Screening Hybrid Poplar for Resistance to Septoria musiva: Greenhouse to Field Correlations Using a Novel Inoculation Procedure

JM LeBoldus, GR Stanosz, R Qin, and O. Faria

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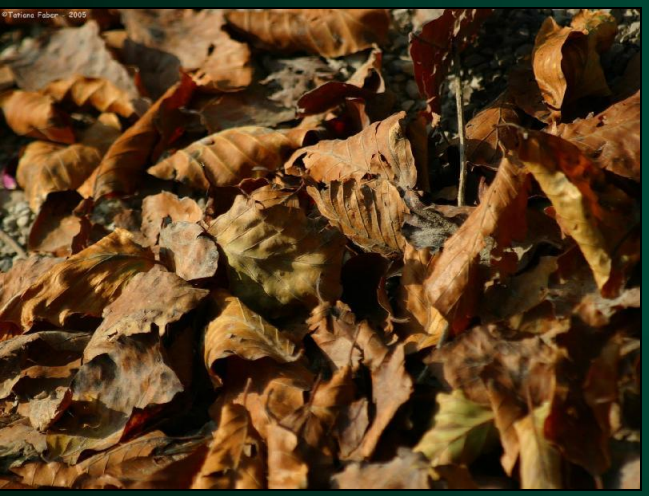
Septoria musiva – Mycosphearella populorum
Leaf spot and stem canker



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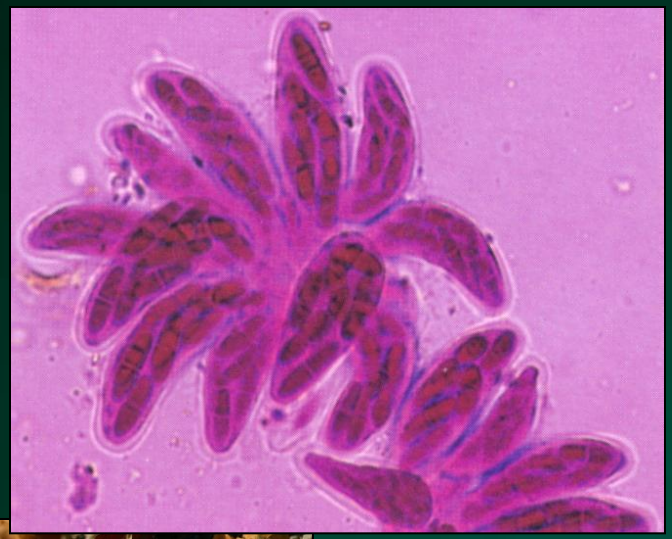
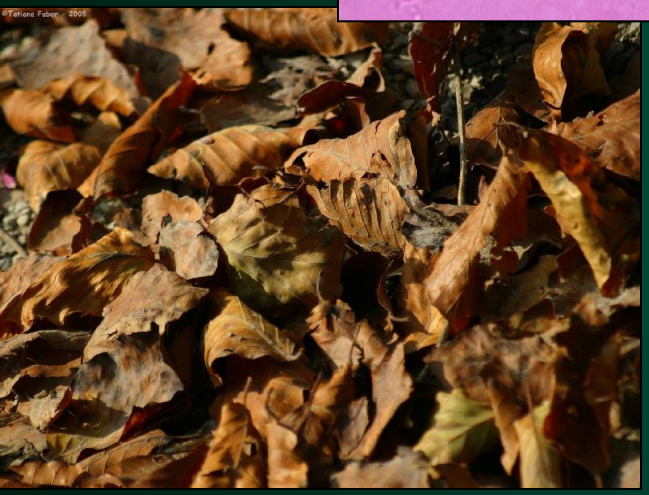
www.forestpests.org/poplar/septoria.html





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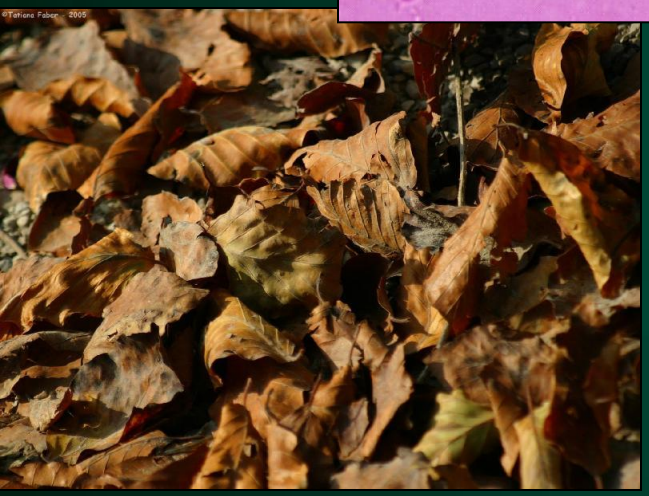

