

Protein patterns of ripe seeds of *Theobroma cacao*, *T. grandiflorum*, and *T. bicolor*.

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Theobroma cacao, the cocoa tree, became one of the main tropical crop plants due to the unique and delicious flavour of the product obtained from the seeds: raw cocoa, the base for the production of chocolate and related products which are consumed world wide. In Brazil cocoa trees widely suffer from the causal agent of witches broom, inflicting severe losses on the Brazilian cocoa production.

T. grandiflorum, the cupuaçu-tree, is considered an excellent crop for local adapted land use systems on former terra firme rain forest areas in the Amazon region. It has been shown that the cultivation in mixed cropping systems favours the development and productivity of cupuaçu-trees. The fruit pulp fetches relatively high market prices whilst the seeds, which amount up to 20% of the fruit's fresh weight, are not yet commercially used. Attempts to commercialize a type of chocolate-wares made from cupuaçu-seeds failed so far, probably due to the unsatisfactory and hardly reproducible quality of the product.

T. bicolor, which is reported to be a very robust tree, can be found nearly throughout the humid tropics of central and south America. In some regions the seeds are used for the production of chocolate for one's own consumption and for local markets.

The objective of our studies is to evaluate whether and under what conditions the seeds of *T. grandiflorum* and *T. bicolor* have the potential to develop a good chocolate-like aroma, revealing the option of producing a storable and valuable ware (in addition to the pulp in the case of cupuaçu).

It has been shown by BIEHL and co-workers that the precursors of the cocoa-aroma are formed from seed storage globulins by enzymatic digestion during fermentation. Thus, as a first approach we studied the seed proteins of the three species by denaturing polyacrylamide gel electrophoresis, paying special attention to the globulins.

The patterns of seed proteins of all three *Theobroma* species are marked by two predominant globulins and at least one predominant albumin. The molecular weights of the two classes of globulins are quite similar for all three species (49 ± 3 kDa and 33 ± 1 kDa). Considering the quantity of globulins the seeds of *T. bicolor* are prominent regarding their very high content of these storage proteins, while the seeds of *T. grandiflorum* are the only ones containing more albumins than globulins. However, in all three species the relative quantity of the globulins at the range between 32 and 34 kDa vary around 15% of total protein content.

The results give rise to the suggestion that *T. grandiflorum* and *T. bicolor* meet at least one requirement for the generation of a chocolate like aroma: the seeds contain globulins similar to those of cocoa regarding the molecular weights and the relative quantities.

The degree of similarities will be further studied by investigating molecular details of the globulins through immune-serological and enzymatic technics.

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