African food tradition revisited by research

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Application of a Check-All-That-Apply Question to the Characterization of *Adansonia digitata L*. drinks with African origin

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Introduction

Food companies increasingly base their product development, positioning, advertisement and communication strategies on consumer perception (Faye et al., 2006; Van Trijp et al., 2007). In this context, understanding how consumers describe the sensory characteristics of food products is highly valuable for food companies.

Traditionally, information about the sensory characteristics of a food product has been obtained using trained assessors' panels. This information is extremely valuable during product development for optimizing the products' formulation (Carr et al., 2001). However, trained assessors could describe the product differently or take into account attributes that may be irrelevant for consumers (Ten Kleij and Musters, 2003). Thus, in order to gather a better understanding of consumers' perception of food products it is necessary to study how consumers perceive and describe individual and multi-attribute changes in food products' sensory characteristics (Carr et al., 2001).

One of the most novel methodologies that has been developed for gathering information about consumers' perception of the sensory characteristics of food products is the use of check-all-that-apply questions (CATA). A CATA question consists of a list of words or phrases from which respondents should select all the words they consider appropriate to describe a product. This type of question has been used in consumer studies to determine which sensory attributes consumers perceive in a food product (Adams et al., 2007; Dooley et al.,2010; Ares et al 2010).

The aim of the present work was to apply CATA questions to study consumer perception to *Adansonia digitata L*. drinks, and to compare results with those achieved using a trained assessors' panel.

Material and Methods

Sensory evaluation

The Baobab samples for sensory tests were from three different types: Commercial juice - Esteval; Syrups from Esteval and Kumba and instantaneous powder (no reference).

Four different samples (traditional and commercial) were presented to the panellists as the following:

➢ Traditional boiled instantaneous powder
➢ Commercial juice from Esteval
➢ Commercial syrup from Esteval
➢ Commercial syrup from Kumba

The Baobab samples were evaluated and scored by a trained sensory panel (as described on ISO 11035:1994 Sensory analysis). The panel was composed by university employees and students (n=8). Said subjects were selected according their sensory ability and familiarity with drinks.

Sensory attributes were generated during preliminary focus group sessions guided by a panel leader. A total of 13 sensory attributes were developed, with correspondent references/or anchors, with panel consensus, as represented in Table 1.

Table 1 - Baobab Drink - Attributes definition.

Consumer study

Consumers (n=100) were interviewed at a public local shopping center using the central location method (Meilgaard et al., 2007).

Three Baobab drinks were selected for consumer tasting among the samples used for sensory analysis, namely:

➢ Traditional boiled instantaneous powder
➢ Commercial juice from Esteval
➢ Commercial syrup from Kumba

Consumers were asked to answer a Check-All-That-Apply (CATA) questionnaire that included 29 sensory and emotional terms (Table 2).

Table 2 - List of attributes considered in CATA question.

Data analysis

All statistical analyses were performed using XLSTAT 2012.

A principal component analysis (PCA) was performed on the correlation matrix of the means of the trained assessors' data.

A multiple factor analysis (MFA) was performed on responses to the CATA question in order to identify relationships between the terms and the samples and to get a sensory map of the samples. This analysis was performed on the frequency table that contained responses for each category of terms of the CATA question, considering consumer overall liking scores as supplementary variable. In this analysis, the different categories of terms from the CATA question were considered as separate groups of data to investigate the relationship between them.

Results and Discussion

Highly significant differences (P < 0.001) between the samples were found for all the evaluated sensory attributes.

The first two principal components (PCs) accounted for by 83,15 % and 15,45 % of the variance of the experimental data, respectively.

