

02.06.2023.

“Lēmumu pieņemšanas atbalsta instruments meža ražības paaugstināšanai, nodrošinot efektīvu un klimatam piemērotu selekcijas efekta pārnesi” (Nr. 1.1.1.1/19/A/111)

Pētījuma rezultāti prezentēti zinātniskā konferencē

Latvijas Kokkopju – Arboristu biedrība, Latvijas mežzinātnes institūts “Silava” un a/s “Latvijas Valsts Meži” kopā organizēja starptautisku zinātnisku konferenci “Tree Conference Riga 2023”, kurā piedalījās pētnieki no Lielbritānijas, Francijas, Norvēģijas, Nīderlandes, Čehijas un Latvijas. Konferencē notika ar koku un mežaudžu izpēti saistītu rezultātu prezentēšana un ideju apmaiņa starp arboristiem, mežzinātniekiem, urbānistiem, pilsētu plānotājiem un mežu apsaimniekotājiem.



Projekta rezultāti, raksturojot klimata un ģenētikas mijiedarbības ietekmi uz augšanas gaitu, iekļauti kā daļa konferences ziņojumā par intensīvas mežkopības nākotni, kā arī prezentēti atsevišķa stenda ziņojuma formātā.



Introduction

Forest tree breeding traditionally focus on improved growth and stem quality, as well as adaptability and resistance to various environmental risks. Still, the traits prioritized for quality timber production and carbon sequestration can contribute to high social value in urban and peri-urban forests. The fast early growth of improved trees may quickly transform undesirable open spaces (e.g. clear-cut areas in peri-urban forests) to visually attractive environment. Rapid establishment and stand development of healthy, fast growing genotypes provide shade in a relatively short period, windbreaks, noise reduction, screening and wildlife habitat, which all are desirable for recreation in forests. In addition, improved planting material can be used for enrichment planting.

Therefore, we aimed to develop individual tree height growth models for improved Scots pine (*Pinus sylvestris*) and silver birch (*Betula pendula*). While Scots pine is the most common tree species in urban and peri-urban forests in Latvia on rather poor sandy soils, the birch can be a fast-growing target species on more fertile sites.

Materials and Methods

We used the generalized algebraic difference approach (GADA) to model individual tree height growth of improved Scots pine and silver birch forest reproductive material (FRM) categories 'qualified' and 'tested'. Modelling was based on data from open pollinated progeny trials with an age range of 3 to 46 and 5 to 22 years for pine and birch, respectively. We used nonlinear fixed-effect modelling approach, applying the FRM category effect on the parameters of commonly used dynamic height growth derivatives.

Results

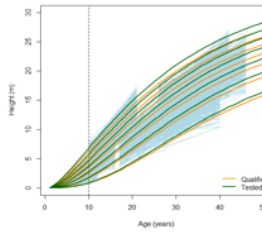
The dynamic form of the Chapman-Richards and King-Prodan equations had the best fit for Scots pine and silver birch, respectively. The growth curve of the category 'tested' was slightly above the one for 'qualified', with more distinct differences in silver birch. When comparing the growth curves of the two species studied, silver birch showed faster early height growth than Scots pine. The most productive birch reached a height of 23 m after 22 years, while the same height for the fastest growing Scots pine took around 35 years with a flatter growth trajectory. The differences in growth patterns between FRM categories remained consistent at least until the mid-rotation. The models also accounted for site quality, with category-specific differences increasing with better site index for Scots pine.

Conclusions

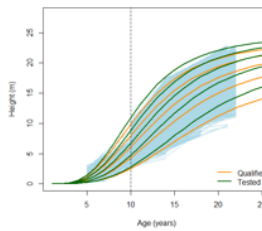
The developed height growth functions accurately reflected the actual growth improved Scots pine and silver birch. The modelling results indicate a faster growth rate of improved material at younger age, hence suggesting a potentially altered management regime for young stands. The developed models may be useful for forest owners, managers, and tree breeders. They could aid in planning management activities and comparing the growth dynamics of different FRM categories. The study also suggested that the models could be integrated into forest growth simulators to improve growth predictions at landscape and regional scale. This would be valuable for evaluating the contributions of tree breeding and forest management to various ecosystem services, aiding in the development of optimal management plans for both contribution to bioeconomy and recreational value.



Scots pine progeny trial, age 22.



Scots pine height growth curves (green and orange lines for improved categories 'tested' and 'qualified', respectively) following Chapman-Richards dynamic model. Light blue colour in the background shows observed height - age series.



Silver birch height growth curves (green and orange lines for improved categories 'tested' and 'qualified', respectively) following King-Prodan dynamic model. Light blue colour in the background shows observed height - age series.



Funding
 European Regional Development Fund, project: «Decision support tool for increased forest productivity via efficient climate-adjusted transfer of genetic gain» (No. 1.1.1.1/19/A/111)

INVESTING IN YOUR FUTURE

