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Phomopsis Update: Disease in 2010, limited disease in fungicide trials, and identifications of pathogens

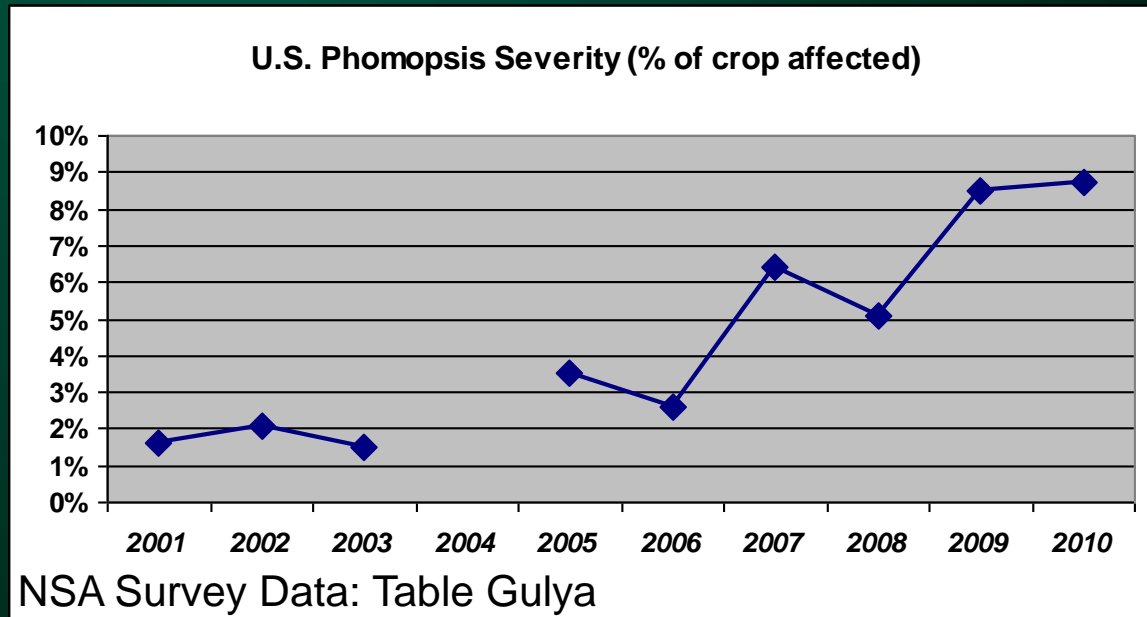
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Importance of Phomopsis

- First identified in Europe
- Incidence and Severity on the rise in the U.S.
- Girdling Lesion, Rotten Pith, Lodging
 - 40% yield losses – France
 - 50-80% incidence in Yugoslavia
 - High Yield Losses







Phomopsis

- Pathogen overwinters in debris
- Perithecia
 - Spores released
 - Splash and wind dispersed
 - Leaf → petiole → stem (1 month)
- Caused by *Phomopsis helianthi* (tel. *Diaporthe helianthi*)
 - Other species could be involved in disease overseas
- ‘New’ Species identified in Australia*

Fungicide Trials in 2010

- Inoculated with Infested residue (2009)
- Supplemental water
- Timing Trial
 - Three Timings, Fenpropimorph
- Efficacy Trial
 - 8 Treatments (labeled and not-labeled)

Carrington 2010 – Fungicide Trial

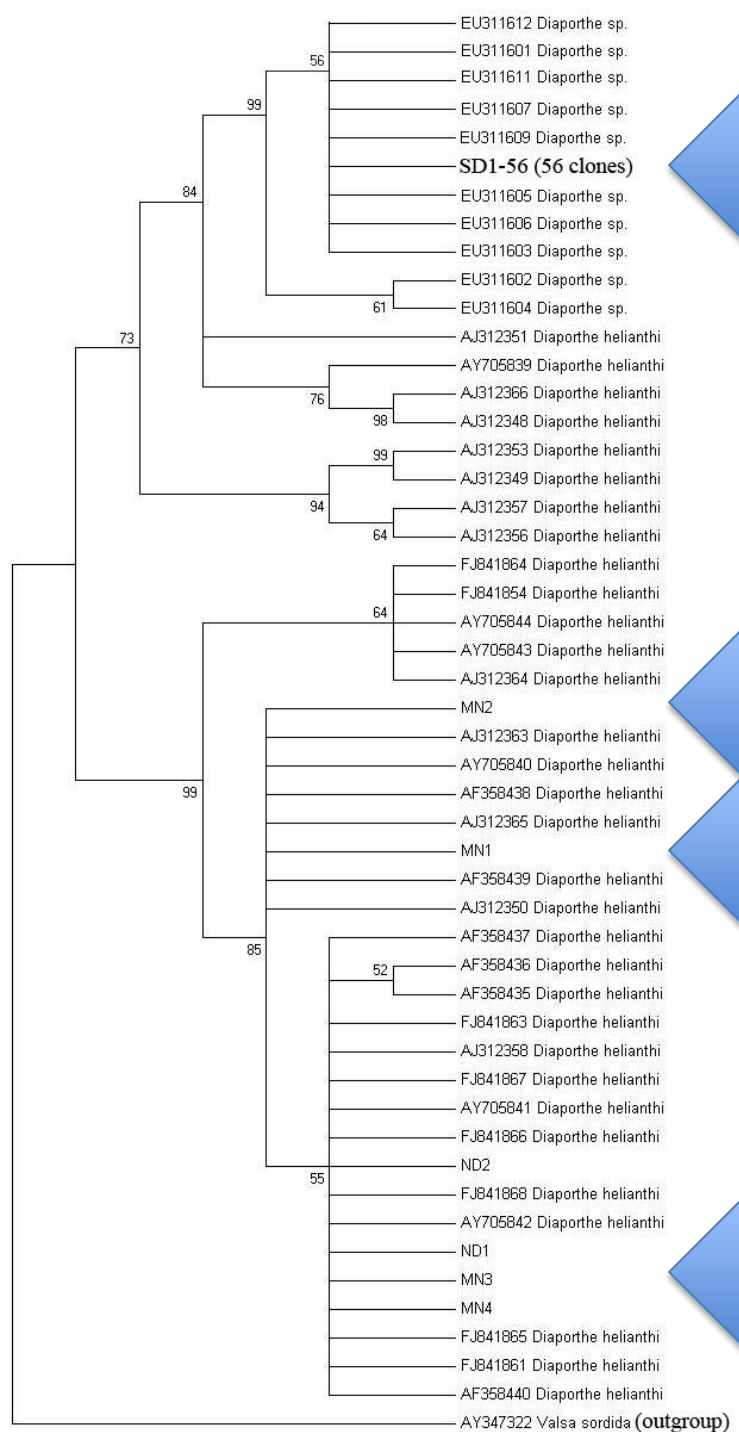
Treatment	Rate	Phomopsis Severity	Yield lb/A
Non-Treated		0 a	1311 a
Headline	6 fl oz	0 a	1157 a
Quadris	6 fl oz	0 a	1286 a
Tebuzol	4 fl oz	0 a	1374 a
Proline	5.7 fl oz	0 a	1290 a
Fenpropimorphe	10.95 fl oz	0 a	1515 a
Endura	6 oz	0 a	1207 a
Quash	4 oz	0 a	1339 a
LSD (P=0.05)		0.00	392
CV		N/A	20.32

