Rachid-Casnati C, Mason E, Woollons R (2019).
Using soil-based and physiographic variables to improve stand growth equations in Uruguayan forest plantations
iForest – Biogeosciences and Forestry – doi: 10.3832/ifor2926-012

Supplementary Material

Fig. S1 - Residuals using the validation dataset for h_{dom} for *P. taeda*'s base (a) and augmented equations (b), and for *E. grandis*' base (c), and augmented function (d).

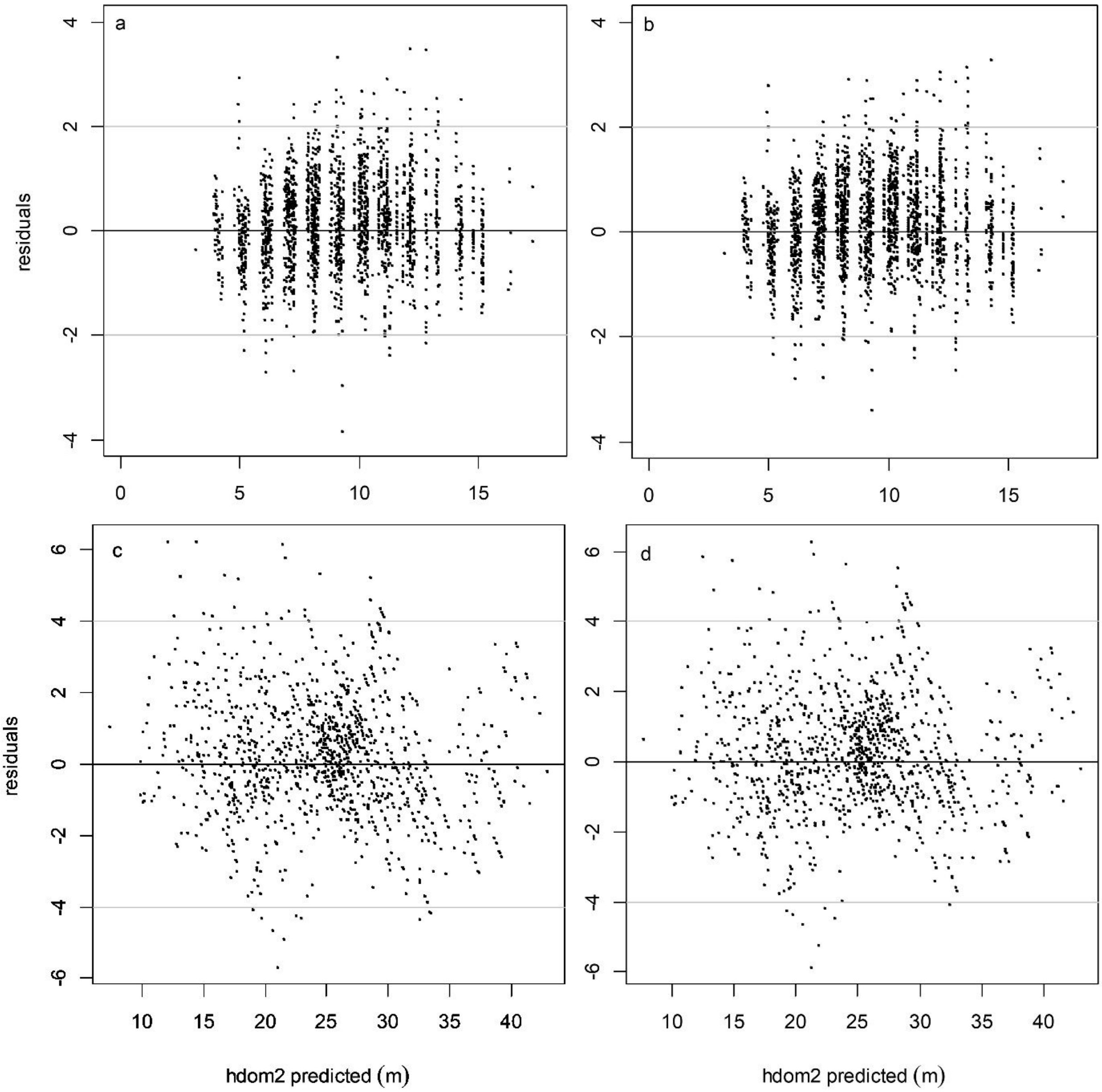


Fig. S2 - Residuals using the validation dataset for *G* for *P. taeda*'s baseline (a) and augmented equations (b), and for *E. grandis*' baseline (c), and augmented equaions (d).

