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Management of Sclerotinia in Sunflower Research Activities To Reduce the Impact of Sclerotinia in Sunflower

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Sunflower growing areas in western Canada

OBJECTIVES

- Efficacy of fungicides in protecting sunflower from Sclerotinia wilt and head rot
- Reduce losses in yield & quality
- Identify sources of resistance in wild sunflower species.

Seed treatments to control Sclerotinia root & basal-stem infections

Mycelia from germinating sclerotia in the soil can infect the roots or main stem causing wilt and death of the plant

Materials and Methods

- Oilseed & Confection Susceptible hybrids
- Replicated field trials 1996 – 2002 at Morden
- 7 Fungicides for seed treatments
- 3 levels of Sclerotinia inoculum applied to the soil at seeding time. (X= 5 g , 2X= 10 g , 3X= 15 g / 3 m)

Disease Assessment

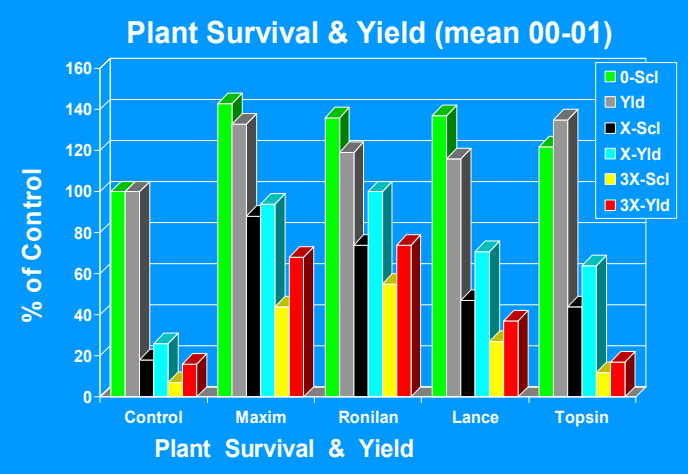
- Count Healthy seedlings.
- Count wilted plants.
- Healthy plants as % of the untreated un-inoculated control.
- Measure Yield, % oil, KD, KWT.

Effects of seed treatment

Seed Treatment	Sclerotinia In Soil	Healthy Plants 2001	Healthy Plants 2000	Yield 2001	Yield 2000
Control	0	100	100	100	100
	Low (X)	20 ~	16 ~	32 ~	20 ~
	High (3X)	12	1	29	3
Maxim	0	126	159	105	161
	Low (X)	93 *	83 *	97 *	91 *
	High (3X)	58	29	78	58
Ronilan	0	116	156	104	133
	Low	73 *	75 *	88 *	115 *
	High (3X)	47	62	60	88

Effects of seed treatment Cont.

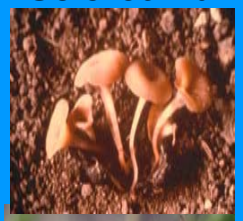
Seed Treatment	Sclerotinia In Soil	Healthy Plants 2001	Healthy Plants 2000	Yield 2001	Yield 2000
Lance	0	122	152	94	138
	X Low	62	32	84 *	58
	3X High	41	12	48	26
Topsin	0	104	140	104	165
	X Low	50	38	65	63
	3X High	16	8	26	12
Quadris	0	91	147	91	143
	X Low	18	18	44	37
	3X High	10	3	19	7



CONCLUSIONS, SEED TREATMENTS

- ►Maxim and Ronilan proved very effective in reducing the sclerotinia infections at the seedling stage & maintaining yield.
- ►Lance and Topsin moderately effective.
- ►Quadris, Gavel and Contans ???.
- ► None of these fungicides is registered for sclerotinia wilt in sunflower in Canada

Foliar application of fungicides to control Sclerotinia head rot & mid-stem infection



