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WAVES

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of Ecosystems and Society
in the Northeast of Brazil

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Fallow Vegetation Enrichment with Leguminous Trees in the Eastern Amazon of Brazil: Trees Performance

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The fallow periods used in slash-and-burn agriculture in the Eastern Amazon of Brazil are being shortened. As a consequence, there is insufficient time for the fallow vegetation recover vitality and build up a biogeochemical nutrient cycle. Planting trees as an enrichment of fallow vegetation can aid biomass accumulation and using leguminous trees might be advantageous due to the benefits of nitrogen fixation.

To study the capability of improvement of fallow biomass, the leguminous trees *Acacia angustissima* Kuntze, *Clitoria racemosa* G. Don, *Sclerolobium paniculatum* Vogel, *Inga edulis* Mart. and *Acacia mangium* Willd. were planted during the agricultural period at spacing of 1 m x 1 m, 2 m x 1 m and 2 m x 2 m, with the exception of *S. paniculatum* which was planted only in 2 m x 1 m to enrich the later fallow. The trees were planted replacing maize (June 1995) and four months after cassava had been planted (February 1995). Trees and cassava grew together for eight months until the cassava be harvested (February 1996). After the last cassava weeding (between October-November 1996) the fallow vegetation started to grow as an enriched fallow. To evaluated the silvicultural performance of trees, the height was measured every 2 months up to 12 months of age and again after 18 and 24 months. The diameter at breast height at 1.3 m (Dbh) was taken only when the trees had a diameter of at least 1 cm.

The values of tree survival at 24 months of age were as follows: *C. racemosa* (99%), *A. angustissima* (98%), *I. edulis* (97%), *A. mangium* (91%) and *S. paniculatum* (90%). At 24 months of age trees planted to enrich fallow vegetation showed different behaviors relating to height- and Dbh growth. *A. mangium* presented the best performance (7.1 m height and 5.6 cm Dbh) followed by *I. edulis* (4.7 m and 3.5 cm), *A. angustissima* (4.5 m and 3.2 cm) and *C. racemosa* (3.4 m and 3.0 cm). Plant spacing did not influence growth in height, but caused significant impacts on growth in Dbh. The lowest value was observed at the spacing of 1 m x 1 m (3.2 cm) followed by 2 m x 1 m (3.9 cm) and 2 m x 2 m (4.3 cm). The monthly dynamics of tree growth, evaluated by average height increment - MHI during the study period, showed the same tendency for species planted and for studied spacing. The interpretation of these growth dynamics demonstrates the existence of the following phases of tree development: "adaptation", "growth explosion", "competition" and "stability". Based on the average of monthly growth in height the trees studied were ranked as: *A. mangium* was considered as of fast growth (32 cm month⁻¹), followed by *S. paniculatum* (22 cm month⁻¹), *I. edulis* (22 cm month⁻¹), and *A. angustissima* (17 cm month⁻¹) were classified as of intermediary growth and *C. racemosa* (11 cm month⁻¹) as of slow growth.

Litterfall and Litter in Enriched Fallow Vegetation with Fast Growing Trees in the Eastern Amazon of Brazil

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Litterfall is the main process of transferring organic matter and nutrients accumulated from standing aboveground tree biomass to the soil. Therefore, its quantification can aid in understanding the biomass dynamics of an ecosystem. In the present study, this parameter was estimated in improved fallow vegetation biomass with the leguminous trees *Acacia angustissima* Kuntze, *Clitoria racemosa* G. Don, *Inga edulis* Mart. and *Acacia mangium* Willd. All trees were planted

during the agricultural period at spacing of 1m x 1m, 2m x 1m and 2m x 2m. The trees replaced maize (June 1995) four months after cassava had been planted (February 1995). Trees and cassava grew together for eight months until the cassava be harvested (February 1996). The litterfall were studied from April 1996 to April 1997 considering planted trees and natural fallow. The existing litter biomass at the beginning and end of the period of litterfall collection