Seeking for seeds. The akan weighing system, part four

Sur la piste des graines. Le système pondéral akan, quatrième partie

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Citation : Crappier J.-J., 2020. Seeking for seeds. The akan weighing system, part four. *Colligo*, 3(1). https://perma.cc/B8Z5-SE35

KEY-WORDS

akan
ashanti
baule
gold weight (goldweight, goldgewitch)
Ghana
Côte d'Ivoire
Gold Coast
dualistic system
ethnomathematics
taku
ba
mitqal
proto-currency
seeds

Summary: A study was conducted to test the hypothesis that the akan weight system was based not on two seed units, *ba* and *taku*, as usually considered, but on four, each of which was used under two varieties, a heavy and a light one. The *ba* is reputed to be two seeds of *damma*, aka *Abrus precatorius*, a forest liana. Examination of a 250 g batch originating from Côte d'Ivoire proves that there are two varieties, one of 74 mg and the other of 84 mg, presumably depending on whether they are harvested, dry season or wet season, which corresponds to the predicted 146 mg and 166 mg *ba*. Research on *taku*, the exact nature of which was unknown, leads to the *Parkia biglobosa* seed, the African carob tree, whose seed weighs 250 mg with its cuticle, and 220 mg when it is shed, that corresponds to the two *taku* values predicted by the calculation. These data support, but do not prove, the hypothesis of the duality of seeds that emerges from the study of akan weight lists collected over centuries by European observers.

MOTS-CLÉS

akan
ashanti
baoulé
poids à peser l'or
Ghana
Côte d'Ivoire
Gold Coast
système dualiste
ethno-mathématiques taku
ba
Mitqal
proto-monnaie
graines

Résumé : Une étude a été menée afin de tester l'hypothèse que le système pondéral akan ait reposé non pas sur deux unités semencières, le *ba* et le *taku*, comme habituellement considéré, mais sur quatre, chacune d'entre elles ayant été utilisée sous deux variétés, une lourde et une légère. Le *ba* est réputé valoir deux graines de *damma*, alias *Abrus precatorius*, une liane forestière. L'examen d'un lot de 250 g originaire de Côte d'Ivoire tend à prouver qu'il en existe bien deux variétés, l'une de 74 mg, l'autre de 84 mg, vraisemblablement selon qu'elles sont récoltées en saison sèche ou en saison humide, ce qui correspond aux *ba* de 146 mg et de 166 mg prédits par le calcul. Les recherches sur le *taku*, dont la nature exacte était inconnue, conduisent vers la graine de *Parkia biglobosa*, le caroubier africain, appelé localement *néré*, dont la graine pèse 250 mg avec sa cuticule, et 220 mg quand elle en est débarrassée, ce qui, là encore, correspond aux deux valeurs du *taku* prédites par le calcul. Ces données confortent, sans toutefois la prouver, l'hypothèse de la dualité des graines qui ressort de l'étude des listes de poids akan colligées au cours des siècles par les observateurs européens.

Introduction

In the first part of this investigation, it was brought to light, by the study of the weight lists established between the 17th and the 20th centuries by various explorers, traders and ethnologists that the weight system used by the Akan peoples of the Gulf of Guinea was based on a certain number of seeds whose African names are known and whose mass has been theoretically estimated.

According to all the authors, who differ only on their role, two seeds were mainly used by the Akan, one of which is identified as the seed of *Abrus precatorius*, locally called *damma*. The

other, the *taku*, has remained unidentified to this day. We only know of her its black color and its hardness, as well as her ratio of 1 to 3 *damma*. A third important unit could also correspond to a seed, the *ake*, in a ratio of 1 to 8 *taku*, but this data is very little documented. It could however correspond to the seed of *Blighia sapida*, a tree known locally as *aki*. Other seeds could also be used, which do not enter into the weight calculation, except the grain of rice, called *pesewa* and evaluated at ½ *damma*. The *damma* was counted by two under the name of *ba*. Finally, each of the three units, *ba*, *taku* and *ake* would have been used, as we have shown in our princeps publication, according to two different systems, one light (B, T, A), so called female, the other heavy, so called male (B*, T*, A*) in a ratio of 8 to 7 such as:

B = 0.146 g	T = 0.22 g	A = 1.76 g
B* = 0.166 g	T* = 0.25 g	A* = 1.98 g

At this stage, the only data verified by weighing is the mass of *damma*, 0.074 mg, which gives a *ba* of 0.146 g [1]. The objective of this second study is therefore to verify the duality of the *ba*, to identify the taku, and to learn more about the *aki* seed.