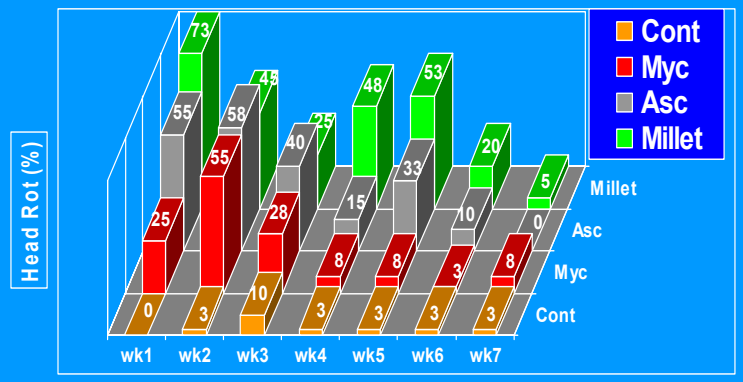
Carpogenic germination produces apothecia and ascospores which infect heads causing head rot, stems causing mid-stem rot

Head rot severity in Manitoba 2004

Materials and Methods

- Oilseed Susceptible hybrid
- Replicated field trials
- 9 Fungicides at three treatments each
  - Early flowering, late flowering, and both
- Fungicide Application:
  - Backpack sprayer, manual operation
- Disease Inoculation 24 hr after fungicides
- Sunflower heads were sprayed with water
- Ascospores / Ground infected millet seed
- Misting supplement 5 mn / 30mn for 3 wks.

Weekly Infections of Sunflower Heads with Different Types of Inoculum

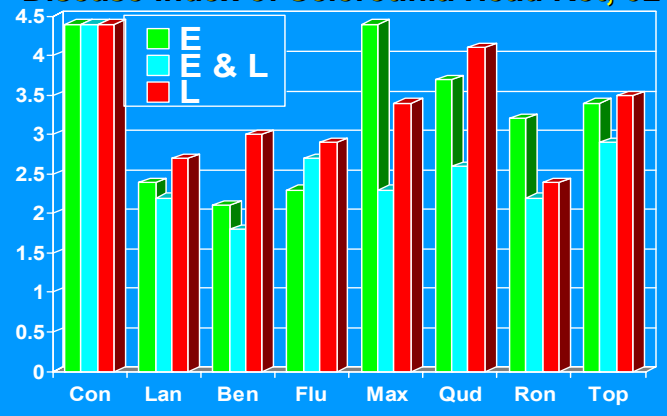


Materials and Methods Cont.

