

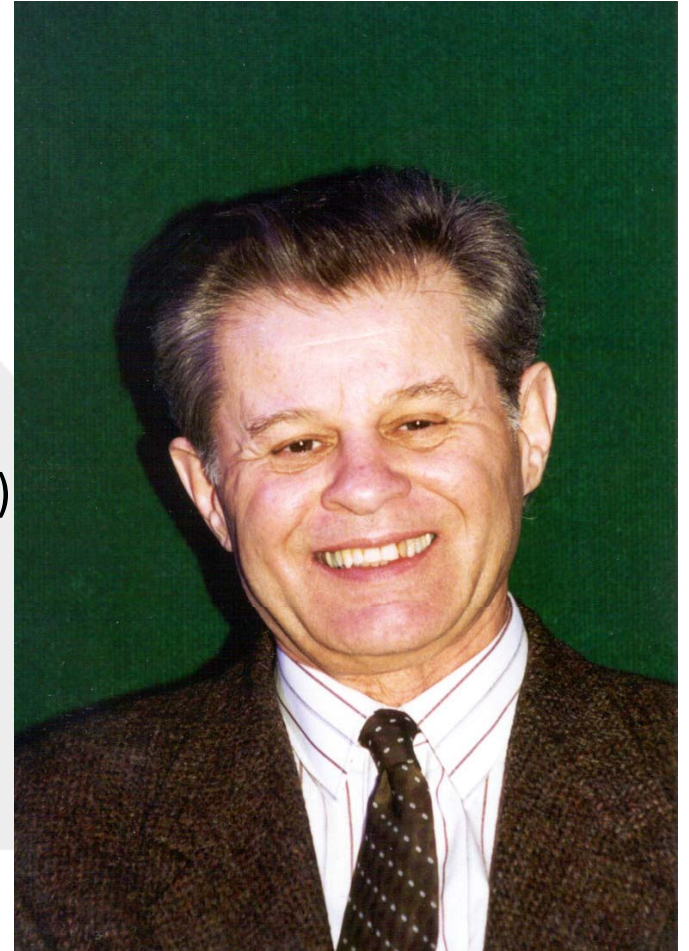
Developing the bioeconomy in southeastern Ontario: Lessons learned from the Domtar Hybrid Poplar Plantations

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History

- Hybrid poplar plantations in southeastern ON were:
 - ▶ One of the first regional programs in Canada
 - ▶ Very successful
- Active: 1976 – 1995
- Program setup as cooperative:
 - ▶ Ontario Ministry of Natural Resources (OMNR)
 - ▶ Domtar Inc.
 - ▶ Private landowners
 - ▶ University of Toronto
- Plantations on leased private and Domtar owned land
- 1990s: end support OMNR
- 2005: last activities (closing Domtar Mill)