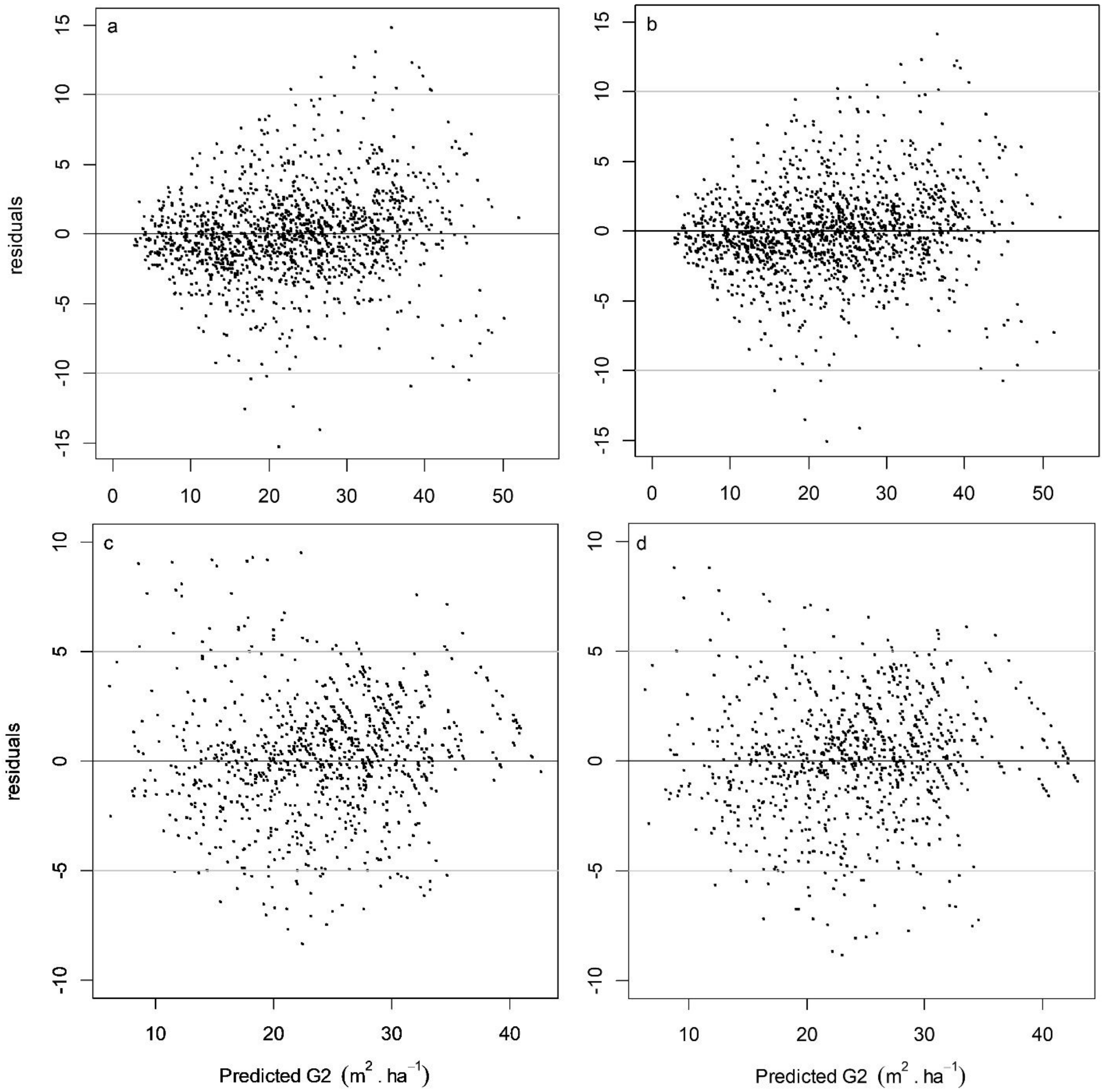


Fig. S3 - Residuals using the validation dataset for d_{max} and SD_d for *P. taeda* base functions.

