PREDICTION OF INDIVIDUAL TREE DIAMETERS OF *Pinus nigra* var. *maritima* (Ait.) Melville (CORSICAN PINE)

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A growth model to predict the future diameter at breast height of Corsican pine trees was constructed using easily measurable explanatory variables. For this work it was assumed that future growth of individual tree diameter at breast height ($dbh_{t+\Delta t}$) can be predicted as a function of current dbh (dbh_t), current age (a_t), age at the time prediction is required ($a_{t+\Delta t}$), current stand density (d_t) and quality of the site (s) as in the equation 1.

$$dbh_{t+\Delta t} = f(dbh_t, a_t, a_{t+\Delta t}, d_t, s) \quad 1$$

Repeated measurement data of permanent sample sample plots over a long period were obtained from the Forestry Commission in Great Britain. These plots were maintained under two thinning types i.e. intermediate and neutral. First the data were divided by the thinning type and each thinning type was divided by the thinning type and each thinning type was divided again as working (3/4) and validating (1/4) data.

In order to reduce the number of variables, the time difference between the beginning and end of the simulation period (a_{dif}) was used for the age factor. Four factors i.e., top height, top height/age, total basal area/age and top height/total basal area were used to represent the site quality. Suitable transformations were used for all the cadidate variables in order to obtain the best medel. R^2, residual distribution, average model bias, mean absolute difference and modelling efficiency were tested for the evaluation purpose.

When tested, stand density was not significant and the best site factor was the total basal area/age. The finally selected equations were as below.

Intermediate thinning:

$$\sqrt{dbh_{t+\Delta t}} = 1.014\sqrt{dbh_t} + 0.059site + 0.004a_{dif}^2 \quad 2$$

Neutral thinning:

$$\sqrt{dbh_{t+\Delta t}} = 1.050\sqrt{dbh_t} - 0.059site + 0.005a_{dif}^2 \quad 3$$

When there is little difference in age, $a_{dif} \rightarrow 0$ and site factor can be ignored because it dies not change when age difference is zero. In such a situation, $\sqrt{dbh_{t+\Delta t}} \equiv \sqrt{dbh_t}$ and therefore the parameter associated with $\sqrt{dbh_t}$ must not be significantly different from one. However, this condition was not fulfilled by above models and a new set of parameters were estimated forcing that parameter to be one. The test results for the models with new parameters indicated that there was no bias and the modelling efficiency was 0.99 for both thinning types. The validation procedure indicated that the models were adequate. The final models are given in equation 4 and 5.