

**Supplementary Materials**

**Table S1.** Characteristics of the individual spruce (n = 24) and beech trees (n= 24), separated by plot (n=12, overall 48 trees), drought treatment (6 plots, 24 trees)/control (6 plots, 24 trees) and intra- and interspecific neighborhoods (six control plots and six treatment plots with respectively six intraspecific beech trees; six interspecific beech trees; six intraspecific spruce trees; six interspecific spruce trees) for the year 2014 (DBH: diameter at 1.3 m breast height).

Plot	Drought Treatment	Mixture	Species	DBH [cm]	Height [m]	Volume [m <sup>3</sup> ]
1	Control	interspecific	N. spruce	39.6	32.7	1.9
1	Control	intraspecific	N. spruce	32.1	31.0	1.2
1	Control	interspecific	E. beech	25.4	27.7	0.7
1	Control	intraspecific	E. beech	23.5	27.1	0.6
2	Treatment	intraspecific	N. spruce	49.3	34.2	2.9
2	Treatment	interspecific	N. spruce	41.5	33.0	2.1
2	Treatment	interspecific	E. beech	27.3	28.2	0.8
2	Treatment	intraspecific	E. beech	24.1	27.3	0.6
3	Control	intraspecific	N. spruce	34.3	31.5	1.4
3	Control	interspecific	N. spruce	36.8	32.1	1.6
3	Control	interspecific	E. beech	41.0	30.7	2.1
3	Control	intraspecific	E. beech	24.2	27.3	0.6
4	Treatment	interspecific	N. spruce	44.9	33.6	2.4
4	Treatment	intraspecific	N. spruce	37.8	32.3	1.7
4	Treatment	intraspecific	E. beech	37.1	30.1	1.7
4	Treatment	interspecific	E. beech	26.5	28.0	0.8
5	Control	interspecific	N. spruce	37.0	32.1	1.6
5	Control	intraspecific	N. spruce	42.2	33.1	2.2
5	Control	intraspecific	E. beech	35.6	29.9	1.5
5	Control	interspecific	E. beech	27.1	28.1	0.8
6	Treatment	intraspecific	N. spruce	41.7	33.0	2.1
6	Treatment	interspecific	N. spruce	38.0	32.4	1.7
6	Treatment	interspecific	E. beech	46.7	31.3	2.8
6	Treatment	intraspecific	E. beech	47.7	31.4	3.0
7	Control	intraspecific	N. spruce	44.1	33.4	2.4
7	Control	interspecific	N. spruce	37.9	32.3	1.7
7	Control	interspecific	E. beech	47.8	31.4	3.0
7	Control	intraspecific	E. beech	26.1	27.9	0.8
8	Treatment	intraspecific	N. spruce	30.0	30.4	1.0
8	Treatment	interspecific	N. spruce	35.2	31.8	1.5
8	Treatment	interspecific	E. beech	28.1	28.4	0.9
8	Treatment	intraspecific	E. beech	28.7	28.6	0.9
9	Control	interspecific	N. spruce	40.0	32.7	1.9
9	Control	intraspecific	N. spruce	40.5	32.8	2.0
9	Control	intraspecific	E. beech	27.2	28.2	0.8

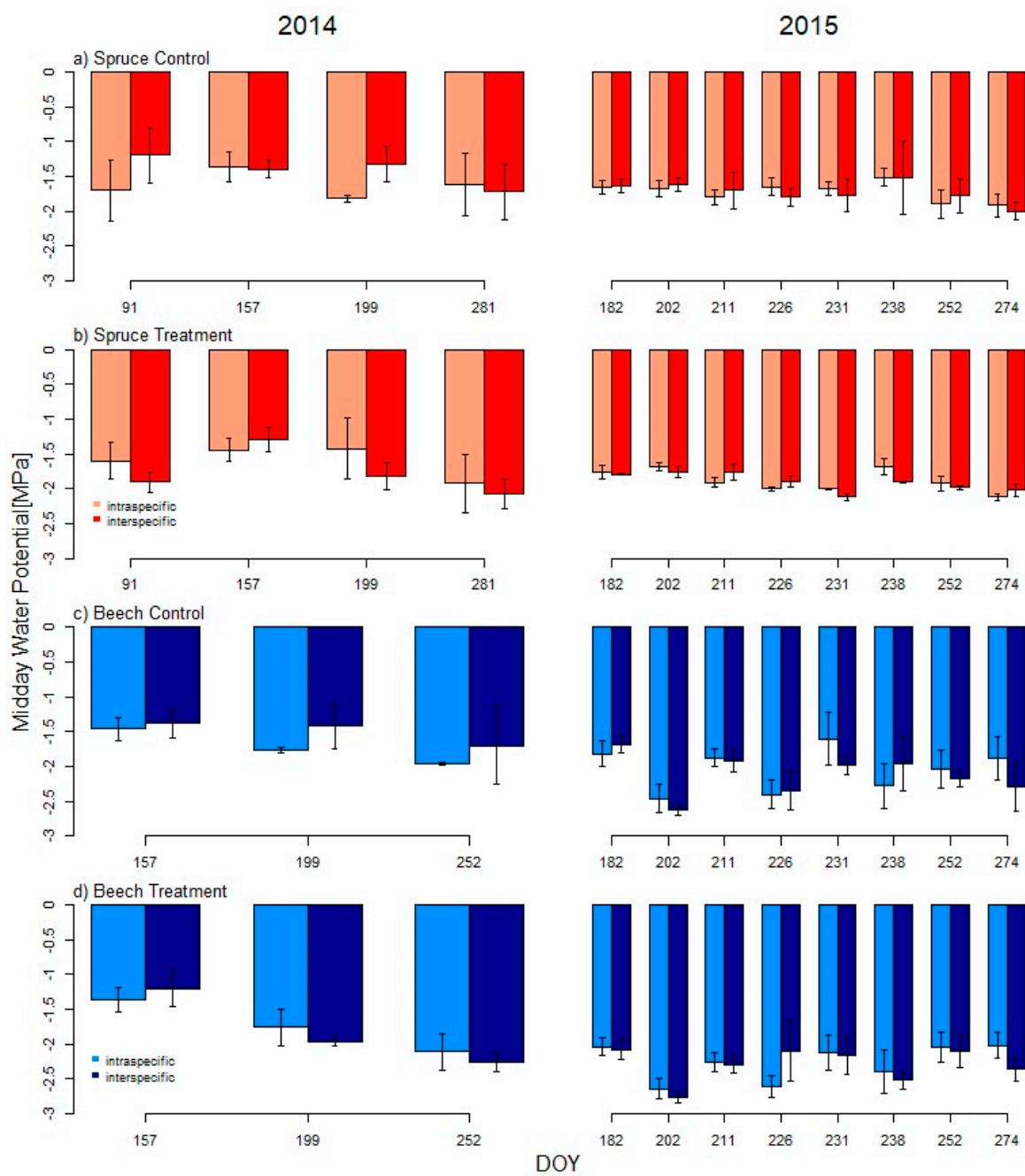
9	Control	interspecific	E. beech	37.9	30.2	1.8
10	Treatment	interspecific	N. spruce	40.1	32.8	1.9
10	Treatment	intraspecific	N. spruce	47.1	33.9	2.7
10	Treatment	interspecific	E. beech	43.0	30.9	2.4
10	Treatment	intraspecific	E. beech	28.5	28.5	0.9
11	Control	intraspecific	N. spruce	26.2	29.1	0.8
11	Control	interspecific	N. spruce	31.7	30.9	1.2
11	Control	intraspecific	E. beech	20.6	26.1	0.4
11	Control	interspecific	E. beech	52.7	31.9	3.7
12	Treatment	interspecific	N. spruce	23.5	28.1	0.6
12	Treatment	intraspecific	N. spruce	48.0	34.0	2.8
12	Treatment	intraspecific	E. beech	36.6	30.1	1.7
12	Treatment	interspecific	E. beech	25.7	27.8	0.7
<b>Mean</b>				<b>35.6</b>	<b>30.6</b>	<b>1.6</b>
<b>Min</b>				<b>20.6</b>	<b>26.1</b>	<b>0.4</b>
<b>Max</b>				<b>52.7</b>	<b>34.2</b>	<b>3.7</b>

