The Search for Grey Poplar Clones That Propagate Easily

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PARIS

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Why Hardwood Cuttings?

Hardwood cuttings @ 16¢

Rooted cuttings @ 24¢

Containerized steckling @ 47¢

More Roots…Fewer Roots…

- The time of year the cutting is collected – environmental preconditioning.
- Position along the parent shoot from which the cutting was taken.
- Diameter and length of the cutting.
- Conditions under which the cutting was stored prior to planting.
- Pretreatment of the cutting (*e.g.* soaking or treating with rooting hormones).
- Date of field planting and method of planting.
- Soil conditions (*e.g.* moisture and temperature) following planting.
- Clonal variation and genetic interaction with any or all of the above factors.

Better Rooting…
Lower Cost

I could be saving 37% to 44% of my planting costs, if only I had more roots!
You know, like 83XAA04
"***plures radices fecit***"

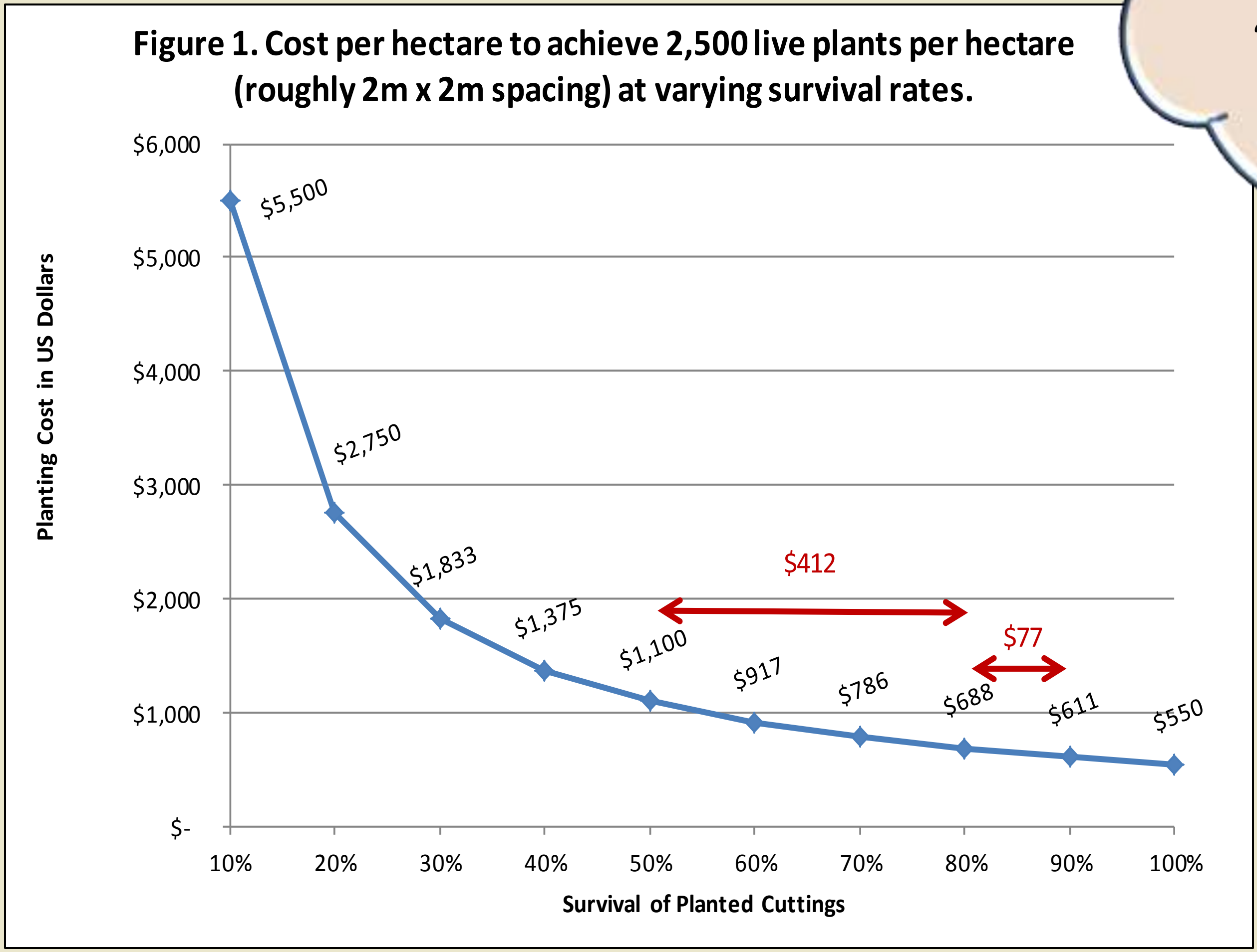
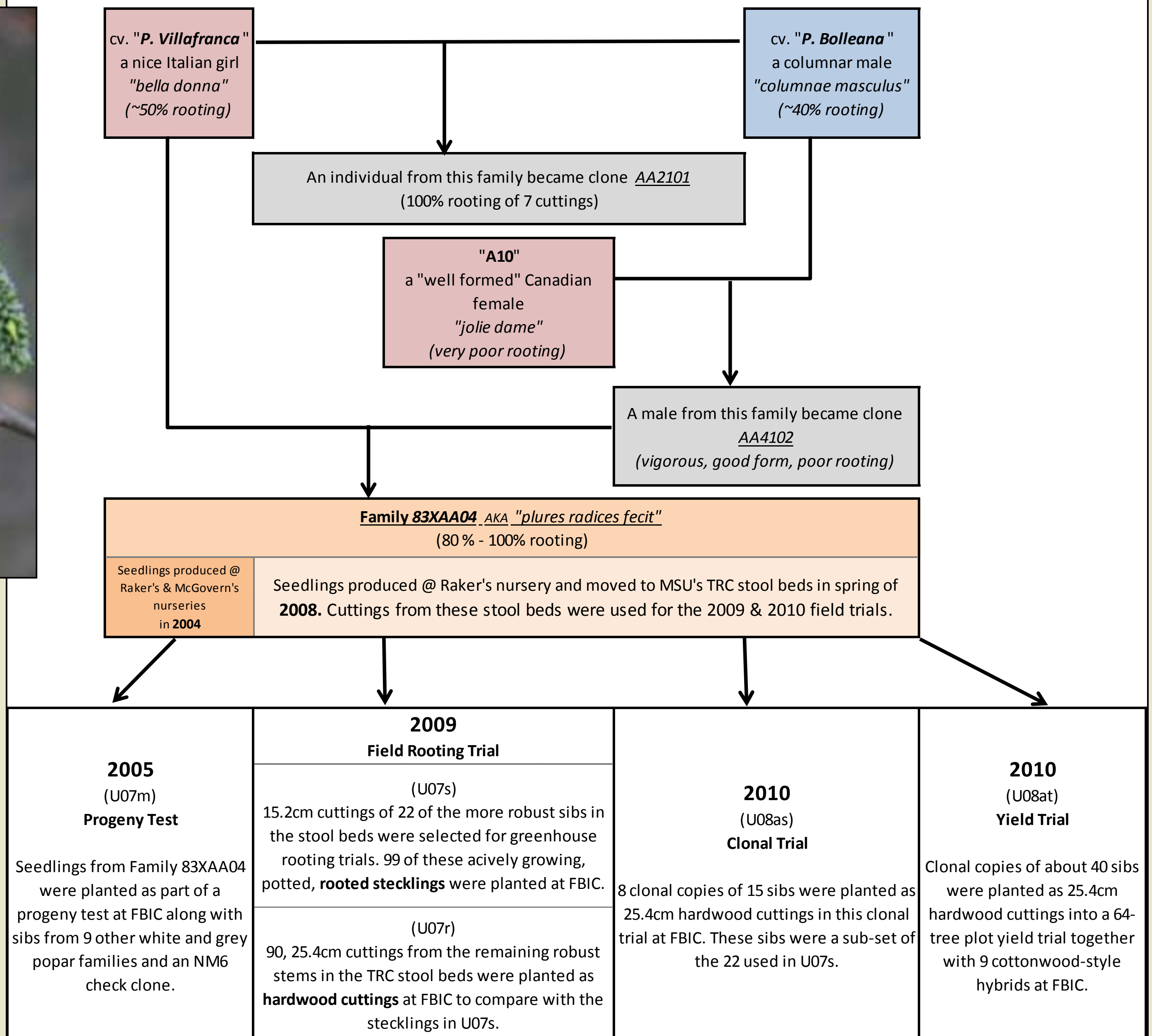
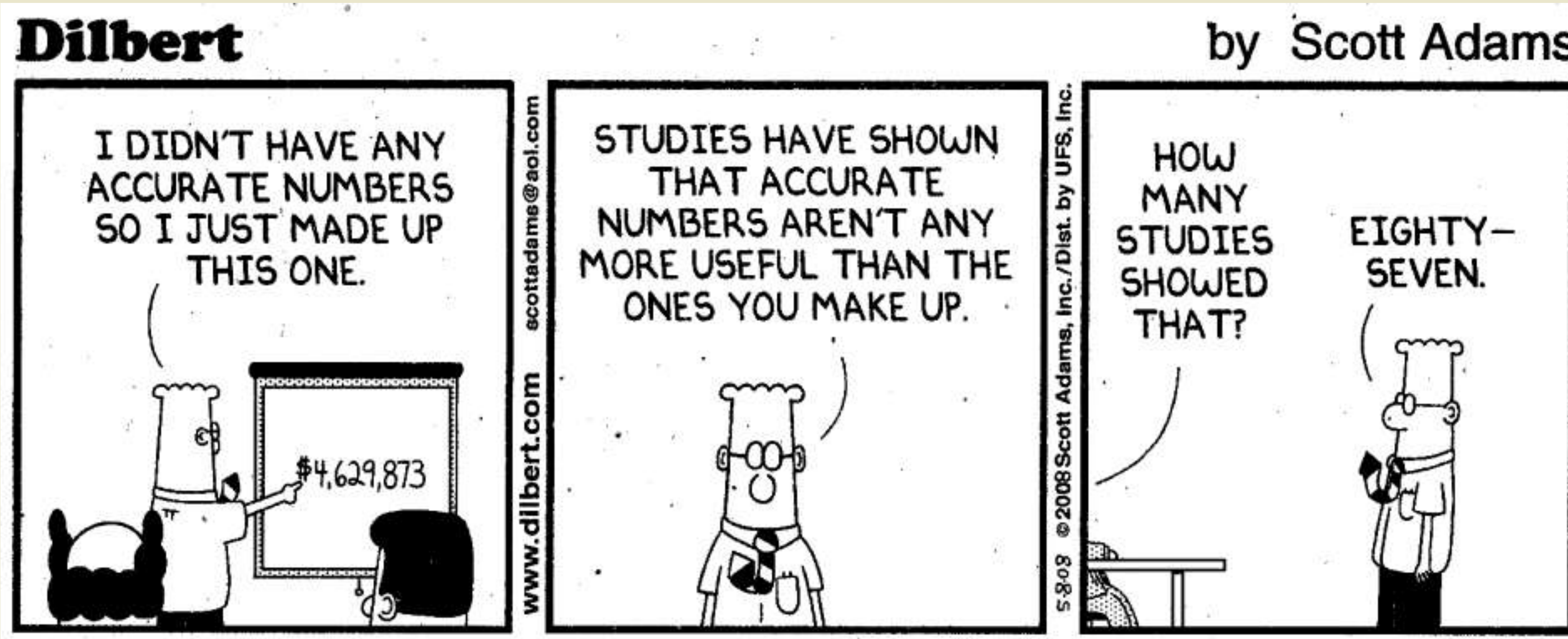


