Modelling natural mortality of tropical plantation species acacia mangium willd.

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Abstrak

Natural mortality of trees is extremely variable due to the uncertainty and complexity of the functioning of forest ecosystems. The objective of this study was to develop a stand-level mortality model for Acacia mangium species by relating mortality to stand variables that affect the natural mortality process. The model was developed using data from l97 permanent sample plots measured periodically at 1-yr time intervals from 2-4 years until 8-11 years after planting in South Sumatra, Indonesia. The model consists of two complementary equations. The first equation is a logistic function predicting the probability of mortality incidence depending on stand density, site index and stand age. The second equation estimates the reduction in the number of surviving stems observed in a stand where natural mortality occurs. Nine equations were fitted using data from permanent sample plots where trees died over the time period and the best model was selected. Estimates from this second model were then adjusted by a factor equal to the probability of mortality applying three different approaches: probabilistic two-step, deterministic threshold and stochastic. All methods revealed no significant difference between the observed and the predicted number of surviving stems per ha. The probabilistic two-step approach, however, produced more consistent and the most accurate estimates. This method should provide reliable prediction when it is to be used in forest productivity prediction and management system for the species.