

Physicochemical characterization of sugar syrup and ethanol from starch of selected Ugandan-grown cassava and maize varieties

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Highlights

- Maize varieties yielded close to twice as much starch as cassava varieties.
- Acid hydrolysis produced sugar syrups with the highest sugar concentration.
- Maize distillates had relatively higher ethanol content than cassava distillates.
- The highest ethanol content was from maize 'Hybrid 2115' distillate at 40.95%.

Abstract

This study investigated the influence of variety and extraction method, on the yield and characteristics of starch, sugar syrup and alcohol from selected maize and cassava varieties grown in Uganda. Starch was extracted from four cassava and maize varieties using wet alkaline method, saccharified to sugar syrup using acid and enzyme methods and then fermented to alcohol. Maize varieties yielded close to twice as much starch as cassava varieties with no significant difference between the local and improved varieties. The most starch yielding maize variety was 'Hybrid 2115' (50.83%) and cassava variety was 'Mwezi mukaaga' (29.17%). Cassava starches had higher amylose content compared to maize starches with all starches classifying as normal starches with 15 – 24% amylose content. Acid hydrolysis produced averagely higher sugar concentration (20.08 °Brix) compared to enzyme hydrolysis (15.21 °Brix). Enzyme hydrolysis gave distillates with comparatively higher ethanol content, in tandem with the observed higher alcohol by volume and fermentation efficiency. The highest ethanol content was from maize 'Hybrid 2115' distillate at 40.95%. Maize varieties 'Hybrid 2115' and 'Longe 4H' performed best and 'Mwezi mukaaga' and 'Mukumba' among the cassava varieties. These can be commercialised for hydrolysis and fermentation. While acid hydrolysis produced sugar syrups with the highest sugar concentration, enzyme hydrolysed syrups performed best for fermentation to alcohol.

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Keywords