**Table S2.** Coefficient of determination ( $R^2$ ) of TWD<sub>min</sub> (tree water deficit, daily minimum), LWP<sub>pre</sub> (water potential at predawn) and of TWD<sub>max</sub> (tree water deficit, daily maximum) and LWP<sub>mid</sub> (water potential at midday). The  $R^2$  based on the relationship between leaf water potential (LWP) and tree water deficit (TWD) at the three different tree heights (H50, BH, Root). The respective models based on equation 1. The last two rows contain the means of both species and of all tree heights.

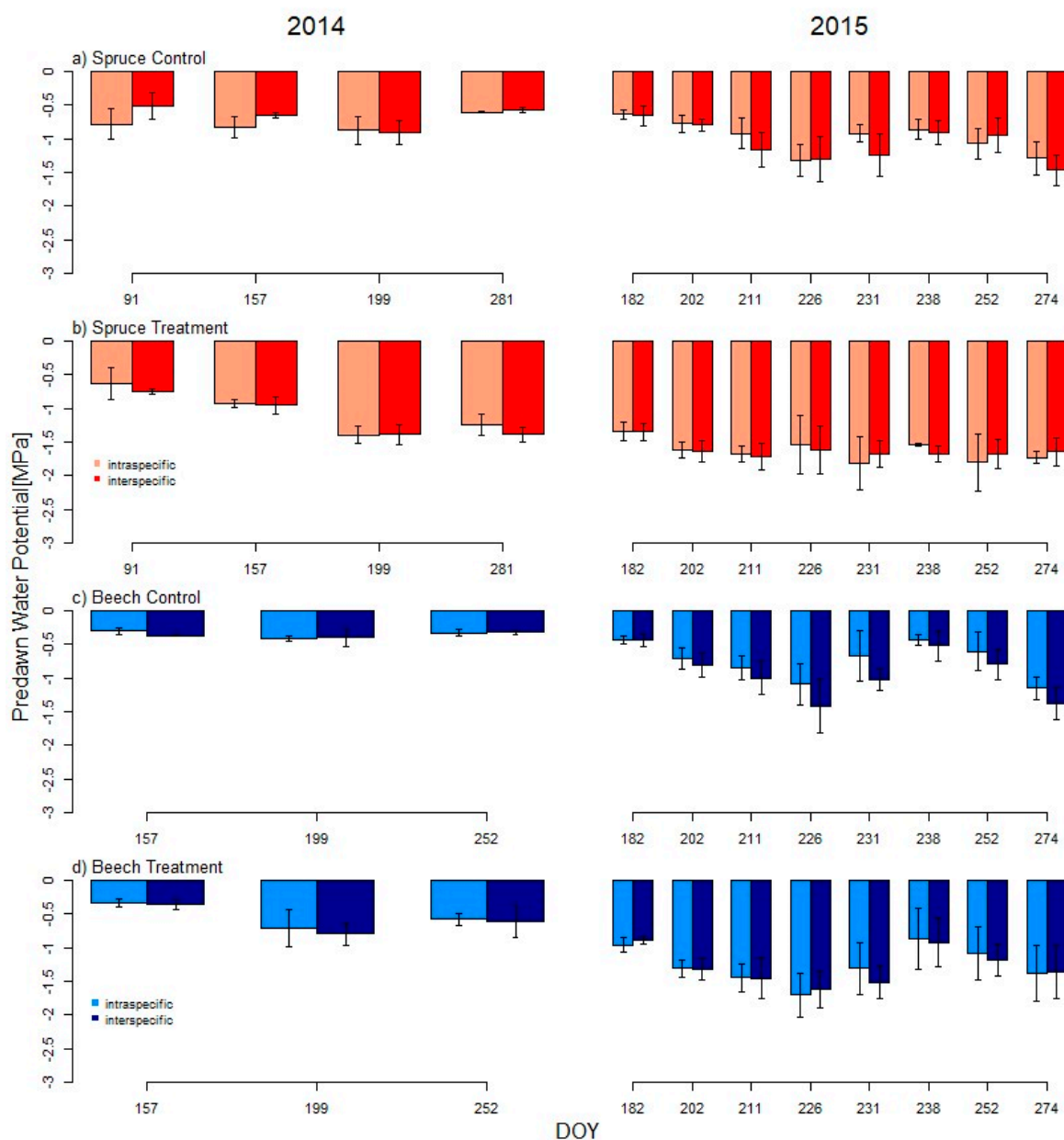
		TWD <sub>min</sub>			TWD <sub>max</sub>		
		H50	BH	Root	H50	BH	Root
LWP <sub>pre</sub>	N.spruce	0,50	0,42	0,68	0,46	0,25	0,62
	E.beech	0,82	0,81	0,38	0,56	0,43	0,35
LWP <sub>mid</sub>	N.spruce	0,32	0,37	0,60	0,25	0,34	0,47
	E.beech	0,84	0,82	0,32	0,56	0,39	0,29
LWP <sub>pre</sub>		0,60			0,45		
LWP <sub>mid</sub>		0,55			0,38		

**Table S3.** Parameter estimates and statistics for the water potential at midday and predawn dependent on species and drought treatment. Standard deviations are in brackets. The dependent variables are in the columns. Rows show the output of the model with the fixed variables. Significance levels: \*\*\*,  $p < 0.001$ ; \*\*, 0.01; \*, 0.05; (\*), 0.1.

