



Climate Change and Emissions Management
(CCEMC) Corporation



Field Tour 27 May 2014

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WBAC

The Western Boreal Aspen Corporation is a not-for-profit corporation established in 1992. Its mission is to develop genetically improved aspen and support research towards achieving successful deployment to support its members fibre needs. As a secondary focus, the corporation is addressing poplar tree improvement.

MEMBERS

Ainsworth Engineered Canada LP
Daishowa-Marubeni International Inc.
Weyerhaeuser Company Limited

GROVEDALE TEST SITE

The Grovedale test site is one of 15 active WBAC test sites in Western Canada. It has been established on leased private farm land developed and managed by Ainsworth Engineered LP

CLIMATE

from Climate WNA v4.82 - decade 2001-2010

SITE	LAT°N	LONG°W	ELEV m asl	ANNUAL Climate variables							Eref	CMD
				MAP	MSP	DD>5°C	NFFD	FFP	Hargreaves reference evaporation	Hargreaves climatic moisture deficit		
Manning	56.766	117.636	570	410	272	1259	147	97	536	230		
Grovedale	55.050	119.175	665	503	333	1263	151	100	551	190		
TIC - DV	53.392	114.953	882	536	409	1232	147	96	560	112		
HASOC	55.070	119.283	720	487	322	1222	150	99	539	189		

SITE	SEASONAL Climate variables				
	Tmax_sp	Tave_sp	DD5_sp	PAS_wt	PAS_sp
Manning	7.9	1.4	169	60	29
Grovedale	9.0	2.5	175	73	39
TIC - DV	8.6	2.2	151	48	33
HASOC	8.7	2.3	165	72	38

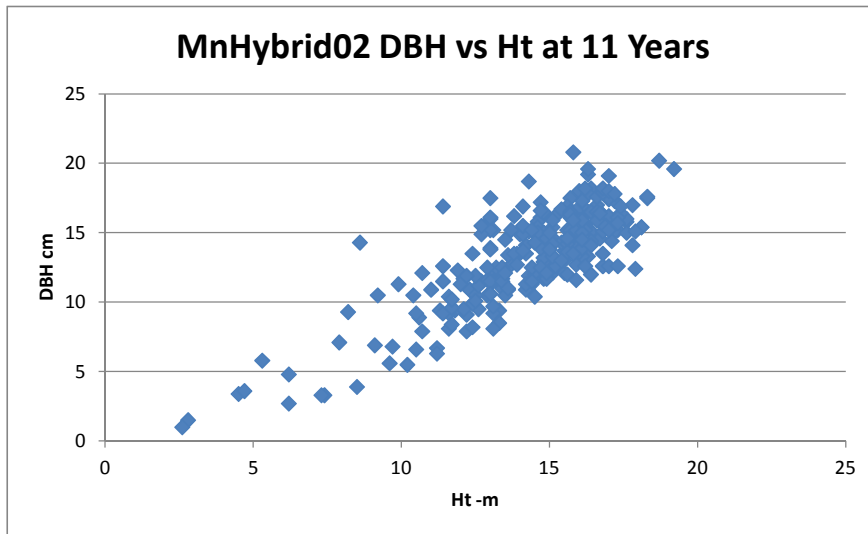
SCHEDULE

- STOP 1** Minnesota Hybrid Aspen
- STOP 2** Aspen Clone 4-81-02
- STOP 3** Canker and Shepherds crook *Entoleuca mammata* syn *Hypoxyylon mammatum* and *Venturia macularis* not serious problems
- STOP 4** Aspen Clone 10-81-02
- STOP 5** Balsam Poplar Pb Clone 4-81-08



Seedling origin hybrid crosses from Minnesota Aspen and larch Genetic Cooperative
 Six crosses of *P. tremuloides* x *P. tremula* Parents from Lake States and Europe