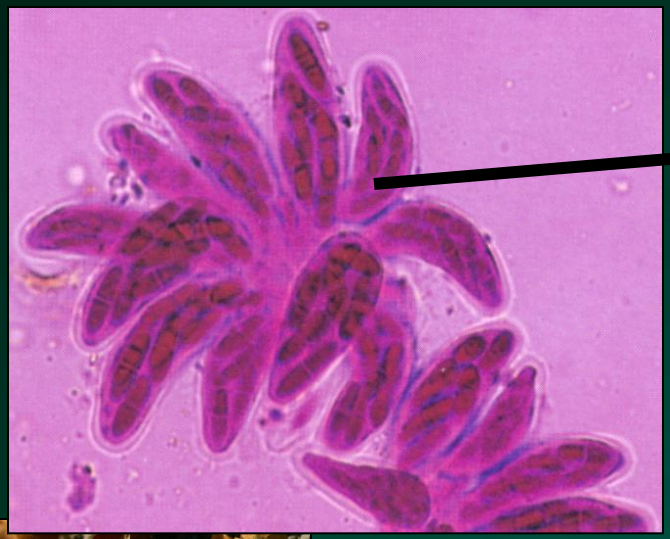

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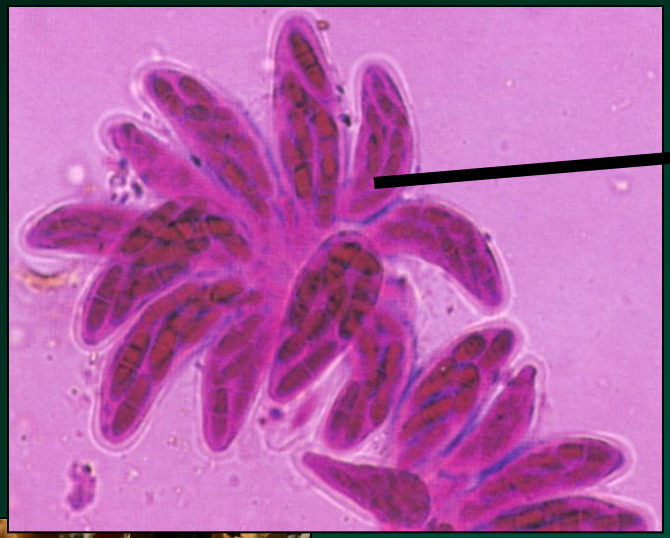

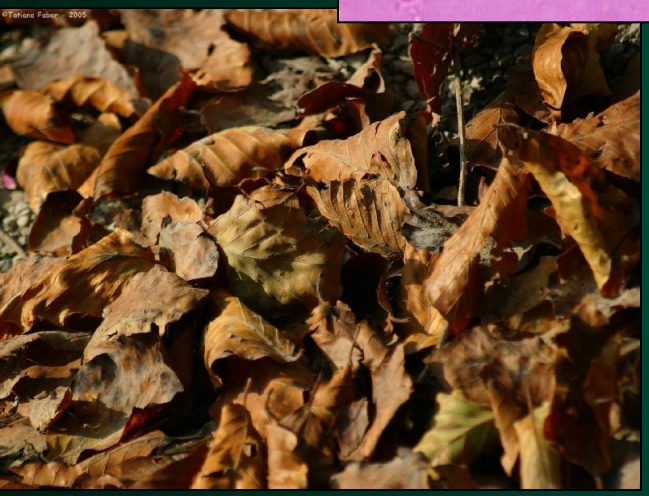

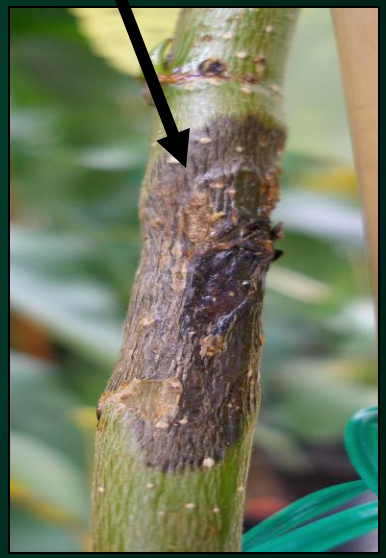

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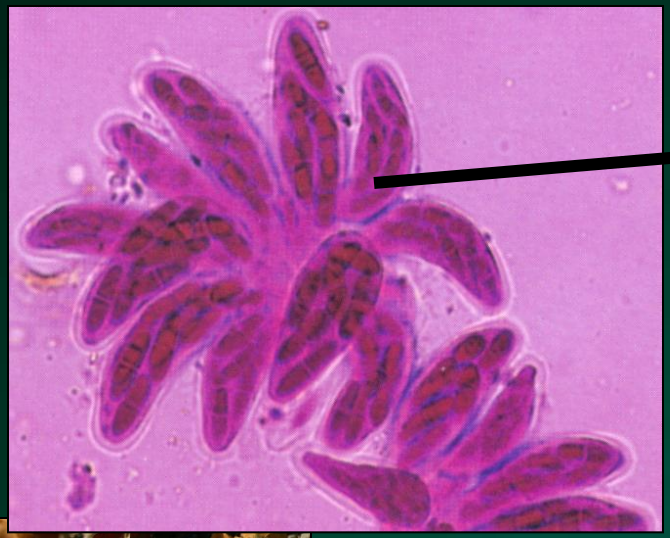