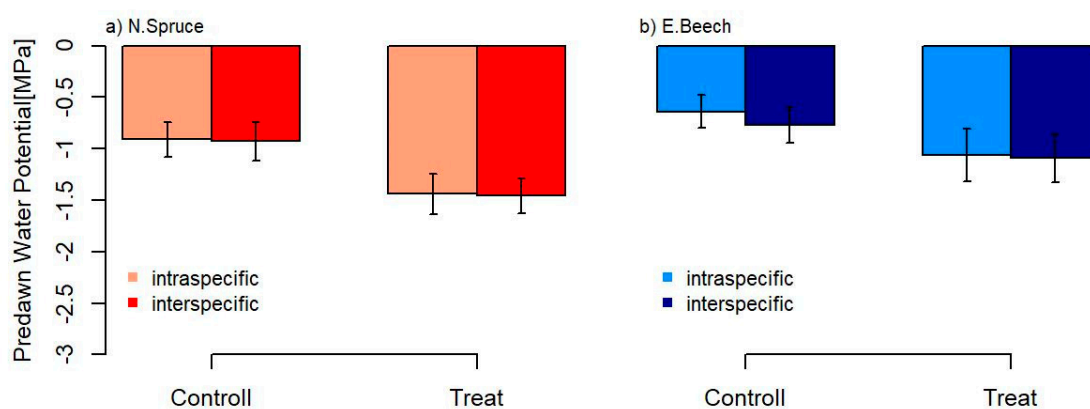
	Dependent Variables	
	Water potential (midday)	Water potential (predawn)
Intercept	-2.276*** (0.033)	-0.938*** (0.069)
Species: Spruce	0.381*** (0.046)	-0.211** (0.096)
Drought treatment (TE)	-0.205** (0.057)	-0.379*** (0.074)
Species Spruce: Drought Treatment (TE)	0.154(*) (0.078)	-0.099 (0.101)
Observations	318	318



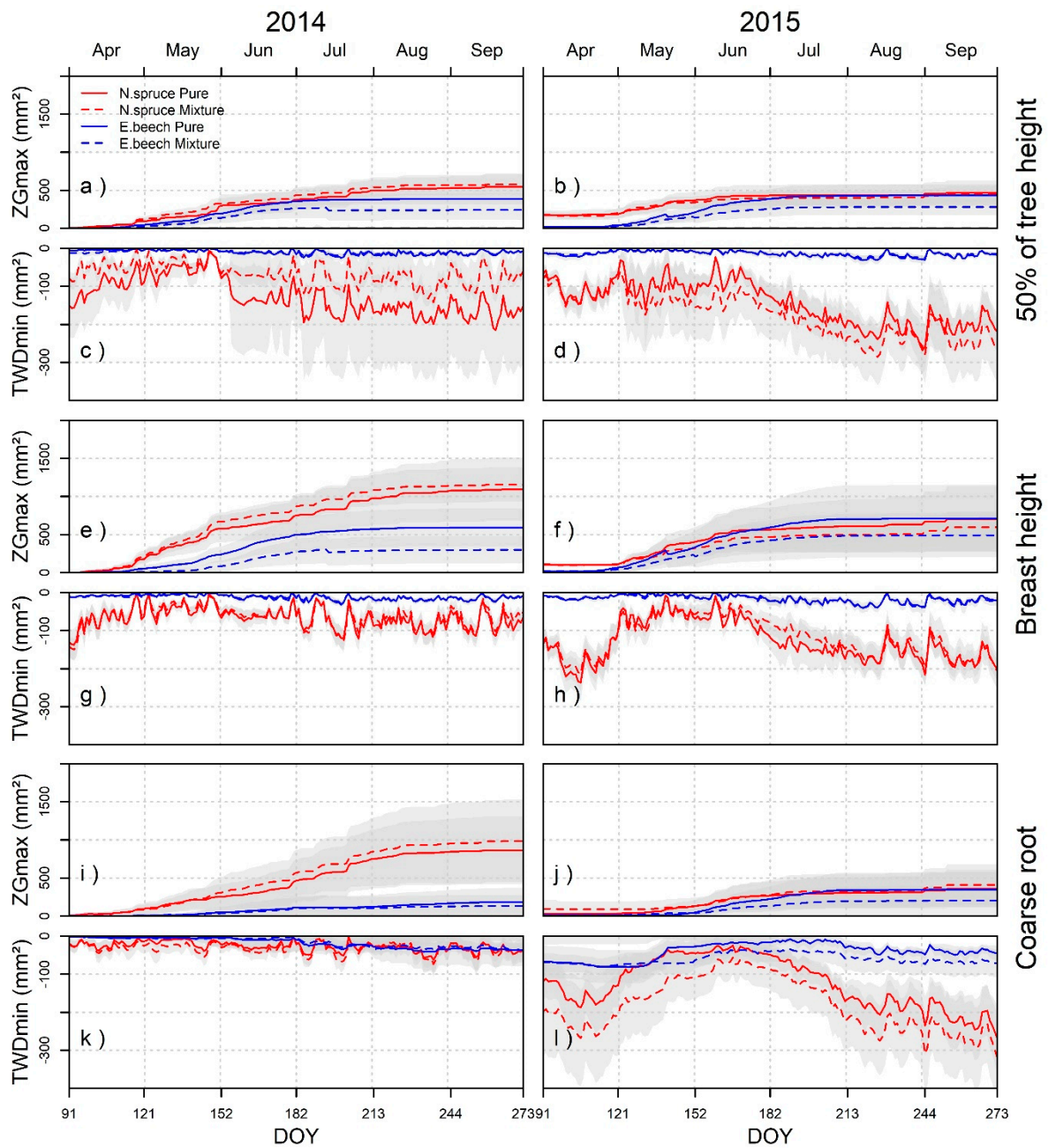
**Figure S1.** Mean water potential at midday for the years 2014 (left) and 2015 (right) for spruce trees in intra- and interspecific neighborhoods at the control and treatment plots (a–b) and for beech trees in intra- and interspecific neighborhoods at the control and treatment plots (c–d). Data is shown for the growing season.



