Phenotypic Characterization and Starch Profiles of the False Banana (Ensete species) in Uganda

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Abstract

Enset is a diploid (2n=18) species that phenotypically resembles a banana plant but the edible parts are formed by the pseudostem and the underground corm rather than by the fruit. Enset is an important staple crop for more than 20 % of the Ethiopian population living in the southern and south-western parts of the country. In Ethiopia, the plant is reportedly grown and exploited for its starch to make various food and industrial products. In Uganda, little is known about enset regarding its use and distribution yet it occurs in the country. Its distribution and phenotypic diversity are yet to be established in Uganda. Moreover, the knowledge of its physico-chemical, functional and proximate starch properties have not yet been documented in Uganda. The main aim of this study was to assess the phenotypic diversity and evaluate the potential of enset as a source of starch for food and industrial applications as compared to other agronomically important starchy crops in Uganda. A survey was carried out throughout the country to collect global information system (GIS) data in the different regions where the enset plants were foundgrowing. Phenotypic characterizationof enset was carried out in different habitats by observing and measuring different morphological attributes of the plant. Samples for starch extraction and analysis were obtained from the corm of the plants during thesurvey. Enset was found growing at elevations ranging from 988 to 2,150 masl and a map indicating its distribution throughout the six regions surveyed in Uganda was made. A catalogue of the local names of enset in Uganda was also established, indicating that the natives know enset and exploit it in different ways given a variety of its local names and uses in the country. Basing on phenotypic traits, five different morphotypes of Ensete species were found to exist in Uganda. The most dominant enset morphotype was mainly found in the eastern, West-Nile and northern regions. Moreover, the dominant enset morphotype was distinguished by such phenotypic traits as; pink mid-ribs on

both sides of the leaf, brown pseudostem background appearance, blackish-pink leafmargins and a purple male bud colour. Starch analyses for physico-chemical, functional and proximate starch properties revealed considerable variations. There were no significant variations ($P>0.05$) for swelling power at 50oC. However, significant variations ($P<0.05$) for swelling power were observed at temperatures ranging between 60-80oC for enset starch. There were no significant variations ($P>0.05$) observed for solubility. Significant variations ($P<0.05$) were observed for water binding capacity, starch content, paste clarity and reducing sugar. Ash content ranged between 0.01-0.04 %, lipid content was between 0.02-0.05 % and moisture content ranged between 12-17 %. Enset starch had low swelling power and low solubility which hinders its use in the food industry for baking and as an adhesive. Enset starch had high water binding capacity which indicates its use for bulking and consistency of processed food products. It further had low paste clarity an attribute which influences brightness and opacity of food products. Its low ash content, lipid content and reducing sugar content qualifies it more for other industrial uses instead of food. These results revealed that enset starch is more recommended for industrial applications such as pulp and textile rather than for food in Uganda.

Key Words: Phenotypic Characterization, Starch Profiles, False Banana.