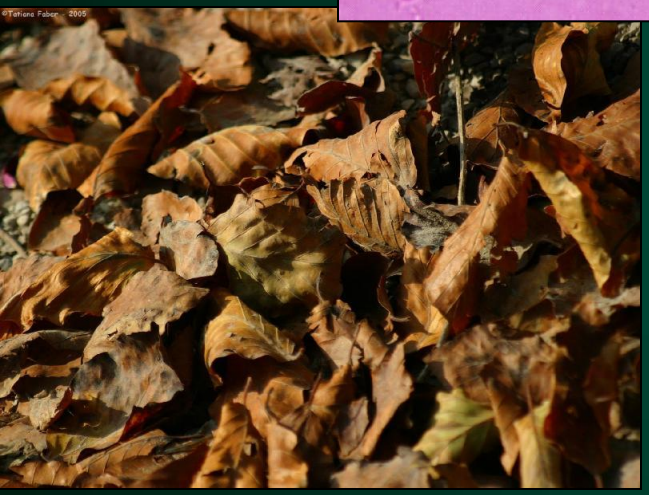

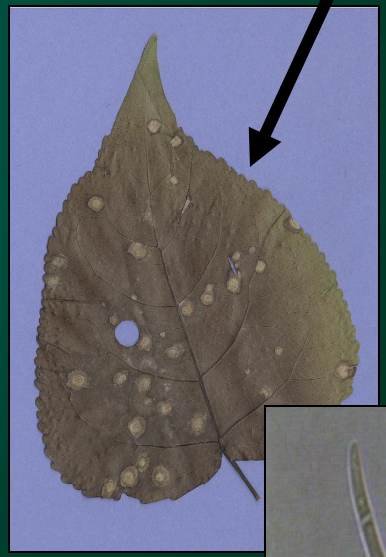

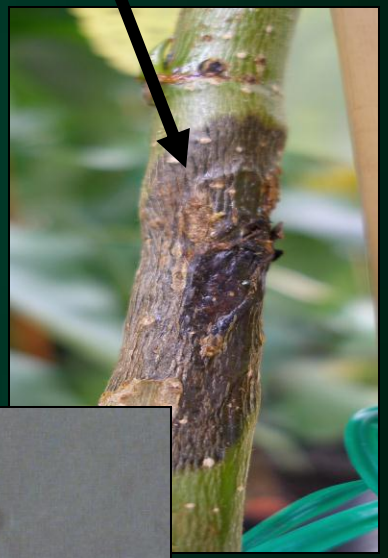

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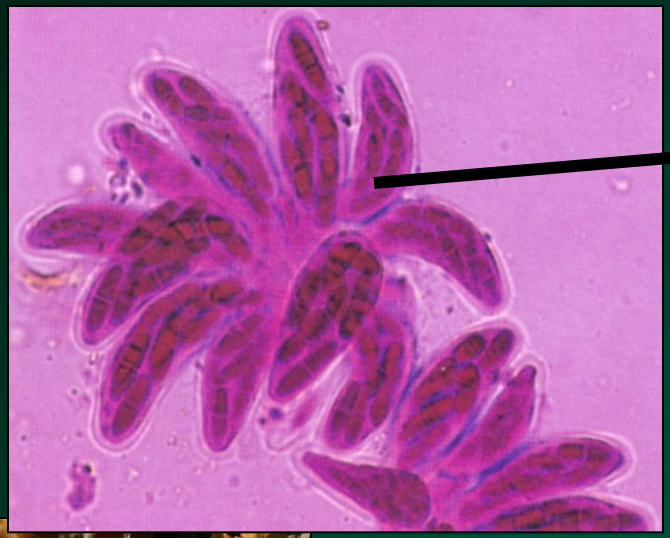