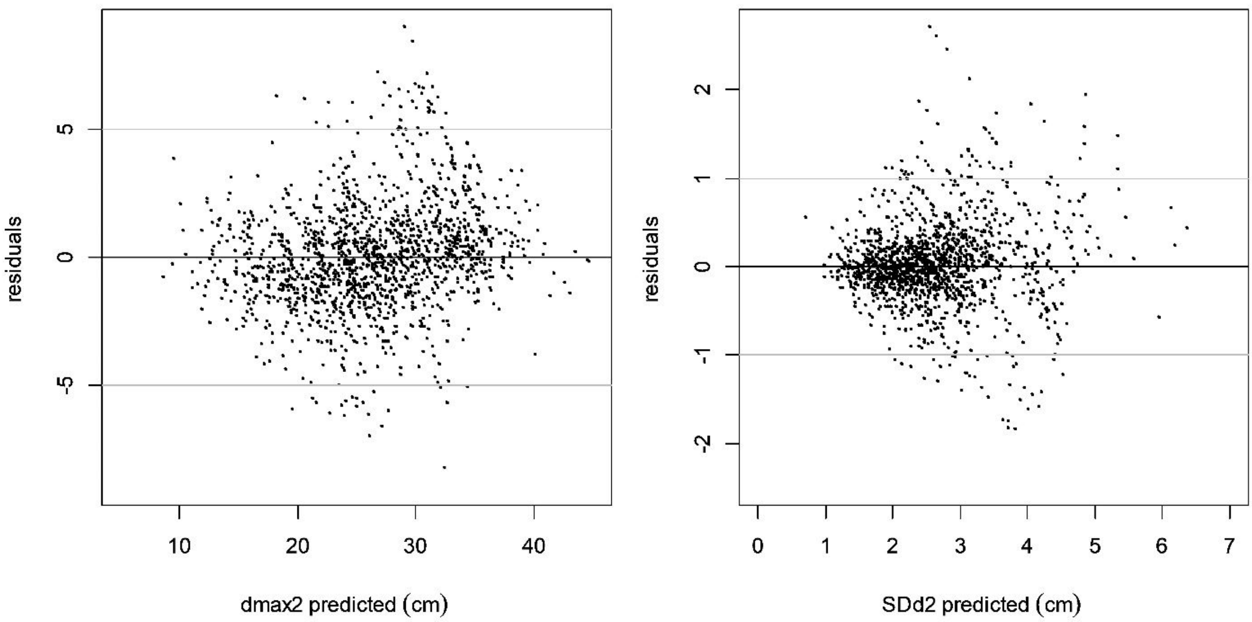


Fig. S4 - Residuals using the validation dataset for d_{max} *E. grandis*' base (a), and augmented functions (b).

