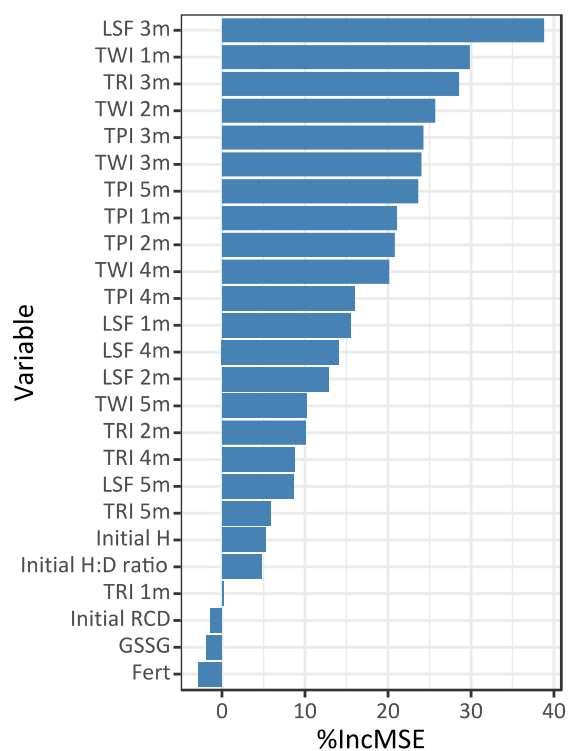


## Supplementary Materials

**Manuscript Title:** Evaluating the Effects of Glutathione and Controlled-Release Fertilizer on the Height Growth of *Cryptomeria japonica* D. Don Seedlings Accounting for Topography and Vegetation

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**Journal:** Forests (Special Issue: Production in Forest Nurseries, Field Performance of Seedlings and Natural Regeneration in the Context of Climate Change: 2nd Edition)



**Figure S1.** Comparison of variable importance (% increase in mean squared error [%IncMSE]) in the random forest regression analysis of *Cryptomeria japonica* seedling height after four growing seasons. The analysis included topographic indices at five spatial resolutions (1–5 m): L-S factor (LSF), Topographic Wetness Index (TWI), Terrain Ruggedness Index (TRI), and Topographic Position Index (TPI), as well as initial seedling height (initial H), root collar diameter (RCD), height-to-RCD ratio (H:D ratio), and planting treatments (fertilization [Fert] and glutathione [GSSG]).

**Table S1.** Summary of generalized additive models (GAMs) results examining the interaction between topographic indices and planting treatments on seedling height in the fourth growing season. The edf (estimated degrees of freedom), F-value, and p-value indicate the significance of each smooth term (spline) for each treatment. Deviance explained and adjusted R<sup>2</sup> are shown for each model.

Topographic Index	Treatment	edf	F-value	p-value	Deviance Explained (%)	Adjusted R <sup>2</sup>
TWI	Control	1.00	8.70	0.0045	44.4	0.313
	Fertilizer	1.00	12.94	0.0006		
	GSSG	1.00	8.54	0.0049		
	GSSG + Fertilizer	1.00	9.37	0.0033		
LSF	Control	1.00	14.58	0.0003	59.7	0.579
	Fertilizer	2.18	4.41	0.0285		
	GSSG	1.00	23.26	<0.0001		
	GSSG + Fertilizer	2.10	8.15	0.0004		
TPI	Control	1.00	14.50	0.0003	56.3	0.547
	Fertilizer	1.00	14.65	0.0003		
	GSSG	1.00	19.83	<0.0001		
	GSSG + Fertilizer	1.52	9.98	0.0014		
TRI	Control	1.00	6.93	0.0108	46.3	0.458
	Fertilizer	1.00	0.16	0.6915		
	GSSG	1.00	16.10	<0.0002		
	GSSG + Fertilizer	2.14	4.77	0.0057		

**Table S2.** Analysis of Deviance comparing models without and with treatment-specific smooth terms for each topographic index. The table shows the change in degrees of freedom ( $\Delta Df$ ), deviance ( $\Delta Deviance$ ), and associated p-values from likelihood ratio tests, assessing whether including treatment interactions significantly improves model fit.

<b>Topographic index</b>	<b><math>\Delta Df</math></b>	<b><math>\Delta Deviance</math></b>	<b>p-value</b>
TWI	6.00	0.069	0.978
LSF	7.76	0.437	0.219
TPI	7.16	0.202	0.721
TRI	5.76	0.035	0.994