Supplementary Figures

P. deltoides × P. deltoides

——— Log. (2500 tree ha-1)   – – – Log. (5000 tree ha-1)

$y = 11.312\ln(x) - 1.0331$
$R^2 = 0.9772$

$y = 7.0935\ln(x) - 0.8247$
$R^2 = 0.9683$

MAI of stem biomass (Mg ha-1)

Stand age (years)

P. trichocarpra × P. deltoides / P. deltoides × P. maximowiczii

– – – Log. (5000 tree ha-1)   ——— Log. (2500 tree ha-1)

$y = 6.6581\ln(x) + 0.6905$
$R^2 = 0.9295$

$y = 5.158\ln(x) - 0.3704$
$R^2 = 0.9634$
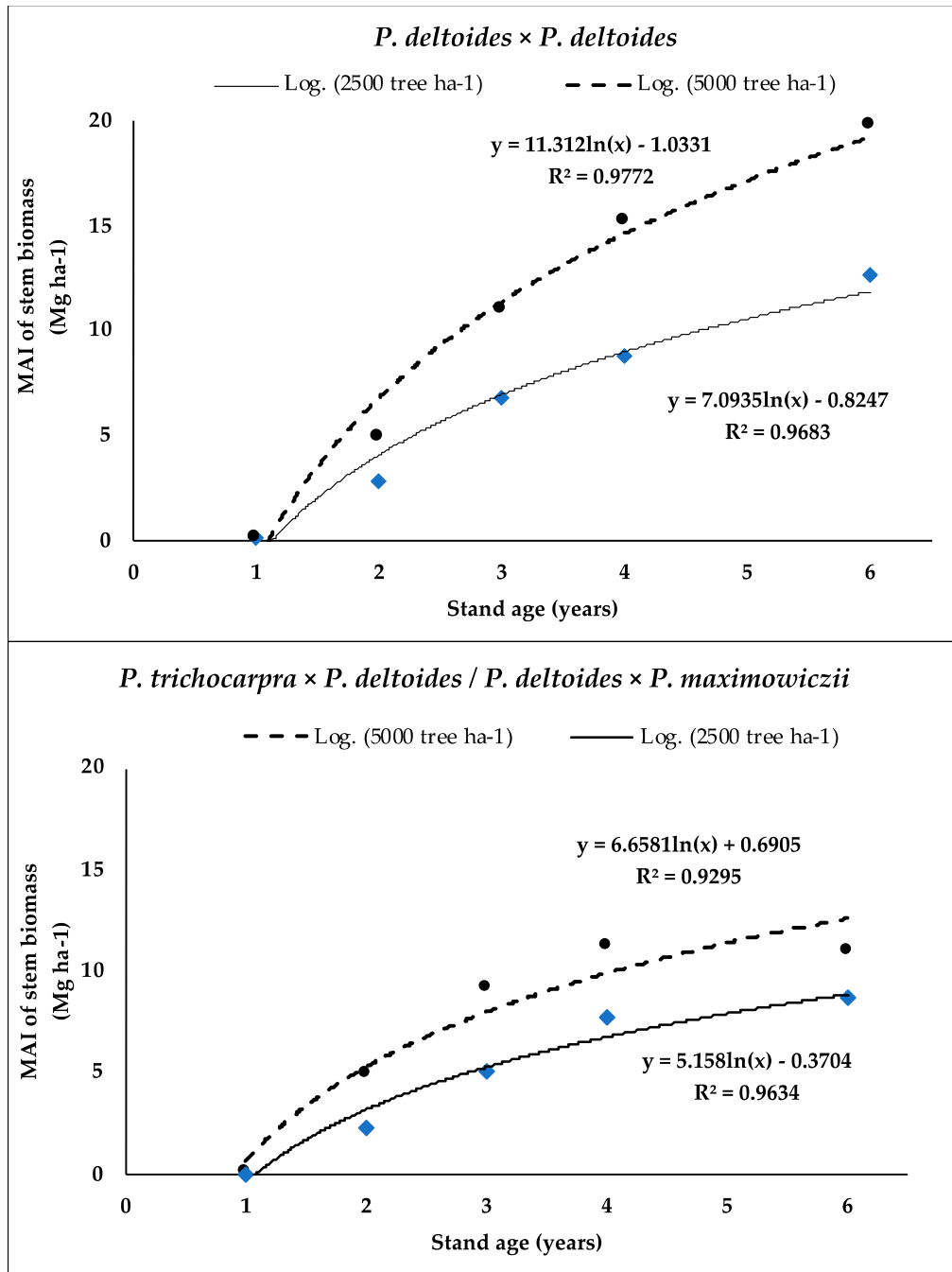
MAI of stem biomass (Mg ha-1)

