Optimization of the use of traditional starter for the reduction of retting time of cassava (*Manihot esculenta* Crantz).

UNIVERSITY OF YAOUNDE 1

Bouquet Agnia H, Nkoudou Ze N, Sado Sylvain, & Essia Ngang J. J. *

Faculty of Sciences

Abstract

Traditional starter was used for the reduction of retting time of Cassava, the results revealed that, flour obtained from cassava after 96 hours of retting (far_96) had a high speed of softening and reduced the length of retting by 53% (from 72 to 34 hours). The different methods of revivification of starter cells show that the best increase of starter activity (21%) was obtained by a 12 hour hydration of the cells. An amelioration of only 11 and 14% was obtained through chemical activation using ethanol and a pre-culture of the starter in starch broth enriched with yeast extracts respectively. Thermal activation instead reduced the activity of the starter, indicating an elimination of part of the starter flora through heat.

Introduction

The length of Cassava retting , usually between 3 and 5 days, unfortunately constitutes the main constraint which limits the productivity of products which involve this unitary operation. This justifies the use of cassava chips to accelerate retting in rural areas. In order to reduce cassava retting time, this study aims to standardize the production of these traditional starters and to find optimal conditions for their usage

Methodology

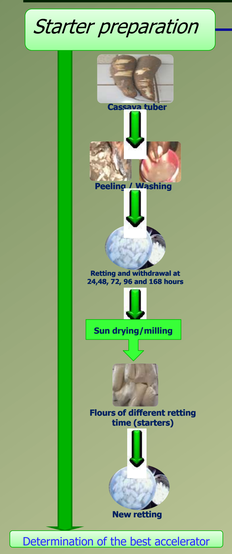


Fig. 1. Flow scheme of starter preparation and usage

Softening follow up

$$T_R = Lat + 8/\mu$$

Optimization

•**Lat :** Latent phase, i.e. spent time between soaking and the onset of softening

•**μ :** maximal speed of softening

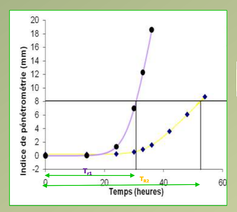


Fig. 2. Evaluation of retting time according to Barany & Robert (1994) model, applied in cassava softening by Ezo'o (2010)

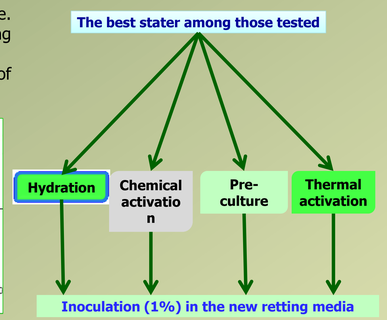
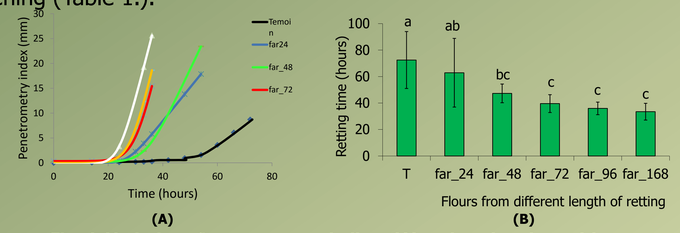


Fig. 3. Revivification methods of starter cells

Results

The results obtained from the different fermented cassava flours (starter) tested show that the starter coded far_168 demarcates itself by having the shortest period of latency and consequently its length of retting is the shortest. A high rate of softening is however observed with the far_96 starter (fig.4.). The same holds for the high concentration of TAMF for this sample which correlated positively with the rate of softening (Table 1.).



(A) (B)

Fig. 4. Variation of penetrometry indices (A) and retting time with respect to flours from different lengths of retting (B)

Table 1. Analysis of correlation between TAMF and kinetic parameters of retting

	LAG	*VIT*	*TR*
Total Aerobic Mesophile Flora (TAMF)	-0.5080 p=0.004	0.7208 p=0.000	-0.6313 p=0.000

The percentage gain in retting time with respect to the different controls (the natural control and the non-hydrated far_96) was calculated in order to compare the different methods of optimization of the accelerator, far_96 used during this work. The results are shown on table 2. From this table, we observe that of all the methods used, hydration is the best method of optimization. In effect, it helps to reduce retting time by 74% and by 21% with respect to the natural control and the non-hydrated trial respectively.

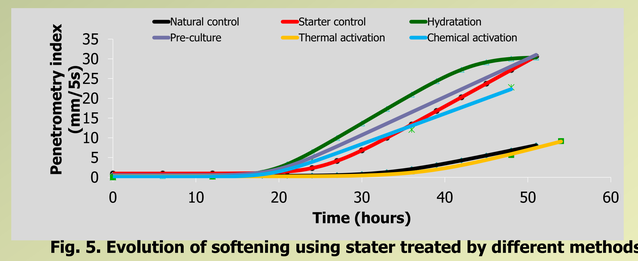


Fig. 5. Evolution of softening using stater treated by different methods

Table 2. Efficacy of different optimization methods

Different optimization methods	Gain of time compare to the non-hydrated far_96	Gain of time compare to natural control
Non-hydated far_96 (control)	0	53%
Thermal activation	negative	44,7%
Chemical activation	11%	64%
Pre-culture	14%	67%
Hydration	21%	74%

Conclusions

At the end of this study whose aim was to have a mastery of the conditions of use of fermented cassava flour in view of reducing retting time and increasing productivity, the following conclusions can be drawn:

•The length of fermentation of the cassava chips used as starters has an impact on their ability to accelerate new retting batches. Those chips which are retted for more than 4 days presented the greatest ability to ameliorate retting parameters.

•The efficiency of cassava chips used as starters is related to their microbial charge. The samples obtained from long retting times are more charged and reduce retting time better than samples which were retted for a shorter time. Cassava chips from 96 hours of retting have the best impact on the length of retting when compared to all the others.

•The revivification of cells before the use of a starter helps to reduce the length of retting. A simple hydration for 12 hours helps to reduce retting time by more than 20%.

The microbial flora of the starter is essentially made up of bacterial spores of the Bacillus gender. However, this flora is likely not the only one which intervenes during retting. Thermal treatment which eliminates the vegetative forms did not give the best results.

Reference

Baranyi J., & Roberts T.A., (1994). a dynamic approach to predicting Bacterial growth in food. *International Journal of Food Microbiology*. **23**: 277-294.

Djouldé D.R., Etoa F.X., Essia Ngang J.J., Mbofung C.M.F., (2003). Fermentation du manioc par une culture mixte de Lactobacillus plantarum et Rhizopus oryzae. *Microbiologie et Hygiène Alimentaire*. **15** : 9-15.

Ezo'o (2010). Impact de la flore sporulée bactérienne des cossettes de manioc rouies séchées sur la durée de rouissage du manioc. *Mémoire de Master* 56 Pages.

Louembé D., Kbawila S.C., Kléké S., Diakabana P.,& Nkoussou B., (2002). Rouissage des tubercules de manioc à partir de "pied de cuve" à base de manioc roui. *Tropicultura.* **20** : 118-124.

Acknowledgment

The authors are thankful to **PRASAC** (Pôle Regional de Recherche Appliquée au développement des Systèmes Agricoles d'Afrique Centrale) and **AIRD** (Agence Inter-établissements de Recherche pour le Développement) for their partial financial support for this project.

**Corresponding author. E-mail address: essia_ngang@yahoo.fr*