Figure 1. Growth of Minnesota hybrid aspen



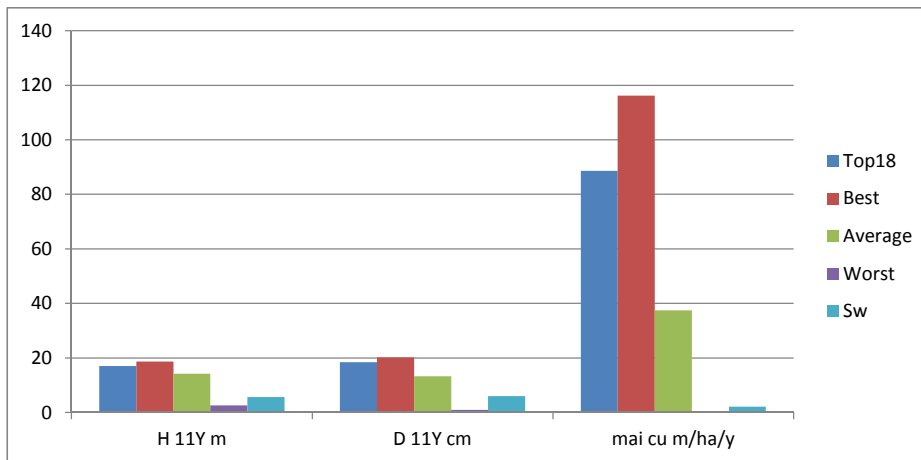
Bareroot 1/2 + 1 1/2 stock

P 2002 256 surviving of 300 planted (85% survival)

Measured May 2014 - 11 years

	H m	DBH cm	mai cu m/ha/y
Top18	17.0	18.5	88.6
Best	18.7	20.2	116.2
Average	14.2	13.2	37.5
Worst	2.6	1.0	0.04
Sw	5.7	6.0	2.1

Figure 1. Height, Diameter and Volume growth of Minnesota hybrid aspen





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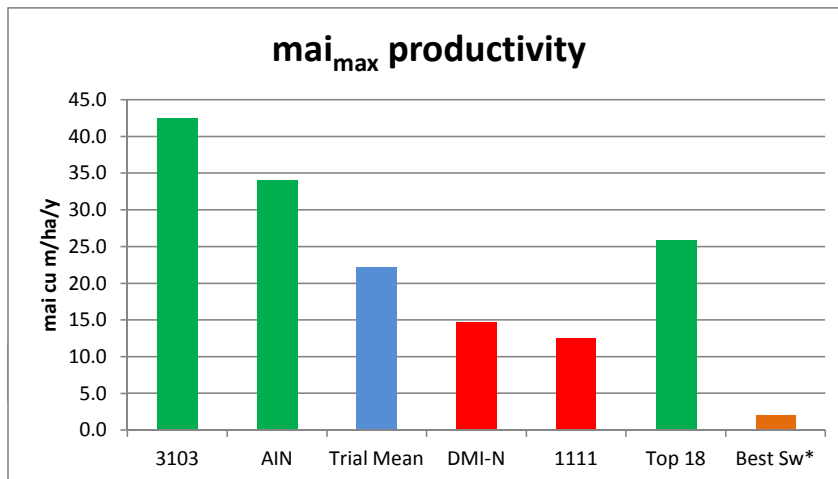
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Aspen Clone 4-81-01

Source	mai		Gain
3103	42.5	Best clone	92%
AIN	34.0	Best source	54%
Trial Mean	22.1		-
DMI-N	14.7	Worst source	-34%
1111	12.5	Worst clone	-43%
Top 18	25.8		17%
Best Sw*	2.1		-91%

Figure 3. Productivity differences for Clone 4-81-01



*From G276 Sw prov trial (CPP REG G2 Sw)
 Sw -best prov (ACC#3240, Edson AB)
 Best site (Diamond Hills)
 15Y Ht = 5.65 m
 Assume: DBH = 6 cm
 & Surv = 100%
 N = 1600 stems/ha
 mai = 2.1 cu m/ha/y



