NDSU Plant Pathology

Managing canola diseases

2012

Minnesota Canola Council
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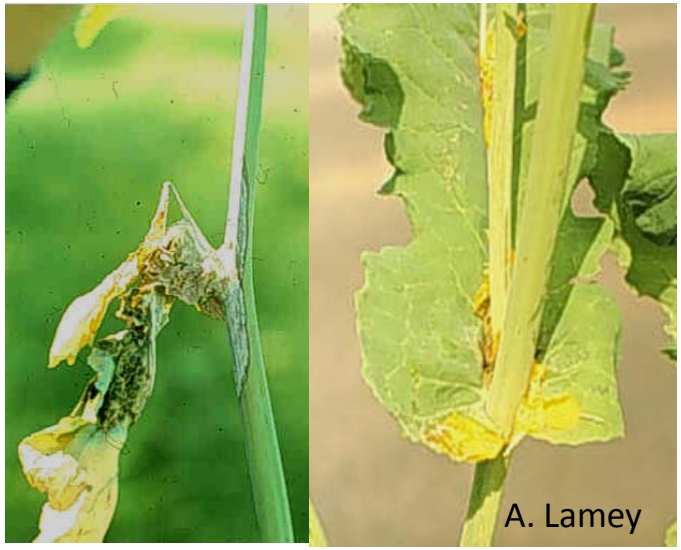
- Sclerotinia stem rot

- Blackleg



Sclerotinia stem rot disease cycle (*Sclerotinia sclerotiorum*)

Influence of blooming stage on efficacy of fungicide applications for SSR control

Fungicide	Doses g ai/ha	% bloom		
		10-20	30-40	50-60
Folicur	126	8	36	35
Ronilan	420	39	26	40
Endura	249	46	51	56
Topsin	785	---	44	43
Mean		31	38	44

Volume of application: 14-20 gal/A

SSR incidence in untreated plots ranged from 25 to 95%

Source: Bradley et al., 2006

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Evaluation of fungicide tank mixtures

- Replicated trials in 2008-2011
- 14-18 treatments (single-product and tank mixtures)
- SSR incidence and severity, and yield
- Data expressed as percentages from non-treated plots
- Trials analyzed separately

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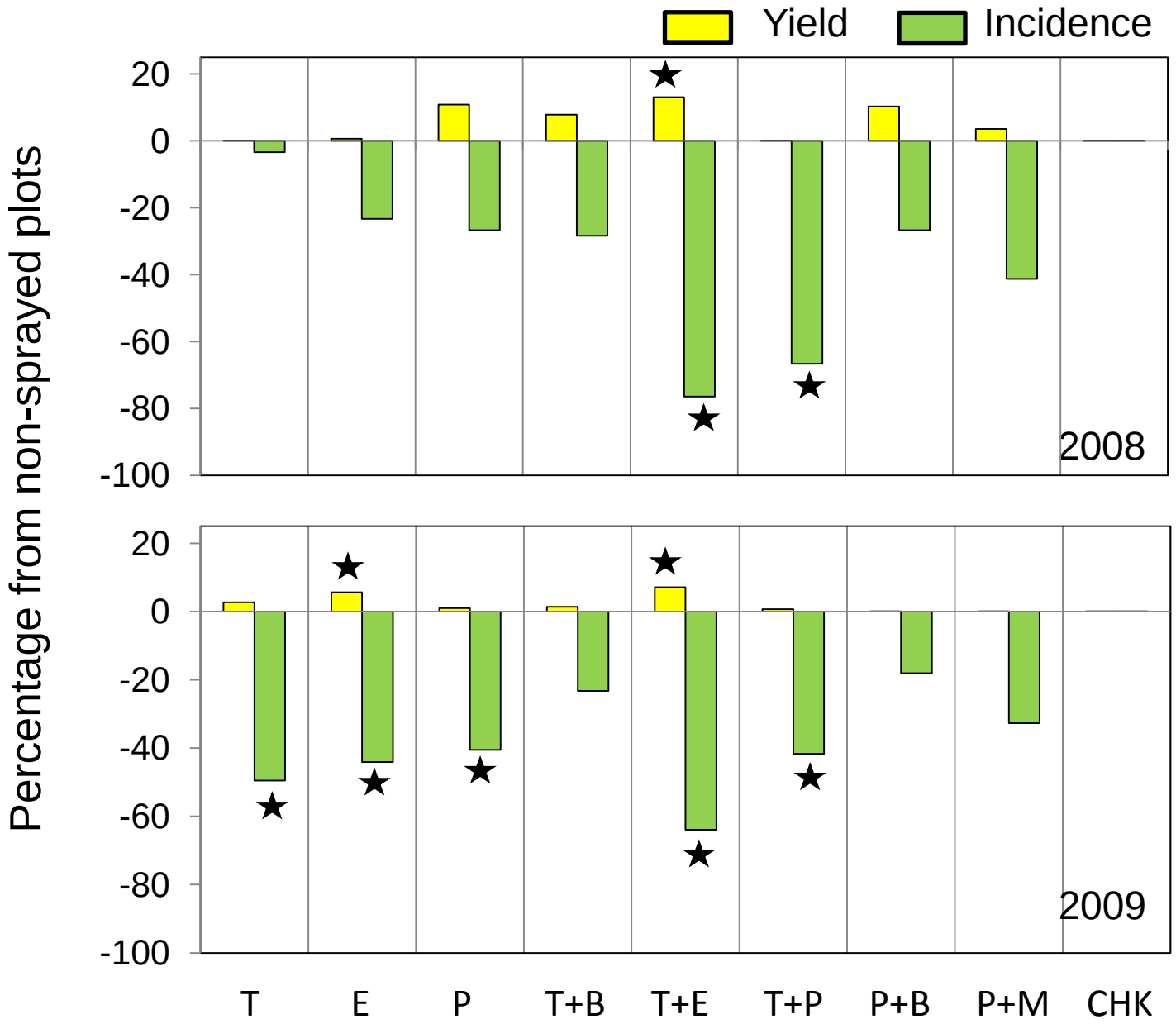
Materials and Methods

