Supplementary materials

Developing a stand based growth and yield model for Thuya (*Tetraclinis articulata* (Vahl) Mast) in Tunisia

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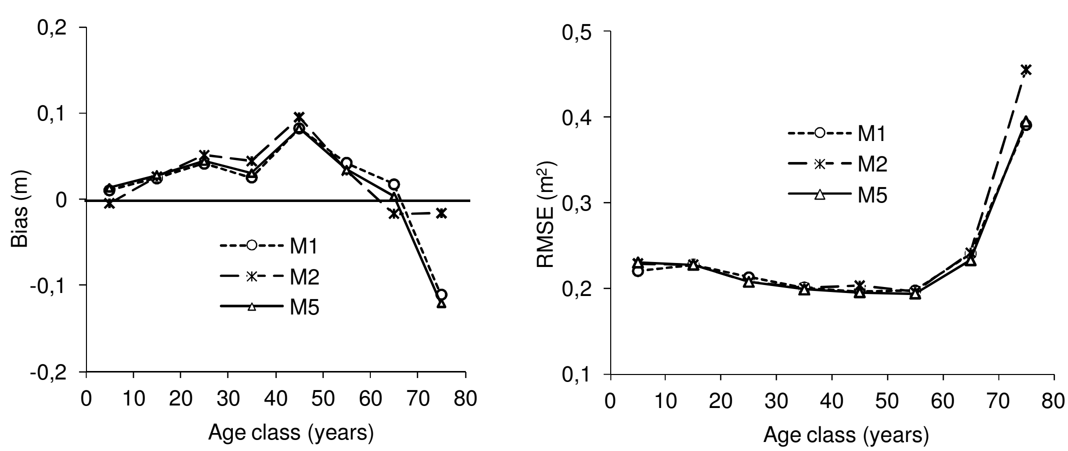

Fig. S1 - Bias and root mean square error (RMSE) in height estimation for site index models M1, M2 and M5 by 5-year age classes.

Fig. S2 - Relative error in height prediction (RE) related to choice of reference age for Model (M5) by 5-year age classes adjusted with CAR(2) and number of observation (n).

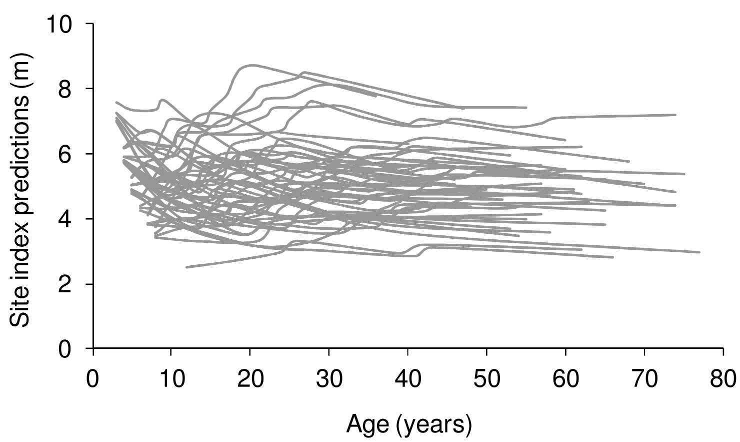

Fig. S3 - Site index predictions against age using model M5 and the stem analysis data.

Tab. S1 - Base models and GADA formulations considered.

Base equation	Parameter related to site	Solution for X with initial values (t_0, Y_0)	Dynamic equation	Model
Log-logistic (log-transformed) : $Y = \dfrac{a_1}{1 + a_2 t^{-a_3}}$	$\begin{cases} a_1 = b_1 + X \\ a_2 = b_2 / X \end{cases}$	$X_0 = \frac{1}{2}\left(Y_0 - b_1 \pm \sqrt{(b_1 - Y_0)^2 + 4b_2 Y_0 t_0^{-b_3}}\right)$	$Y = \dfrac{b_1 + X_0}{1 + b_2 / X_0 t^{-b_3}}$	(M1)
	$\begin{cases} a_1 = b_1 + X \\ a_2 = b_2 X \end{cases}$	$X_0 = \dfrac{Y_0 - b_1}{1 - b_2 Y_0 t_0^{-b_3}}$	$Y = \dfrac{b_1 + X_0}{1 + b_2 X_0 t^{-b_3}}$	(M2)
Bertalanffy-Richards : $Y = a_1 (1 - \exp(-a_2 t))^{a_3}$	$\begin{cases} a_1 = \exp(X) \\ a_3 = b_2 + b_3 / X \end{cases}$	$X_0 = \frac{1}{2}\left(\ln Y_0 - b_2 F_0 \pm \sqrt{(b_2 F_0 - \ln Y_0)^2 - 4b_3 F_0}\right)$ with $F_0 = \ln(1 - \exp(-b_1 t_0))$	$Y = Y_0 \left(\dfrac{1 - \exp(-b_1 t)}{1 - \exp(-b_1 t_0)}\right)^{(b_2 + b_3 / X_0)}$	(M3)
	$\begin{cases} a_1 = \exp(X) \\ a_3 = b3 / X \end{cases}$	$X_0 = \frac{1}{2}\left(\ln Y_0 \pm \sqrt{(\ln Y_0)^2 - 4b_3 F_0}\right)$ with $F_0 = \ln(1 - \exp(-b_2 t_0))$	$Y = \exp(X_0)(1 - \exp(-b_2 t))^{b_3 / X_0}$	(M4)
	$\begin{cases} a_1 = \exp(X) \\ a_3 = b_3 + 1 / X \end{cases}$	$X_0 = \frac{1}{2}\left(\ln Y_0 - b_3 F_0 \pm \sqrt{(\ln Y_0 - b_3 F_0)^2 - 4F_0}\right)$ with $F_0 = \ln(1 - \exp(-b_2 t_0))$	$Y = \exp(X_0)(1 - \exp(-b_2 t))^{b_3 + 1 / X_0}$	(M5)
Lundqvist-Korf $Y = a_1 \exp(-a_2 t^{-a_3})$	$\begin{cases} a_1 = \exp(X) \\ a_2 = b_2 / X \end{cases}$	$X_0 = \frac{1}{2}\left(\ln Y_0 \pm \sqrt{(-\ln Y_0)^2 + 4b_2 t_0^{-b_3}}\right)$	$Y = \exp(X_0) \exp(-(b_2 / X_0) t^{-b_3})$	(M6)

Tab. S2 - Proposed stand density isolines for constructing SDMD

Isoline for	Equation	Values for isoline
SDI	$N = \left(SDI \left[\frac{a_o H_0^{a_1}}{25} \right]^{-1.605} \right)^{1/(1+1.605\,a_2)}$	SDI = 100 to 700 by 100
Dg	$N = \left(\frac{Dg}{a_o H_0^{a_1}} \right)^{1/a_2}$	Dg = 5 to 14 by cm
W_T	$N = \left(\frac{W_T}{b_0 a_0^{b_1} H_0^{(a_1 b_1 + b_2)}} \right)^{1/(b_3 + a_2 b_1)}$	$W_{T=}$ 5 to 140 by 10 t/ha
V	$N = \left(\frac{V}{c_0 a_0^{c_1} H_0^{(a_1 c_1 + c_2)}} \right)^{1/(c_3 + a_2 c_1)}$	Vol = 5 to 120 by 5 – 10 m^3/ha
Ri	$N = \left(\frac{\log(R_i)}{d_0 D_i^{d_1} a_0^{d_2} H_0^{a_1 d_2}} \right)^{1/a_2 d_2}$	Ri= 0.10 to 0.40 by 0.05 D_i = 15 cm