**Figure S2.** Mean predawn water potential for the years 2014 (left) and 2015 (right) for spruce trees in intra- and interspecific neighborhoods at the control and treatment plots (a–b) and for beech trees in intra- and interspecific neighborhoods at the control and treatment plots (c–d). Data is shown for the growing season.



**Figure S3** Mean predawn water potential for the years 2014 and 2015 for spruce trees in intra- and interspecific neighborhoods at the control and treatment plots (a) and for beech trees in intra- and interspecific neighborhoods at the control and treatment plots (b). Data is shown for the growing season.



**Figure S4.** Mean TWDmin and zero growth (growth without the water signal) referring to the stem/root basal area ( $\text{mm}^2$ ) for the years 2014 (left) and 2015 (right) for spruce (red) and beech (blue) in intraspecific (solid line) and interspecific (dashed line) neighborhoods at 50% tree height (a–d), breast height (BH, e–h) and the roots (i–l). Shaded regions are confidence intervals. Data are shown for the growing season.

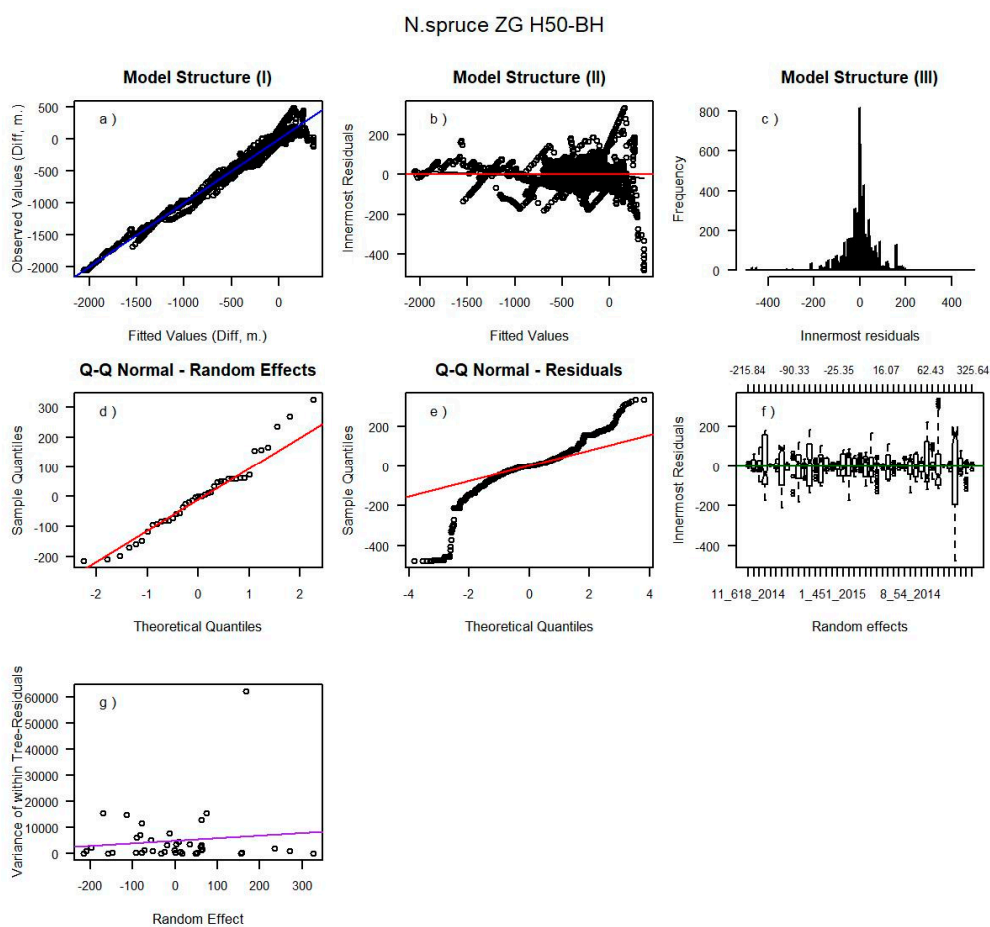
**Table S2.** Coefficient of determination ( $R^2$ ) of TWD<sub>min</sub> (tree water deficit, daily minimum), LWP<sub>pre</sub> (water potential at predawn) and of TWD<sub>max</sub> (tree water deficit, daily maximum) and LWP<sub>mid</sub> (water potential at midday). The  $R^2$  based on the relationship between leaf water potential (LWP) and tree water deficit (TWD) at the three different tree heights (H50, BH, Root). The respective models based on equation 1. The last two rows contain the means of both species and of all tree heights.

		TWD <sub>min</sub>			TWD <sub>max</sub>		
		H50	BH	Root	H50	BH	Root
LWP <sub>pre</sub>	N.spruce	0,50	0,42	0,68	0,46	0,25	0,62
	E.beech	0,82	0,81	0,38	0,56	0,43	0,35
LWP <sub>mid</sub>	N.spruce	0,32	0,37	0,60	0,25	0,34	0,47
	E.beech	0,84	0,82	0,32	0,56	0,39	0,29
LWP <sub>pre</sub>		0,60			0,45		
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	Dependent Variables	
	Water potential (midday)	Water potential (predawn)
Intercept	-2.276*** (0.033)	-0.938*** (0.069)
Species: Spruce	0.381*** (0.046)	-0.211** (0.096)
Drought treatment (TE)	-0.205** (0.057)	-0.379*** (0.074)
Species Spruce: Drought Treatment (TE)	0.154(*) (0.078)	-0.099 (0.101)
Observations	318	318





**Figure S5.** N. spruce ZG H50-BH. Model criticism plots for the linear mixed effect models in Table 3 and Figures 5 and 6. The models criticism plots are in the same order. Description of the single plots within each Figure: a) plot of the outermost fitted values against the observed values of the response variable; b) plot of the innermost fitted values against the innermost Pearson residuals; c) histogram of the innermost residuals; d) QQ-plot of the estimated random effects; e) QQ-plot of the Pearson residual; f) notched boxplot of the innermost Pearson residuals by the grouping variables plot:indivudal tree:year; g) scatterplot of the variance of the Pearson residuals within the grouping variables.