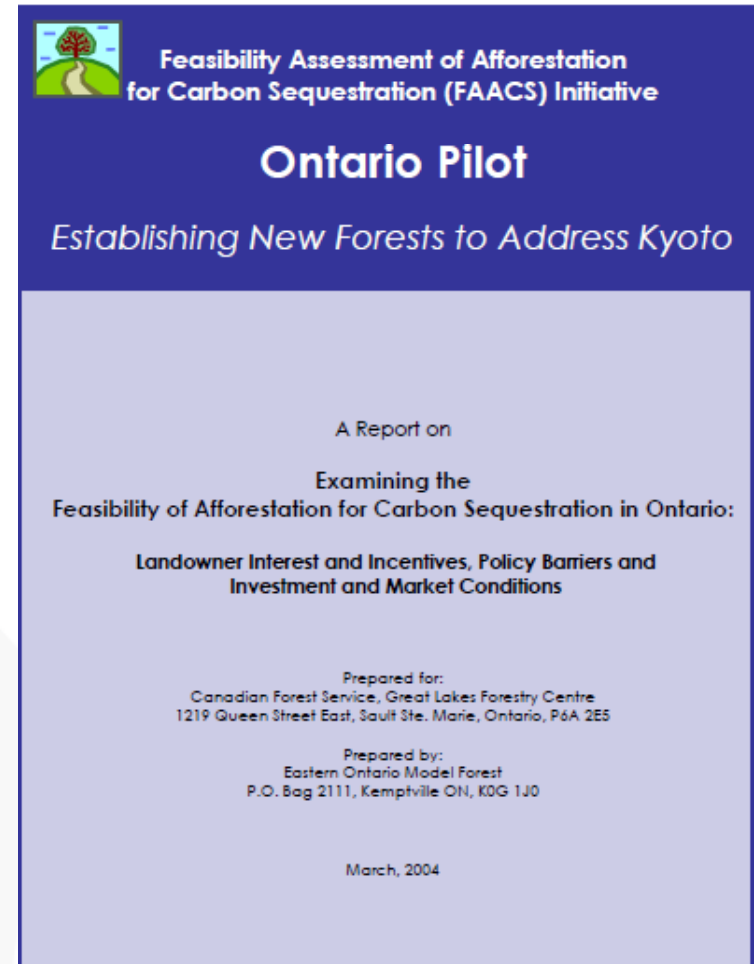
Objectives

- Summarize lessons learned from hybrid poplar plantations in southeastern ON
- Propose re-measurement of 3 high performance plantations to increase knowledge of available lignocellulosic feedstocks



Lessons learned include:

- Socio-Economics
 - ▶ Landowner interest
 - ▶ Incentives needed
 - ▶ Policy barriers
 - ▶ Investment and market conditions
- Techniques
 - ▶ Selection and breeding
 - ▶ Stock production
 - ▶ Site preparation and tending
- Clonal information
 - ▶ Yields
