Chemotypic variation explaining traditional selection of tropical root crops in Vanuatu, South Pacific.

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Abstract

Understanding chemical variations in edible plant organs is essential for a better understanding of crop genetic diversity in traditional fields as well as for selection. Among tropical root crop species, high variation has been shown in the composition and content of isoprenoids and flavonoids. The purpose of this work was to identify relations between local preferences, primary compound and secondary metabolite contents, to attempt characterizing a good cultivar according to traditional customs and knowledge. A core-collection of about 500 cultivars was built to represent the widest agro-morphological variability, and analyses were made for percentage of dry matter, starch, minerals, cellulose, proteins and total sugars. In terms of primary compounds, very high coefficients of variation were found for protein, total sugar, cellulose and mineral contents, while starch exhibited the lowest variation. Starch content was always positively correlated with dry matter content, whereas it was negatively correlated with protein, mineral, total sugar and cellulose contents significant at 0.01% level. Through blind tests on organoleptic properties, local consumers were shown to prefer consuming their national dish with high starch and dry matter content, giving a particular cultivar high value in the eyes of local consumers. In contrast, preferences for daily consumption of boiled or roasted tubers were linked to average starch content, indicating great opportunities for improvement of others primary compound contents. Interestingly, isoprenoids content were strongly correlated to flavonol and flavanol contents among yam species, while phenolic acids content exhibited positive correlation with anthocyanins. This work suggests biofortification opportunities in isoprenoids and flavonoids content by colour-based selection. The database we established will help breeders improve micronutrient contents and health benefits of such staple foods.

Keywords: aroids, biofortification, cassava, flavonoids, isoprenoids, primary compounds, sweet potato, yam