Fungicides evaluated for control of Sclerotinia stem rot of canola between 2008 and 2011.

Fungicide mix	Code	Doses/A	FRAC
Endura	E	6 oz	7
Proline 480 SC	P	5 fl oz	3
Topsin 4.5 Fl	T	20 fl oz	1
Topsin + Bravo	T + B	10 fl oz + 11 fl oz	1+M5
Topsin + Endura	T + E	10 fl oz + 3 oz	1+ 7
Topsin + Proline	T + P	10 fl oz + 3 fl oz	1+ 3
Proline + Bravo	P + B	3 fl oz + 12 fl oz	3+M5
Proline + Microthiol	P + M	3 fl oz + 5 lb	3+M2
Non-treated control	CHK	---	---

Results


Yield
Incidence
Percentage from non-sprayed plots
20
0
-20
-40
-60
-80
-100
2008
2009
T
E
P
T+B
T+E
T+P
P+B
P+M
CHK

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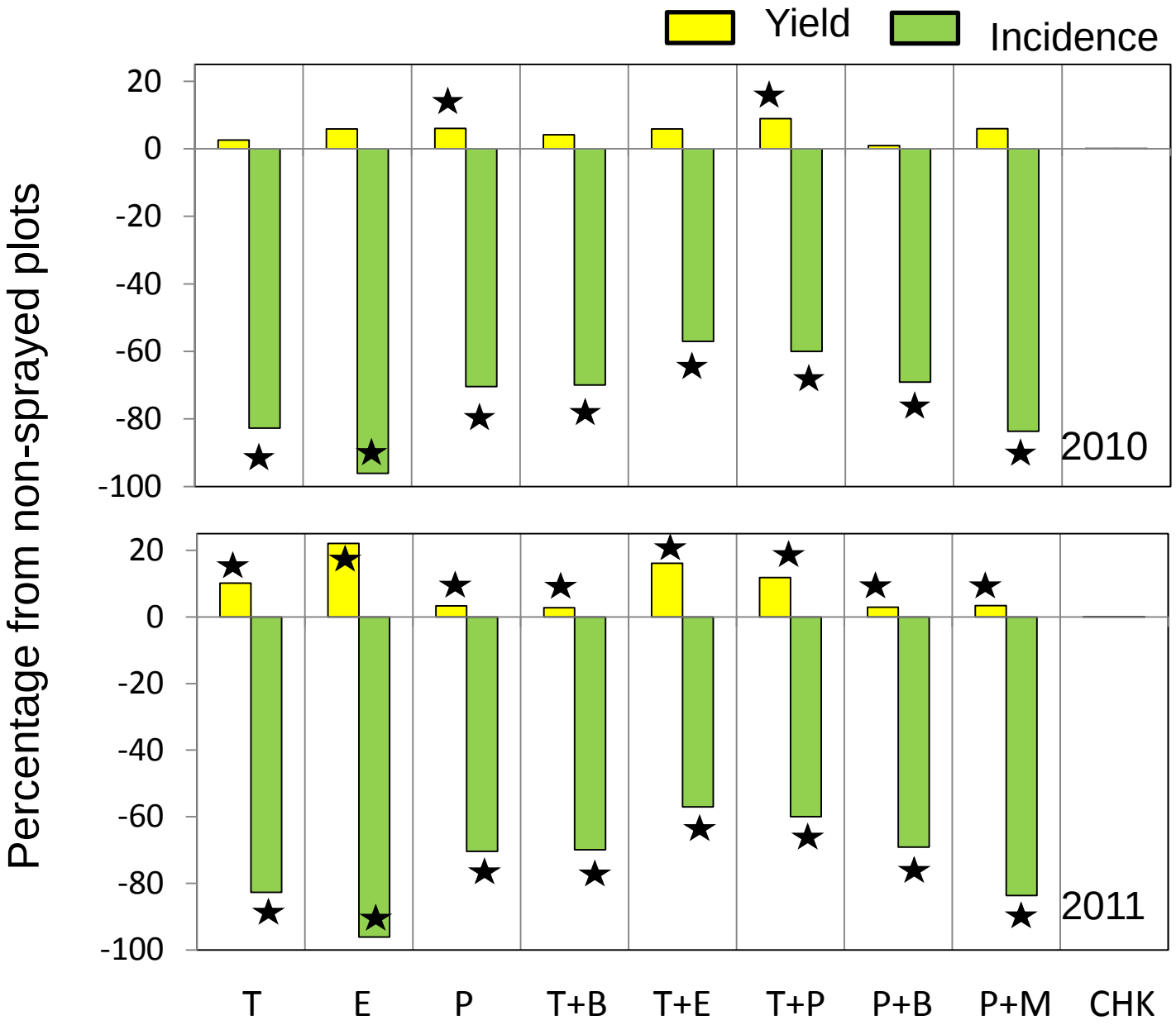
Results



Conclusions

- Topsin + Endura reduced SSR and increased yield in three of the four years
- Topsin + Proline did same in two of four years
- Single product applications lowered disease in all years but increased yields only in two
- Tank mixes are a good management alternative

Baseline fungicide sensitivity for thiophanate methyl

- 95 isolates from North Central US
- PDA amended with 0, 0.01, 0.1, 0.5, and 1 µg ml^{-1}
- Two replications
- Experiment repeated once
- 50% effective concentration (EC_{50}) calculated