 - ▶ Disease prevention and early detection → *Septoria musiva*



Material and methods

- Hybrid poplar
 - ▶ 35 clones
- Planted: 1990/91
- 3 fields on former Domtar land
 - ▶ D78, D76 and D18
- Statistical design:
 - ▶ RCBD (D78 and D18)
 - ▶ CRD (D76)
- Plot: 4 trees
- Spacing: 3.6 m x 2.4 m
- Planting stock: Cuttings
- Now: 20 years old



Material and Methods

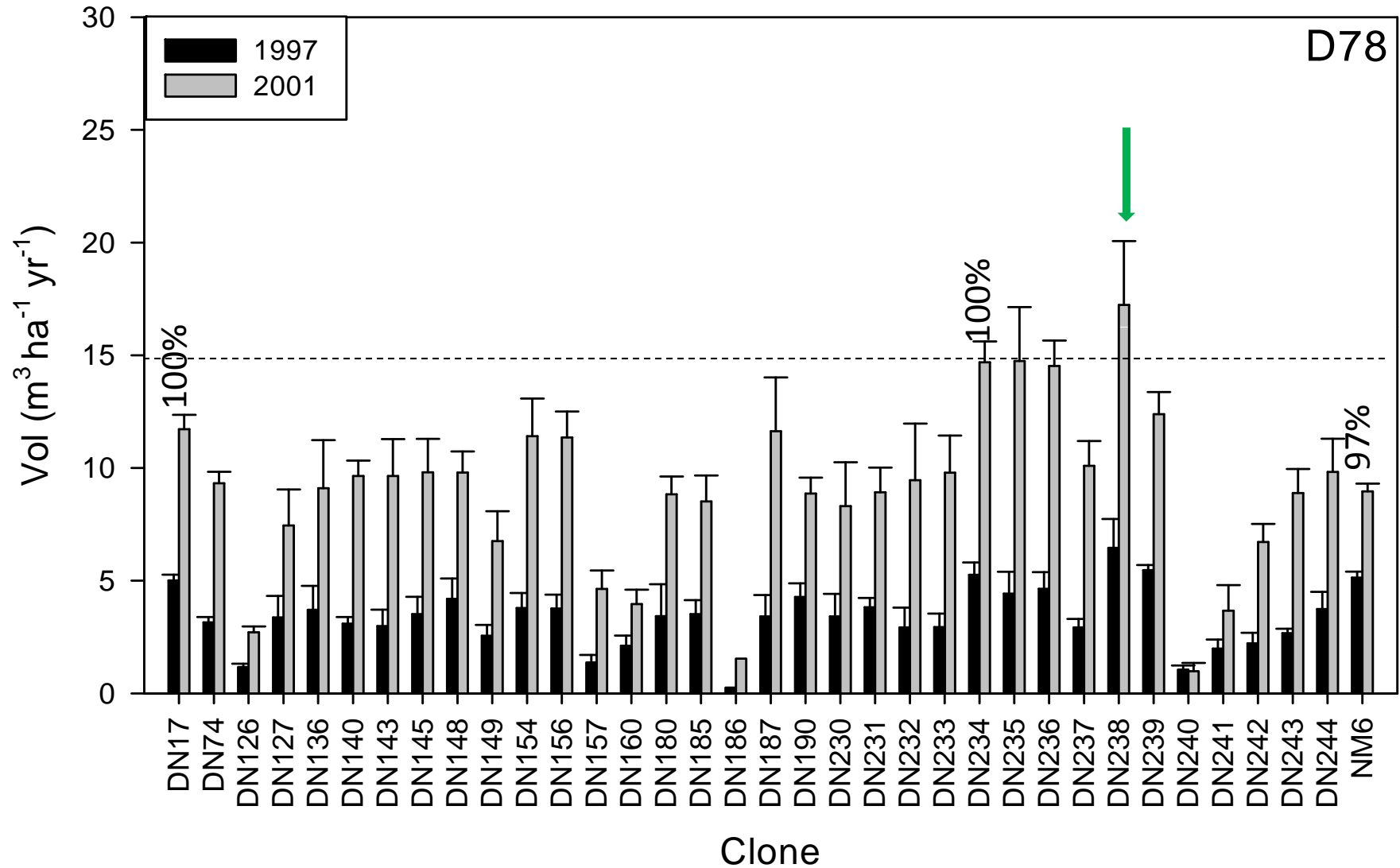
- Measured:
 - ▶ 1997 (pre- ice storm)
 - ▶ 2001 (post- ice storm)
- Measurements:
 - ▶ Survival
 - ▶ Height
 - ▶ DBH
 - ▶ Quality
 - *Septoria*
 - ▶ Volume defect
 - Frost