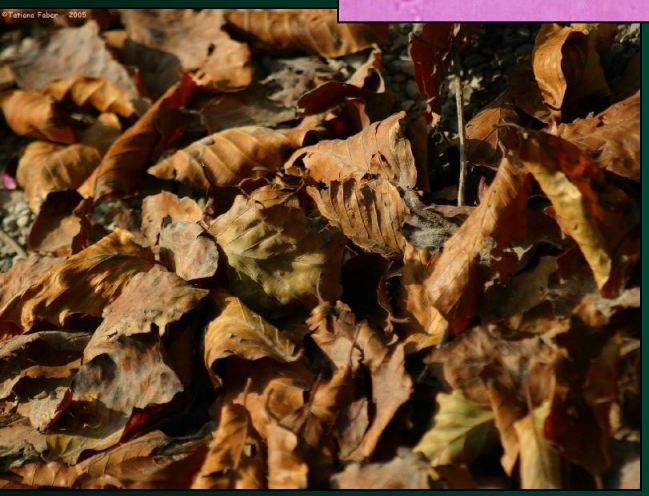

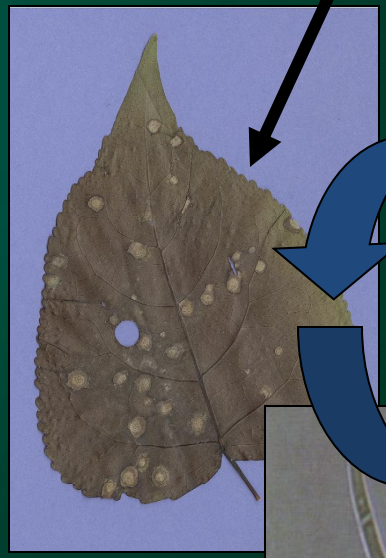

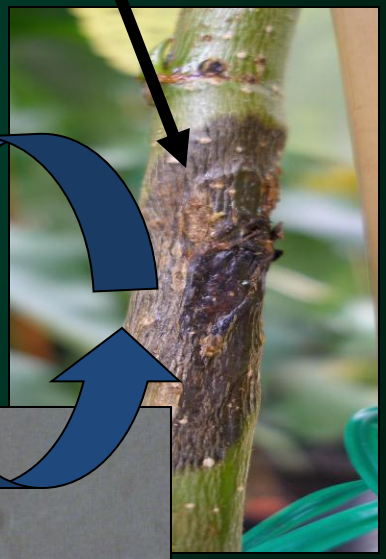

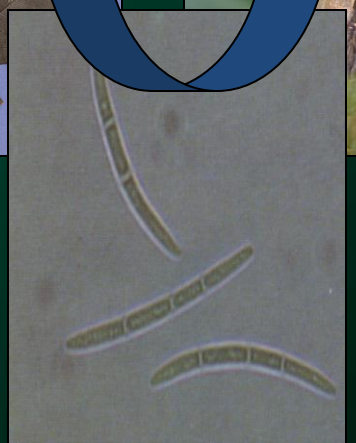

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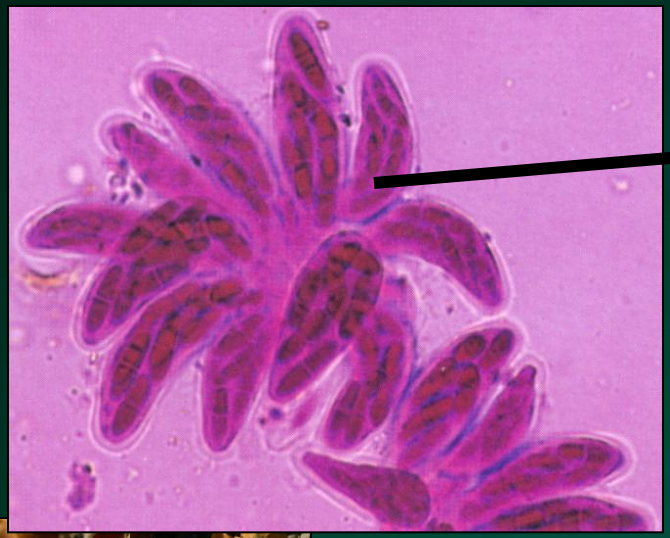

