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Improved Food Security and Alleviation of Cyanide Intoxication through Commercialization and Utilization of Cassava Starch by Tanzania Industries

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Abstract : Starchy tuberous roots of cassava provide food for people but also find application in various industries. Recently there has been the focus of concentrated research efforts to fully exploit its potential as a sustainable multipurpose crop. High starch yield is the important trait for commercial cassava production for the starch industries. Furthermore, cyanide present in cassava root poses a health challenge in the use of cassava for food. Farming communities where cassava is a staple food, prefer bitter (high cyanogenic) varieties as protection from predators and thieves. As a result, food insecure farmers prefer growing bitter cassava. This has led to cyanide intoxication to this farming communities. Cassava farmers can benefit from marketing cassava to starch producers thereby improving their income and food security. This will decrease dependency on cassava as staple food as a result of increased income and be able to afford other food sources. To achieve this, adequate information is required on the right cassava cultivars and appropriate harvesting period so as to maximize cassava production and profitability. This study aimed at identifying suitable cassava cultivars and optimum time of harvest to maximize starch production. Six commonly grown cultivars were identified and planted in a complete random block design and further analysis was done to assess variation in physicochemical characteristics, starch yield and cyanogenic potentials across three environments. The analysis showed that there is a difference in physicochemical characteristics between landraces ($p \leq 0.05$), and can be targeted to different industrial applications. Among landraces, dry matter (30-39%), amylose (11-19%), starch (74-80%) and reducing sugars content (1-3%) varied when expressed on a dry weight basis ($p \leq 0.05$); however, only one of the six genotypes differed in crystallinity and mean starch granule particle size, while glucan chain distribution and granule morphology were the same. In contrast, the starch functionality features measured: swelling power, solubility, syneresis, and digestibility differed ($p \leq 0.05$). This was supported by Partial least square discriminant analysis (PLS-DA), which highlighted the divergence among the cassavas based on starch functionality, permitting suggestions for the targeted uses of these starches in diverse industries. The study also illustrated genotypic difference in starch yield and cyanogenic potential. Among landraces, Kiroba showed potential for maximum starch yield (12.8 t ha-1) followed by Msenene (12.3 t ha-1) and third was Kilusungu (10.2 t ha-1). The cyanide content of cassava landraces was between 15 and 800 ppm across all trial sites. GGE biplot analysis further confirmed that Kiroba was a superior cultivar in terms of starch yield. Kilusungu had the highest cyanide content and average starch yield, therefore it can also be suitable for use in starch production.

Keywords : cyanogen, cassava starch, food security, starch yield
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