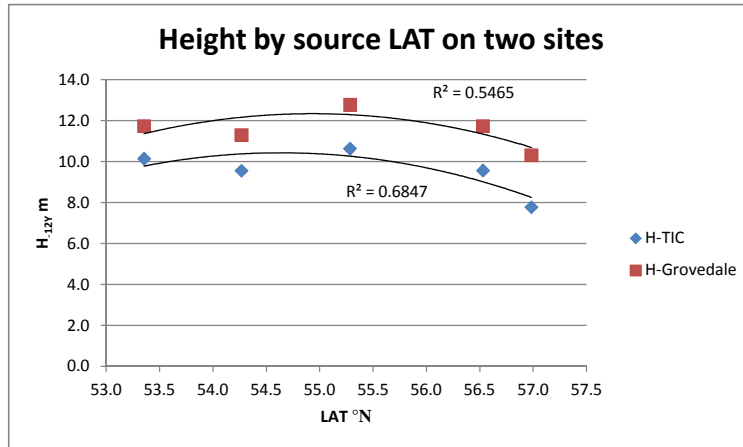
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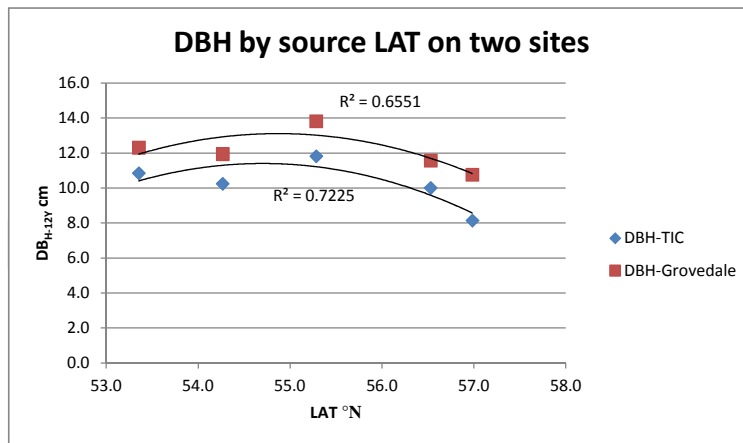
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Figure 4 12 Year Measurements for two trials

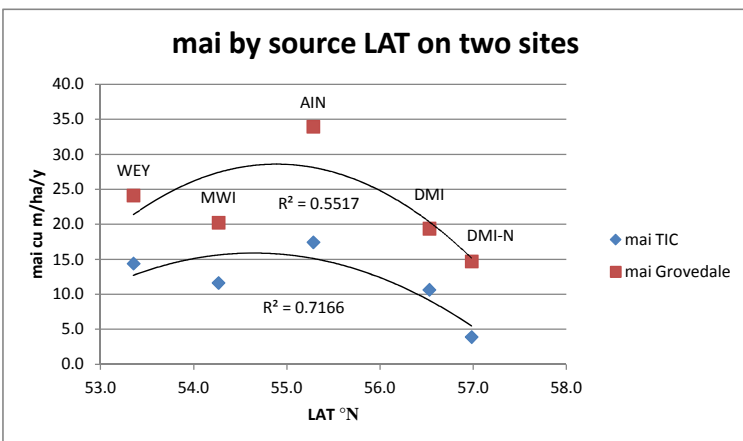
Test site Latitude:	53.4 °N	55.1 °N
Test site Elevation:	882 m	665 m
Source	Lat	H-TIC H-Grovedale
DMI	56.5	9.6 11.7
DMI-N	57.0	7.8 10.3
WEY	53.4	10.1 11.7
MWI	54.3	9.6 11.3
AIN	55.3	10.6 12.8
Mean		9.5 11.6
SD		1.082 0.891
CV%		11% 8%
Correl.		0.946
Clone 4-81-02	Grovedale	
Clone 3-31-02	TIC (Drayton Valley)	