E.beech ZG H50-BH

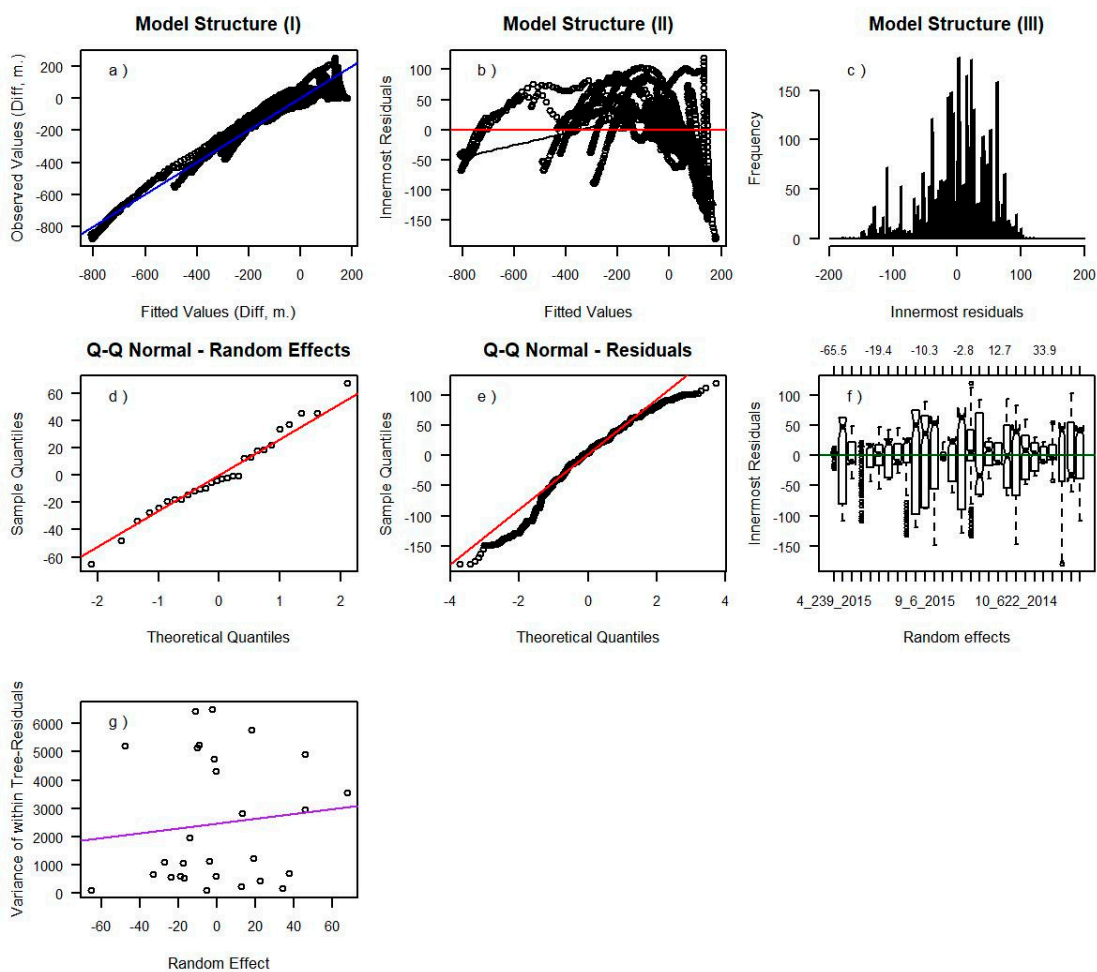


Figure S6. E. beech ZG H50-BH.

N.spruce TWD H50-BH

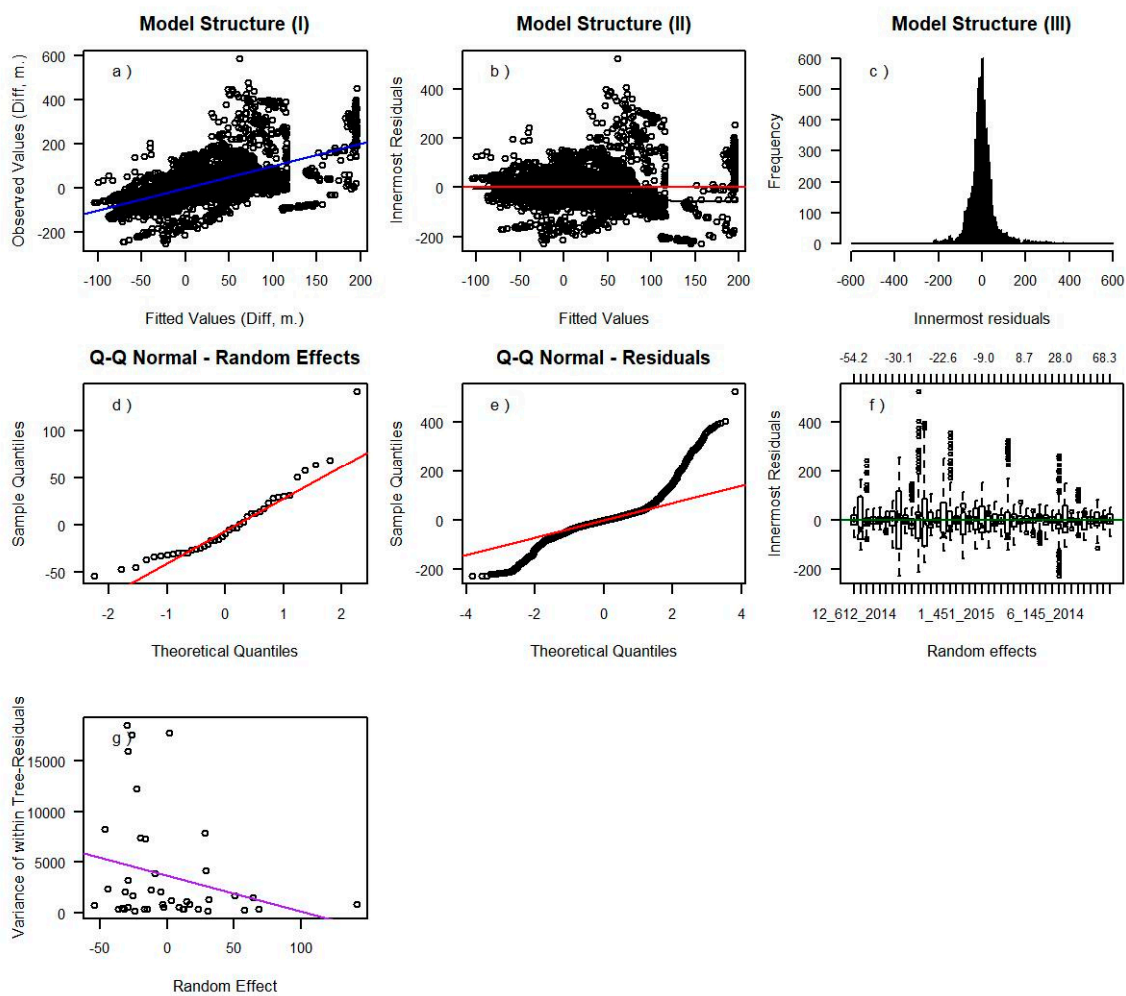


Figure S7. N. spruce TWD H50-BH.

