

### Diversity of technologies and quality of Akpan, a vegetal yoghurt-like cereal product from Benin



**A**KPAN is a fermented beverage, yogurt-like product traditionally prepared in Benin from maize ogi. Beyond the traditional processing technology, diverse forms of "Akpan" have been developed in southern region of Benin, particularly at Cotonou and Porto-Novo. Up to now, little is known on their basic characteristics and process flow diagrams. The variability in the raw materials and processing methods used can result in high inconsistency in the quality, particularly nutritional, microbiological and sensory qualities of Akpan.

#### Objectives

To highlight differences in the flow diagrams, physico-chemical and microbiological characteristics of Akpan types and to map samples Akpan in relation with the sensory attributes.

#### Methodology

A survey was carried out in the southern region of Benin using a questionnaire administered to producers, sellers and consumers for gathering information on raw materials and processing techniques. A total of 145 producers/sellers and 607 consumers were interviewed. In addition, twenty-four traditional samples of Akpan were collected at Cotonou and Porto-Novo markets for microbiological and chemical analysis.

#### Results

##### Diversity of processing technologies

Irrespective of the raw materials used, two processing technologies were observed based on submerged and solid state fermentation. These are Akpan from Ogi and Akpan from kneaded flour, essentially obtained through submerged and solid state fermentation respectively (Figure 1). The predominant technology remains that of Akpan from Ogi, which was used by 100% of the respondents. In this technology, Akpan is prepared from Ogi mash, a process that has been totally described previously (Madode et al., 2003)