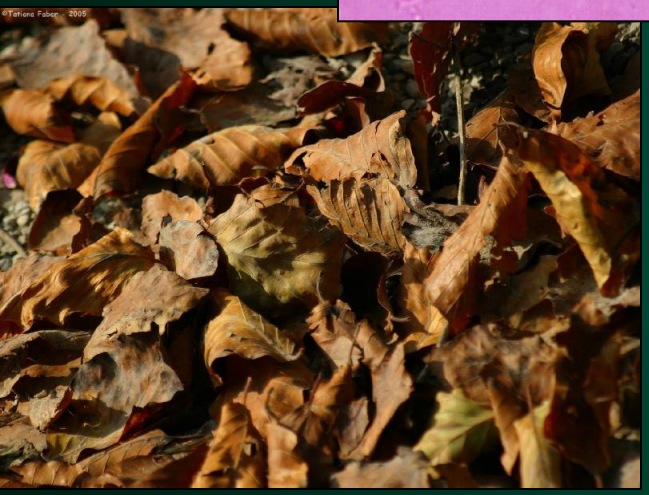

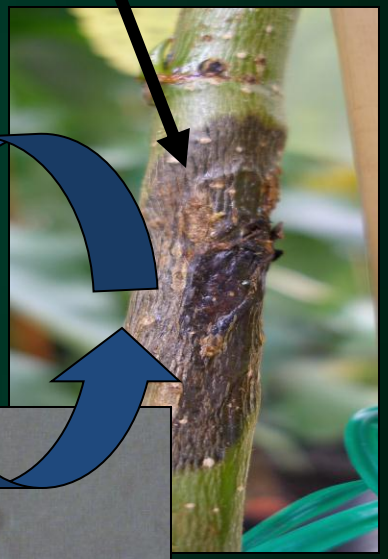

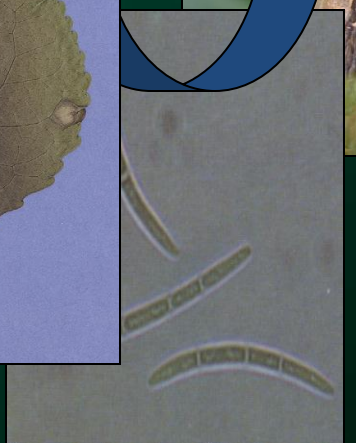

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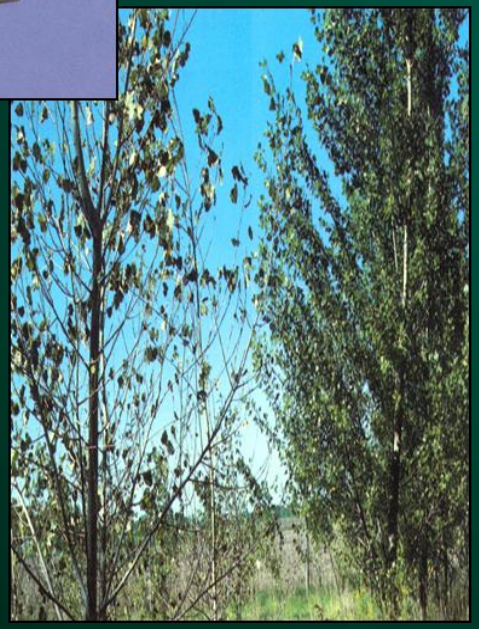

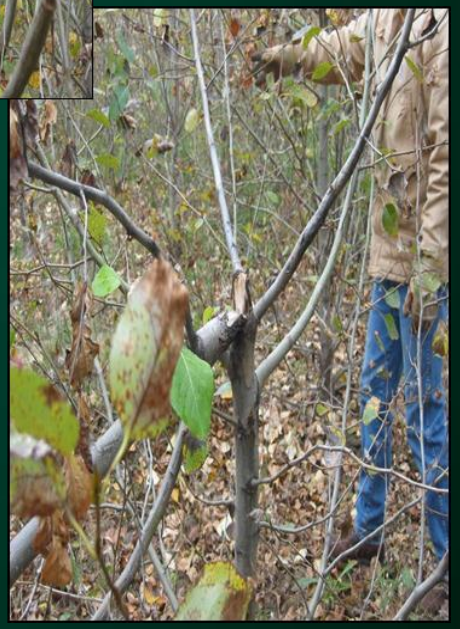

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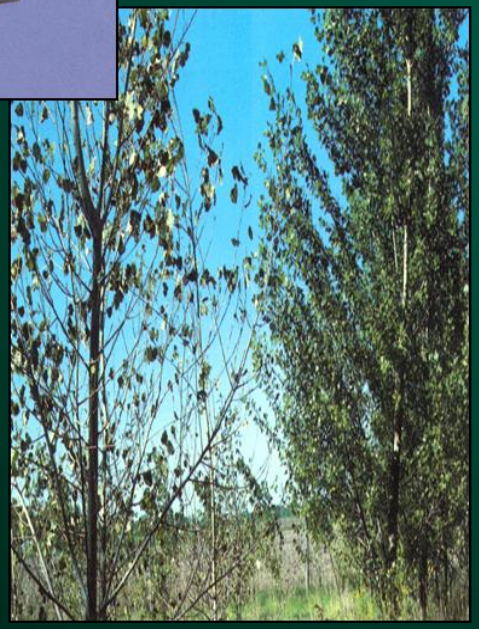

