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Exploiting the Venezuelan Cocoa Diversity: Metabolomic of Theobroma Cacao

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Venezuela has a rich history in cocoa and a world reputation for the quality of its beans, with several well known local varieties having distinctive flavors and aromas. For improvement our objective is to characterize and use the vast cocoa diversity present in Venezuela. Gene banks in all the country, with around 1000 trees, were genotyped using 24 microsatellites. With the goal of asexual genetic improvement and *in situ* and *ex situ* conservation, 110 elite cocoa varieties have been propagated using somatic embryogenesis. The first plants are now in the fields. Fungi are the main pathogens for cocoa and in diverse location different diseases are present, with differences in western, central and eastern Venezuela. Until present 1500 fungi have been characterized, in morphology, *in vitro* cultures and molecular fingerprint, with 30 antagonists were found. The more important symbiosis on earth, plant-arbuscular mycorrhizas, play an important role in cocoa development, therefore mycorrhizas are isolated and characterized from several locations, looking for regional differences, if any, with the goal to improve the propagation of elite cocoa trees and their performance in the field. Natural products are essential compounds in cocoa, playing an important role in the development of aroma and flavor in chocolate and in human health. The characterization of the diversity in terms of secondary metabolites is under way, 80 elite cultivars have been characterized to compare the difference among the trees and among roots, stems, leaves and pods of the same tree. To fully establish the genetic fingerprint of the metabolic process, the sequencing of the genome of the Criollo cocoa is underway.

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Ascorbic Acid Content of Different Varieties of Mangoes (*Mangifera indica* L.)

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Ascorbic acid content of mangoes is fairly high and it plays a major role in prevention of certain diseases and aging problems as an antioxidant. Ascorbic acid content is important to find out antioxidant activity and ascorbic acid content of local mango varieties found in Jaffna and Vavuniya has not been studied. Thus, the main objectives of this study were to find out ascorbic acid content of different mango varieties and to compare ascorbic acid content of mangoes obtained from Jaffna and Vavuniya. Mature green mangoes of Karthacolomban, Vellaicolomban, Ambalavi, Selam, Thumbuma (Puli) were harvested carefully and allowed to ripen at 30±4 °C and 70-75% RH. During ripening colour development and disease development were assessed by scoring method. Ascorbic acid content was determined immediately after ripening and pulp stored in refrigerator for 2 days by using 2, 6-Dichlorophenol Visual Titration Method. Among those mango varieties, high amount of ascorbic acid was recorded in Selam mangoes from Jaffna (138.98mg/ml) and it showed significant difference (p=0.05) from all other varieties. Ascorbic acid content of mango varieties ranged from 62.96 to 158.24 mg/100ml. Very low amount of ascorbic acid was found in Puli mangoes from Jaffna (62.96 mg/100ml) and Selam mangoes from Vavuniya (65.06 mg/100ml). These values did not show significant difference (P=0.05). Ascorbic acid content was not affected by refrigeration of mango pulp for 2 days. There was no significant difference (p=0.05) observed in the ascorbic acid content of mangoes immediately after ripening and pulp stored in refrigerator for 2 days. Ascorbic acid content of Selam mangoes was high in Jaffna whereas it was high in Ambalavi mangoes in Vavuniya. These mangoes can be used for maintaining good and sound health and for prevention from common cold.

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Postharvest Quality and Chlorophyll Content in Sapodilla cv. Sapota Tropical Grown under Organic and Conventional Systems

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This work evaluated the postharvest quality of fruits and chlorophyll content of leaves of sapodilla (*Manilkara zapota* L. cv. 'Sapota tropical') grown under organic and conventional agricultural systems, in Northeast Brazil. Fruit were harvested ripe and evaluated for pH, total acidity (TA), total solids (TS) and total vitamin C content and samples were made up of four replicates of four fruit each. Total chlorophyll content was evaluated in the youngest completely developed leaves on the same branches as the harvested fruit with a portable chlorophyll analyzer SPAD-502 (Minolta, Osaka-Japan). Thus, two leaves on each branch were analyzed adding up to four replicates of eight measures. The postharvest analyses of the ripe sapodilla showed no significant differences for pH (5.40) and TS (11.3%) for both management systems, however, the organic fruit had greater TA (0.117%) and vitamin C contents (17.56 mg/100g) than conventional (0.058% and 8.57 mg/100 g, respectively). The leaves of plants submitted to the conventional cultivation method had greater total chlorophyll content (25.2) than organic sapodilla (22.1). Further studies are underway, however the initial data as greater vitamin C content suggests the antioxidant metabolism is more active in organic *M. zapota* cv. 'Sapota tropical' indicating the organic agricultural system induces a stress condition and this idea is reinforced by the lower total chlorophyll content found for the organic plants.

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Chemical Predictors of Sweetness and Sourness in Banana

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Assessing sensory properties generally takes a long time because the process is labor intensive and requires a lot of logistics. To be able to take sweetness and sourness into account sooner in selection scheme when assessing a new banana hybrid, chemical indicators were looked for. Ten trained panellists evaluated both taste attributes on a 0-9 scale in 17 dessert banana cultivars. Dry matter (DM), total soluble solid (TSS), pH, and titratable acidity (TA) were concomitantly measured in the fruits. Linear regressions were established between sensory properties and chemical parameters with a set of 46 data. The sweetness was the best predicted as a function of pH and TSS ($Y=2.85 \times \text{pH} + 0.25 \times \text{TSS} - 13.6$; $R^2=0.79$). The sourness was the best predicted as a function of TA ($Y=0.56 \times \text{TA} - 0.46$; $R^2=0.75$). Our data suggest that these chemical parameters, which are easy to measure, can thus be used to predict taste in new hybrid bananas without making sensory analysis.

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In vitro Bioaccessibility of the Carotenoids of Fresh and Processed Fruits

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Due to their importance in human health, the carotenoid compositions of Brazilian foods have been studied, resulting in an extensive database. Compositional data, however, should be complemented with information on bioavailability. *In*