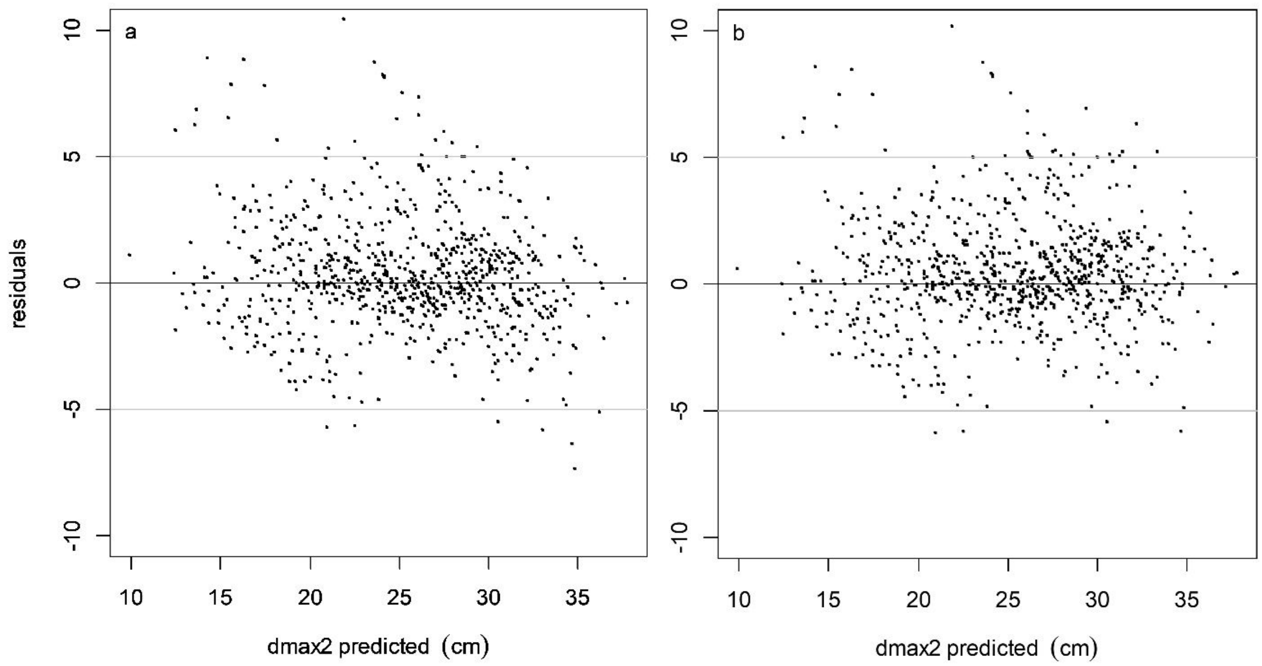
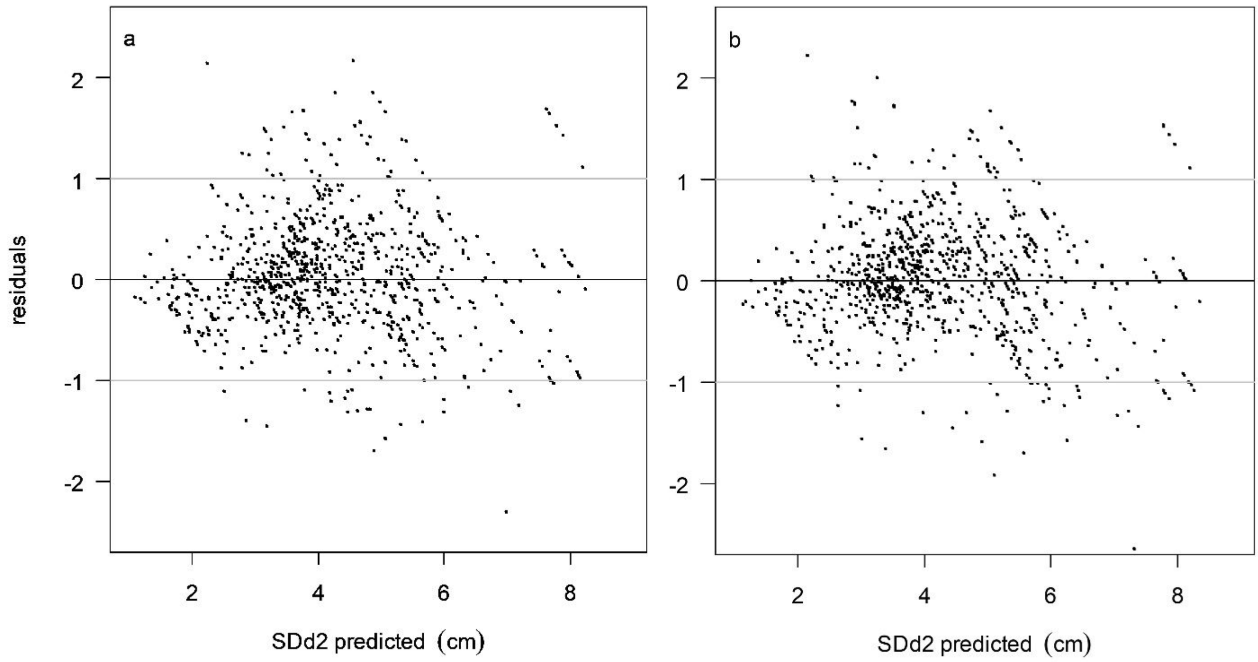