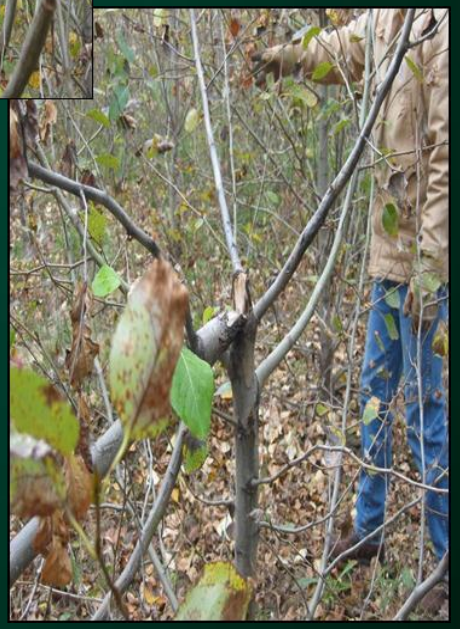

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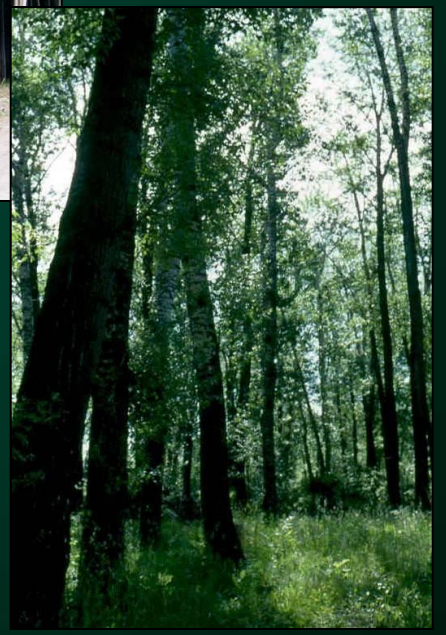
Disease Management

- Cultural Methods
- Chemical Control
- Biological Control
- Disease Resistant Clones



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Wound inoculation

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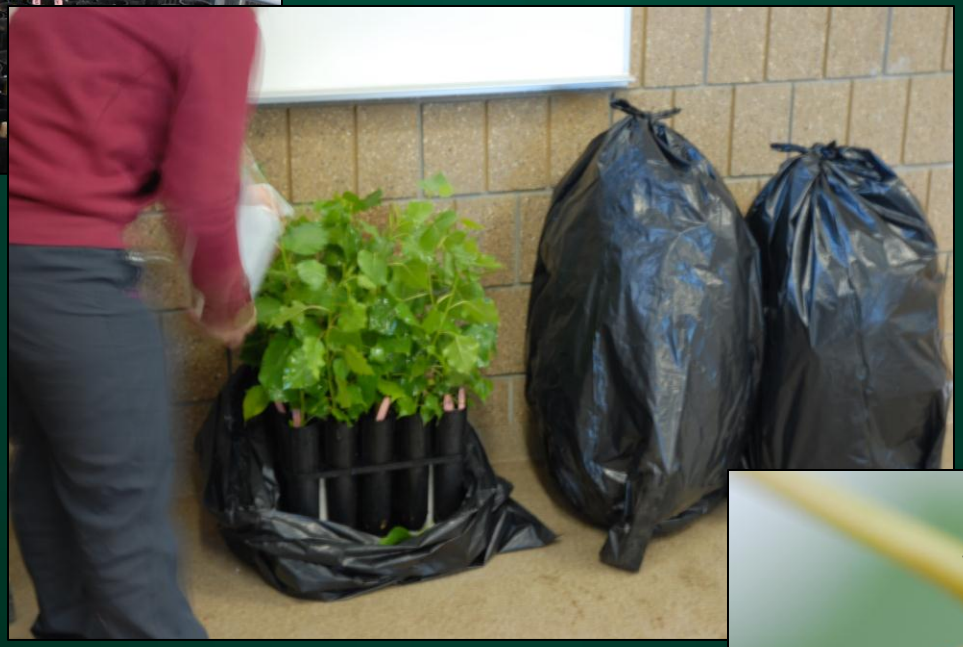
Disease severity

Non-wound inoculation



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Septoria canker resistance

Objective: Determine the relationship between non wounded greenhouse inoculations and field Resistance.

Clone	Parentage	Categories
NC11505	*P. maximowiczii* × *P. trichocarpa*	High
NE351	*P. deltoides* × *P. nigra*	high
NC11432	*P. deltoides* × *P. trichocarpa*	high
NE308	*P. nigra* × *P. nigra*	high
MWH5	*P. deltoides* × *P. maximowiczii*	high
NC5260	*P. tristis* × *P. balsamifera*	intermediate
NC5271	*P. nigra* × *P. nigra*	intermediate
NE222	*P. deltoides* × *P. nigra*	intermediate
DN177	*P. deltoides* × *P. nigra*	low
DN164	*P. deltoides* × *P. nigra*	low
DN74	*P. deltoides* × *P. nigra*	low
NM6	*P. nigra* × *P. maximowiczii*	low
DN34	*P. deltoides* × *P. nigra*	low
MWH13	*P. deltoides* × *P. maximowiczii*	high

Experimental Design

- RCBD with 10 blocks
- 3 canker isolates from MN plantations
- 14 genotypes of hybrid poplar
- Experiment repeated twice

Parameters measured

- Height at time of inoculation
- Final height and root collar diameter
- Lesion number
- Lesion area

- Lesions/cm
- Necrotic area
- % necrotic area

Data Analysis

The average disease parameter values for each clone were calculated.

