

## **Air yam (*Dioscorea bulbifera*) flour, underutilized plant species as an ingredient for food processing in Ghana**

Bachelorarbeit im Fachgebiet Agrartechnik

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### abstract

Malnutrition and food security are issues of great concern in Ghana and Africa. Ghana to be precise is enriched with many plant species (most of which are underutilized, that is to say, they are of minor importance in terms of their production, consumption and utilization) which should be researched into more to help curb the issue of the above-mentioned intricacies. It is in this regard that I developed the interest to research into this underutilized plant species, *Dioscorea bulbifera* (Air yam) which is abundant in the Northern part of Ghana. This research was aimed to examine the effect of different drying techniques (open sun and HT Mini Solar Dryer) and pre-treatment (control, blanching and ascorbic acid) on the drying characteristics of air yam chips, its effect on the different drying techniques and pre-treatment on colour and water activity, and finally, investigate the functional and pasting properties of the flour of this underutilized plant species when subjected to the above-mentioned treatments.

Raw air yam was processed to flour. Flour was obtained by subjecting the air yam to different pre-treatments (control, steam blanching at 100 °C in a rice cooker colander for 5mins, and ascorbic acid-soaked 2% (w/v) for 5mins) then dried (open sun and HT Mini Solar Dryer). In all, 6 samples were used: control the open sun, control HT Mini Solar Dryer, blanched open sun, blanched HT Mini Solar Dryer, ascorbic acid open sun and ascorbic

acid HT Mini Solar Dryer. Dried samples (moisture content below 10%) were milled and sieved. Moisture loss was high in the HT Mini Solar Dryer than the open sun except for the blanched samples due to bad climatic factors.

The result in this study indicates that pre-treatment and drying techniques had a significant effect on the water activity, functional and pasting properties but not the total colour change. Water activity ranged from 0.489 to 0.273, which was below the optimum water activity range of 0.60. Total colour change ranged from 14.070 to 8.141. The flour had functional properties ranging from 0.884 to 0.824g/ml bulk density; 522.96 to 450.02% swelling capacity; 2.643 to 1.402g/g water absorption capacity and 0.833 to 0.701g/g oil absorption capacity. The flour also had pasting properties ranging from 85.2 to 77 °C pasting temperature; 7:00 to 5:59mins peak time; 3521.50 to 2740.50 peak; 5677.50 to 4186.00 final viscosity; 271.50 to 21.00 breakdown; 3448.50 to 2586.00 trough and 2229.00 to 1526.50 setback. It was also observed that the pre-treatment and processing will prolong the shelf life of this seasonal and perishable crop.

Overall, these differences in functional and pasting properties inform one of the packaging materials to use and different food products the flour can be used for.

