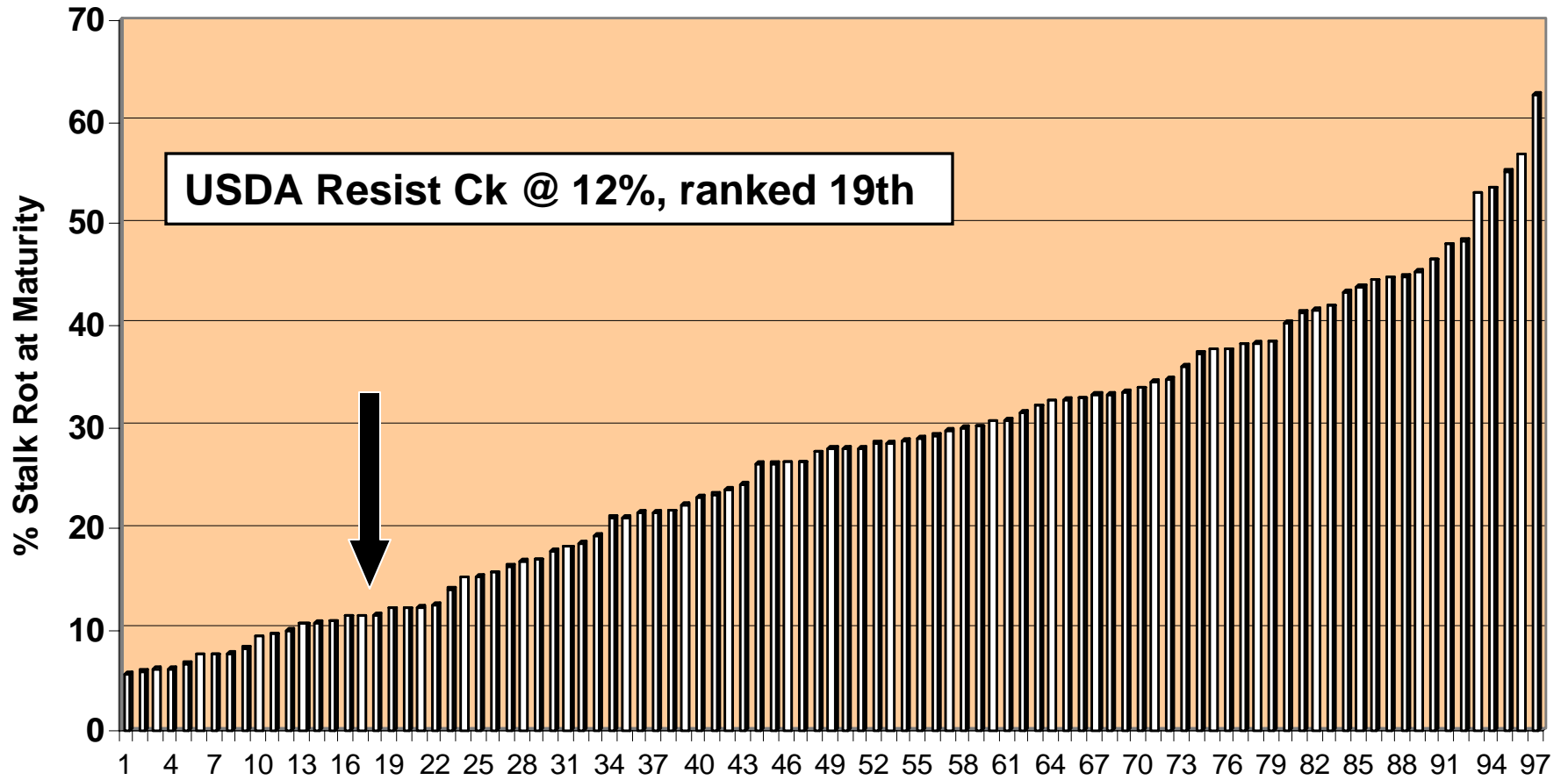
- **75 hybrids tested, with inoculation (using ~900 lbs of infested millet), at five locations:**
 - **Carrington, West Fargo, ND; and Crookston and Moreton MN**
 - **4 replications of single row plots, with ~80-100 plants/entry/location**