Method

As regards the *taku*, a priori unknown, it is an empirical research on the internet with the keywords, “carat”, “carob tree”, chosen on the basis of a quasi equivalence of weight and function, which led to the African carob tree, alias *nere*, alias *Parkia biglobosa* which proved to be a plausible candidate. The scientific names of the three seeds being known, the working method was, in the absence of personal botanical knowledge, to search for documentation on databases such as SID ([2]), the database of the Royal Botanic Gardens of KEW, and by a new empirical internet research on the names of plants.

This documentary research was supplemented by weighing seeds of *Abrus precatorius* and *Parkia biglobosa* from West Africa. From Ivory Coast for the former, from Benin for the latter. A mg sensitive electronic scale was used for this purpose.

Results

In Search of heavy *damma*

Damma, a small red seed with a black dot that is still found in the family *dja* [3] of Ivory Coast and the *futuo* [4] of Ghana has been reported since the 16th century and its average mass is usually given as 74 mg, while calculations according to Binger's report in Agni country give it a mass of 83 mg. A search on the SID database gives them an average mass of 77 mg, but with a dispersion of 63.5 to 91.6 mg. Abel (1952) for his part attests a mass of 74 mg in the dry season, and 84 mg in the rainy season, on an electronic scale from the 1950s.

We checked it on a batch of 250 g of seeds from Ivory Coast, without any notion of season, acquired from a diviner who used them for his practice. Their average mass, evaluated on a 100 g sample, is 0.08 g, but careful examination with the naked eye shows a significant disparity between them.

100 g of seeds has been selected and sorted by hand to gradually separate the larger from the smaller. The sorting was carried out to the end, leaving no seed indeterminate. Deformed and blackened seeds were removed. Ten of each type were measured in length and width with a caliper. The approximate dimensions are 5.8 mm by 4 mm and 6.3 mm by 4.5 mm. About 40% of the seeds of the first type and 60% of the second are obtained. The scrap is less than 1%. 100 seeds of each type taken at random were weighed. The result is in line with Abel's measurements, that’s to say a mean mass of 0.0736 mg for some and 0.0839 mg for others.

In search of *taku*

Nere is the Bambara name for *Parkia biglobosa*, a tree from the African savannah, which in West Africa grows between 7° and 12° north latitude. Its seed, peeled after boiling, is used to make a sauce with high nutritional value, particularly appreciated by Ivorians under the name of *soumbala* and by Ghanaians under that of *dawa-dawa*. Its fruits are pods very similar to that of *Ceratonia siliqua*, the Mediterranean carob tree whose seed, with a mass of 0.20 g, has been used since antiquity to weigh gold and jewels. Those of the *nere* are black under an adherent beige cuticle.

Further research on these seeds leads to an article published in a Beninese agronomic journal (Ahouansou *et al.*, 2006), which specifies that a thousand peeled seeds weighs 222 g, which is exactly the mass calculated for light taku by Abel. As for the mass of raw seeds, it is provided to us by the Burkina Faso seeds catalog (CNSF, 2015) which indicates 4,000 seeds

1. These two values are given to us by Abel, who had obtained the first by weighing, the second by calculation. This difference has no practical consequences.

2. *Seed information database. https://data.kew.org/sid/. Accessed online February 23, 2017.s.*

3. A name which in Western Akan countries refers to the treasure in which weights, weighing instruments and gold dust are kept.

4. The *dja* for Eastern Akan people.

per kg, that's to say 0.25 g each. Another Burkinabe source (Millogo, 2014), relating to seeds collected in Guinea, Ivory Coast, Benin and Cameroon, however reveals a strong regional disparity with a west-east mass gradient of 0.21 g to western Ivory Coast, up to 0.28 g in Cameroon, and north-south, from 0.22 g per 10.36° north latitude to 0.26 g per 7.25° latitude North.

Rainfall is another decisive factor, explaining the paradoxically high mass of seeds from Guinea (0.26 g) even though this state is the most northerly and the most westerly of the four countries studied, but by far the most watered. Having focused on 20-year-old seed collection, this study also shows their stability over time. We check it on a sample of 100 seeds originating in Benin, from a 1 kg lot, eliminating the largest and the smallest, and found a mass of 24.9 g. Brought to the boil for 2 minutes to get rid of their cuticle by friction then dried, it is effectively only 22 g.

The uncertainties of *ake*

There is no mention in the published literature of a seed corresponding to this weight value, which is a multiple by 8 of the *taku* and therefore of a mass of 1.76 or 1.98 g depending on the system of reference. This word is not considered as akan, but as a deformation by Europeans of the radical *agira*, *agiraotwe-fa* being the weight to which it corresponds (Bowdich, 1819).

Our hypothesis refers to the number 8, which is said *aquiay* in Brong Ahafo, a state bordering on Ashanti, where a very pure language was spoken. Term which is declined according to the same source in the other akan dialects in *otwe*, or *awotwe*, and which one still finds in the form *oque* in the relation made by de Marees of Gold Coast in 1605 (De Marees, 1605).