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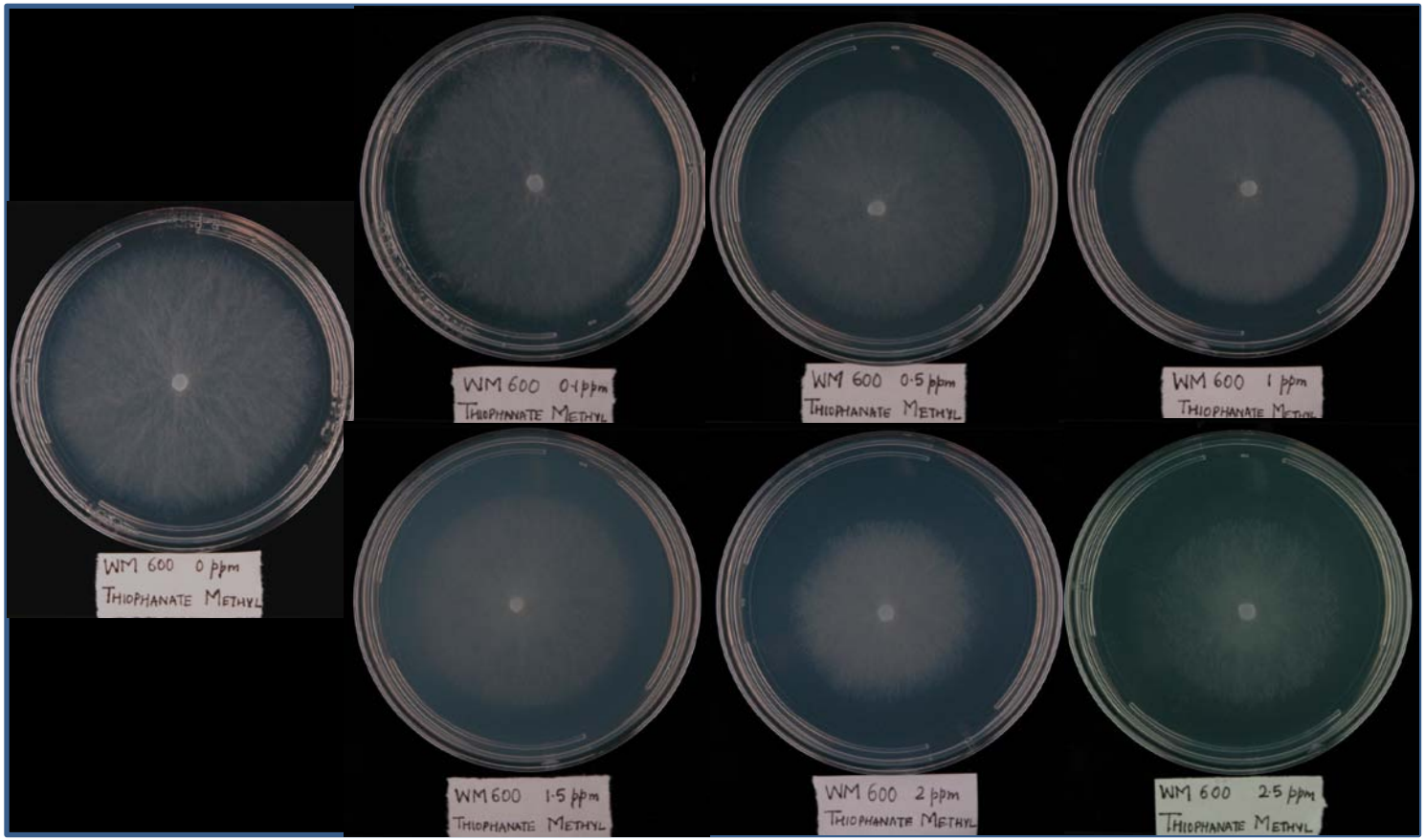
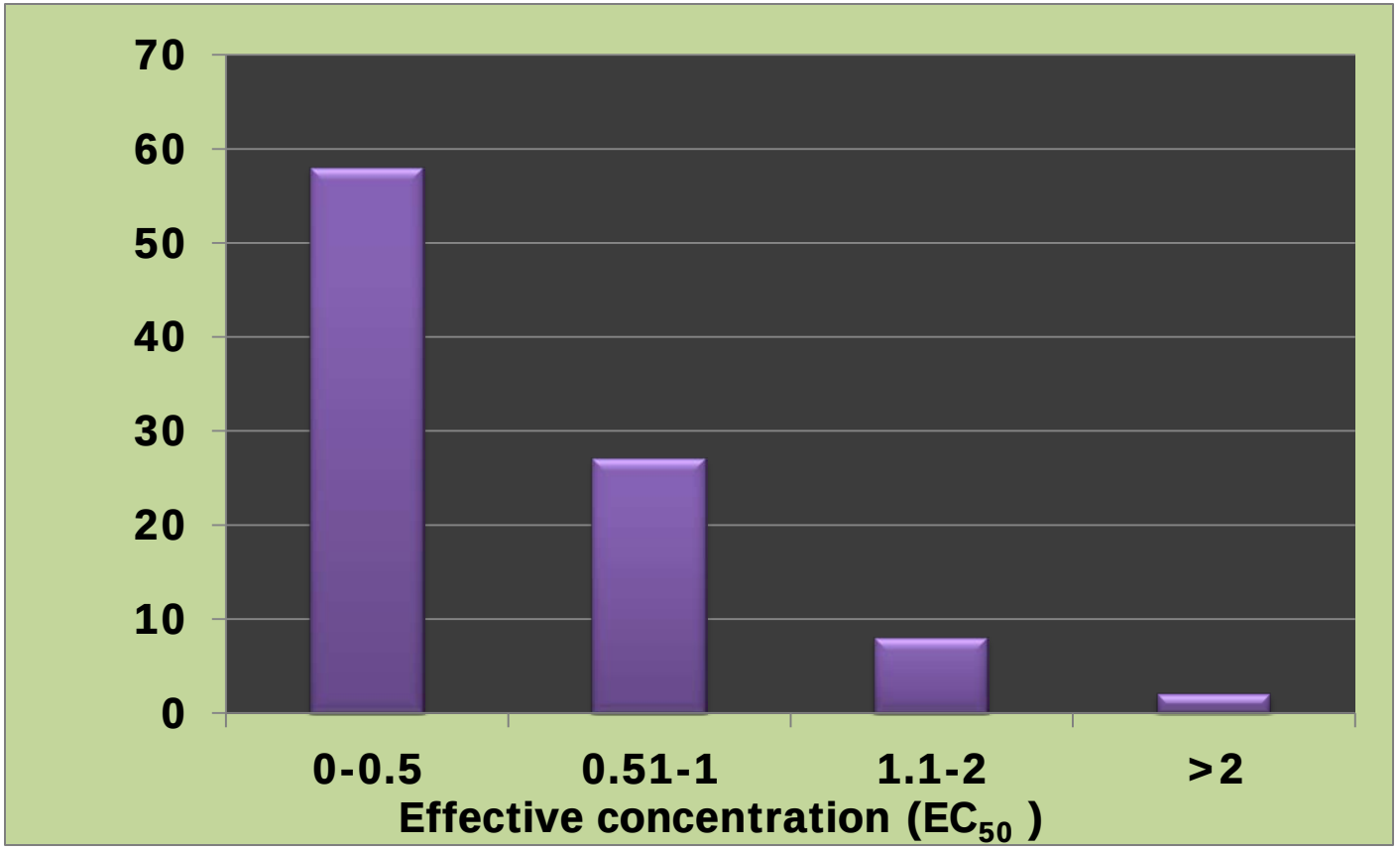
Radial growth of *S. sclerotiorum* isolates on PDA amended with different concentrations of thiophanate methyl