Stand age (years)

Figure S1. Mean annual increment (MAI, Mg ha^{-1}) of green stem biomass versus stand age at Clinton A

and Clinton B (in the Coastal region of North Carolina, USA) during the first six years of growth
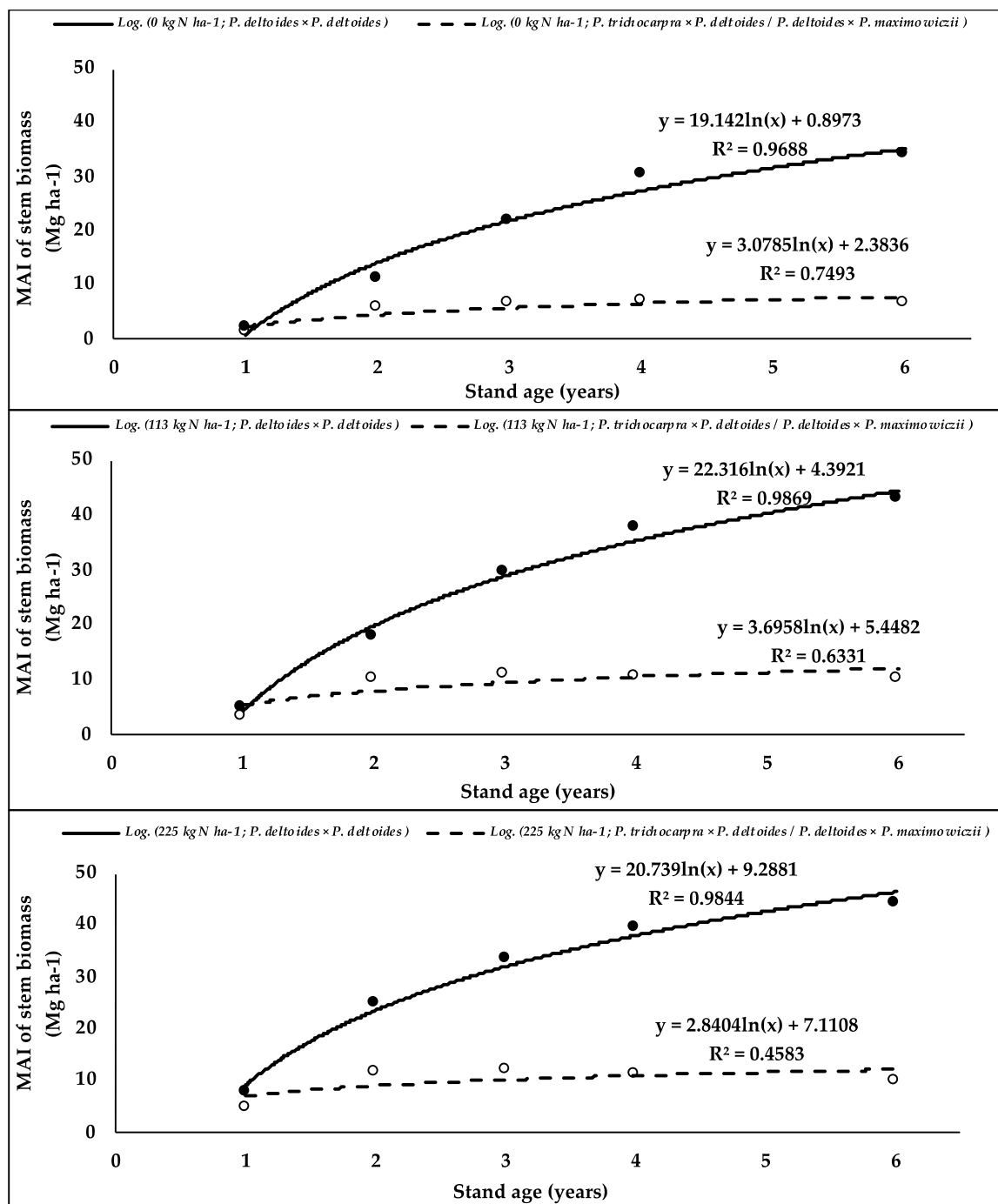
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Figure S2. Mean annual increment (MAI, Mg ha⁻¹) of green stem biomass versus stand age at Williamsdale site in North Carolina, during the first six years of growth

