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Original Research Article

Technical sheet of the grain size of different qualities of Attieke sold on the market in Abidjan city (Côte d'Ivoire)

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Abstract

The study on the grains size of different qualities of Attieke sold on the market in Abidjan city clearly indicates that the *Normal Attieke* produced in Abidjan was of small grain sizes. One gram of sample of this category of grain contained between 180 and 200 grains. A majority of these grains were distributed in sieve sizes with diameter range between 3.15 to 0.5 mm. These grains were divided into several categories according to their diameter. *Agbodjama* is characterized by a multitude of mainly homogenous grains of which the total number in one gram was between 300 and 320. Their size varied generally between 2 and 0.8 mm. The majority of grains from *Garba* were ranged between 3.15 to 0.315 mm and one gram of *Garba* contained between 210 and 230 grains. These results constitute an important database for international specifications establishment

Keywords: Grain size, *Normal Attieke, Agbodjama, Garba,* Abidjan city

INTRODUCTION

The attieke is a meal derived from fermented cassava cooked with steam from water. It is characterized by a whitish color and slightly acidic taste. It is a typical food of Côte d'Ivoire and produced for self-consumption in family circles (Kouadio et al., 1991; Akely et al., 2010). This product has become a commodity that sells well in international market from CEDEAO countries to Europe (France). The dish is popular and bought at moderate prices. In Côte d'Ivoire, the production of attieke is practiced and particularly controlled by women of the following ethnicity, Avikam, Ebrié, Alladjan and Adjoukrou.

However, the traditional process of preparation has resulted in three qualities of attieke. The *Agbodjama*, which is regarded as the attiéké of very good quality, is recognizable by a multitude of mainly homogenous grains.*Normal Attieke* little grain, as its name indicates. It is this kind which is the most widespread. The third type of attieke is the *Garba*, it is not of good quality and is mainly sold by foreigners «Haoussa». These attieke qualities are available on the local markets and different at the level of their visual appearance and shape of grains. The previous work carried out by Krabi et al. (2015) was focused on production of Attieke (couscous made from cassava fermented) in the Abidjan city. Thus, the aim of this work was to define the grain size of the various categories of attieke produced and sold in Abidjan in order to establish a standard for the grain size of the attieke qualities in Côte d'ivoire.

MATERIALS AND METHODS

Method

The grain size of different attieke samples was determined following a modification of the method of Henderson and Perry (1979) for dry flour. The modification was made to suit the sample under investigation which was a wet sample. One hundred

Plant material

Photo 1. *Garba* grains

Photo 2. *Normal Attieke* grains

Photo 3. *Agbodjama* grains

Technical material

Photo 4. Granulometer consisting of several sieves with diameters between 5.00 and 0.315 millimeter.

grams of partially dried attieke was sieved through a set of graded Tyler sieves of aperture sizes 5.00, 3.15, 2, 1.25, 0.8, 0.63, 0.5, 0.4 and 0.315 mm using a Retsch Vibro shaker (Model D.407-020) set at frequency of 50 Hz for 10 min. Fractions retained on each sieve were then weighed and numerated.

Statistical analyses

One way analyses of variance based on DUNCAN multiple range tests with significant level α=0.05 were performed in order to compare the grain size of differents attieke samples and also to determine significant differences between attieke varieties.

RESULTS AND DISCUSSION

The number of granules in 1g of attieke varied significantly ($p<0.05$) between the different Attieke qualities, with mean values of 313 granules/g for *Agbodjama*, 225 granules for the *Garba* and 186 granules for *normal Attieke* (Figure 1). The number of grains of the *Agbodjama* is higher than those of *Garba* and the *Normal Attieke* because of the fact that the *Agbodjama* has homogeneous grains and well separated making it easy to count. On the other hand, the grains of *Garba* and those of the *Normal Attieke* are bonded to each other because of their humidity content is higher. Nevertheless the *normal attieke* is cleaner and of better quality compared *Garba* because of the time of preparation which was 24 hours for the *Garba* and 48 hours for the *Normal Attieke* and *Agbodjama* (Krabi et al., 2015).

The particle size of *Agbodjama* samples ranged from 2 to 0.8 mm, with a dominance between 2 and 1.25 mm granules in *Agbodjama* samples. The majority grains of *Normal Attieke* were in the diameter sieve 2 mm. The particle size of *Garba* were ranged from 0.315 to 3.15 mm, with a dominance of 2 mm granules (Tables. 1).