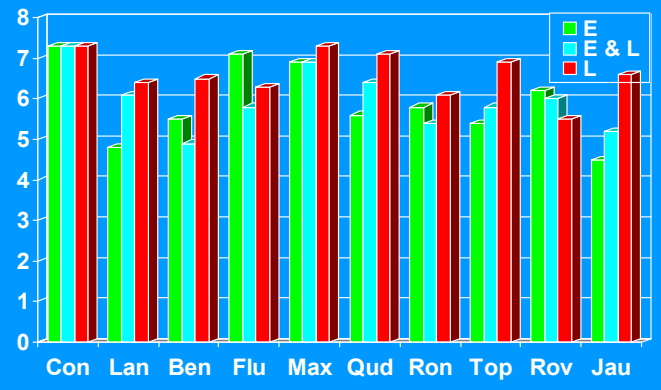
Disease Assessment

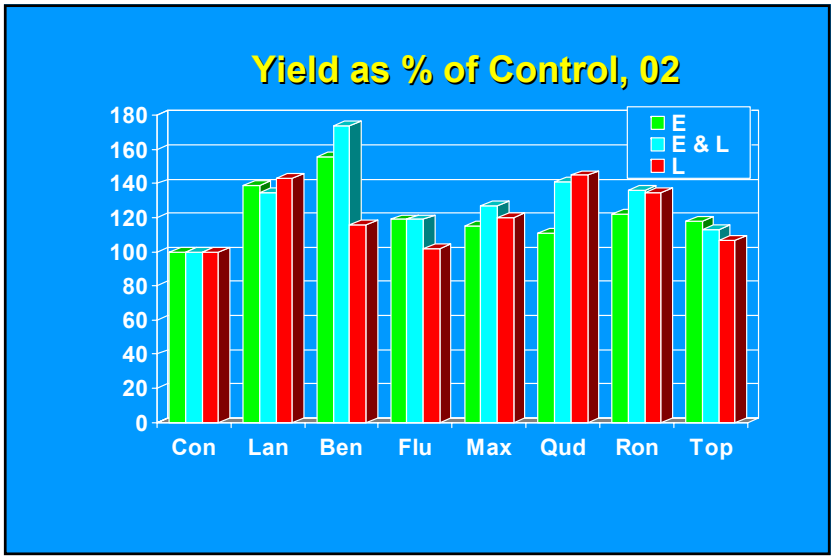
- Heads were assessed weekly,
- Scale of 0 to 5 (severe)
- Disease index was calculated.
- Measured Yield, %oil, KD, KWT
- % Sclerotinia in harvested seed.

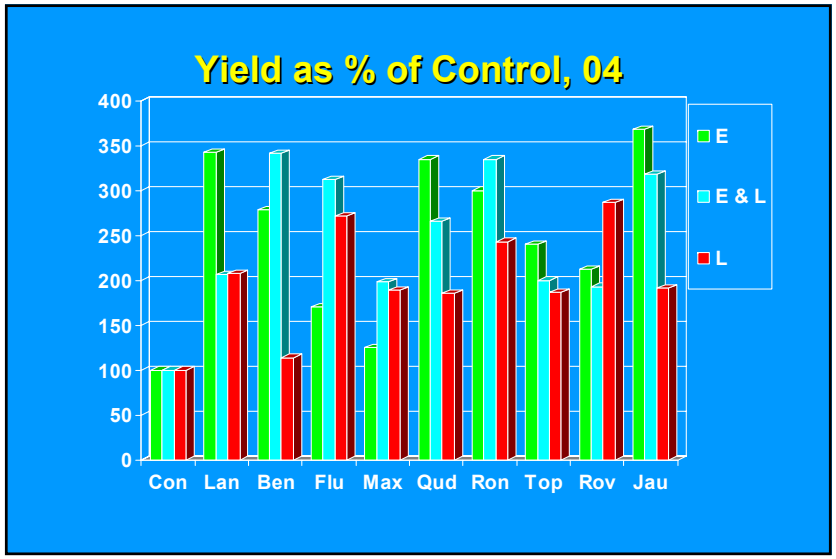
Disease Index of Sclerotinia Head Rot, 02

