UNIVERSITE D'ABOMEY-CALAVI

FACULTE DES SCIENCES AGRONOMIQUES

Preserving African Food Microorganisms for Green Growth
(Green Growth for Africa)

Report of

Carrier materials and procedures for distribution of starter cultures

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Introduction

In order to upgrade fermented food sector in West Africa, the research project entitled "*Preserving African Food Microorganisms for Green Growth*" funded by DANIDA, aimed at developing starter culture in dried form to be use at SME level for safe food fermentation. At the University of Abomey-Calavi (UAC) in Benin, freeze drying experiments are in progress in order to identify a relevant carrier that can allow high viability after freeze drying and easy distribution of starter culture. The carrier materials being tested are commercial skim milk, commercial soluble starch and a locally developed starch that will be extracted from local cereals as e.g. maize, sorghum. Preliminary experimentation including standardization of freeze drying conditions is now in progress and results obtained so far are summarized in this report.

Freeze drying procedure

The preliminary trial was conducted on *L. fermentum* strain (lactic acid bacteria) coded C2-6-L3 (UAC biobank accession Nr UAC-01-335; NCBI Genbank accession Nr MG245804). Two carriers including commercial skim milk (Sigma-Aldrich) and commercial soluble starch (Sigma-Aldrich) were tested. The freeze drying procedure included preparation of the microbial culture, freezing of the microbial culture in a freezer and drying of the frozen culture with freeze dryer. For the preparation of the microbial culture, cells from a volume of an overnight culture (20h) was harvested, washed twice, suspended in 10 mL of sucrose solution 5% , (w/v) and OD_{600} adjusted to 2.0-2.3. A volume of 50 µL of the cell suspension was added to 1mL of 15% (w/v) autoclaved skim milk and soluble starch in separated tubes to get the microbial cultures. For the freezing of the microbial culture, two different temperatures including -25°C and -80°C were tested. For the freeze drying, first desiccation lasted 24h and two durations including 3h and 6h of the 2nd desiccation was tested.

Water activity, moisture content and viability of freeze dried samples

As showed in table 1, soluble starch led to the lowest water activity and moisture content. Also, soluble starch provided highest viability just after freeze drying. In other hand, a freezing temperature of -25°C and a duration of 3h of the 2nd desiccation was enough to allow satisfactory freeze drying.

		Skim milk		Soluble starch	
		-25 °C	-80 °C	-25 °C	-80 °C
A_w	3h of 2nd desiccation	0.04	0.07	0.02	0.03
	6h of 2nd desiccation	0.05	0.06	0.02	0.03
Water content (%)	3h of 2nd desiccation	3.5	5.2	0.14	0.55
	6h of 2nd desiccation	4.1	3.5	1.2	0.99
Viability (%)	3h of 2nd desiccation	N.D	93,2	N.D	95.1

Test of a locally developed cereal starch to be used as carrier

Starch will be extracted from maize and freeze drying trials will be carried out using the above conditions. A freeze dried starter culture will be formulated using the maize based starch as carrier.

Distribution of the starter culture

The freeze dried starter culture will be used for fermentation in pilot plant at two or three SMEs. This will allow the SMEs to be familiarized with the use of the starter culture. When the fermentation at SME is successful, the defined starter culture will be packaged to allow long-term viability and to facilitate the distribution to SMEs.

Conclusion

Starch like material could be used as carrier for starter culture distribution. Locally produced starch (maize starch) could be more accessible and could result to low production cost. Experiments are in progress to test the local starch to be used as carrier. Further, distribution of the freeze dried starter culture will be done through trials at SMEs level.