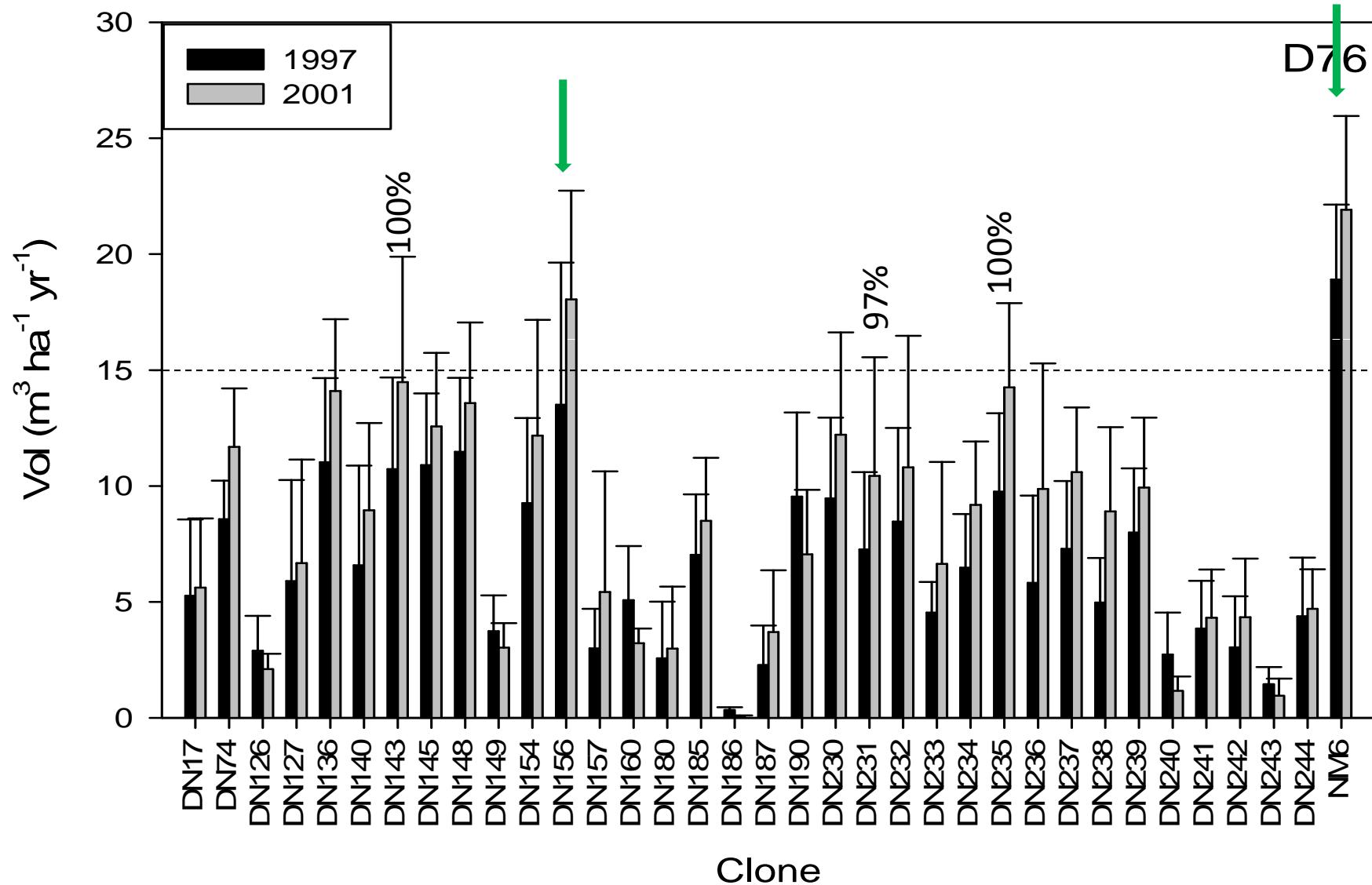
Hybrid Poplar 35 Clones - Origin

Clone	Cross	Origin
DN17	x euramericana cv. "Robusta"	
DN74	deltoides D35	x nigra N3 Pop 537-5 Wentworth Co., Hungary
DN126	deltoides D56	x N1+2 Mixed Pop 696-1 Thunder Bay, Ontario
DN127	deltoides D56	x N1+2 Mixed Pop 696-2 Thunder Bay, Ontario
DN136	deltoides D56	x N1+2 Mixed Pop 696-13 Maple/T.Bay, Ontario
DN140	deltoides D56	x N1+2 Mixed Pop 696-17 Maple, Ontario
DN143	deltoides D56	x N1+2 Mixed Pop 696-20 Maple, Ontario
DN145	deltoides D56	x N1+2 Mixed Pop 696-22 Maple, Ontario
DN148	deltoides D56	x N1+2 Mixed Pop 696-25 Maple/T.Bay, Ontario
DN149	deltoides D56	x N1+2 Mixed Pop 696-26 Maple, Ontario
DN154	deltoides D56	x N1+2 Mixed Pop 696-32 Maple/T.Bay, Ontario
DN156	deltoides D56	x N1+2 Mixed Pop 696-34 Maple, Ontario
DN157	deltoides D36	x N1+2 Mixed Pop 683-45 Maple/T.Bay, Ontario
DN160	deltoides D36	x N1+2 Mixed Pop 683-48 Maple/T.Bay, Ontario
DN180	x euramericana (cl. "Flevo") (Koster925)	Wageningen, Netherlands
DN185	x euramericana (cl. "Spijk") (Koster2195)	Wageningen, Netherlands
DN186	"nebraska robusta"	Durham, New Hampshire
DN187	x euramericana (Quebec # E-3024-PB)	Netherlands
DN190	deltoides (D32)	x nigra (N2) Pop 813 Elizabethtown Township, Ontario
DN230	Belgian - 78.010/27	Clones DN230-DN244 were selected by the FGF staff in 1989 from 177 clones in the IEA trial at the Kemptville Nursery (B7/B8) after 3 years of observation for frost, disease (septoria & melampsora) and growth.
DN231	Belgian - 78.010/28	
DN232	Belgian - 78.010/32	
DN233	Belgian - 78.010/33	
DN234	Belgian - 78.010/149	
DN235	Belgian - 78.010/155	
DN236	Belgian - 78.010/156	
DN237	Belgian - 78.010/192	
DN238	Belgian - 78.010/202	
DN239	Belgian - 78.010/203	
DN240	Belgian - 78.010/223	
DN241	Belgian - 78.010/226	
DN242	Belgian - 78.010/228	
DN243	Belgian - 81.001/30	
DN244	Belgian - 81.001/31	
NM6	nigra	x maximowiczii (cl. "Max-5") Munden, W. Germany