2007 Sclerotinia Stalk Rot Field Tests

	2005	2006	2007			
	Av.	Av.	Av.	Loc 1	Loc 2	Loc 3
<i>Av</i>	38	14	27	15	36	29
<i>Min</i>	8	2	3	0	3	0
<i>Max</i>	71	44	58	58	98	67
<i>cv</i>	57	111	88	102	68	89
<i>Isd, 0.05</i>	17	11	19	21	33	39

Fourth 2007 location had minimal Sclerotinia, but with severe Phomopsis infection

**USDA 2007 Stalk Rot Tests
3 locations - 97 hybrids**



2007 Sclerotinia Stalk Rot Most Resistant Entries

Hybrid	SR	Hybrid	SR%
<i>ProSeed E-85</i>	6	<i>Pioneer 6444</i>	9
<i>Advanta F30924</i>	6	<i>Croplan 378</i>	10
Seeds2000 3293	6	<i>Croplan 6N14</i>	10
Heaton 7030	6	Croplan 305 DMR NS	11
ProSeed 6004	7	Garst 4651	11
<i>ProSeed E-3</i>	8	Triumph 7439	11
Croplan 305DMR	8	Mycogen E89350	11
Dahlgren 9583	8	Heaton 7020	12
<i>Croplan 343 DMR</i>	8	Mycogen E87425	12

Further Disease Testing

- Same 75 “initial” hybrids and 20 “retests” evaluated at Carrington and Morden for head rot resistance (under mist irrigation, with inoculation).
- Natural Phomopsis infection – good data
- Data compiled and available in NDSU publication A-652 (online & hardcopies)

Phomopsis - 2007

Trial Average	56%
Low entry	10%
High entry	99%

Hybrid	% Disease
ProSeed 6004	10
Heaton 7020	15
Croplan 6N14	17
Mycogen 87425	22
USDA Scl Res Ck	49

Integrating Head Rot and Stalk Rot – A Challenge

- Widely different data from locations (i.e. low at one location and high at another) makes analysis and decisions difficult. Can be helped with multiple ratings at each location.
- Hybrids from 2006 repeated in 2007 – data sets (4 to 8) to be combined to identify hybrids performing well across locations

Searching for new sources of Sclerotinia Resistance for USDA breeding program

- Past efforts have relied upon germplasm from a few public foreign research groups (INRA, Novi Sad, INTA, etc).
- Transfer of resistance from wild (annual and perennial) sunflower is in progress, but will be years before any releases.
- USDA Plant Introduction collection has ~ 800 accessions (recently available) which have not been tested for Sclerotinia resistance.

2007 – Initial Evaluation of USDA Plant Introductions

- 150 accessions tested for stalk rot resistance at one, inoculated location
- 15 entries with 95 – 100% plants not infected.
- Accessions from many countries (China, Germany, Hungary, Iran, Spain, Russia, Yugoslavia).

Plans to Evaluate Remainder of USDA Plant Introductions

- ~600 accessions to be tested at two inoculated locations in 2008 for stalk rot.
- Resistant entries to be tested in 2009 at two locations for head rot, and retested for stalk rot at 3-4 locations, including Central Plains site (KS or TX) for late-maturing entries.
- 2010 – entries with high levels of both head rot and stalk rot resistance available for breeding efforts.
- Will require assistance of seed companies to accommodate large field trials at multiple locations.

Summary - 2007

- Stalk rot testing of commercial hybrids successful at 3 of 4 locations, but can we improve precision (more reps, higher inoculum, different statistical analysis) ?
- Ambitious plans to identify new sources of stalk rot (and head rot) resistance in USDA Plant Introductions recently available.

Future Plans to Identify New Sources of Sclerotinia Resistance

- Refine field procedures to increase statistical precision.
- Examine best of PI collection, with inoculation.
- Work with Charlie Block to develop greenhouse method for SR testing of wild sunflowers
- Assist Dr. Jan in transferring SR from wilds.
- Assist Dr. Hu in search for molecular markers.