- **Baobab powder** – viscosity, grass and hay attributes
- **Baobab juice** – acid and astringent descriptors
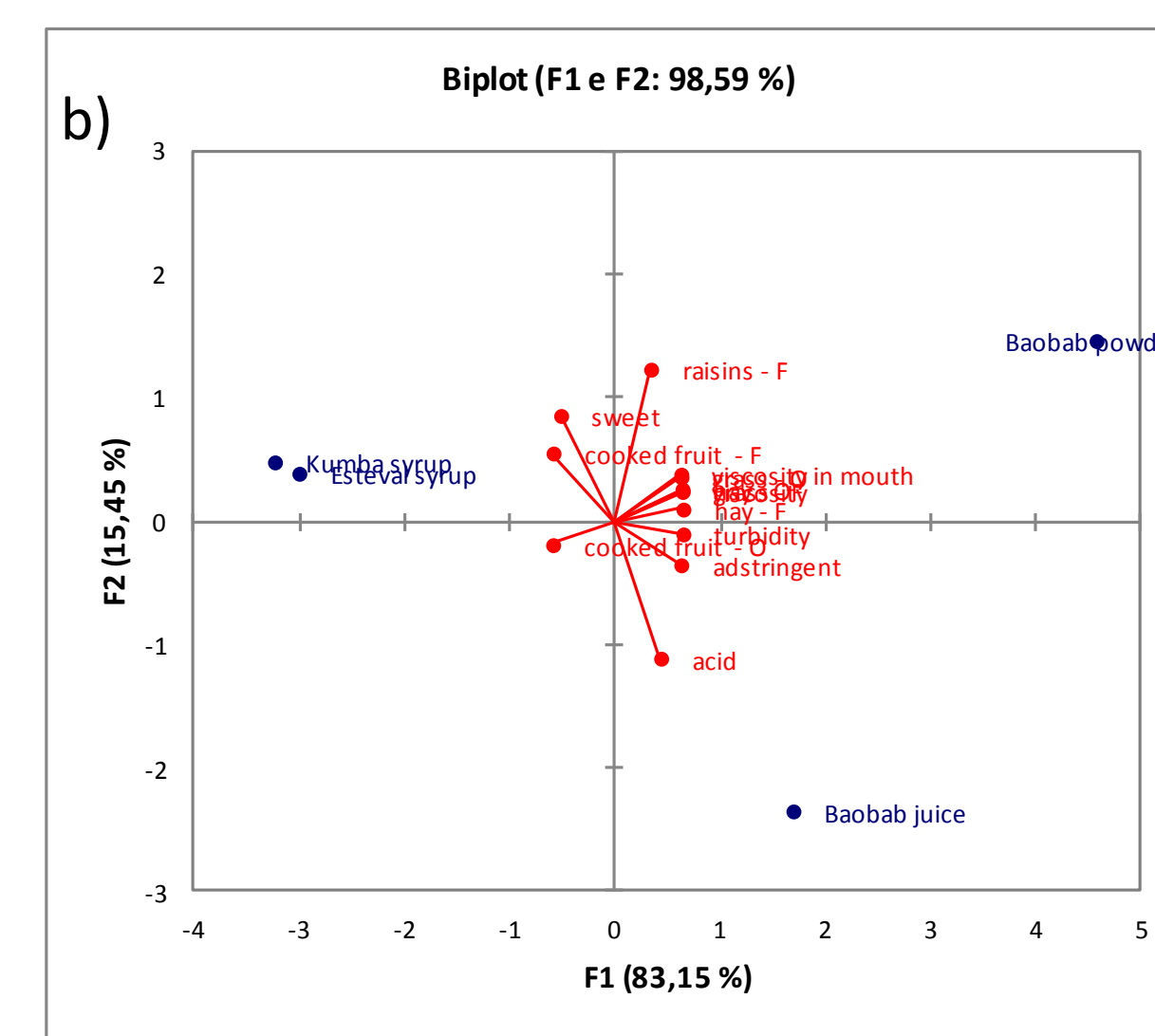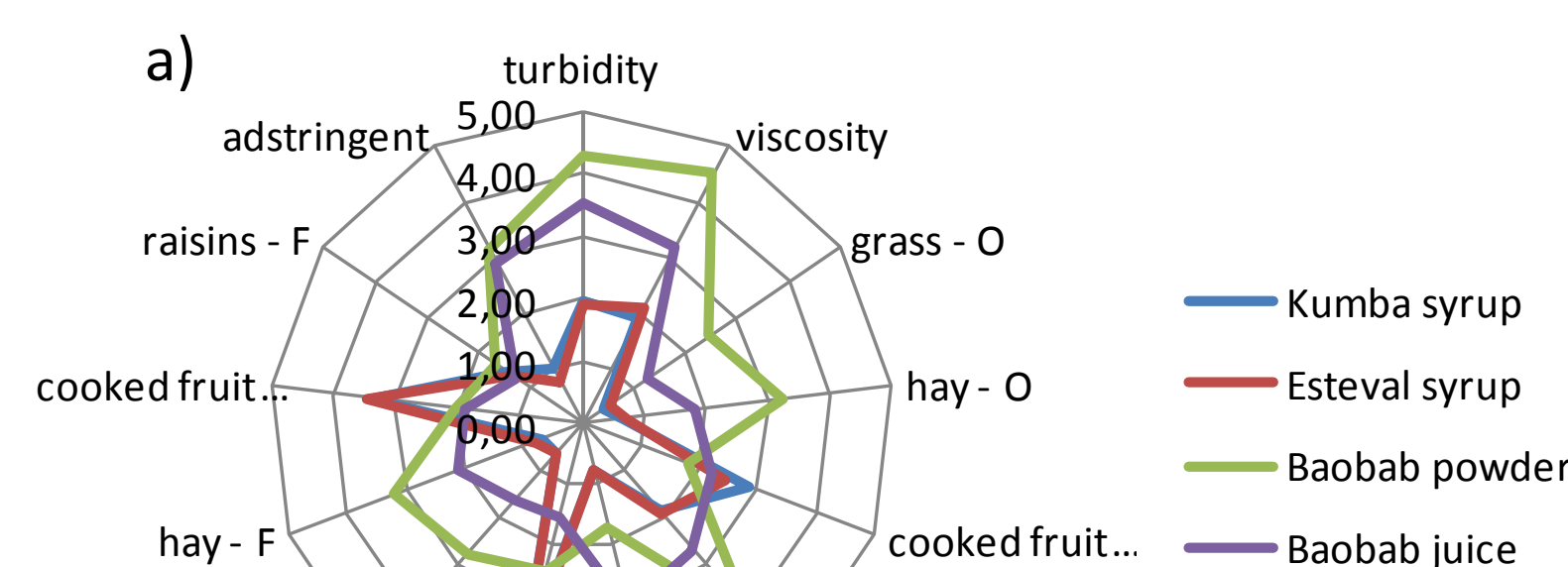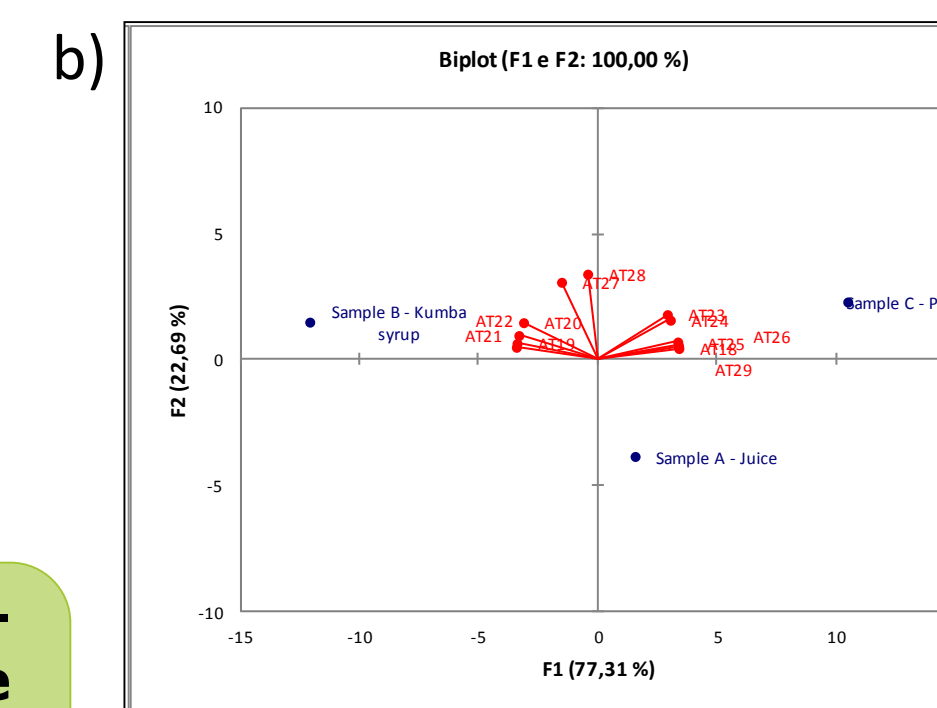- **Kumba