Figure 2. The development and testing of a hybrid of *Populus alba* whose hardwood cuttings exhibit the ability to reliably root and grow well under field conditions.

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HOW MANY STUDIES SHOWED THAT?
EIGHTY-SEVEN.

2005 Progeny Test

Table 1. Lineage of families included in a 2005, full-sib progeny test in Escanaba, Michigan, USA		
McGovern Family ID	**Female Parent (McGovern ID)**	**Male Parent (McGovern ID)**
1XTE04	P. tremuloides (clone 5)	P. tremula (ta-4-83)
2XT4E04	P. tremuloides (clone 5)	P. tremula (ta10)
18XAG04	P. alba (aa4101)	P. grandidentata (gg101)
17XGA04	P. grandidentata (gg102)	P. alba (aa4102)
80XAA04	P. alba (aa2301)	P. alba (aa4102)
81XAA04	P. alba (aa3201)	P. alba (aa4102)
82XAA04	P. alba (aa901)	P. alba (aa4102)
83XAA04	P. alba (a502)	P. alba (aa4102)
84XAA04	P. alba (aa3001)	P. alba (aa4102)
85XAA04	P. alba (aa4101)	P. alba (aa4102)
NM6	P. nigra	P. maximowiczii

Table 2. Average performance of 10 full-sib poplar families and one poplar check clone in a 2005 progeny test in Escanaba, MI, USA after 9 growing seasons.

Family ID	**Survival**	**Number of Stems**	**Basal Area per Stool**	
			ft^2	**m^2**
83XAA04 †	100%	2.4	0.368	0.0342a
80XAA04 †	92%	1.6	0.289	0.0268b
84XAA04 †	88%	1.8	0.240	0.0223b
NM6	96%	1.1	0.240	0.0223b
81XAA04 †	79%	1.5	0.231	0.0215b
82XAA04 †	96%	1.9	0.230	0.0214b
18XAG04	100%	1.6	0.163	0.0151c
17XGA04 †	94%	1.7	0.133	0.0124c
1XTE04	67%	1.5	0.087	0.0081c
2XT4E04	25%	2.0	0.074	0.0069c
85XAA04 †	29%	1.0	0.047	0.0044c

Family IDs followed by the symbol † have the same father. Basal area means followed by the same letter are not significantly different from one another.

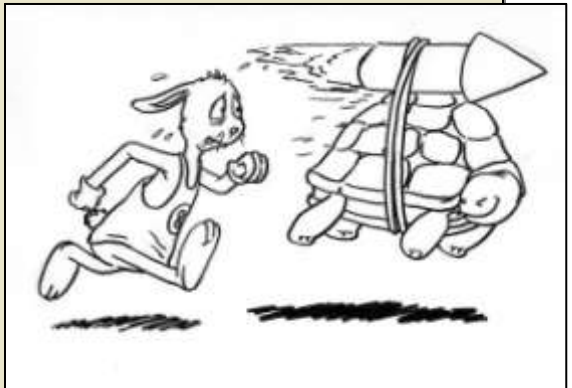


Figure 3. Single-stool Basal Area of a *P. alba* Family (83XAA04) and an NM6 Check Clone in a Progeny Test in Escanaba, Michigan, USA

Solid lines show total basal area, dashed lines show the trend in annual Basal Area Increment (BAI).
Actual BAI of *P. alba* i

