APPLICATION OF MATESEL SOFTWARE IN A LOBLOLLY PINE BREEDING PROGRAM

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The use of the MateSel software is now standard in many livestock and aquaculture breeding programs and is increasingly used in forest tree breeding programs. The software uses a differential evolution algorithm to balance gain and diversity when selecting parents for the next generation and is subject to several logistical constraints that vary based on the biology of the species. The North Carolina State University Cooperative Tree Improvement Program first utilized this algorithm to develop a mating plan for the 4th-Cycle breeding program (Isik and McKeand 2019). The Cooperative is now using the software in a novel approach to make forward selections for the 5th cycle of breeding by modifying the mating plan output to create a list of progeny test trees to graft for future breeding. We have evaluated several constraints, such as accounting for recent selections in breeding orchards that are not yet producing strobili and accounting for potential selections from families in young progeny tests that are not yet measured. Results indicate that even when the nominal balance of gain and diversity is held constant, considerable impacts on the gain and diversity of the next generation can occur with the inclusion or omission of these logistical breeding constraints.

Isik, F., and S. E. McKeand. 2019. Fourth cycle breeding and testing strategy for Pinus taeda in the NC State University Cooperative Tree Improvement Program. Tree Genetics & Genomes. 15(5):70.