Supplementary Tables

Table S1. Results of analyses of variance for stem biomass (green) of poplar clones established at two stand densities with three fertilization rates at Clinton A, Clinton B, and Williamsdale (in the Coastal region of North Carolina, USA) after six years of growth ($\alpha = 0.05$).

Effect	DF	Clinton A		Clinton B		Williamsdale	
		F Value	*P value*	*F Value*	*P value*	*F Value*	*P value*
Stand Density	1	8.53	0.0054	12.35	0.001	7.73	0.0083
Fertilization Rate	2	1.85	0.1689	0.69	0.5061	10.09	0.0003
Clone	3	12.97	<.0001	10.11	<.0001	55.63	<.0001
Stand Density*Fertilization Rate	2	1.69	0.1962	1.37	0.265	0.48	0.6253
Stand Density*Clone	3	0.61	0.6096	1.07	0.3698	3.24	0.0322
Fertilization Rate*Clone	6	0.61	0.7249	0.24	0.9607	2.06	0.0799
Stand Density*Fertilization Rate*Clone	6	0.34	0.9131	1.33	0.2639	3.35	0.0093

P values lower than $\alpha = 0.05$ are significant

Table S2. Results of analyses of variance for site effects and interaction on stem biomass (green) of poplar clones established at two stand densities with three fertilization rates at Clinton A, Clinton B, and Williamsdale (in the Coastal region of North Carolina, USA) after six years of growth ($\alpha = 0.05$).

Effect	DF	*F Value*	*P value*
Site	1	2.39	0.1254
Site*Stand density	3	0.03	0.8577
Site*Fertilizer Rate	1	0.38	0.6821
Site*Clone	3	0.57	0.6375
Site*Stand density*Clone	2	0.66	0.5775
Site*Fertilizer Rate*Clone	6	0.48	0.8182
Site*Stand density*Fertilizer Rate	2	2.06	0.1332
Site*Stand density*Fertilizer Rate*Clone	6	0.95	0.4624

P values lower than $\alpha = 0.05$ are significant

Table S3. Results of analyses of variance for LAI of poplar clones during the second year of growth. The stands were established at two stand densities with three fertilization rates at three sites in the Coastal region of North Carolina, USA (Clinton A, Clinton B, and Williamsdale; $\alpha = 0.05$).