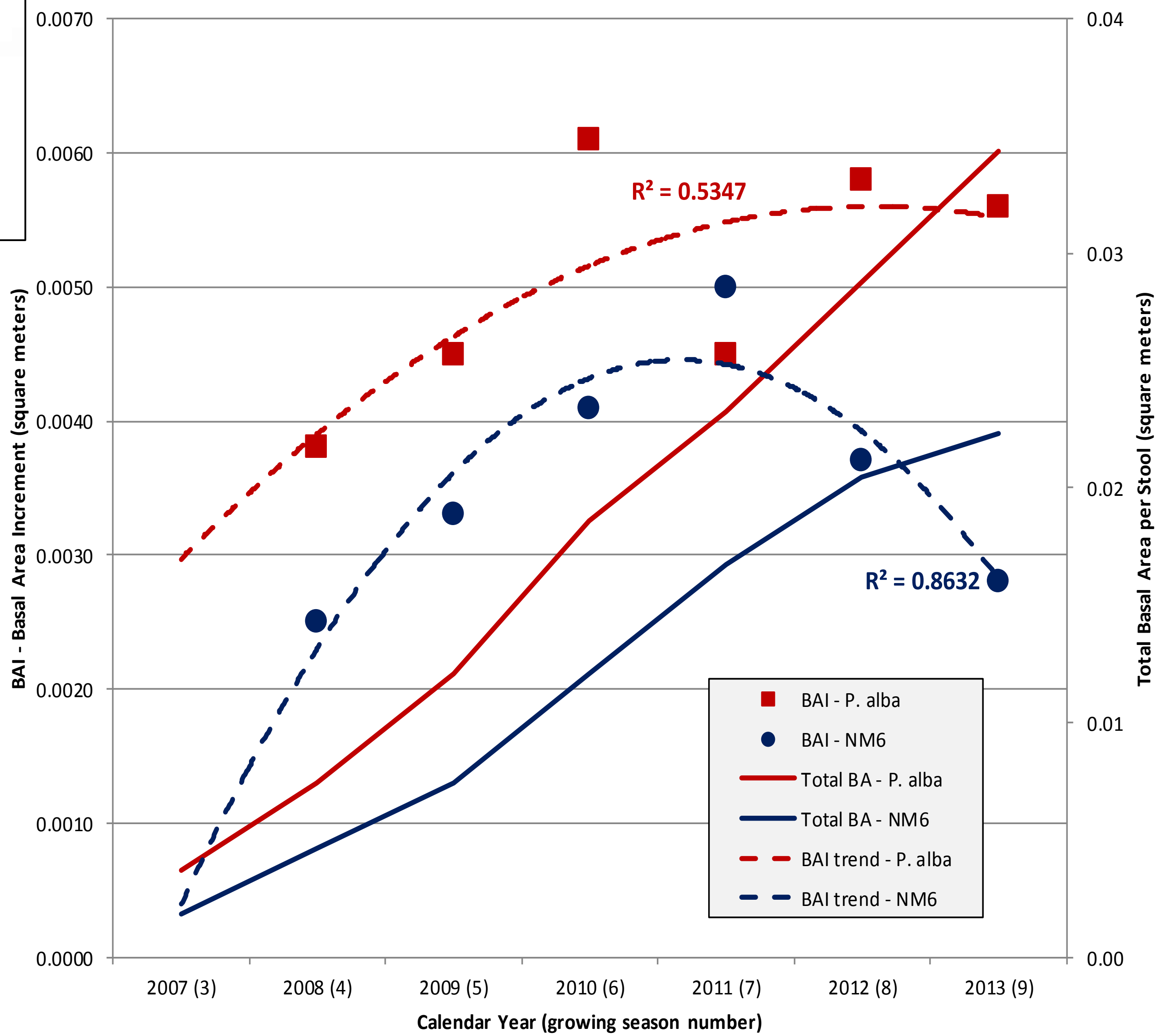


Table 3. Comparison of Steckling & Cutting origin white poplar trees (clones of about 50 sibs from one full-sib family) in two 0.04 hectre plots in Escanaba, Michigan, USA after five growing seasons.		
Attrribute	Stecklings	Cuttings
Age 2 stool survival	94%	79%
Age 2 Stem Height (m)	2.6	2.1
Age 5 stool survival	90%	77%
Age 5 # stems/stool	1.4	1.5
Age 5 Stem Height (m)	7.0	6.2
Age 5 Stem DBH (cm)	6.6	6.1
Age 5 Basal Area (m^2/hectare)	8.2	7.0