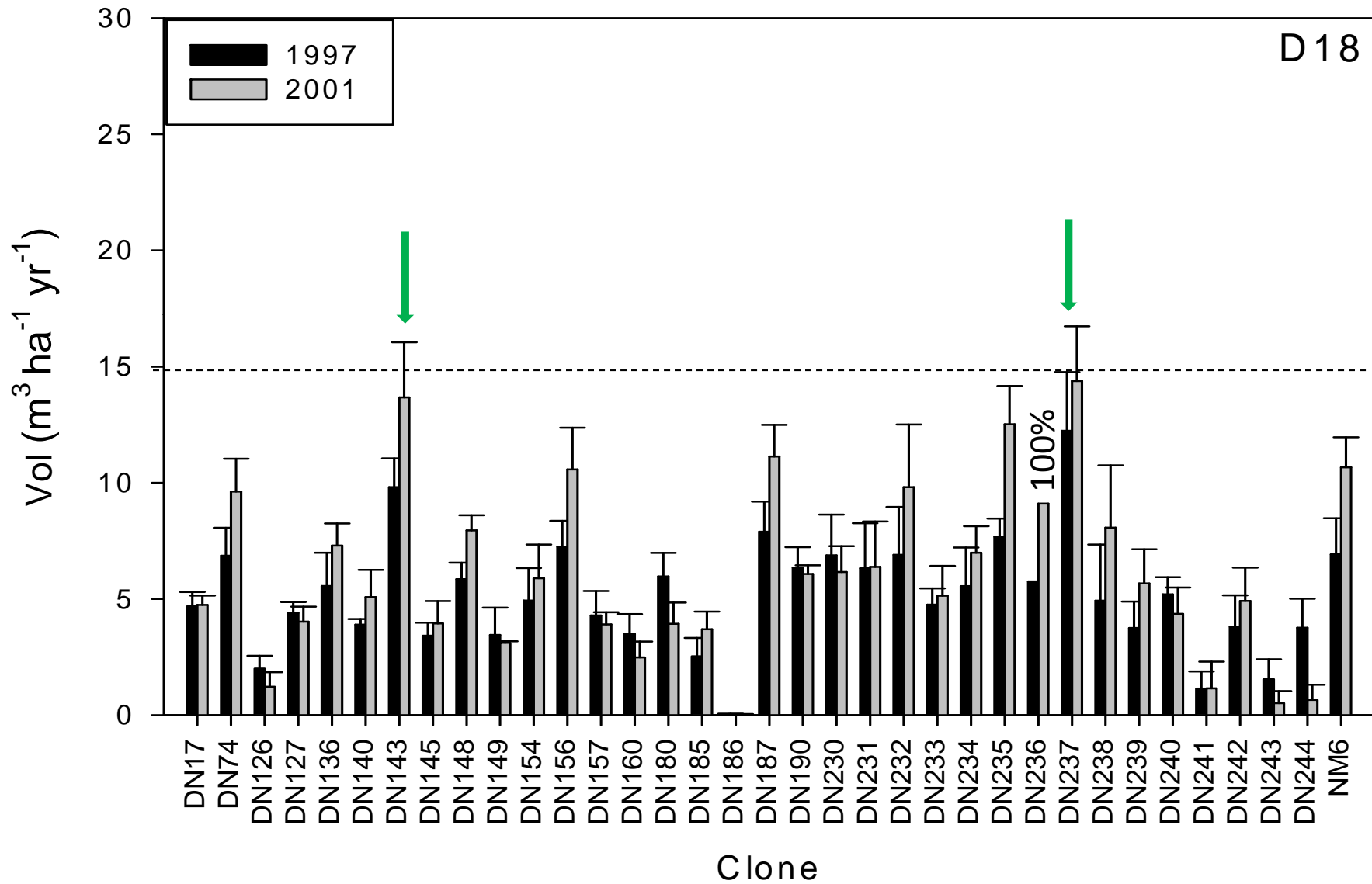
Pre-/post Ice Storm Data - Volume



Pre-/post Ice Storm Data - Volume



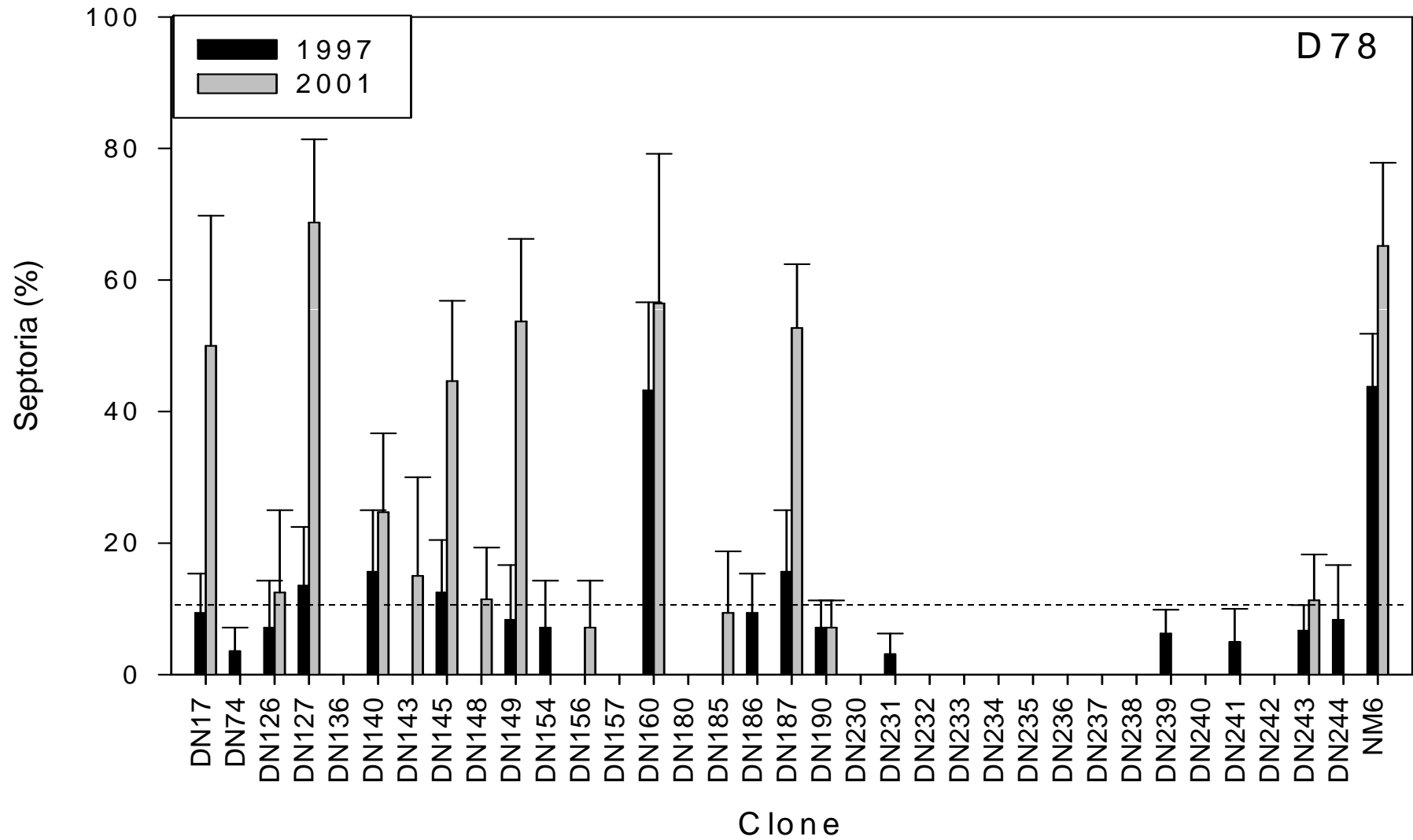
Pre-/post Ice Storm Data - Volume



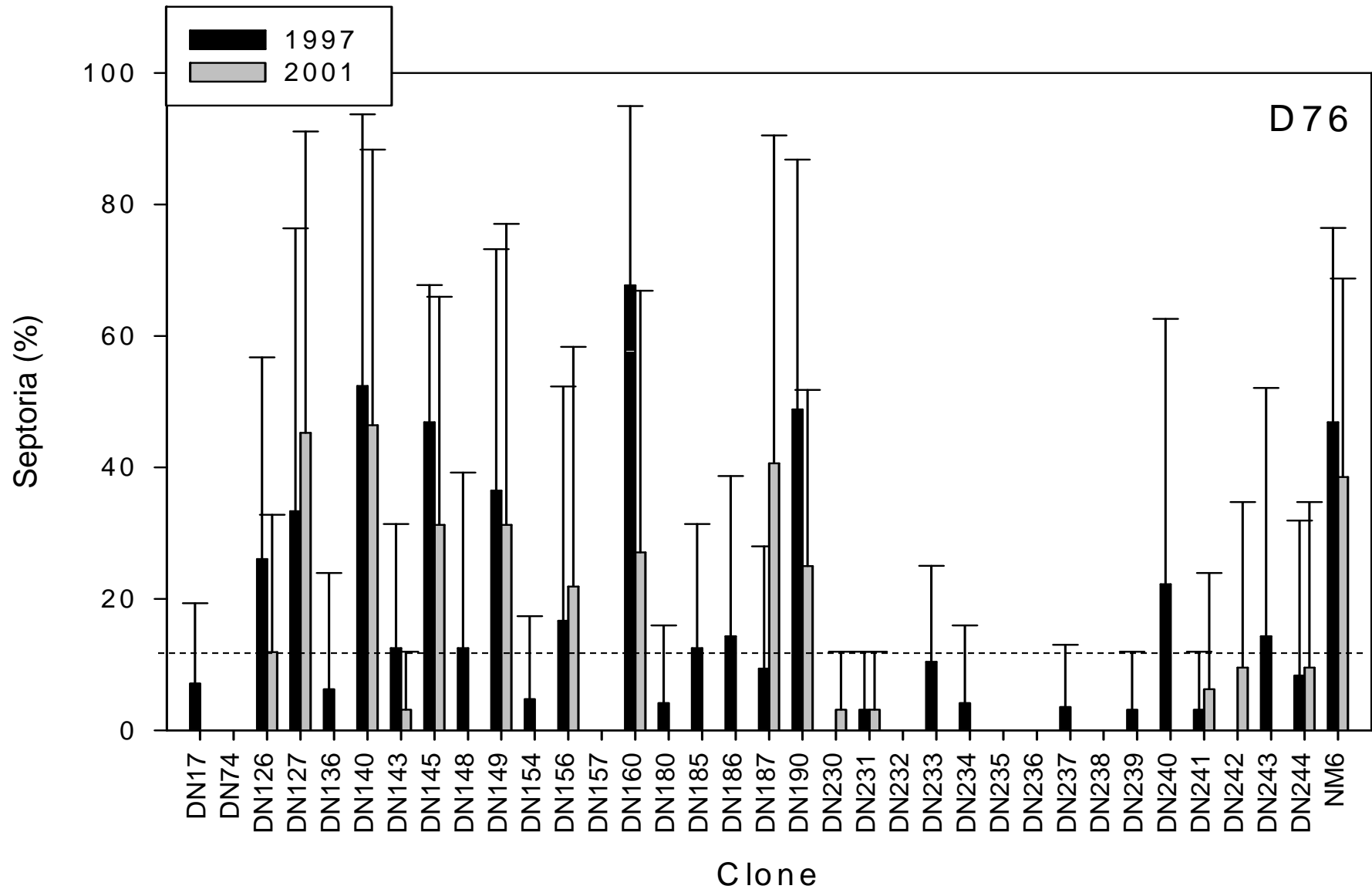
Summary- Yield

Site	> 15 m ³ ha ⁻¹ yr ⁻¹	12-15 m ³ ha ⁻¹ yr ⁻¹	Cross		Origin
D78	DN238		Belgian - 78.010/202		
		DN234	Belgian - 78.010/149		
		DN235	Belgian - 78.010/155		
		DN236	Belgian - 78.010/156		
D76	DN156		deltoides D56	x N1+2 Mixed Pop 696-34	Maple, Ontario
	NM6		nigra	x maximowiczii (cl. "Max-5")	Munden, W. Germany
		DN136	deltoides D56	x N1+2 Mixed Pop 696-13	Maple/T.Bay, Ontario
		DN143	deltoides D56	x N1+2 Mixed Pop 696-20	Maple, Ontario
		DN145	deltoides D56	x N1+2 Mixed Pop 696-22	Maple, Ontario
		DN148	deltoides D56	x N1+2 Mixed Pop 696-25	Maple/T.Bay, Ontario
		DN154	deltoides D56	x N1+2 Mixed Pop 696-32	Maple/T.Bay, Ontario
		DN230	Belgian - 78.010/27		
		DN235	Belgian - 78.010/155		
D18		DN143	deltoides D56	x N1+2 Mixed Pop 696-20	Maple, Ontario
		DN235	Belgian - 78.010/155		
		DN237	Belgian - 78.010/192		