Fig. S5. Residuals using the validation dataset for SD_d for *E. grandis* base (a), and augmented equations (b).



Tab. S1 - Distribution of plots across predictors' ranges.

Predictor	Range	PSP number	
		E. grandis	*P. taeda*
Elevation (m a.s.l.)	<50	71	0
	50-100	41	58
	100-150	76	258
	150-200	115	314
	>200	2	39
Potentially available soil water (mm)	<100	15	101
	100-150	145	158
	>151	143	410
Slope (%)	< 0.5	53	12
	0.5-3.5	92	274
	3.5-6	83	176
	6-12	71	196
	12-18	4	7
	>18	0	4
Aspect (degrees)	315-45	61	156
	45-135	97	171
	135-225	37	154
	225-315	108	189
Zone	7	147	489
	8	17	101
	9	133	41
	Others	6	39

Tab. S2 - Polymorphic forms of equations tested.

Model	**Expression**
Schumacher (1)	$Y_2 = e^{\ln(Y_1)\left(\frac{t_1}{t_2}\right) + a\left(1 - \frac{t_1}{t_2}\right)}$
Schumacher (2)	$Y_2 = e^{\ln(Y_1)\left(\frac{t_1}{t_2}\right)^c + a\left[1 - \left(\frac{t_1}{t_2}\right)^c\right]}$
Weibull (1)	$Y_2 = Y_1 e^{-b\left(t_2^{\gamma} - t_1^{\gamma}\right)} + a\left[1 - b\left(t_2^2 - t_1^2\right)\right]$
Weibull (2)	$Y_2 = a - b\left(\frac{a - Y_1}{b}\right)^{\left(\frac{t_2}{t_1}\right)^{\gamma}}$
Hossfeld	$Y_2 = \frac{1}{\frac{1}{Y_1}\left(\frac{t_1}{t_2}\right)^b + a\left(1 - \left(\frac{t_1}{t_2}\right)^b\right)}$
von Bertalanffy-Richards (1)	$Y_2 = a\left(\frac{Y_1}{a}\right)^{\frac{\ln\left[1 - e^{(-b t_2)}\right]}{\ln\left[1 - e^{(-b t_1)}\right]}}$
von Bertalanffy-Richards (2)	$Y_2 = a\left\{1 - \left[1 - \left(\frac{Y_1}{a}\right)^{1-v}\right]^{\frac{t_2}{t_1}}\right\}^{\frac{1}{1-v}}$
Von Bertalanffy-Richards (3)	$Y_2 = a\left\{1 + \left[\left(\frac{a}{Y_1}\right)^v - 1\right] e^{\left[-b\left(t_2 - t_1\right)\right]}\right\}^{\frac{1}{v}}$
Levakovic	$Y_2 = \left\{Y_1^c\left[\left(\frac{t_1}{t_2}\right)^2 + a\left(1 - \left(\frac{t_1}{t_2}\right)^2\right)\right]\right\}^{\frac{1}{c}}$

Tab. S3 - Anamorphic forms of equations tested.

Model	**Expression**
Schumacher	$Y_2 = Y_1 e^{-b\left(\frac{1}{t_2} - \frac{1}{t_1}\right)}$
von Bertalanffy-Richards	$Y_2 = Y_1 \left[\frac{1-e^{-bt_2}}{1-e^{-bt_2}}\right]^c$
Weibull	$Y_2 = Y_1 \frac{1-e^{-bt_2^c}}{1-e^{-bt_2^c}}$
Hossfeld	$Y_2 = \frac{1}{\frac{1}{Y_1} + b\left(\frac{1}{t_2}\right)^c - \left(\frac{1}{t_1}\right)^c}$
Levakovic	$Y_2 = Y_1 \left[\left(\frac{t_2}{t_1}\right)^2 + \left(\frac{b+t_1^2}{b+t_2^2}\right)\right]^c$

Tab. S4 - Parameters of the equations selected for modelling h_{dom}.

