Nutrient fluxes from litterfall in mixed cropping systems of the central Amazonia

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Litterfall and prunings are major components of organic inputs in an agroforestry system. They are the main source of organic matter and nutrients to the subsoil ecosystem. For best agronomic results in low input agricultural system, management of organic inputs is necessary. The aim of this study was to quantify nutrient fluxes from litterfall and prunings in an agroforestry system and to determine differences associated with fertilization.

The agroforestry system studied is located at the Embrapa Amazônia Ocidental research station, 29 km Northeast of Manaus, in the Amazonas state, Brazil. It is one of the mixed cropping systems of the SHIFT Program, «Rehabilitation of Degraded Areas». The system consists of a mixed cropping of *Bixa orellana* (annatto), *Bertholletia excelsa* (brazil nut), *Theobroma grandiflorum* («Cupuaçu»), *Bactris gasipaes* (peach palm) and *Pueraria phaseoloides* as a cover crop. Two fertilization treatments were compared (30% -without nitrogen- and 100% of the dose recommended for the respective tree species). Litterfall from the trees was collected with tree-centered littertraps and prunings were quantified when harvested to be incorporated to the system. In most of the plots, Pueraria had an heterogeneous cover, so it was not considered in this study. THE macronutrients N, P, K , Ca, and Mg were analyzed in the litterfall and pruning leaves.

Annual litterfall in the agroforestry system was greater in the high fertilization treatment (1,56 t/ha) than in the low (1,42 t/ha) but the difference was not significant. Prunings were higher in the high fertilization treatment than in the low, both from peach palm (1,33 and 1,04 t/ha) and annatto (1,79 and 1,15 t/ha). Significant difference in pruning biomass was found only for annatto leaves. There were more differences between the two fertilization treatments for nutrient content. Variations depended on species and nutrients. Fertilization had a positive effect on litter nitrogen concentration only for annatto leaves and flowers and for trash; a positive effect on phosphorus concentration for annatto leaf litter, fresh leaves, «cupuaçu» flowers and trash. Fertilization had also a positive effect on litter potassium concentrations for all leaves except Brazil nut leaves and trash. Calcium and magnesium concentrations were higher in all litter and prunings in the high fertilization treatment. Annatto and peach palm had more variations in nutrients than brazil nut and «cupuaçu» ; these differences are associated with species demands for that nutrient. Annatto and peach palm are trees which have fast biomass production and, thus, high nutrient demand after pruning. These two species were also selected for a long time for their productivity and capacity to grow faster with fertilizers. Brazil nut and «cupuaçu» had little response to fertilizers ; they both are species which had a shorter selection history and are still well adapted to low nutrient in soil of their natural habitats.