E. beech TWD H50-BH

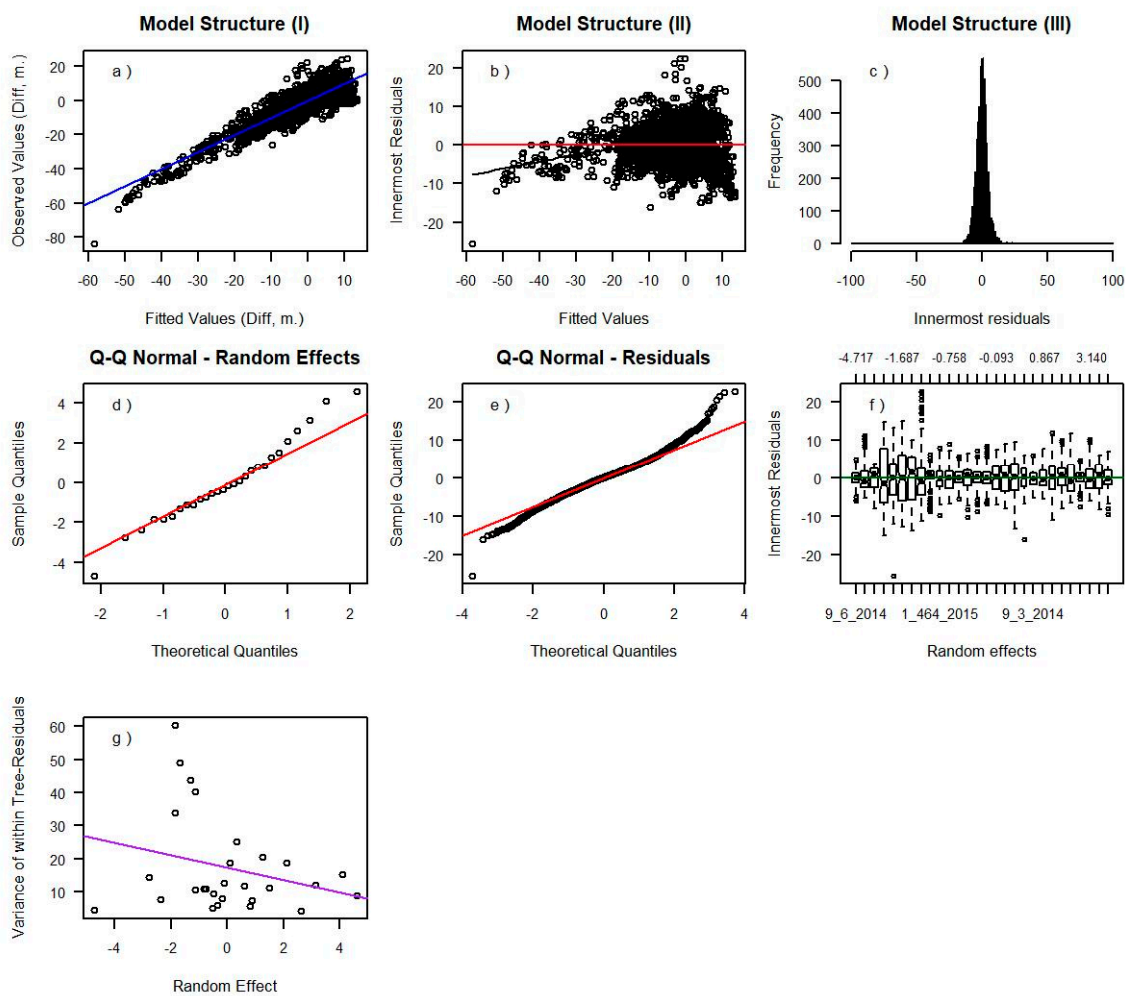


Figure S8. E. beech TWD H50-BH.