Species	eqn.	Stats	a/a_0	a_1	a_2	a_3	b	k
P.taeda	1	Estimate	30.413912	-	-	-	0.102622	-
		SE	0.323879	-	-	-	0.001877	-
		p-value	<0.001	-	-	-	<0.001	-
	9	Estimate	22.265319	0.023379	0.021562	-	0.109748	-
		SE	0.441550	0.001961	0.002314	-	0.001888	-
		p-value	<0.001	<0.001	<0.001	-	<0.001	-
E. grandis	5	Estimate	4.00389	0.19295	-	-	-	3.06896
		SE	0.01233	0.01010	-	-	-	0.08570
		p-value	<0.001	<0.001	-	-	-	<0.001
	11	Estimate	3.6014737	0.0029913	0.0087987	0.0175036	-	2.4973491
		SE	0.0223338	0.0001586	0.0028142	0.0011831	-	0.0870299
		p-value	<0.001	<0.001	<0.01	<0.001	-	<0.001

Tab. S5 - Parameters of the equations selected for modelling *G*.

Species	eqn.	Stats	a/a_0	a_1	a_2	a_3	c/c_0	c_1
P.taeda	2	Estimate	4.51079	-	-	-	1.013	-
		SE	0.02101	-	-	-	0.01287	-
		p-value	<0.001	-	-	-	<0.001	-
	10	Estimate	3.7497295	0.0026375	0.0068628	0.0018031	1.0520980	-
		SE	0.0322047	0.0001733	0.0010891	0.0001776	0.0122932	-
		p-value	<0.001	<0.001	<0.001	<0.001	<0.001	-
E.grandis	6	Estimate	3.7534	0.27345	-	-	1.07956	-0.93323
		SE	0.01995	0.01834	-	-	0.02539	0.05720
		p-value	<0.001	<0.001	-	-	<0.001	<0.001
	12	Estimate	2.611299	0.0115832	-0.0033998	-	1.1164274	-1.0353749
		SE	0.0611871	0.0006817	0.0003416	-	0.0243492	0.0552464
		p-value	<0.001	<0.001	<0.001	-	<0.001	<0.001

Tab. S6 - Parameters of the equations selected for modelling d_{max}.

Species	eqn.	Stats	a_0	a_1	a_2	c/c_0	c_1
P. taeda	3	Estimate	6.392204	-0.100819	-	0.749582	-
		SE	0.105504	0.004479	-	0.011994	-
		p-value	<0.001	<0.001	-	<0.001	-
E. grandis	7	Estimate	4.26886	1.14703	-	0.45368	-0.15881
		SE	0.07421	0.16114	-	0.02620	0.03274
		p-value	<0.001	<0.001	-	<0.001	<0.001
	13	Estimate	3.4624929	0.005749	0.0714808	0.5225331	-0.0101125
		SE	0.0483201	0.0002405	0.0067483	0.0187085	0.0027341
		p-value	<0.001	<0.001	<0.001	<0.001	<0.001

Tab. S7 - Parameters of the equations selected for modelling SD_d.

Species	eqn.	Stats	*a*	a_0	a_1	*b*
P.taeda	4	Estimate	5.132918	-	-	0.070622
		SE	0.131473	-	-	0.004199
		p-value	<0.001	-	-	<0.001
E.grandis	8	Estimate	-	9.230291	2.424718	0.054145
		SE	-	0.404682	0.345347	0.005234
		p-value	-	<0.001	<0.001	<0.001
	14	Estimate	-	8.863645	0.450453	0.069762
		SE	-	0.305291	0.038898	0.005116
		p-value	-	<0.001	<0.001	<0.001