

Stand basal area as an index of tree competitiveness in timber intercropping

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Abstract

To derive optimal benefits from intercropping timber, farmers should make important initial decisions on tree species and planting density with a good understanding of their tradeoffs. Complex and data-intensive models used by researchers should be supplemented with simpler models based on easily measured parameters and easily understood competition functions. In experiments in the Philippine uplands, growth parameters of three popular farm-forestry species (*Eucalyptus deglupta*, *E. torelliana*, and *Paraserianthes falcataria*) were measured, along with intercropped and non-intercropped yields of maize and vegetables. The commonly used forestry parameter of stand basal area had a significant negative correlation with intercrop yields (as a percentage of non-intercropped yields). The slope of the regression line differed between species; in this study, percent yield loss per unit stem basal area growth was in the order *E. deglupta* > *E. torelliana* > *P. falcataria*. The relationship between stand basal area and intercrop-yield decline was tested on an independent data set from China. Intercrop yields had significant negative correlations with stand basal area of *Paulownia elongata*. We propose that adaptive tree-screening trials evaluate competitiveness in addition to evaluating growth and mortality. Stand basal area may be better suited to this task than more mechanistic indices such as leaf-area index as it is easy to measure, calculate, and understand, and it may serve as a better index of total (aboveground + belowground) competition. Basal area is also directly related to tree volume, and allows farmers to more easily evaluate the economic tradeoffs between tree growth and intercrop-yield declines.

Keywords: *Eucalyptus* spp, farm forestry, *Paraserianthes falcataria*, *Paulownia elongata*, Philippines