Frequency distribution of sensitivity of *S. sclerotiorum* from North Central US to thiophanate methyl



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Sensitivity of North Central US *S. sclerotiorum* isolates to thiophanate methyl

States	Number of Isolates	EC_{50}		
		Median	Mean	Range
IA	5	0.33	0.61	0.30 - 1.64
IL	2	0.32	0.46	0.30 - 0.62
IN	1	0.55	0.55	-
KS	1	0.41	0.41	-
MI	2	1.10	1.10	0.48 - 1.72
MN	11	0.30	0.51	0.05 - >2.4
MO	1	0.46	0.46	-
ND	57	0.45	1.68	0.23 - 1.75
NE	4	0.30	0.98	0.27 - 2.40
OH	1	0.31	0.31	-
SD	1	0.30	0.30	-
WI	8	0.45	0.42	0.28 - 0.51
MT	1	1.32	1.32	-
CO	1	1.31	1.31	-

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Sensitivity of *S. sclerotiorum* to thiophanate methyl

- Greenhouse study
- RCBD with six replications
- Six isolates (2 sensitive, 2 insensitive and 2 intermediate)
- One-month old sunflower plants
- Sprayed with equivalent of 20 fl oz Topsin per acre (x) and also at 0.25x, 0.5x and 2x

- Stem inoculation 30 h after spraying

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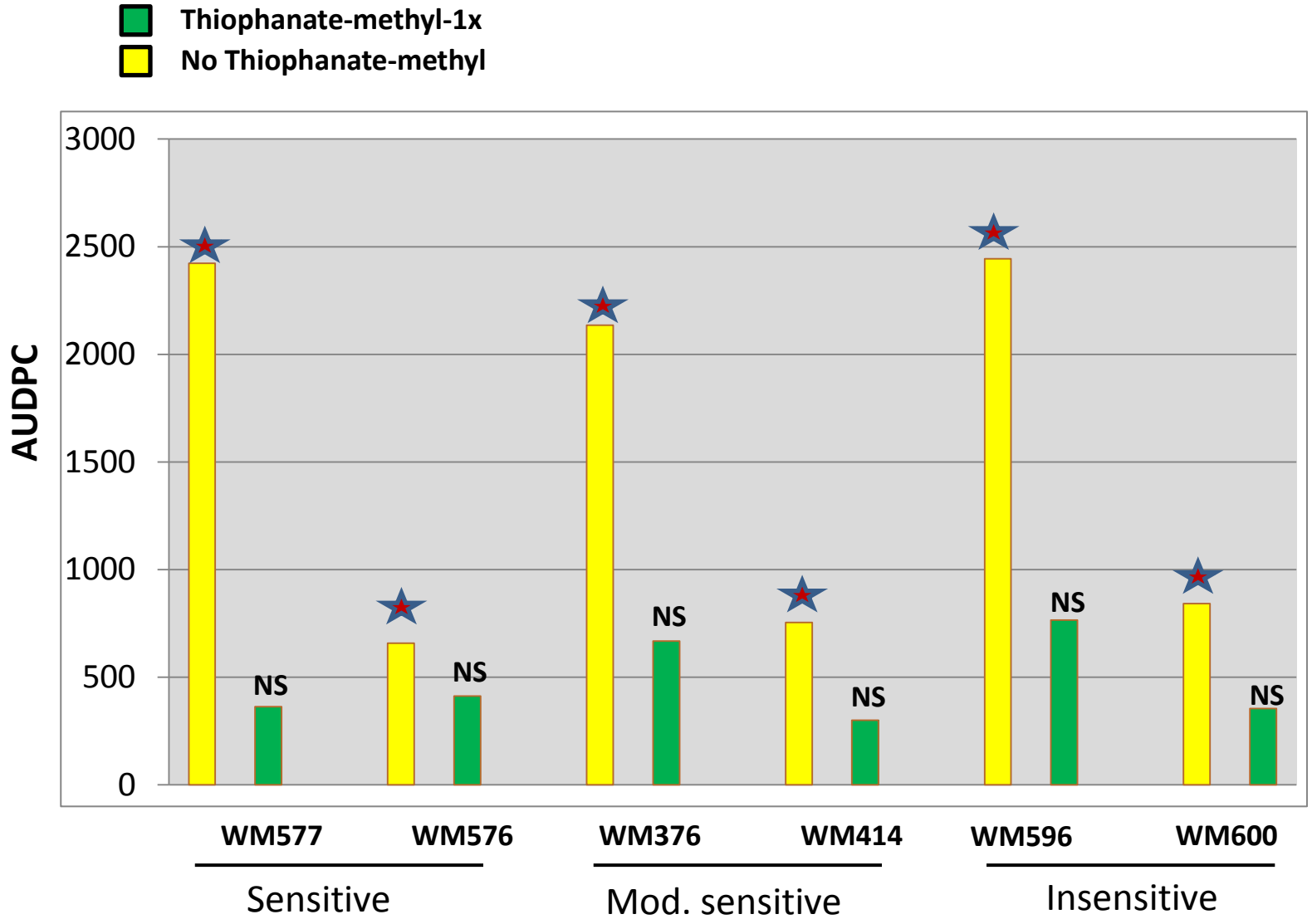
Sensitivity of *S. sclerotiorum* to thiophanate methyl



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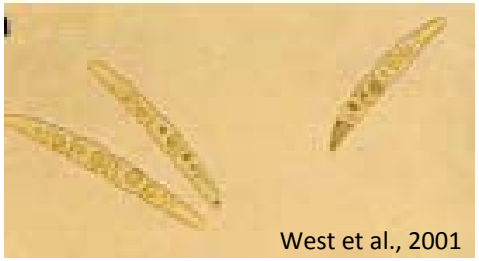
Conclusions

- TM sensitivity close to normal distribution with 2% of isolates being insensitive ($EC_{50} \geq 2$ µg ml^{-1}).
- Three of 95 isolates evaluated were considered TM-insensitive.
- Six were considered moderately insensitive (EC_{50} >1.5 µg ml^{-1}).
- Results suggests TM tolerance may be building up in the region.
- Commercial doses still effective in controlling SSR



