

***Vismia guianensis* (Aubl.) Choisy, Clusiaceae:
Management Factors in Early Stages of Agroforestry Systems
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Vismia guianensis is a common pioneer tree species in the Central Amazon, which occurs on degraded areas during the early succession. Resprouting vegetatively by roots, *V. guianensis* builds up the first dense thickets in the fallow vegetation and shows a high rate of biomass production. Loss of nutrients is thus prevented by uptake from the soil into the plant biomass. Therefore *V. guianensis* may contribute to the management of the early stages of agricultural systems, e.g. as a shadow plant or nutrient accumulator plant, which can be used in the form of mulch as a natural fertilizer. However, little is known about this plant species. The objective of our study was to investigate plant growth, nutrient content, root morphology, and interactions with other plant species.

V. guianensis grows rapidly and shows a high accumulation of magnesium and phosphorus into the biomass. In the study area, phosphorus is a limiting factor for plant growth.

Under these circumstances the question arises how *V. guianensis* is able to accumulate phosphorus. The root system of *V. guianensis* is dense and heavily branched with a high proportion of fine roots as root hairs are present in very low numbers, the fine roots are responsible for the uptake of most nutrients. Due to the large intercellular spaces and fragile cell walls these fine roots break off easily. This light-weight construction enables a fast distribution in the soil, without preventing root growth of other species. Primary forest species, planted into the *Vismia*-thicket, grow well. This suggests that growth of many other plant species is not inhibited.

The results demonstrate a potential use of *V. guianensis* as integrative component in sustainable agroforestry systems. More detailed studies about the processes of nutrient absorption and fertilization experiments with litter of *V. guianensis* are necessary.

**African Mahogany - Alternative for Amazonian Agroforestry
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High-value timber species are an interesting component of agroforestry systems, especially in areas where these species have largely been lost from forests due to over-exploitation. The Meliaceae family comprises some of the most valuable timber trees in the world, including the genera *Swietenia* (mahogany) and *Cedrela* in Latin America, and *Khaya* and *Entandrophragma* in Africa. The principal problem of the production of these tree species in forest plantations and agroforestry is the attack of the shoot tip of the trees both in the nursery and in the field by borers of the genus *Hypsipyla*. Repeated attack by these borers causes poor form and slow growth of the trees. In Latin America, the incidence of *H. grandella* is so severe that planting of mahogany or other Meliaceae trees in agroforestry systems can hardly be recommended. In West Africa, the Latin American timber species *Cedrela odorata* has successfully been planted since 1922, because it is not attacked by the local pest, *H. robusta*. Similarly, the African timber species *Khaya ivorensis* has successfully been intro-

duced in Eastern Amazonia some time ago and is believed to be resistant to *H. grandella*. *K. ivorensis* trees originating from the Eastern Amazonian introductions were planted in a multi-strata agroforestry experiment near Manaus in early 1997. The trees showed very rapid growth. Attack by shoot borers occurred, but was not very severe in most cases, and resulting trunk bifurcations could be reduced by appropriate pruning. As the genetic basis of the Eastern Amazonian introductions is extremely small, we obtained additional seeds from African collections for the species *K. ivorensis*, *K. anthotheca* and *K. senegalensis*. These were planted both on a clayey terra firme and in a pasture on a sandy várzea site in early 1999. Tree growth on the terra firme site was very rapid, whereas the trees in the sandy pasture suffered from nutrient deficiencies. From this preliminary evidence it can be concluded that further research on these species is worthwhile and may provide Amazonian agroforesters with high-value timber species at a much reduced production risk compared with the native Meliaceae.