

Estimation of *Fagus orientalis* Lipsky height using nonlinear models in Hyrcanian forests, Iran

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Electronic Supplementary Material (ESM)

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Table S1. Model fitting parameters for the model calibration dataset: Estimated parameter of models

Region	Parameter	Model No.						
		1	2	3	4	5	6	7
High-altitude	<i>a</i>	1.614	53.380	36.648	36.729	−2.840	5.340	0.210
	<i>b</i>	0.637	74.650	0.018	−21.704	−0.150	0.250	0.630
		8	9	10	11	12	13	14
	<i>a</i>	8.090	44.490	33.610	33.340	41.890	8.090	3.960
	<i>b</i>	0.870	−10.540	0.030	0.010	−33.930	0.870	−9.790
	<i>c</i>	0.020	1.050	1.270	1.160	6.230	0.020	−0.630
Mid-altitude		1	2	3	4	5	6	7
	<i>a</i>	1.990	66.590	45.190	41.340	−2.810	7.590	0.290
	<i>b</i>	0.640	84.270	0.020	−23.080	−0.140	0.310	0.630
		8	9	10	11	12	13	14
	<i>a</i>	−2.220	103.300	57.910	62.540	65.910	−2.210	6.280
	<i>b</i>	1.390	−5.540	0.008	0.020	−74.160	1.390	−6.740
	<i>c</i>	0.014	0.690	0.790	0.820	25.150	0.010	−0.190

a, b, c – significant ($P < 0.05$)Table S2. Results of performance criterion (*RMSE*, R_{adj}^2 , *AIC*, and *MAE*) for beech in high-altitude and mid-altitude regions: Performance criteria of models for high-altitude region

Model	Modelling ($n = 1\ 206$)				Evaluation ($n = 441$)			
	<i>RMSE</i>	R_{adj}^2	<i>AIC</i>	<i>MAE</i>	<i>RMSE</i>	R_{adj}^2	<i>AIC</i>	<i>MAE</i>
1	2.480	0.938	936.130	2.140	2.063	0.950	323.447	1.658
2	1.682	0.971	537.940	1.389	1.415	0.976	157.340	1.066
3	1.569	0.975	466.296	1.274	1.387	0.977	148.336	1.019
4	1.727	0.970	564.670	1.354	1.912	0.957	289.903	1.549
5	1.328	0.982	295.372	1.003	1.465	0.975	172.545	1.102
6	3.395	0.883	1 258.968	2.935	2.905	0.901	474.316	2.336
7	2.480	0.938	935.951	2.141	2.064	0.950	323.537	1.659
8	1.328	0.982	297.099	1.002	1.401	0.977	154.731	1.076
9	1.326	0.980	297.080	1.004	1.403	0.976	155.256	1.084
10	1.417	0.980	364.010	1.084	1.474	0.974	177.082	1.098
11	1.442	0.979	381.966	1.115	1.471	0.975	176.085	1.083
12	1.334	0.982	301.739	1.003	1.421	0.976	160.964	1.095
13	1.338	0.982	304.932	1.006	1.412	0.977	158.256	1.080
14	1.314	0.982	285.721	0.991	1.396	0.977	153.147	1.089
ANN	1.239	0.984	228.440	0.914	1.339	0.978	137.032	1.017

AIC – Akaike’s information criterion; *MAE* – mean absolute error; n – number of beech trees; R_{adj}^2 – adjusted coefficient of determination; *RMSE* – root mean square error

<https://doi.org/10.17221/93/2022-JFS>Table S3. Results of performance criterion (*RMSE*, R_{adj}^2 , *AIC*, and *MAE*) for beech in high-altitude and mid-altitude regions: Performance criteria of models for mid-altitude region

Model	Modelling ($n = 1\ 243$)				Evaluation ($n = 533$)			
	<i>RMSE</i>	R_{adj}^2	<i>AIC</i>	<i>MAE</i>	<i>RMSE</i>	R_{adj}^2	<i>AIC</i>	<i>MAE</i>
1	1.875	0.959	786.224	1.324	2.522	0.944	496.237	1.739
2	1.801	0.962	735.252	1.304	1.289	0.988	139.229	0.978
3	1.882	0.959	790.580	1.418	2.829	0.939	557.271	2.333
4	2.899	0.902	1 328.167	2.426	3.039	0.930	595.372	2.457
5	2.217	0.943	995.858	1.813	1.782	0.976	311.399	1.453
6	2.498	0.927	1 142.920	1.768	3.447	0.910	662.385	2.426
7	1.875	0.959	786.173	1.341	1.977	0.971	366.502	1.497
8	1.766	0.964	713.948	1.263	1.316	0.987	151.514	1.029
9	1.777	0.963	720.972	1.274	1.357	0.986	168.524	1.061
10	1.745	0.964	698.935	1.238	1.334	0.987	159.468	1.047
11	1.764	0.965	699.616	1.238	1.362	0.986	170.419	1.073
12	1.796	0.962	734.449	1.299	1.375	0.986	175.561	1.099
13	1.772	0.963	717.582	1.259	1.315	0.987	151.456	1.029
14	1.749	0.964	701.774	1.232	2.613	0.948	516.921	2.044
ANN	1.526	0.973	531.506	1.060	1.142	0.988	130.573	0.937

AIC – Akaike’s information criterion; *MAE* – mean absolute error; n – number of beech trees; R_{adj}^2 – adjusted coefficient of determination; *RMSE* – root mean square error