Logistic regression of ordered categories was used to estimate the probability of greenhouse parameters predicting long term field categories.

Clone	Category	Probability L	Probability I	Probability H
DN164	L	0.53	0.32	0.15
DN177	L	0.76	0.18	0.06
DN34	L	0.55	0.30	0.15
DN74	L	0.55	0.30	0.15
MWH13	H	0.24	0.36	0.40
MWH5	H	0.52	0.32	0.16
NC11432	H	0.06	0.18	0.74
NC11505	H	0.00	0.01	0.99
NC5260	I	0.56	0.30	0.14
NC5271	I	0.05	0.15	0.80
NE222	I	0.62	0.26	0.12
NE308	H	0.02	0.10	0.88
NE351	H	0.01	0.02	0.97
NM6	L	0.58	0.28	0.14

Clone	Category	Probability L	Probability I	Probability H
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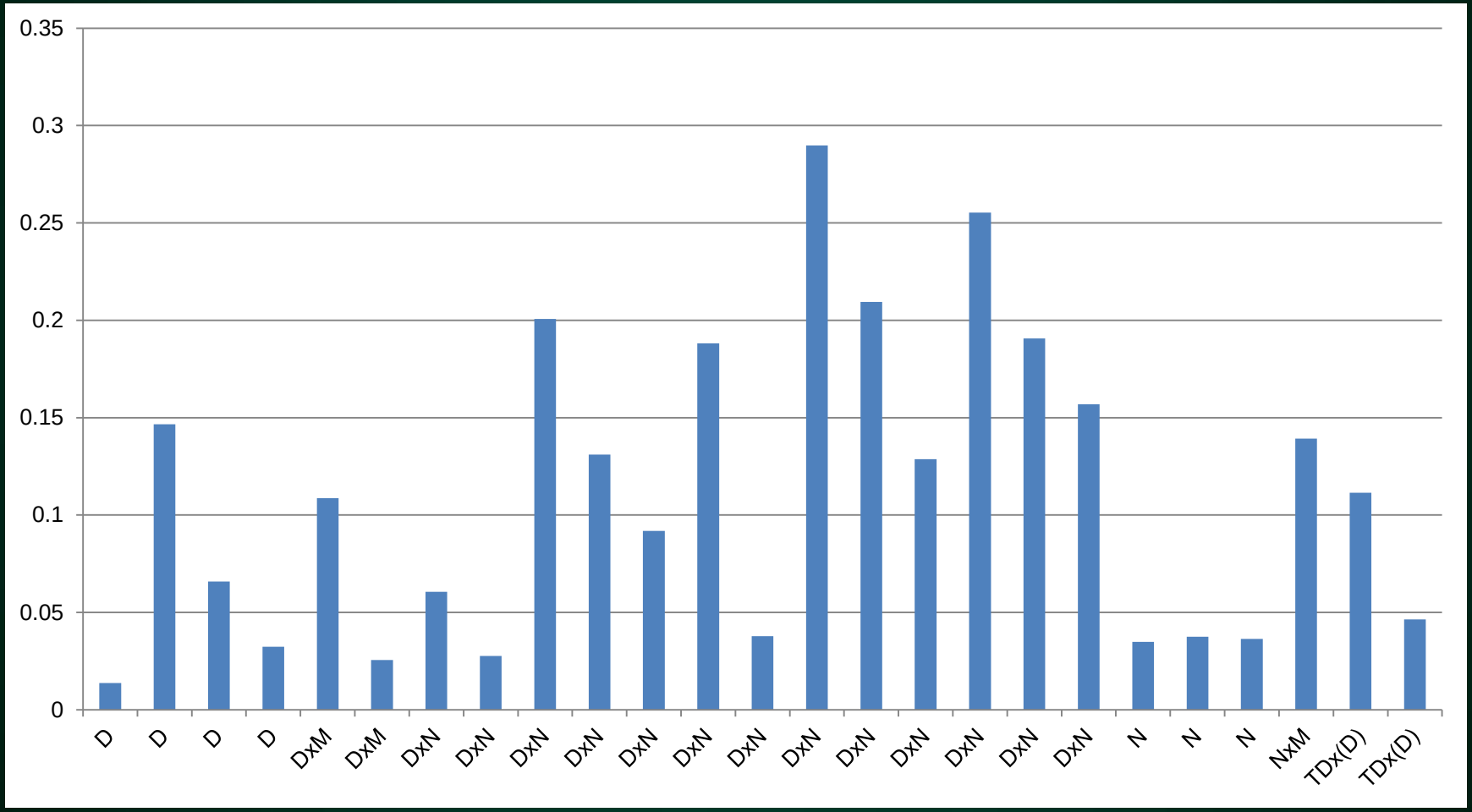
Septoria canker resistance screening

- Verso Paper Corporation and NRRI.
  - 25,000 acres of hybrid poplar plantations in MN
  - Hybrid poplar (D x N) breeding program
  - Disease resistance screening (94 genotypes).