N.spruce ZG BH-Root

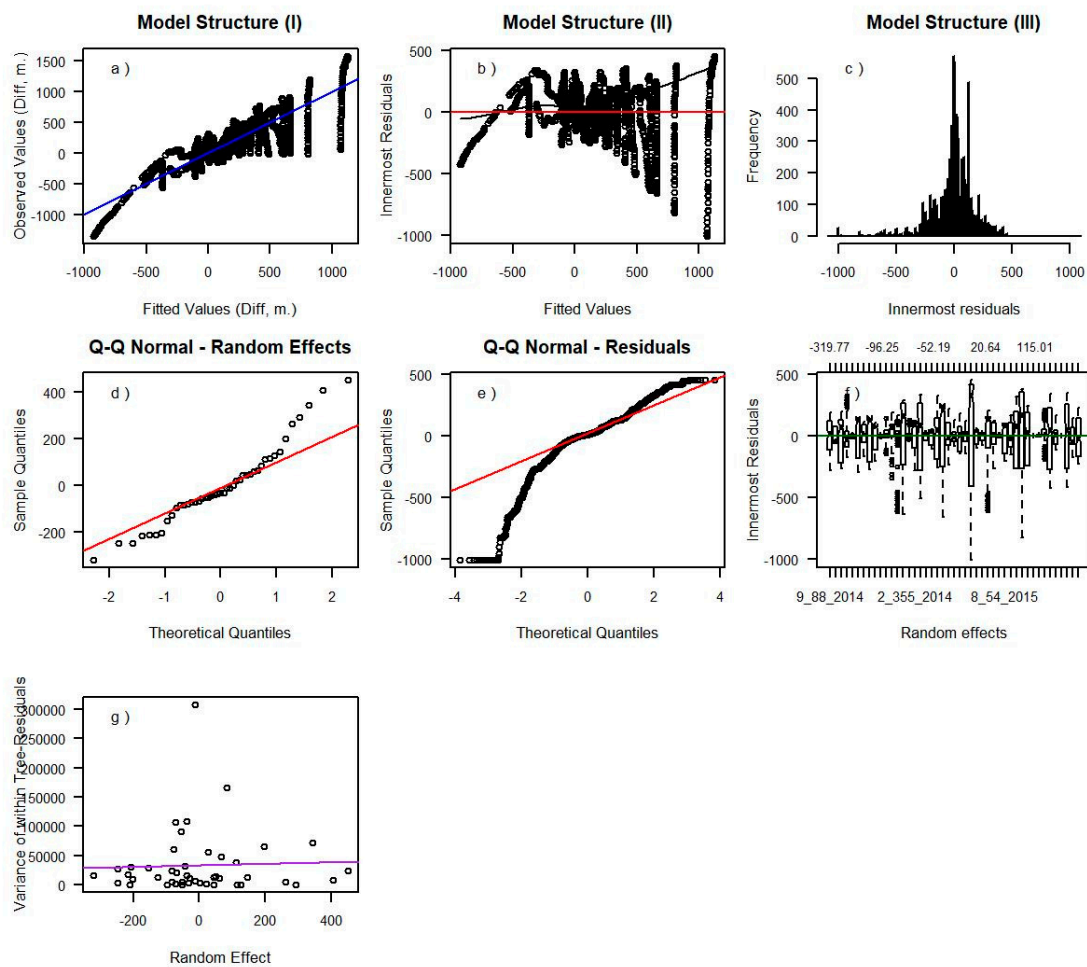


Figure S9. N. spruce ZG BH-Root.

E.beech ZG BH-Root

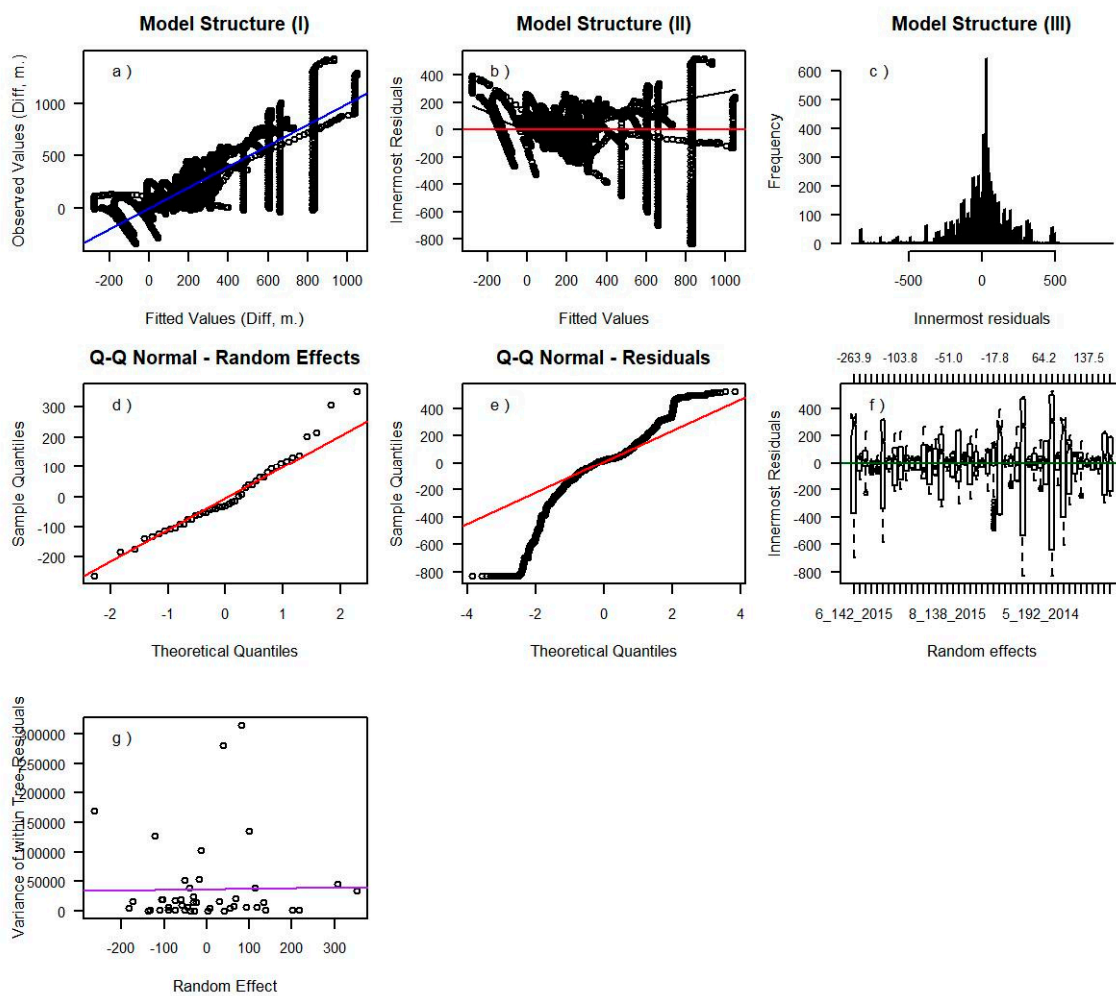


Figure S10. E. beech ZG BH-Root.