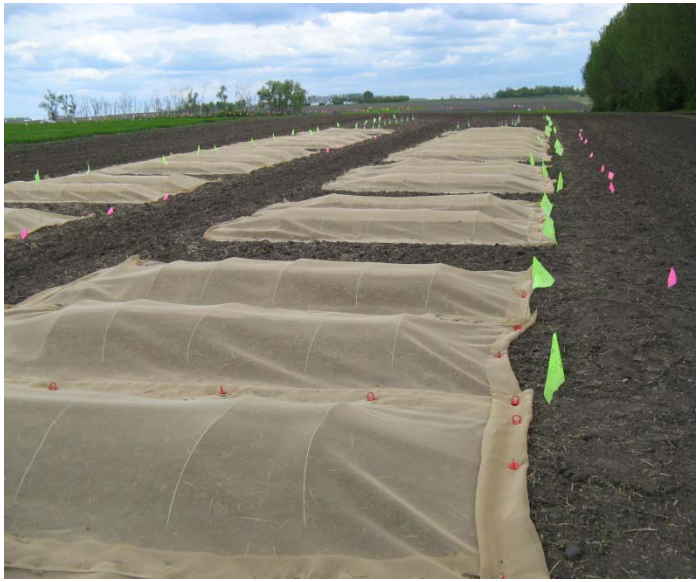
Blackleg Disease cycle (*L. maculans*)

Blackleg epidemiology

- Can be seed transmitted
- 1% seed infection = 3% plant infection = 2% yield loss
- Multiple pathogenicity groups

Association between flea beetles and blackleg

- Field trial in Langdon using cages
  - Ten treatments, six replications
  - Cages 20 x 5 ft
  - Inoculated with spores or not
  - 0 to 1,000 beetles per cage
  - Cages lifted after 6th leaf stage
  - Incidence and severity measured before swath



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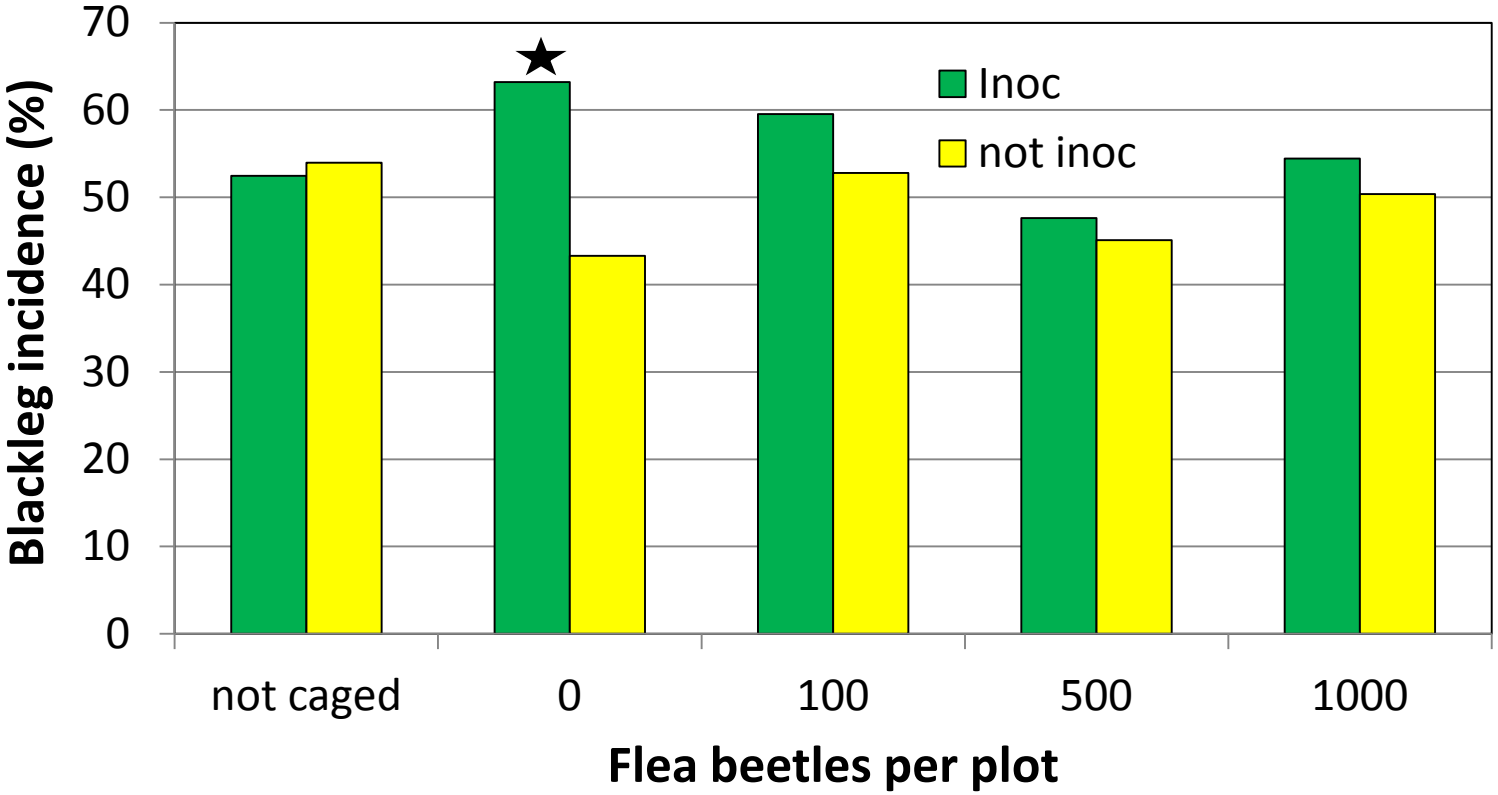
Association between flea beetles and blackleg