Source	Lat	DBH-TIC DBH-Grovedale
DMI	56.5	10.0 11.6
DMI-N	57.0	8.1 10.8
WEY	53.4	10.9 12.3
MWI	54.3	10.2 11.9
AIN	55.3	11.8 13.8
Mean		10.2 12.1
SD		1.354 1.126
CV%		13% 9%
Correl.		0.945



Source	Lat	mai TIC mai Grovedale
DMI	56.5	10.7 19.4
DMI-N	57.0	3.9 14.7
WEY	53.4	14.4 24.1
MWI	54.3	11.6 20.3
AIN	55.3	17.5 34.0
Mean		11.6 22.5
SD		5.057 7.232
CV%		44% 32%
Correl.		0.919



mean annual increment (mai) is calculated using total tree height and overbark diameter at breast height. It expresses wood productivity in cubic meters per hectare per year

Note 1: Grovedale is a rich and highly productive site, on average the trees are 21% taller 18% fatter and 94% more productive than the same clones at TIC

Note 2: The CV% is higher for all three traits on the poorer site TIC. Partly because all materials are southern transfers on this site. Response to latitudinal transfer is asymmetric.



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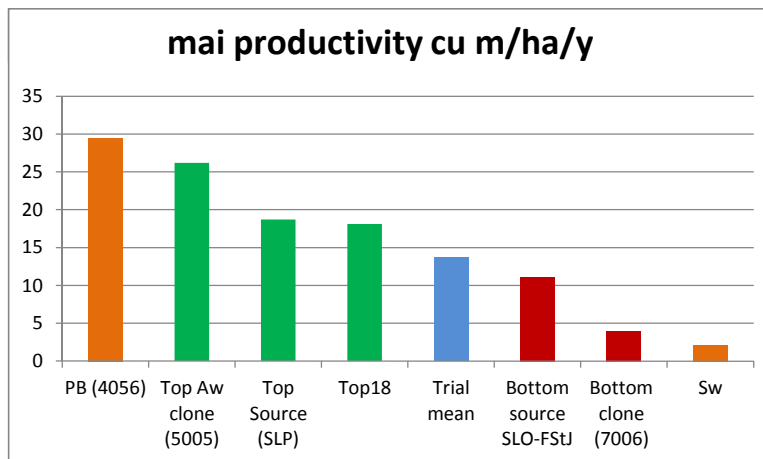


Clone10-81-02 Grovedale

Clone trial with 36 treatments from 7 sources
 RCB 5 Reps, 4 tree row plots, Sister trials at TIC and Manning
 Propagated by steckling culture

Lat-DD	Elev-m	Source	H-11Y m	D-11Y cm	mai cu m/ha/y	Gain%
53.2	972	WEY	9.2	10.0	14.3	
54.3	962	MWI	9.5	10.3	15.6	
55.0	773	AIN	9.1	9.8	14.2	
55.3	637	SLP	10.0	10.0	18.7	
55.8	553	AlPac	9.6	10.3	16.4	
56.4	804	SLO-F StJ	8.3	9.1	11.1	
56.9	740	DMI	8.5	9.2	11.3	
		Top18	9.8	10.8	18.1	33%
		Top Clone (5005)	10.8	11.6	26.2	92%
		Bottom Clone(7006)	6.8	6.5	4.0	
		PB (4056)	10.8	13.4	29.5	116%
		Trial mean	9.0	9.7	13.7	-
		Sw	5.7	6.0	2.1	

Figure 5 Productivity in selected treatments



Note best clone here is a balsam poplar.
 This stimulated our research efforts in developing rootling propagation.