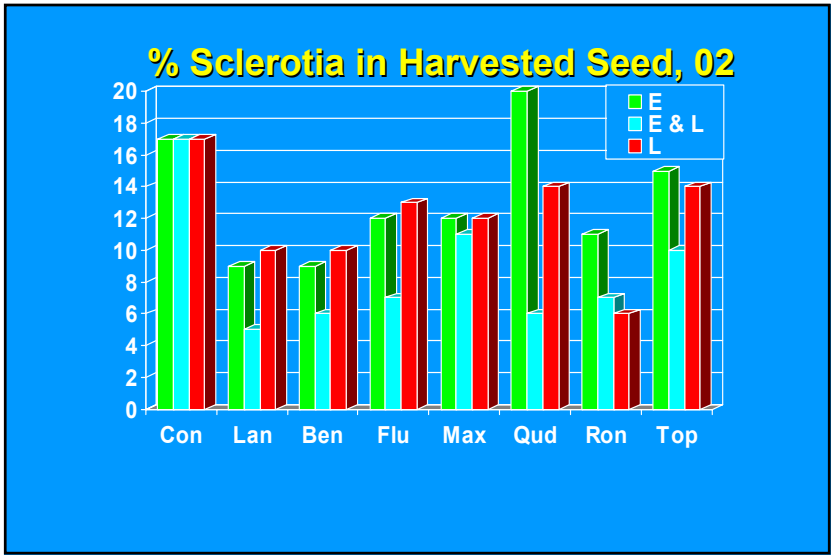


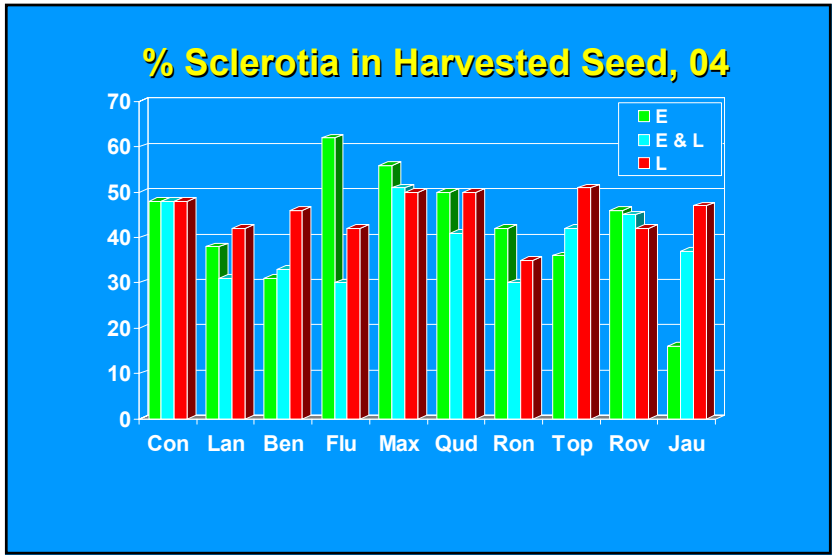
Disease Index of Sclerotinia Head Rot, 04




Yield as % of Control, 02
180
160
140
120
100
80
60
40
20
0
E
E & L
L
Con
Lan
Ben
Flu
Max
Qud
Ron
Top


Yield as % of Control, 04
400
350
300
250
200
150
100
50
0
E
E & L
L
Con
Lan
Ben
Flu
Max
Qud
Ron
Top
Rov
Jau


% Sclerotia in Harvested Seed, 02
20
18
16
14
12
10
8
6
4
2
0
E
E & L
L
Con
Lan
Ben
Flu
Max
Qud
Ron
Top


% Sclerotia in Harvested Seed, 04
70
60
50
40
30
20
10
0
E
E & L
L
Con
Lan
Ben
Flu
Max
Qud
Ron
Top
Rov
Jau

CONCLUSIONS: Head Rot

- ►One application of JAU6476, Lance and Benlate Sig. reduced head rot, yield losses, and sclerotia in seed.
- ►Two applications were better than one.
- ►Ronilan, Quadris, Topsin, and Fluazinam Sig. reduced head rot, and yield losses.
- ►Maxim and Rovral reduced head rot & increased yield
- ►The combination of ground millet inoculum and ascospores produced high levels of infections.
- ►Need to confirm the efficacy of the fungicides, fine-tune the dates and number of applications

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Resistance in the wild species??

Objectives:

- Standardize methodology for evaluating wild sunflower species to head rot, including type of inoculum, and the most susceptible stage of plant growth.
- Evaluate wild sunflower species to reaction to Sclerotinia wilt and head rot.
- Identify Resistant genotypes.