Only one author (Ott, 1968) mentions its possible relationship to the seed *Blighia sapida*, a tree whose African name is *aki*. This is a tree whose fruit is edible under certain conditions, and whose seed of around 1 cm x 2 cm could be a good candidate, but, according to SID, its average mass is 2.9 g, so too high. A well-documented study (Olufunke *et al.*, 2016) confirms this mass at picking and shows that it is very sensitive to desiccation so that its mass after 28 days of storage is only 2.24 g.

Weighing of 100 seeds of *nere* (*Parkia biglobosa*) from Benin.
Top, unshelled seeds, mean weight 0.25 g (theoretical weight 0.25 g).
Bottom, peeled seeds, mean weight 0.222 g (theoretical weight 0.222 g)

Weighing of 100 seeds of *damma* (*Abrus precatorius*) from Ivory Coast. Top, 100 heavy seeds, average weight 0.084 g (theoretical weight 0.083 g). Bottom, 100 light seeds, average weight 0.074 g (theoretical weight 0.073 g).

Discussion

Why are *nere* seeds not found in the *futuo* and *dja* that have been transmitted?

If we admit that the *taku* was the basis of the Eastern AWS, how is it that we no longer find its seeds in the *futuo* that have been preserved, while we find that of *damma* ? The answer may be very simple. The seed of *Abrus precatorius* is poisonous. It contains abrin, a deadly poison in low doses. However, its cuticle is sufficiently resistant to digestive juices to make absorption safe. The *nere* seed is a sweet treat, which is eaten raw by children who chew it. It is understandable that after the demonetization of gold dust and weights by the colonial powers, they had disappeared from the *dja*.

What mass should be retained for the *nere* seed?

The variability in seed weight casts doubt on the *nere* hypothesis. Those of Ghana are not documented, but, if we take into account the geographic data and rainfall (L'Hôte & Mahé, 1996), we see that the north of the Akan states is found in average for all these determinants of the weight. It is therefore logical to think that the same is true for seeds. If we also admit that the initiation of the goldsmiths taught them the correct provenance of the seeds, and that they knew how to select by eye those of the right weight, we can reasonably attribute to the unshelled *nere* seed used by the Akan a value approaching 0.25 g.

Why would the Akan, people of the forest, have used a seed from the savannah?

While the *damma* is the seed of a forest liana, the *nere* is a savannah tree. It is therefore surprising that the Akan, people of the forest, adopted it as the basis of their weight system. This can be seen as a confirmation of their

claimed link with *Wagadou*, the Ghanaian empire that flourished in the Middle Ages on the banks of the Niger. We can also see the influence of the Dioula, the Mande merchants who according to Garrard would have initiated the Akan in the use of weights and their lost wax casting, or simply north-south trade including the *nere*, although not reported by Europeans (who had no reason to be interested in this commodity), could be part. We can also refer to the history of the Ashanti, who would not have learned the use of weights until the beginning of the 18th century, after their conquest of Brong Ahafo, located on their northern border, at the edge of the savannah. Another possible explanation is the use of the seed of *Parkia bicolor*, which is a forest variety that grows further south than *biglobosa* and therefore in Akan territory. No information has been found on this seed that allows further discussion of this hypothesis.

What is the real mass of *damma*?

Kew's data are not consistent with the results of this study, but the origin of the seeds should be known, as there seems to be a great disparity from one region of the globe to another. Thus the average mass of a batch from Madagascar is 0.09 g and that of a batch from China 0.10 g. These seeds are known to be very resistant, in particular to desiccation, which has been verified by leaving them for a month on a radiator. The difference in mass observed therefore does not come from progressive dehydration. *Abrus precatorius* is a liana from the equatorial forest which fruits several times a year. We can think that the volume of seeds is dependent on annual variations in rainfall.

We do not know the harvest period of the Ivorian lot that was tested. It seems quite old as evidenced by the number of blackened seeds and could have been formed gradually, which explains the coexistence of the two types of seeds. We can therefore, subject to confirmation, admit that there were *damma* of 74 mg and 84 mg corresponding to B and B*.

Does *ake* match the *aki* seed?

For a seed to serve as a standard, its mass must remain stable and resist over time. Based on the available data, this is not the case with *aki*. Unless it stabilizes around 2 g beyond the 28 days that the Nigerian experience lasted, which remains to be demonstrated. As appealing as the homonymy is, it is so far a coincidence.

Conclusion

In conclusion, the data from the literature and from the experiment do not oppose the hypothesis of a duality of *ba* and *taku*, and show that the masses calculated by the theory are consistent with reality, but do not allow not to determine if these two systems were independent of each other, or integrated into a single system in the form of *male* and *female* weights. The Akan bequeathed us millions of weights, many of which are preserved in European collections. The study of their weight distribution, even their decoding if it is possible, should logically teach us more on this point.

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