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Clone 7-81-02		Grovedale 55.1°N			
Source	Latitude	h	dbh	mai	
SLO-FN	59.1	6.5	7.0	5.2	southern transfer
DMI	57.1	8.0	8.8	10.0	southern transfer
SLP	55.3	8.3	9.2	11.4	southern transfer
AIN	54.8	8.4	9.6	12.5	local
MWI	54.2	8.5	10.6	15.4	northern transfer
WEY	53.2	9.2	10.5	16.4	northern transfer
Stocking 1111 sph					
Trial mean		8.4	9.5	11.6	Volume
Survival 68%					Realized gain
Top 18 clones		9.3	10.9	17.3	49%

Figure 6 Productivity of six aspen provenances on three test sites

Clone 6-10-02

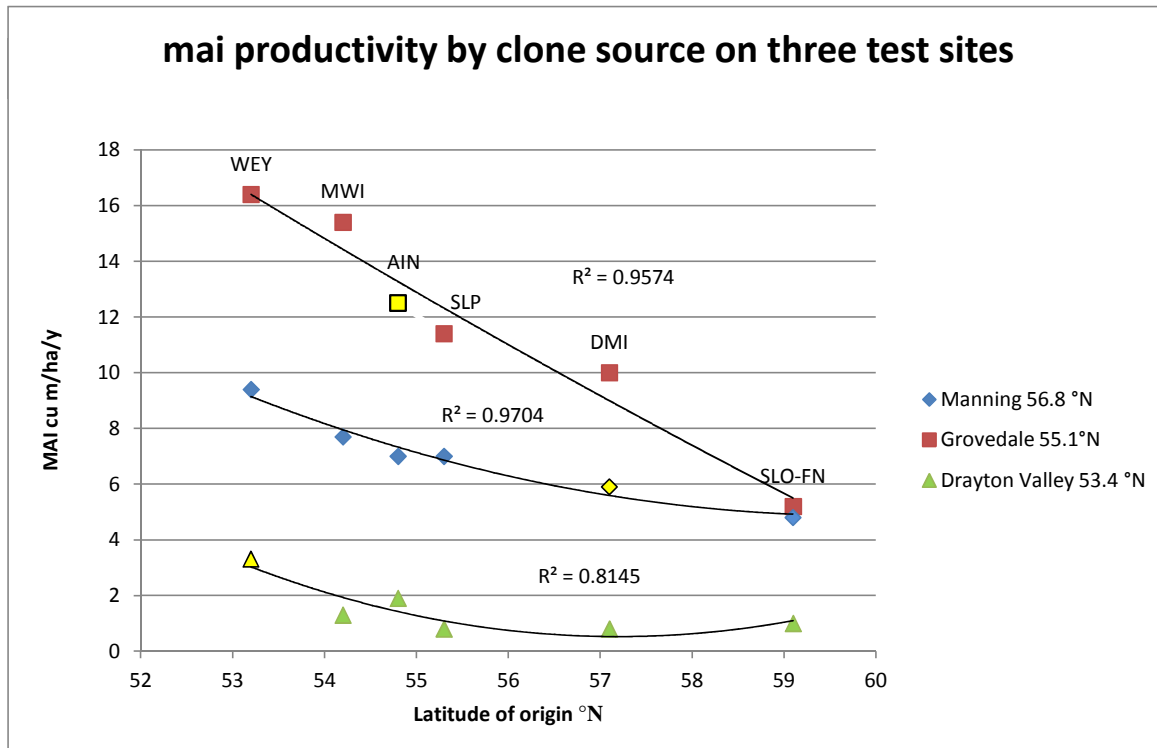
Manning 56.8 °N

Clone 7-81-02

Grovedale 55.1°N

Clone 5-31-02

Drayton Valley 53.4°N



Yellow filled markers are the local source

