

GENETIC TESTING BASED ON PEDIGREE RECONSTRUCTION AND SPATIAL ANALYSIS IN A PLANTATION OF *LARIX KAEMPFERI*

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Larix kaempferi is one of the major timber species in Northeast Asia because of their rapid growth and straightness. The demand for the reforestation of the species has been increased in Korea due to the promoted timber utilization by recent advances in wood processing technology. The genetic testing is the prerequisite process for the evaluation of genetic value and gain, and in turn for the supply of genetically improved seed. However, the genetic testing of *L. kaempferi* has not been performed yet because it is an introduced species in South Korea. The establishment of progeny trial of the species is even difficult because of the irregularity and the large variation in seed production. In this study, the genetic testing was simulated using the pedigree reconstruction and the spatial distribution analysis in a plantation originated from seed orchard crops in order to replace progeny trials. The adequacy of utilizing the plantation as a testing population was confirmed based on the comparable level of the genetic variation in the offspring to that in the group of mother trees. The pedigree reconstruction was conducted by maternity analysis using microsatellite markers. The genetic testing of diameter growth was performed subsequently using both the animal model and the model accounting for spatial autoregression. The improved fitness of the latter presented the usefulness of the spatial analysis in genetic testing with plantation lacking the prior experimental design. To understand the environmental characteristics of the heterogeneous site, the environmental effects on the growth were investigated by geographically weighted regression analysis. The changes in the main effects allowed it possible to propose a zoning scheme for the management of the plantation as breeding material. In addition, it could be expanded to be utilized in the genetic testing of the other tree species without progeny trials.