N.spruce TWD BH-Root

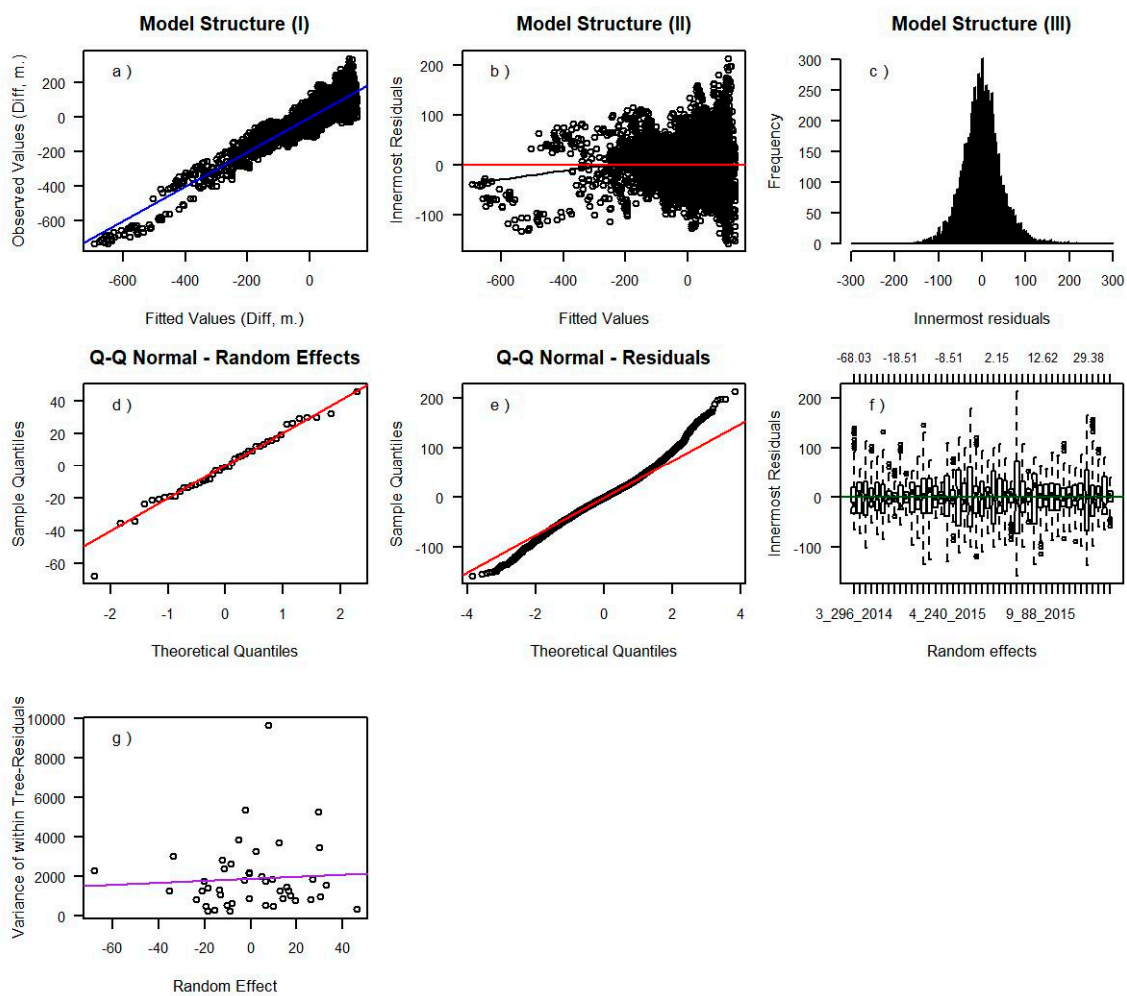


Figure S11. N. spruce TWD BH-Root.

E.beech TWD BH-Root

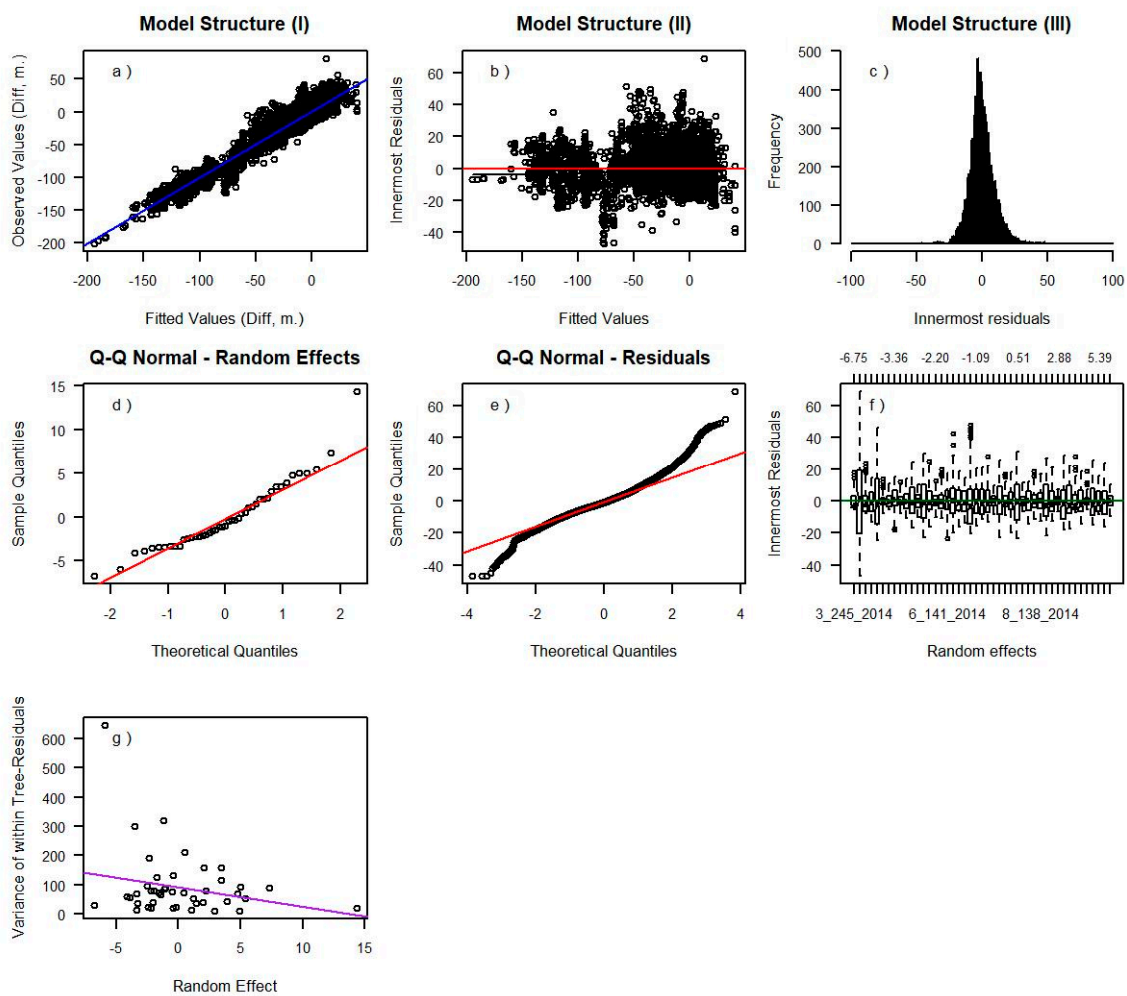


Figure S12. E. beech TWD BH-Root.