Note: No rank order changes across sites



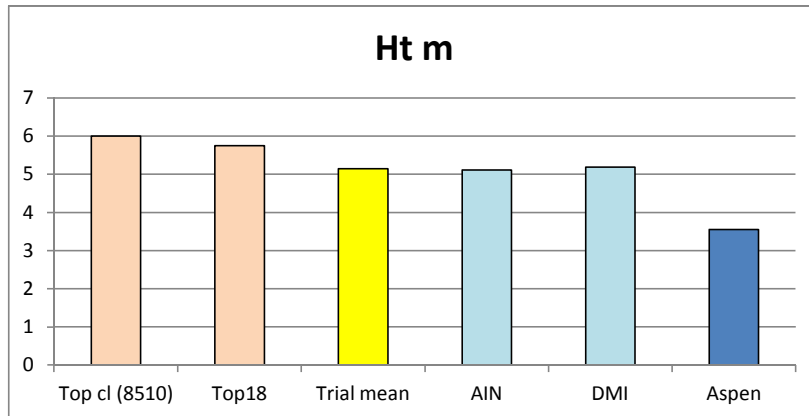
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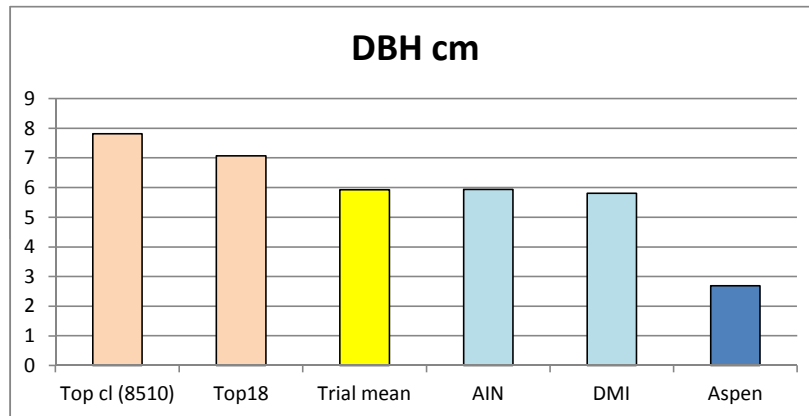


Figure 7 Pb Clone 04-81-08 Balsam Poplar 5 year growth

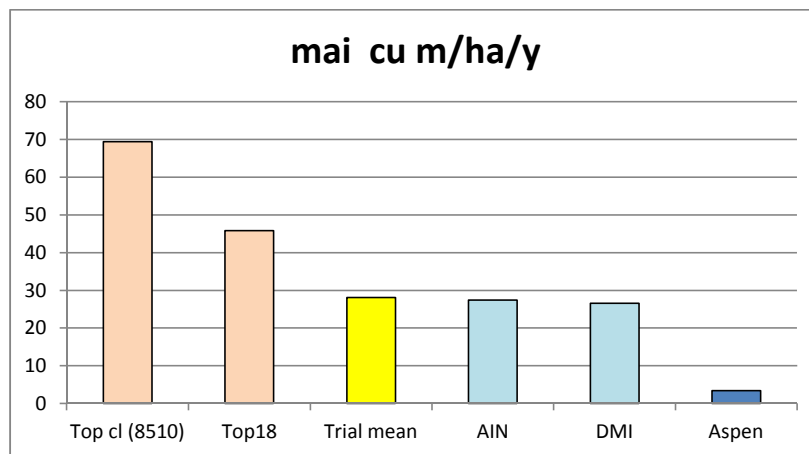
Treatment	Ht m
Top cl (8510)	6.0
Top18	5.7
Trial mean	5.1
AIN	5.1
DMI	5.2
Aspen	3.6



Treatment	DBH cm
Top cl (8510)	7.8
Top18	7.1
Trial mean	5.9
AIN	5.9
DMI	5.8
Aspen	2.7



Treatment	mai cu m/ha/y
Top cl (8510)	69.4
Top18	45.8
Trial mean	28.1
AIN	27.4
DMI	26.6
Aspen	3.4



60 treats: 4 DMI, 53 AIN, 2 AW1 aspen clones, 1 filler, Alpha design 9 reps, single tree plots (10 alpha blocks, 6 treats per block)
540 trees + 1 row of surrounds