Association between flea beetles and blackleg

- GHSE trials
  - Inoculated with spores or not
  - Beetles allowed to feed before and after inoculation
  - Incidence and severity at flowering
  - Three replications, trials repeated six times

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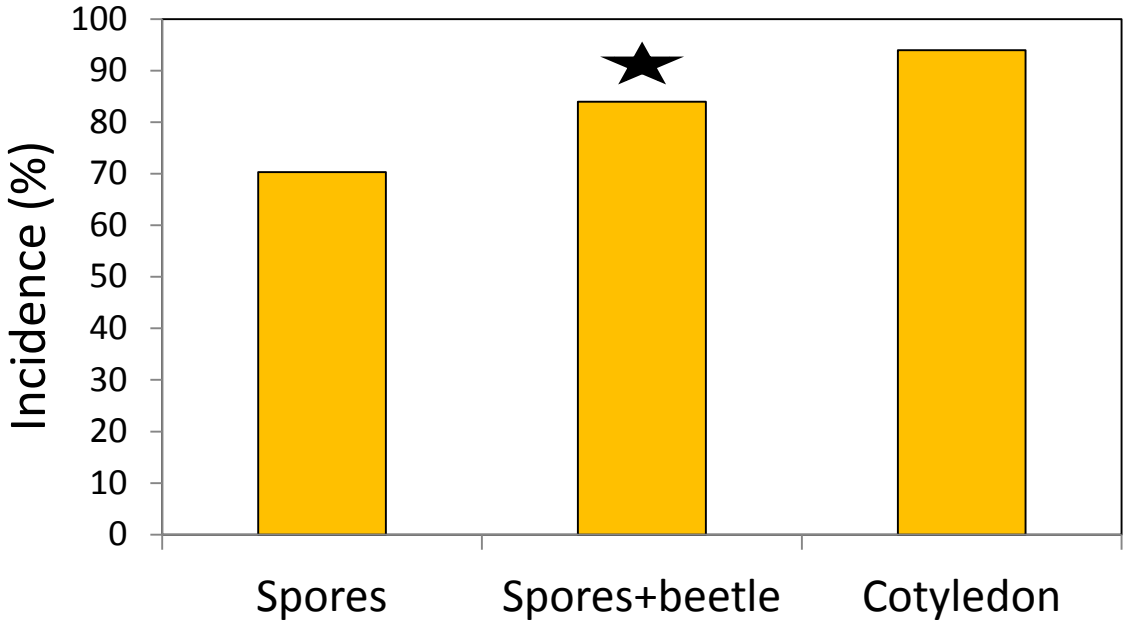
Association between flea beetles and blackleg

Spores alone

Flea beetle + spores

Association between flea beetles and blackleg



Effect of flea beetle on blackleg still not clear and may depend on inoculum concentration

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