Effect	DF	Type III SS	Mean Square	F Value	P value [a]
Site	2	29.50	14.75	65.93	<.0001
Stand Density	1	2.38	2.16	10.65	0.0012
Site*Stand Density	2	7.24	3.62	16.18	<.0001
Clone	3	28.24	9.41	42.07	<.0001
Site*Clone	6	12.99	2.16	9.68	<.0001
Stand Density*Clone	3	2.10	0.70	3.14	0.0248
Site*Stand Density*Clone	6	0.74	0.12	0.55	0.7678
Fertilization	2	38.98	19.49	87.11	<.0001
Site*Fertilization	4	7.26	1.81	8.12	<.0001
Stand Density*Fertilization	2	1.54	0.77	3.44	0.0325
Site* Stand Density*Fertilization	4	20.79	5.19	23.23	<.0001
Fertilization*Clone	6	2.23	0.37	1.67	0.1265
Site*Fertilization*Clone	12	2.05	0.17	0.77	0.6868
Stand Density*Fertilization*Clone	6	0.37	0.06	0.28	0.9461
Site*Density*Fertilization*Clone	12	4.95	0.41	1.85	0.0379

[a] P values lower than $\alpha = 0.05$ are significant

Table S4. Results of analyses of variance for foliar nitrogen (%) of poplar clones during the second year of growth. The stands were established at two stand densities with three fertilization rates at three sites in the Coastal region of North Carolina, USA (Clinton A, Clinton B, and Williamsdale; $\alpha = 0.05$).

Effect	DF	Type III SS	Mean Square	F Value	P value [a]
Site	2	9.66	4.83	103.13	<.0001
Stand Density	1	0.02	0.02	0.59	0.4443
Site*Stand Density	2	0.70	0.35	7.55	0.0006
Clone	3	3.13	1.04	22.26	<.0001
Site*Clone	6	1.05	0.17	3.77	0.0011
Stand Density*Clone	3	0.67	0.22	4.77	0.0027
Site*Stand Density*Clone	6	0.60	0.10	2.16	0.0453
Fertilization	2	0.31	0.15	3.38	0.0347
Site*Fertilization	4	1.71	0.42	9.16	<.0001
Stand Density*Fertilization	2	1.67	0.83	17.87	<.0001
Site* Stand Density*Fertilization	4	3.08	0.77	16.46	<.0001
Fertilization*Clone	6	1.09	0.18	3.90	0.0008
Site*Fertilization*Clone	12	1.04	0.08	1.86	0.0364
Stand Density*Fertilization*Clone	6	0.69	0.11	2.47	0.0227
Site* Density*Fertilization*Clone	12	1.53	0.12	2.72	0.0013

[a] P values lower than $\alpha = 0.05$ are significant

Table S5. Results of analyses of variance for *Melampsora* (rust) presence on poplar clones during the second year of growth. The stands were established at two stand densities with three fertilization rates at three sites in the Coastal region of North Carolina, USA ($\alpha = 0.05$).

Effect	DF	Type III SS	Mean Square	F Value	P value [a]
Site	2	66.06	33.03	224.86	<.0001
Stand Density	1	0.02	0.02	0.14	0.7090
Site*Stand Density	2	0.64	0.32	2.19	0.1123
Clone	3	2.00	0.66	4.55	0.0036
Site*Clone	6	0.85	0.14	0.97	0.4468
Stand Density*Clone	3	2.46	0.82	5.59	0.0009
Site*Stand Density*Clone	6	1.54	0.25	1.75	0.1066
Fertilization	2	0.47	0.23	1.62	0.1994
Site*Fertilization	4	0.86	0.21	1.47	0.2091
Stand Density*Fertilization	2	0.71	0.35	2.44	0.0883
Site* Stand Density*Fertilization	4	1.35	0.33	2.31	0.0566
Fertilization*Clone	6	1.26	0.21	1.44	0.1977
Site*Fertilization*Clone	12	3.26	0.27	1.85	0.0372
Stand Density*Fertilization*Clone	6	0.64	0.10	0.74	0.6201
Site* Density*Fertilization*Clone	12	3.06	0.25	1.74	0.0553

[a] *P* values lower than $\alpha = 0.05$ are significant

Table S6. Results of analyses of variance for *Chrysomela scripta* Fabricius damage presence on poplar clones during the second year of growth. The stands were established at two stand densities with three fertilization rates at three sites in the Coastal region of North Carolina, USA ($\alpha = 0.05$).