Significant variations ($p<0.05$) existed in the granules sizes of the attieke samples mainly samples *Agbodjama* which grains were homogeneous. These differences

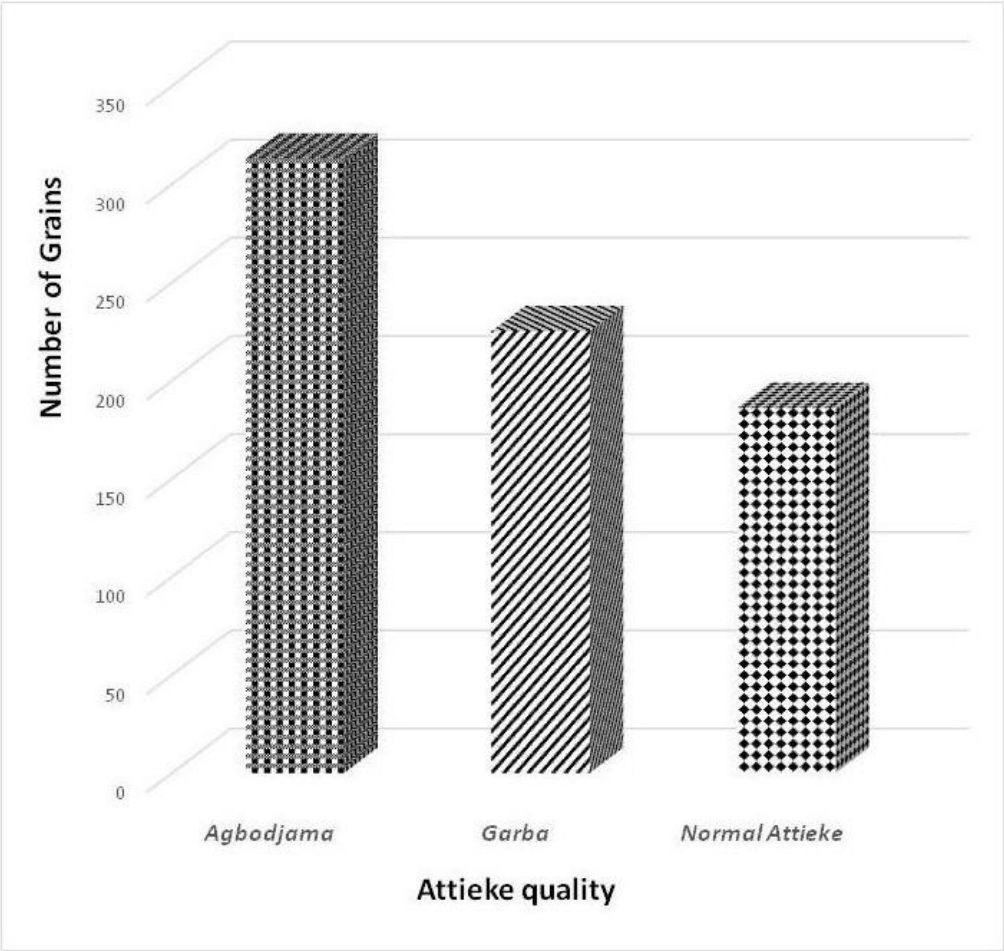

Figure 1. Average number of grains in 1g of sample (*Agbodjama, Garba* and *Normal Attieke*)

Table 1. Particles size of *Normal attieke, Agbodjama* and *Garba* sold on the market in Abidjan city (Côte d'Ivoire)

	Sieves Diameter (mm)	**3,15**	**2**	**1,25**	**0,8**	**0,63**	**0,5**	**0,4**	**0,315**
Mass of sample retained by each sieve (g) for 100g of samples used for granulometry	*Agbodjama*	0	43,43	44,57	11,89	0	0	0	0
	Normal Attieke	5,02	61,07	23,14	8,14	2,35	0,11	0	0
	Garba	7,17	69,36	14,29	5,86	2,29	0,138	0,37	0,06

may be attributed to the grating procedure, the extent of fermentation and the humidity content in the dough after pressing. Particle size depended on fermentation. Its action has been attributed to the activity of tissue degrading enzymes in the fermenting mash resulting in tissue breakdown. Amoa-Awua et al. (1997) in their studies on agbelima stated that during fermentation, smooth textured sour dough is produced due to the presence of specific mould and yeast strains which possess cellulase activity and are responsible for the hydrolysis of cassava tuber cellulose leading to the breakdown of the coarse texture of cassava dough. Moreover, in Abidjan sites, the use of many sieves with different mesh at the sieving step allows the separation of granules in function of their sizes; thus giving after steaming, products with various granules sizes.

CONCLUSION

Agbodjama has homogeous grains. The grains were concentrated at the mesh size of 2 mm, 1.25 mm and

0.8 mm. For the *Normal Attieke* produced in Abidjan, the grains were distributed in the sieves of diameter between 3.15 and 0.5 mm. As for *Garba* the grains were distributed almost in all the sieves which diameters were ranged of 3.15 to 0.315 mm.

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