Introduction

Sweetpotato is an important crop that is widely consumed in sub-Saharan Africa. Sun drying of sweetpotatoes is a traditional practice: after drying on rocks crushed or sliced dried sweetpotato are stored in granaries; re-hydrated and boiled to be eaten like fresh roots, or milled into flour to make porridge. Orange fleshed sweetpotato is being promoted in Africa to tackle vitamin A deficiency. There are inconsistent reports on the effect of sun-drying on pro-vitamin A retention. High losses have been reported which may be associated with the unsaturated stable provitamin A carotenoids easily degraded by light, oxygen and heat (Rodriguez Amaya 1997). This poster describes work to understand the effects of sun/solar drying and storage on pro-vitamin A retention.

Materials and methods

- **Samples**: Sweetpotato varieties from Uganda (produced by Namulonge Research Station NARO) and Mozambique (World Vision)
- **Driers**: solar: under clear plastic sheeting (greenhouse; tent or tunnel); sun: direct exposition, shade: under a roof made of straw.
- **Total carotenoids content** on sweetpotatoes grown in Uganda and Mozambique by visible spectrophotometry and trans-β-carotene content by HPLC on preliminary samples (Orange Flesh Sweetpotato from USA). Samples were selected in minimum triplicate. Readings were done at 450nm.
- **Losses** were calculated following the formula: total carotenoids (or all trans-β-carotene loss (%) = 100 - 100 x total carotenoids (or all trans-β-carotene) content in dried or stored chips (µg/g dry weight) / total carotenoids (or all trans-β-carotene) in fresh chips (µg/g dry weight)
- **Analysis of variance** SPSS14.0 software: Significant differences per variety between samples (p<0.05) were given by Tukey test and are indicated by different letters in the same column.

Results

**Preliminary trials**

Cross flow drying (hot air drying) significantly retained a higher content of all trans-carotenoids and total carotenoids than sun-drying. No significant difference was observed between drying by greenhouse solar dryer and direct sun in term of all trans-carotene and total carotenoids (table 1). Total carotenoids content was significantly correlated to β-carotene content (R=0.737; p<0.01; 20 extractions) which indicated that total carotenoids can be used to estimate β-carotene content and provitamin A. All trans-β-carotene content represented 87% of total carotenoids.

**Field trials**

On both varieties grown in Uganda and Mozambique, no significant difference was observed between retention in solar tunnel and/or tent or sun dryer (tables 2&3). This differs from previous studies that reported sun drying was more damaging than solar drying (Rodriguez Amaya 1997, Mulokozi and Svanberg 2003).

Weather had a significant impact: average loss was 39% in wet weather against 4% in dry weather (table 2). There was a significant correlation between losses and drying time (Pearson coefficient R=0.727; p<0.01). Shade drying significantly retained more total carotenoids compared to sun and solar drying in Mozambique. Loss of provitamin A was even insignificant compared to fresh sweetpotatoes on MGCL (loss=1.0%) (table 3). Dried chips stored for 4 months had important losses for both varieties Ejumula and Kakamega with an average of 67%. Clear polythene bags placed under the window did not demonstrate any difference to opaque (black bag) sealed or with simple knot. Overall losses were of 78% (table 4). Some other studies on storage showed that light did not have such an important impact compared to other factors such as presence of oxygen.

Conclusions

- No significant difference was observed between the various solar dryers and sun dryer in terms of provitamin A retention: sun-drying can be recommended to farmers if the drying time is controlled.
- Shade drying significantly retained more total carotenoids than sun and solar drying but in some cases fermentation due to slower drying affected the chips quality.
- Losses are less than 40% in drying in general and less than 20% in dry weather in Uganda and Mozambique.
- On the other hand, losses after 4 month-storage are more than 60% independently of packaging (clear or opaque).
- Mechanisms of loss still need to be investigated.
- All dried chips met daily nutritional requirement for children (table 5).

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References