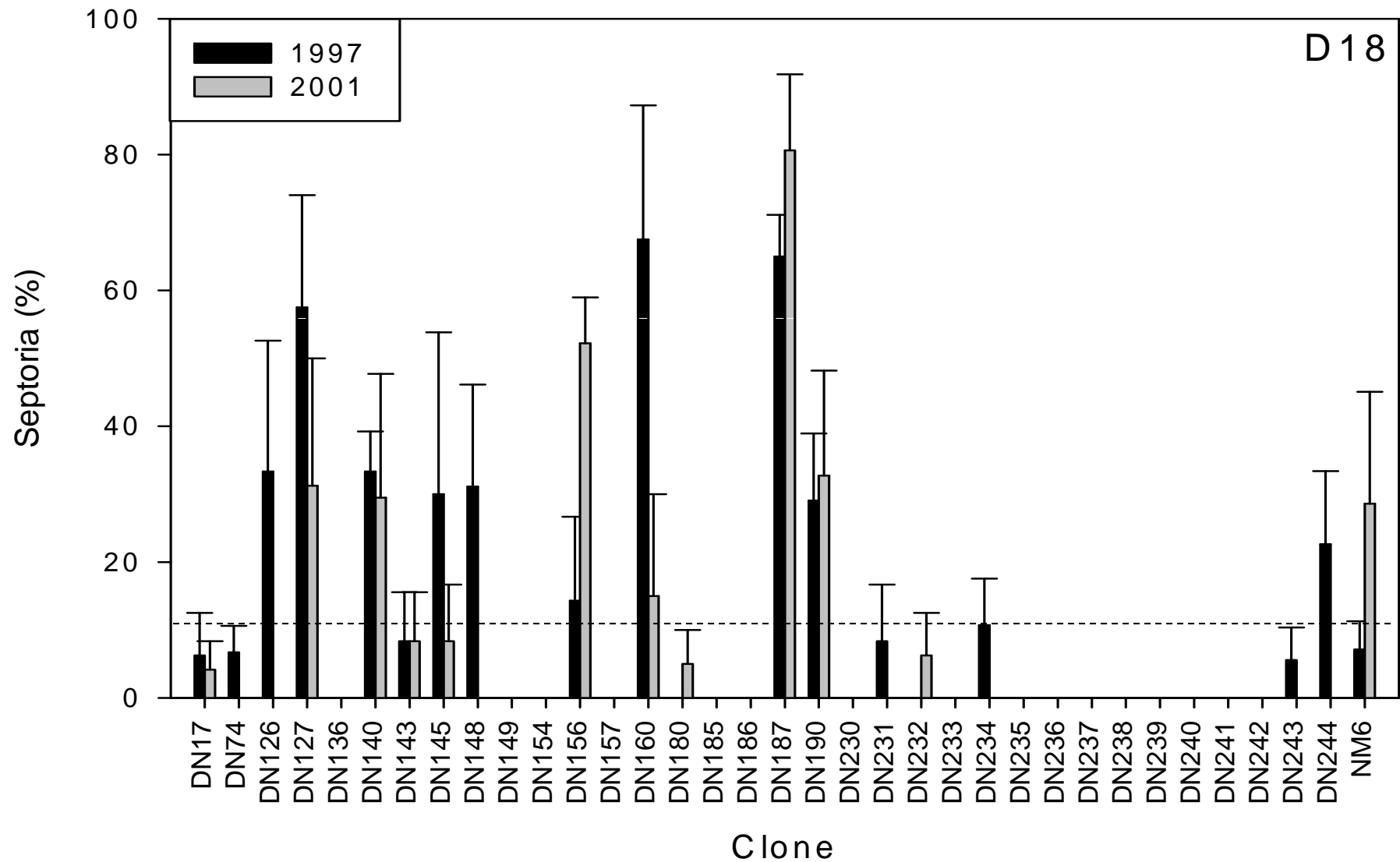
Pre-/post Ice Storm Data - Septoria



Pre-/post Ice Storm Data - Septoria



Pre-/post Ice Storm Data - Septoria



Summary –No Septoria

D78	D76	D18
DN136	DN74	DN136
DN157	DN157	DN149
DN180	DN232	DN154
DN230	DN235	DN157
DN232	DN236	DN185
DN233	DN238	DN186
DN234		DN230
DN235		DN233
DN236		DN235
DN237		DN236
DN238		DN237
		DN238
		DN239
		DN240
		DN241
		DN242

Conclusion

- Significant differences between fields
- Only one clone had yields above $12 \text{ m}^3 \text{ ha}^{-1} \text{ yr}^{-1}$ on all three sites
 - ▶ DN235
- Four clones did not suffer from *Septoria musiva* on any of the sites
 - ▶ DN157, DN235, DN236, DN238
- This is data from 1997 and 2001, but what would be the case for 2010 after 20 years of growth?
- Would the annual yields be higher or lower now?
- Are the plantations already past their peak?
- What would be the optimum harvesting age?



Questions?

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