Age 5 Biomass (dry Mg/hectare)	13.7	11.9
Field Planting Date	*6/19/2009*	*5/15/2009*
Planting Stock	*1m-tall potted plants*	*25.4cm hardwood cuttings*

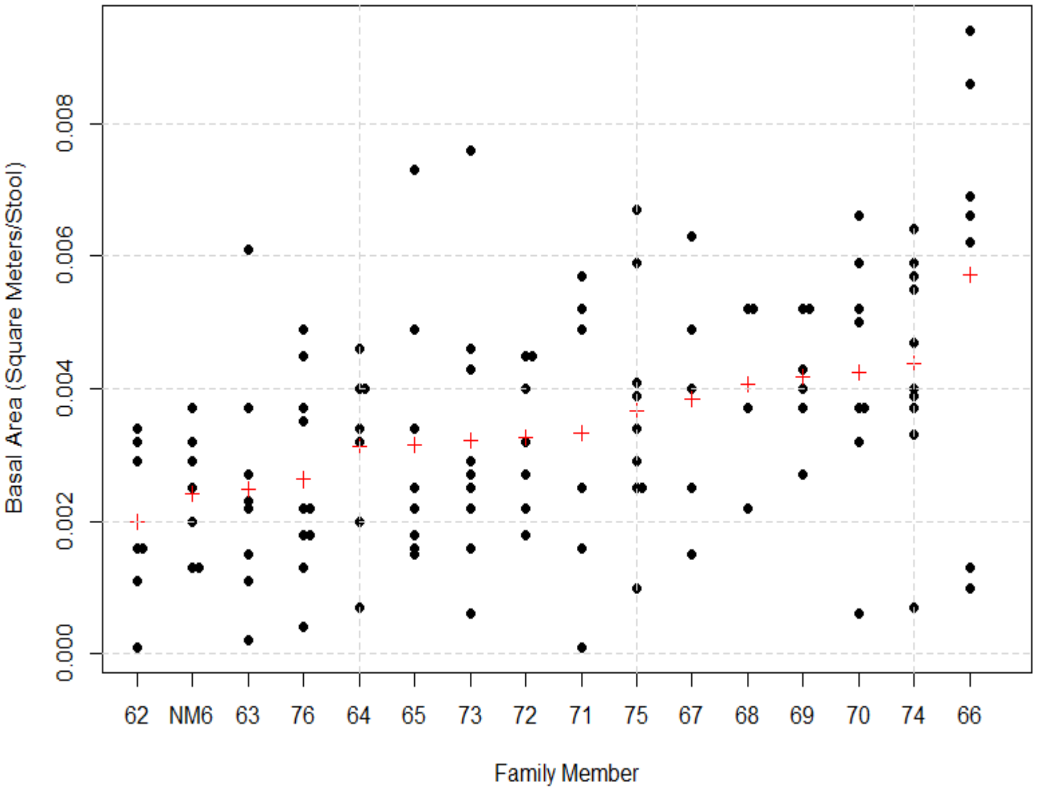
2009 Rooting Trial

2010 Clonal Trial

Table 4. Performance of 15 white poplar family (83XAA04) members relative to a commercial check clone of NM6 in a clonal trial in Escanaba, Michigan, USA after four growing seasons. Each family member was represented by 8 clonal copies in the trial.