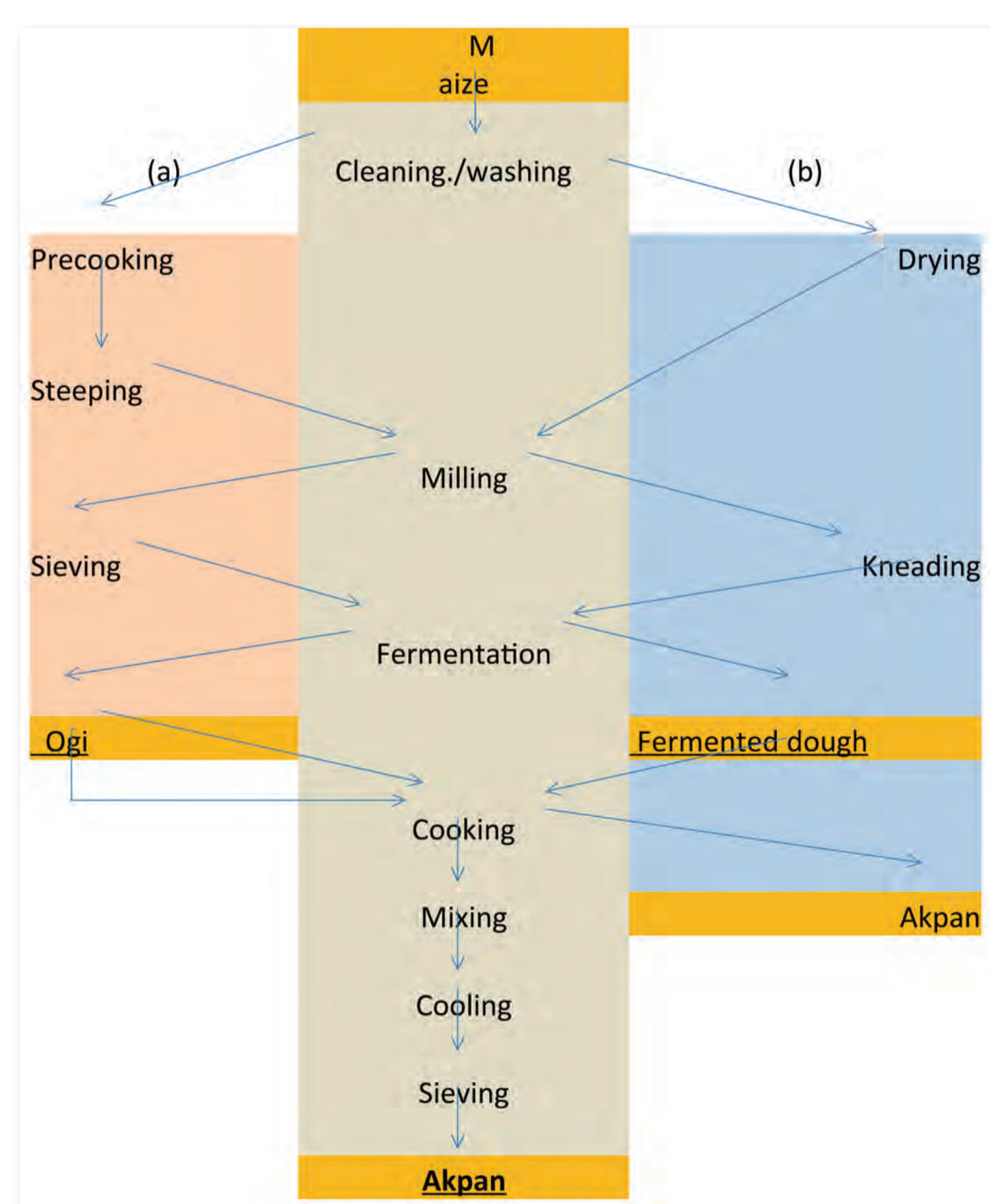


Figure 1. Flow diagram (a) Akpan from Ogi; (b) Akpan from dough.



##### Physico-chemical and microbiological characteristics

Akpan were found to be slightly acidic, with pH ranging between 3.5 and 4.1. Regarding the total acidity, Akpan from Ogi (submerged fermentation) had lower acidity whatever the raw material (2.8% lactic acid for sorghum and 2.9% lactic acid for maize) than Akpan from kneaded flour (solid state fermentation) (3.1% lactic acid for mix sorghum and maize dough and 4.1% lactic acid for sorghum dough). The dry matter content of Akpan varied from 15.1 to 19.6% depending on the type of Akpan. As for total acidity, Akpan from ogi had lower lactic bacteria and yeasts and moulds counts (5.2-5.4 and 5.7-5.9 Log10UFC/g respectively) than counts observed for Akpan from dough (6.1-6.8 and 6.5-6.7 Log10UFC/g respectively). Akpan does not embedded pathogens such as Entérobactéries, *Echerichia Coli*, *Clostridium Perfringens*, *Bacillus cereus*, *Staphylococcus Aureus* and *Salmonella sp.*

##### Diversity of processing technologies

Four types of Akpan are marketed in Benin, with quality attributes depending on raw materials and processing techniques: (1) Akpan from maize ogi, a wet sieved fermented maize mash, which is the most commonly produced; (2) Akpan from sorghum ogi, a wet sieved fermented mash similar to maize ogi; (3) Akpan obtained by kneading and fermentation of whole sorghum flour or Akpan from "mixed sorghum and maize" flours. Regarding quality attributes, Akpan should have no lumps, it should be flavoured, smooth, sweet and acid. Particularly, Akpan from sorghum is of red colour, sour taste, mushy with smooth texture whereas Akpan from exclusively maize is of white colour, slightly acid, partially/slightly cooked with aroma of fermented ogi. When crossing actors perception of quality attributes of Akpan, the PCA revealed that 67.9% of the variation in quality criteria was explained by the first axes which mapped three classes of actors in relation with their perception.