Canada

400 accessions of wild sunflower species

Helianthus maximiliani

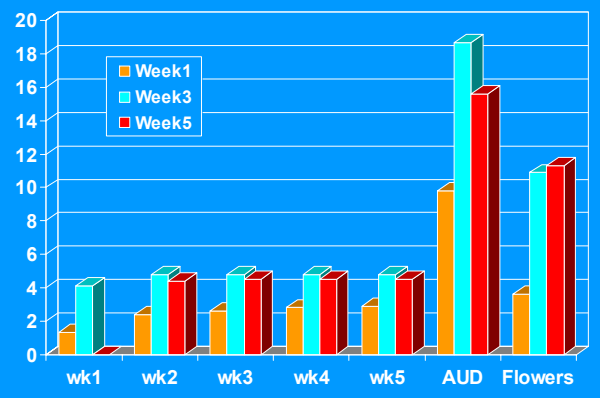
mixtures of the two

Helianthus nuttallii

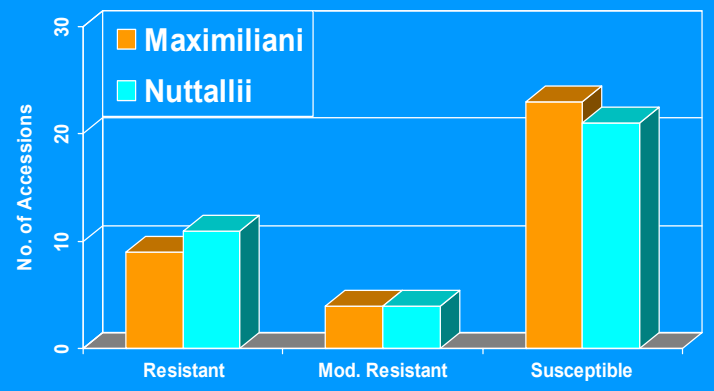
Sclerotinia-infected millet seed were applied to the basal stem at soil surface 2-3 times

Accession were divided into four treatments. One type of inoculum & four head covers:
-paper
-Pollinating,
-plastic bags
-Open control

Ground Millet / Paper Bag / Time



Selected Accessions with Resistance



CONCLUSIONS

- Ground Sclerotinia-infected millet was the best inoculum type, followed by ascospores.
- Paper bag was the best covering.
- Inoculation at 3rd week was better than at 1st or 5th week of flowering.
- Standard procedure, ground sclerotinia-infected millet at the 3rd week of flowering, covered with paper bag.
- No differences in *H. maximiliani & H. nuttallii*.
- Identified accessions with resistance to both basal-stem and head rot infections.

Management of Sclerotinia in sunflower

- ►Avoid susceptible crops for >3 years. (Basal-stem / wilt).
- ► Use seed treatment (basal-stem / wilt): Maxim, Ronilan, Lance, Topsin.
- ► Foliar application (head rot), flowering + 2-wks: (JAU6476), Lance, Ronilan, Quadris, Topsin.
- ► Use the best resistant / tolerant hybrids.
- ► Resistance from wild species (on-going Res.)
- ► Reduce inoculum: cultural and Biological.

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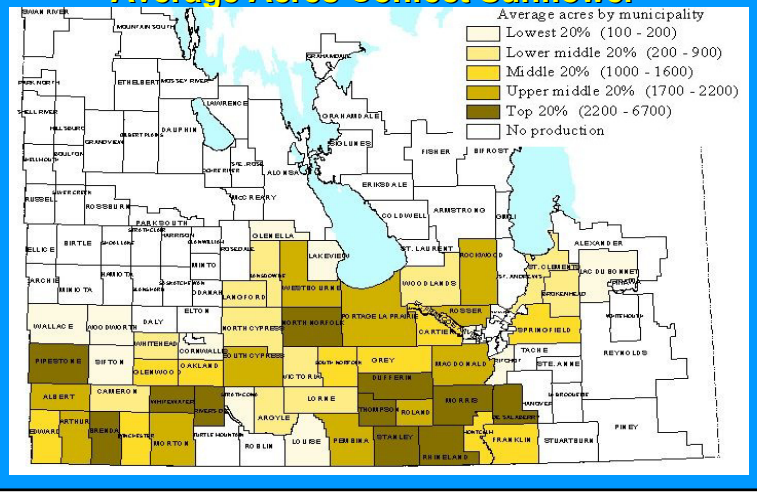
  Maurice Penner

Canada

Average Acres Confect Sunflower