Clone ID	*Number of stems per Stool*	*Basal Area (m^2/stool)*	*Tallest stem (m)*	*Survival*
66	1.7	0.0058	6.52	88%
74	1.7	0.0044	6.52	100%
69	1.0	0.0042	6.68	75%
70	1.3	0.0042	6.46	100%
68	1.3	0.0041	6.37	50%
67	1.2	0.0038	6.25	63%
75	1.3	0.0036	6.10	100%
71	1.5	0.0033	5.39	75%
72	1.3	0.0033	6.77	88%
73	1.2	0.0033	5.97	100%
64	1.1	0.0032	6.43	88%
65	1.0	0.0032	5.82	100%
76	1.4	0.0027	4.97	100%
63	1.3	0.0025	5.88	100%
62	1.0	0.0020	5.43	88%
Alba Avg.	**1.3**	**0.0036**	**6.10**	**88%**
NM6	**1.0**	**0.0024**	**5.06**	**88%**

Figure 4. Variation in basal area per stool among clonal copies of 15 full-sibs of Populus alba family 83xAA04 after 4 growing seasons in a clonal trial in Escanaba, Michigan, USA



2010 Yield Trial

Table 5. Performance of 10 poplar clones after 4 growing seasons in a 64-tree plot yield trial in Escanaba, Michigan, USA.

Clone ID	Survival	Basal Area per Stool	Basal Area per Unit Area		Predicted Dry Biomass Production	
		(m^2)	(ft^2/acre)	(m^2/ha)	(tons/acre)	(Mg/ha)
NM6	100%	0.0024	20.5	4.7	4.4	9.9
NRRI-1	98%	0.0022	18.3	4.2	3.9	8.7
DN164	94%	0.0023	18.1	4.2	3.9	8.7
NRRI-2	100%	0.0022	18.2	4.2	3.8	8.5
NRRI-3	96%	0.0022	18.0	4.1	3.8	8.5
NRRI-4	92%	0.0020	15.2	3.5	3.2	7.2
ALBA	90%	0.0015	11.4	2.6	2.3	5.2
DN170	54%	0.0023	10.5	2.4	2.2	4.9
DN177	54%	0.0016	7.4	1.7	1.5	3.4
NRRI-5	90%	0.0008	5.6	1.3	1	2.2
Top 4 NRRI	*96%*	*0.0022*	*17.4*	*4.0*	*3.7*	*8.2*

Conclusions

- **83XAA04 is an excellent biomass producer.**
  83XAA04 survived and grew as well as or better than NM6 in both the 2005 progeny test and the 2010 clonal trial. Indications from these tests are that it may exceed the productivity of NM6 in time. It did not perform as well as NM6 in the 2010 yield trial. This discrepancy has not been adequately explained and bears further investigation.

- **83XAA04 will cost no more than commercial poplar to establish.**
  83XAA04 hardwood cuttings root and survive at rates of 80% to 100% when planted directly in the field. This is comparable to many current commercial taxa that arise from *P. deltoides*, *P. nigra*, and *P. maximowiczii* parents. This suggests that there can be parity in establishment costs between the older "cottonwood" and newer *P. alba* clones.

- **Clones of 83XAA04 are variable.**
  Variation within certain 83XAA04 clonal lines appears to exceed that of NM6 which bears further examination. It is not clear if this variation will be a benefit or detriment to SRE plantation systems.

- **More work is needed to find native poplars for SRE plantations.**
  Hybrids containing native "aspens" grew poorly compared to the pure *P. alba* hybrids in our 2005 progeny trial. Those containing *P. tremuloides* "Clone 5" survived and grew especially poorly. Since it is desirable to include some of the favorable characteristics of the native poplars (*e.g.* range of site adaptability and resistance to pests) in future SER plantation taxa, continued interbreeding with superior *P. alba* family members identified here and subsequent field testing is recommended. It may be possible to combine some of the native poplar traits with the growth and rooting ability of these new hybrids to yield truly elite taxa for future SRE plantations.

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and me,

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…along with numerous admiring colleagues