and Esteval Syrups** – sweet and cooked fruit pear/quince (marmalade) sensory attributes
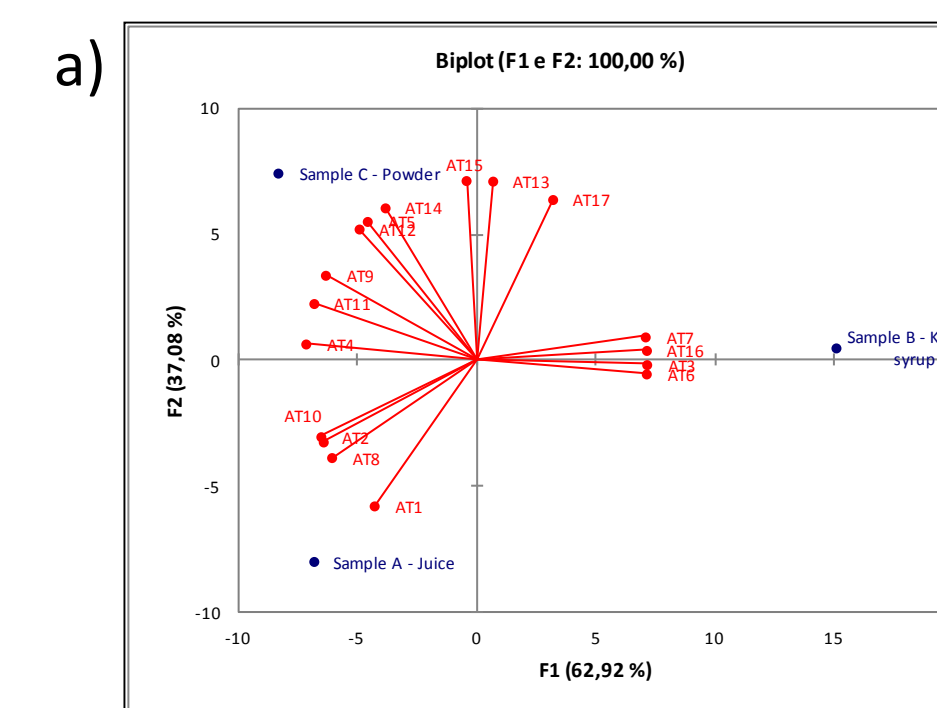
Figure 1 – a) Sensory profiles (QDA) and b) Principal Component Analysis of Baobab samples

