

# IMPACT OF GENE FLOW ON QUANTITATIVE GENETIC VARIATION AND ITS APPLICATION IN MANAGEMENT OF FOREST GENETIC RESOURCES

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A model based on two populations differing in gene frequencies, one natural population and another man-made plantation, was presented to explore the role of unidirectional gene flow from plantation to natural population in maintaining genetic variation of adaptive quantitative trait (QT). A single quantitative trait locus (QTL) with  $n$  alleles is considered. Mutation rate is assumed to be much smaller than that of migration rate and hence is not included. Analytic expression for genetic variation within recipient population was developed in theory under the hypothesis of external factors of migration and selection and effects of gene additive and dominance on adaptive QT. It has been shown using numerical cases that impacts of gene flow on maintaining genetic variation of adaptive QT are double, depending upon the selection system involved in the trait and also upon the gene frequency in the source population. Implication of these results was discussed in detail in management of genetic resources such as the appropriate treatment of the relationship between man-made plantation using genetic improved materials and natural population of the same tree species, and the genetic activities associated with seeds transfer and other forest policy-makings. In order to maintain genetic diversity within natural populations for sustainable utility in the future, great attention paid to employment of different materials is required when practical plantation is made in large scale.

Keywords: genetic conservation, natural population, plantation, adaptive quantitative trait, gene flow