- Alberta-Pacific Forest Industries Inc.
  - Balsam poplar for oil and gas site reclamation
  - Disease resistance screening (255 genotypes).

NRRI -Trial 1 - Data



Screening trials

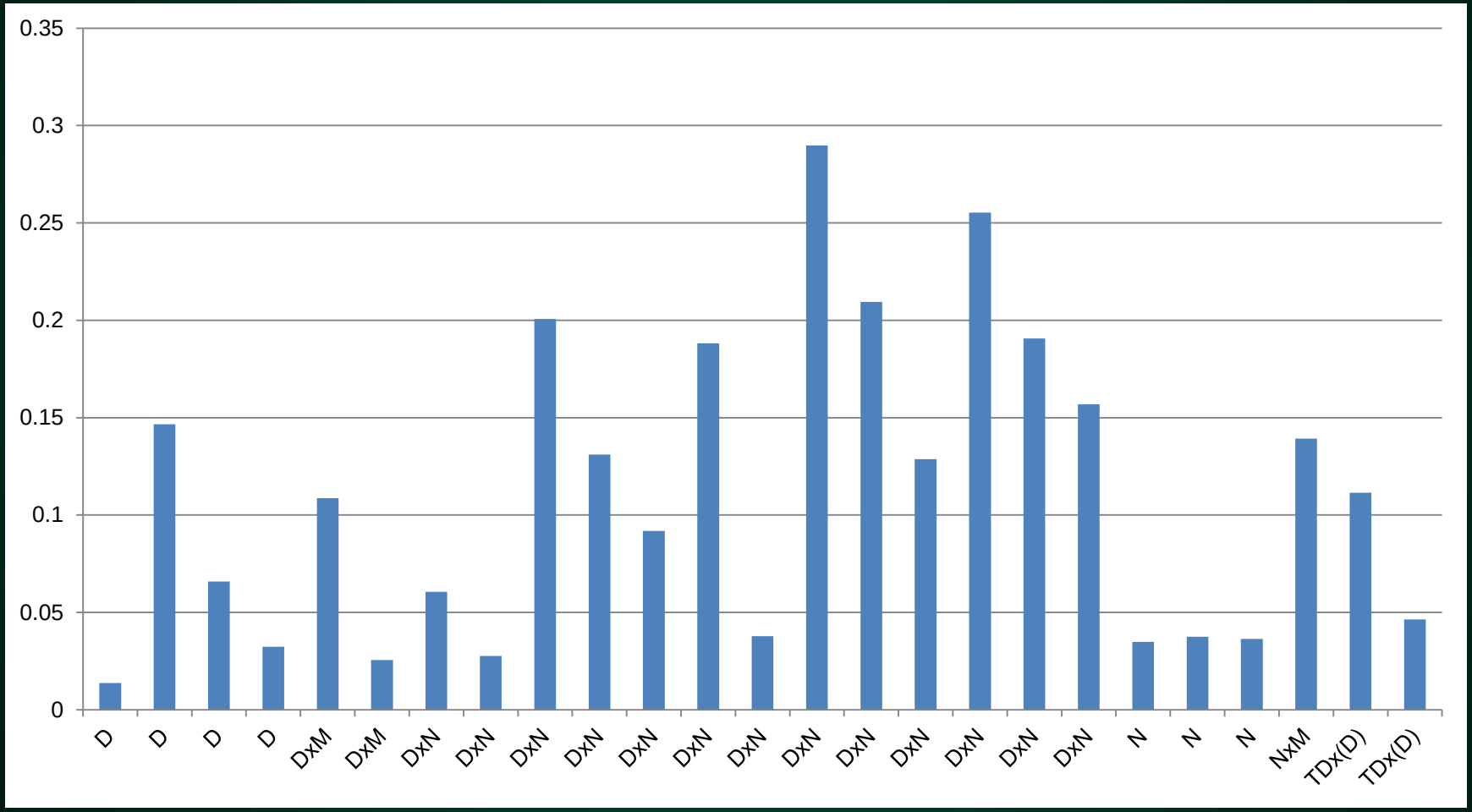
NRRI	Al-Pac
Trial 1 – 25 genotypes x 10 reps	Trial 1 – 105 genotypes x 5 reps
Trial 2 – 69 genotypes x 5 reps	Trial 2 – 150 genotypes x 5 reps

Trial 1 – No significant block effect - reduced the number of reps for all future trials

Significant differences detected among clones

Use relative differences between clones to select putatively resistant individuals based on resource availability

NRRI -Trial 1 - Data



Summary

Non wound inoculations are a good predictor of field performance for the most resistant genotypes.

Protocol can detect significant differences among clones.

It is possible to screen a large number of individuals to reduce number to be field tested.

Isolate number may be important consideration.

Acknowledgements

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