Effect	DF	Type III SS	Mean Square	F Value	P value [a]
Site	2	0.42	0.21	0.99	0.3725
Stand Density	1	4.40	4.40	20.60	<.0001
Site*Stand Density	2	2.22	1.11	5.22	0.0056
Clone	3	2.21	0.73	3.45	0.0163
Site*Clone	6	3.76	0.62	2.94	0.0077
Stand Density*Clone	3	2.01	0.67	3.14	0.0248
Site*Stand Density*Clone	6	8.97	1.49	7.00	<.0001
Fertilization	2	3.90	1.95	9.14	0.0001
Site*Fertilization	4	1.72	0.43	2.02	0.0895
Stand Density*Fertilization	2	1.10	0.55	2.59	0.0758
Site* Stand Density*Fertilization	4	1.35	0.33	1.59	0.1761
Fertilization*Clone	6	2.99	0.49	2.33	0.0308
Site*Fertilization*Clone	12	1.96	0.16	0.77	0.6867
Stand Density *Fertilization*Clone	6	1.62	0.27	1.26	0.2719
Site* Density*Fertilization*Clone	12	2.71	0.22	1.06	0.3939

[a] *P* values lower than $\alpha = 0.05$ are significant

Table S7. Analysis results of stem biomass correlations with LAI, foliar N, *Melampsora spp.* rust, and *Chrysomela scripta* damage for poplars ($\alpha = 0.05$). The poplar were two years old and established at two stand densities with three fertilization rates at three sites in the Coastal region of North Carolina, USA.

Correlation between poplar LAI and green stem biomass

Source	DF	Sum of Squares	Mean Square	*F Value*	*P value* [a]
Model	1	14,848	14,848	113.36	<.0001
Error	776	101,639	130		
Corrected Total	777	116,486			

Variable	DF	Parameter Estimate	Standard Error	t Value	*P value* [a]
Intercept	1	0.12	1.11	0.11	0.9100
Leaf Area Index	1	6.84	0.64	10.652	<.0001

[a] *P* values lower than $\alpha = 0.05$ are significant; $R^2 = 0.1275$

Correlation between Foliar N of poplars and green stem biomass

Source	DF	Sum of Squares	Mean Square	*F Value*	*P value* [a]
Model	1	12,095	12,095	89.91	<.0001
Error	776	104,391	134		
Corrected Total	777	116,486			

Variable	DF	Parameter Estimate	Standard Error	t Value	*P value* [a]
Intercept	1	-15.65	2.86	-5.47	<.0001
Foliar N	1	14.24	1.50	9.48	<.0001

[a] *P* values lower than $\alpha = 0.05$ are significant; $R^2 = 0.1038$

Correlation between *Melampsora spp.* Rust and green stem biomass of poplars

Source	DF	Sum of Squares	Mean Square	*F Value*	*P value* [a]
Model	1	10,325	10,325	75.47	<.0001
Error	776	106,161	136		
Corrected Total	777	116,486			

Variable	DF	Parameter Estimate	Standard Error	t Value	*P value* [a]
Intercept	1	8.16	0.54	14.98	<.0001
Melampsora spp. rust	1	7.41	0.85	8.69	<.0001

[a] *P* values lower than $\alpha = 0.05$ are significant; $R^2 = 0.0886$;

Correlation between *Chrysomela scripta* Fabricius damage and green stem biomass of poplar clones

Source	DF	Sum of Squares	Mean Square	*F Value*	*P value* [a]
Model	1	657	657	4.41	0.0361
Error	776	115,829	149		
Corrected Total	777	116,486			

Variable	DF	Parameter Estimate	Standard Error	t Value	*P value* [a]
Intercept	1	10.37	0.58	17.67	<.0001
C. scripta Damage	1	1.85	0.88	2.10	0.0361

[a] *P* values lower than $\alpha = 0.05$ are significant; $R^2 = 0.0056$