• A multiple factor analysis (MFA) was performed on responses to the CATA question in order to identify relationships between the terms and the samples and to get a sensory map of the samples.

• Sample B - **Kumba syrup**: gold, fluid, caramel and sweet sensory attributes; artificial, fresh, watery/diluted and instantaneous emotional terms.

• Sample C - **Baobab powder**: pear nectar, marmalade/jelly, viscous and raisins sensory attributes; syrup/concentrated, fibres, natural, healthy, functional food and tropical/exotic emotional terms.

• Sample A - **Baobab juice**: amber colour and acid sensory attributes; no emotional terms associated.

Figure 2 - Multiple Factor Analysis on the Check-All-That-Apply questions a) representation of the attributes for sensory characteristics category and b) representation of the attributes for emotional associations category.

➢ The sensory profile obtained reveals that sample produced from Baobab powder is represented by grass and hay, the juice by acid and astringent descriptors, and syrup by sweet and cooked fruit pear/quince (marmalade), attributes.

➢ Regarding all samples used during consumer study it was possible to verify that all of the drinks were on the acceptable range since the mean scores were between 6 (like moderately) and 7 (like slightly). Baobab juice was the most preferred followed by Kumba syrup and Baobab powder, in a decrease order of magnitude (according Tuckey's test).

➢ Highly significant differences were found in the frequencies in which CATA terms were used for describing the four samples, suggesting that this methodology was able to detect differences in consumer perception of the drinks. Sample configuration from consumers' CATA counts and trained assessors data were similar, suggesting a good agreement between both evaluations.

➢ Considering results from the present study, the use of CATA questions could be an interesting and simple methodology to get an insight on consumer perception of a food product. Using this methodology, a map of the samples could be generated taking only consumer perception of the products.

References Ares, G., Barreiro, C., Deliza, R., Giménez, A., & Gámbaro Gámbaro, A. (2010). Application Application of a check-all-that-apply question to the development of chocolate milk desserts. Journal of Sensory.
Dooley, L., Lee, Y. S., & Meullenet, J.F. (2010). The application of check-all-that-apply (CATA) consumer profiling to preference mapping of vanilla ice cream and its comparison to classical external preference mapping. Food Quality and Preference.