Objective

Identify *Phomopsis* species observed in 2010 in the Northern Great Plains

Methods

- About 70 isolates obtained from infected stalks
 - Mathew, Friskop, Gulya, Alananbeh, Industry, Myself, Heitkamp
- DNA extracted (Promega)
- ITS region amplification (PCR)
 - ITS5 / ITS4 primers (White et al. 1990)
- Sequenced (McLab)
- Sequence analysis BLASTN
 - NCBI database
- Reference species obtained via GenBank (Ash *et al.* 2010; Says-Lesage *et al.*, 2002)
- Sequence alignment and phylogenetic analyses using MEGA 4.0
- Neighbor Joining tree-1000 bootstrap replicates



56 South Dakota isolates

MN (Rothsay)

MN (Roseau)

ND (Wing), MN (Roseau)

Outlier (*Valsa sordida*; Ash 2010)

56 South Dakota isolates

EU311607 Diaporthe sp.
EU311604 Diaporthe sp.
EU311612 Diaporthe sp.
EU311602 Diaporthe sp.
EU311609 Diaporthe sp.
SD1-56 (56 clones)
EU311603 Diaporthe sp.
EU311611 Diaporthe sp.
EU311605 Diaporthe sp.
EU311606 Diaporthe sp.
AY196779 Diaporthe angelicae
EU814462 Diaporthe angelicae
AY196778 Diaporthe angelicae
AB247170 Diaporthe melonis
AY196777 Diaporthe arctii
EU814476 D. ambigua
AY485748 D. helianthi
AY485746 D. helianthi
AJ312366 Diaporthe helianthi
AY485747 D. helianthi
AY485745 D. helianthi
AY485749 D. helianthi
AB105171 Phomopsis vexans
AY050627 Phomopsis sojae
AY577815 Diaporthe phaseolorum
AF001024 Diaporthe phaseolorum
EF026104 Phomopsis longicolla
AF358442 Phomopsis longicolla
EU650789 Phomopsis longicolla
AB247168 Phomopsis longicolla
AB247167 Phomopsis longicolla
AB247169 Phomopsis longicolla
EU311608 Diaporthe sp.
AY841801 Phomopsis longicolla
AJ312349 Diaporthe helianthi
AJ312353 Diaporthe helianthi
EU311610 Diaporthe sp.
EU814479 Diaporthe ambigua
AF358441 Diaporthe helianthi
AF358439 Diaporthe helianthi
MN1
MN2
AF358438 Diaporthe helianthi
AF358435 Diaporthe helianthi
AF358437 Diaporthe helianthi
MN4
MN3
ND1
ND2
AF358436 Diaporthe helianthi
AF358440 Diaporthe helianthi
AJ312360 Diaporthe phaseolus var. cauliv.
AJ312361 Diaporthe meridionalis
EU272528 Diaporthe phaseolorum
AB302249 Diaporthe citri
AB302240 Phomopsis asparagi
AB247166 Phomopsis asparagi
AY485778 Phomopsis viticola
AY485780 Phomopsis viticola
AY485783 Phomopsis viticola
AY662404 Phomopsis viticola
AY485761 Phomopsis viticola
AY485755 Phomopsis viticola
AY485758 Phomopsis viticola
AY347322 Valsa sordida (outgroup)

New Australian Species
(Sunflower)

D. helianthi (Sunflower)

D. phaseolorum (Soybean)

P. longicolla (Soybean)

D. helianthi (Sunflower)

P. Viticola (Grape)

MN (Rothsay,
Roseau)

ND (Wing), MN
(Roseau)

Preliminary Results and Questions

- There are *two species* causing phomopsis on sunflowers in the United States
 - Have we always had this?
 - Did we bring in a new species?
 - Is this related to the increase in disease?
 - Will this impact genetics for resistance?

Summary

- Phomopsis is increasing
- Fungicide Trials for Phomopsis have been a challenge
- We have two populations of Phomopsis in the United States

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- Febina Mathew
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