

Transformation Alimentaire du Manioc.

T. Agbor Egbe, A. Brauman, D. Griffon, S. Trèche (éd)

© 1995, éditions ORSTOM

Screening of local isolates of *Lactobacillus* for characters useful in African food fermentations

Détermination de certaines activités des bactéries lactiques, importantes pour les fermentations traditionnelles

- Résumé -

Les *Lactobacilles* sont connus pour être impliqués dans de nombreuses fermentations alimentaires locales en particulier celles des produits à base de céréales ou de manioc. Il est donc important d'améliorer les cultures bactériennes pour qu'elles puissent être utilisées en tant qu' inoculum de départ. Ce type d'inoculum pourra être utilisé au niveau villageois ou au niveau d'unités commerciales de taille moyenne.

L'utilisation d'inoculum de départ permettra, à la fois, de mieux contrôler la fermentation et conduira à la production d' aliments standards de haute qualité.

Les *lactobacilles* ont été isolés à partir de 9 aliments fermentés Nigériens. Nous avons déterminé leurs capacités à produire de l'amylase, de la linamarase et des bactériocines. Les souches de *lactobacilles* possèdent ces caractères et avant les

Introduction

Many African foods are fermented before consumption. The Micro-organisms involved in African food fermentation are restricted to a few groups of yeasts and bacteria (Odunfa, 1985). Lactic acid bacteria particularly *Lactobacillus* are involved in the fermentation of many African foods. In general, acid cereal and cassava fermentation in Africa have *Lactobacillus spp.* as the predominant micro-organisms. They have been reported to be involved in the production of a wide range of products.

The indigenous fermentation operation is plagued with many problems, which include non-reproducible quality of products, lack of uniformity in taste and flavour and short shelf life. This is mainly because fermentation generally depends on chance inoculation from the environment and starter cultures are not used thus encouraging spoilage organisms, contamination and unhygienic products. In addition, cereals and cassava are generally low in nutrients. For example, cereals like corn are low in minerals. The antimetabolite phytic acid is common and condensed tannins are high in sorghum. Corn is deficient in lysine and in tryptophan (Austin, 1979). In corn meal, phytate is believed to complex with some

Samples were taken at 24h intervals under aseptic conditions or from finished products. One gram of each food item was weighed and placed into 9ml of sterile 0.1% peptone water to form a solution. Serial dilutions were then made from the solution and plated. The total viable counts were on plate count agar (PCA) (Oxoid). Yeast and mould counts were determined on Malt Extract Agar (MEA) containing 100U ml⁻¹ streptomycin. Lactic acid bacteria were isolated on de Man Rogosa Sharpe (MRS) agar incubated under anaerobic conditions (BBL Gas Pak). Plates were incubated at 30°C for 24h for the PCA and MRS media and for 4-5 days for the MEA medium.

2. Characterization and identification

Isolates were picked randomly at varying times from the PCA plates and subcultured before being subjected to physiological and biochemical tests (Harrigan and McCance, 1976; Barnett *et al.*, 1983; Sneath, 1986). Identification was

12,0.66%KI) and screened for halos. Partial characterization of the α -amylase produced was carried out as described by Amund and Ogunstina (1987).

2.3. Screening for phytase activity

This was as described by Lopez *et al.* (1983).

2.4. Screening for Fungicidal activity

Lactobacillus spp. was grown overnight on MRS agar incubated anaerobically at 37°C. This was scraped with a sterile loop into a bijoux bottle containing 3ml sterile MRS broth. *Aspergillus niger* was introduced into the MRS broth and the bottle was closed and mixed thoroughly. The lid was lightly

Purified ligninase was purchased from Sigma Chemical Co. (St. Louis, Mo.).

characteristics have been identified in this study and studies are presently in progress to maximize and exploit these useful characteristics. Already two fermented foods have been improved using a combination of starter cultures. These foods are Ogi (Olukoya, 1994) and Wara (Olukoya *et al.*, unpublished).

References

AMUND (O. O.), OGUNSHINA (O. A.), 1987 - Extra cellular amylase production by cassava - fermenting bacteria. *J. Ind. Microbiol.*, 2 : 123-127.

AUSTIN (J. E.), 1979 - *Global Malnutrition and cereal fortification*. Ballinger Publishing Company. Cambridge. M.A.

BARNETT (J. A.), PAYNE (R.W.), YARROW (D.), 1983 - *Yeasts: Characteristics and*



OKAFOR (N.), EJIOR (M.A.N.), 1986 - The microbial breakdown of linamarin in fermenting pulp of cassava (*Manihot esculenta Crantz*). *MIRCENJ*, 2 : 327-318.

OLUKOYA (D.K.), TICHACZEK (P.S.), BUTSCH (A.), VOGEL (R.E.), HAMMES (W.P.), 1993 - Characterization of the bacteriocins produced by *Lactobacillus pentosus* Dk 7 isolated from ogi and *L. plantarum* Dk 9 from fufu. *Chem. Mikrobiol. Technol. Lebenson.*, 15 : 65-68.

OLUKOYA (D.K.), EBIGWEI (S.J.), OLASUPO (N.A.), OGUNJIMI (A.), 1994 - Production of Dogik: An unproved ogi (Nigerian fermented weaning food) with potentials for use in diarrhoea control. *Journal of Tropical Pediatrics*, 40 : 108-113.

OYENUGA (V.A.) ,1968 - *Nigerian's foods and feeding stuffs: Their chemistry and nutritive values*. 3rd edn. Ibadan University Press, Nigeria.

OYEWOLE (O.B.), 1990) - *Microbiological studies on cassava fermentation for 'lafun' and 'fufu' production*. Ph.D. Thesis. Dept. of Botany and Microbiology, University of Ibadan, Ibadan, Nigeria.

SNEATH (P.H.A.), 1986 - *Bergey's Manual of Systematic Bacteriology*, Vol. 2. Baltimore. Williams and Wilkins.

TICHACZEK (P.S.), NISSEN-MEYER(J.), NES (I.F), HAMMES(W.P), 1992 - Characterization of the bacteriocins curvacins from *Lactobacillus curvatus* LTH1174 and sakacin P from *L. sake* LTH673. *Syst. Appl. Microbiol.*, 15 : 460-468.