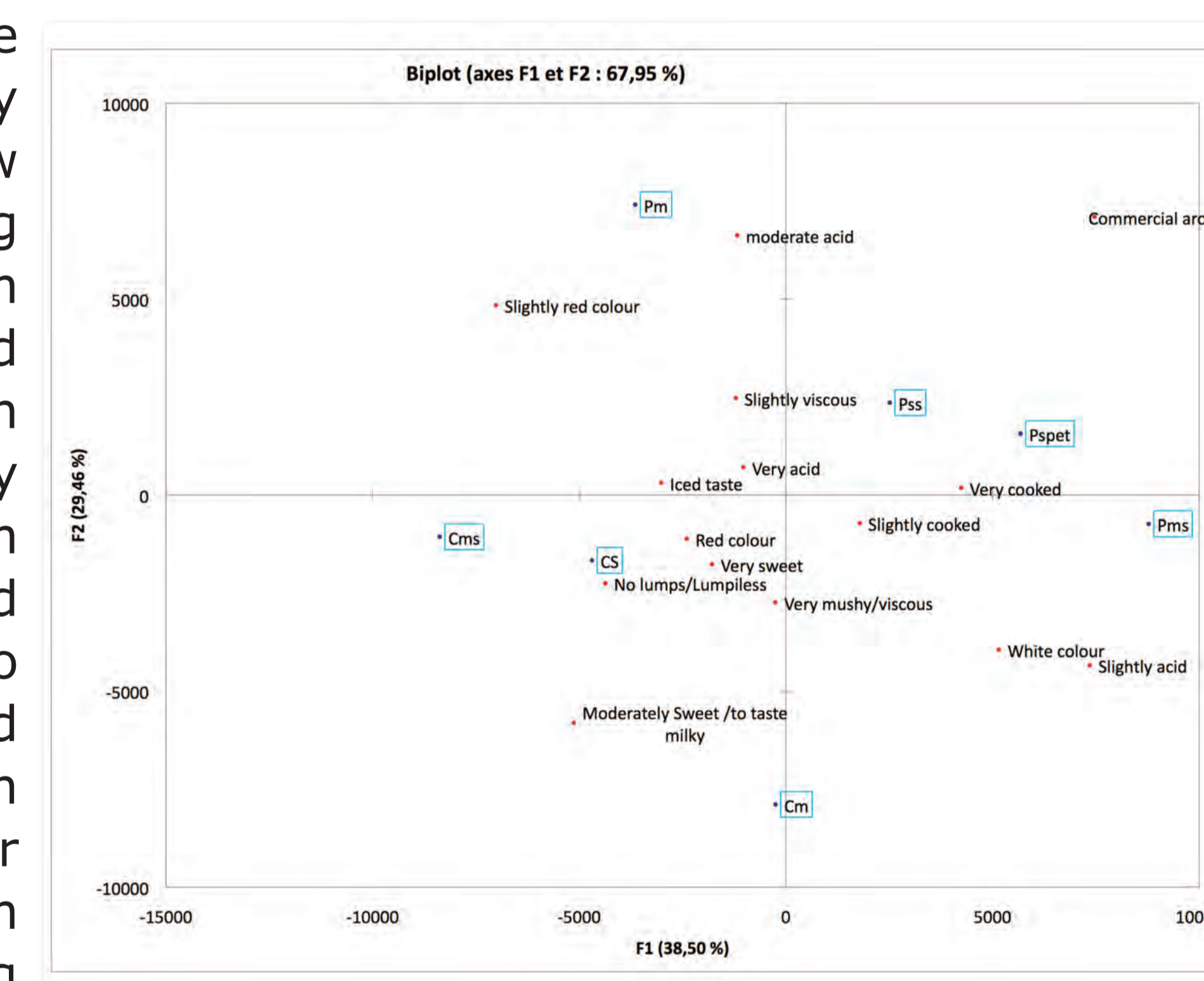


Figure 2. Relation between players (plot 1x2) with respect to sensory attributes perception of Akpan.

Legend: Pos: Producer of Akpan from sorghum Ogi; Pfs: Producer from sorghum flour; Cm/Pom: Consumers or Producer of Akpan from maize ogi; Cms/Pfms: Consumers or Producer of Akpan from mixture maize +sorghum flour; Cs: Consumer of Akpan from sorghum.

#### Conclusion

Akpan is with great economic significance and will take increasing importance in the future due to many variants encountered nowadays; then, satisfying the consumer demand of non-dairy beverages such as Akpan is a challenge to the future local food industry.

**Références**  
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