

# Uses of graminaceous plants as food by man in West Africa

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## ABSTRACT

The family Gramineae, with over 7 000 species is the fifth largest family in the plant kingdom, and has over the years played a very important role in providing food for man in the form of cereals among which the most important and well-known examples are rice, wheat, maize and others.

The principal graminaceous plants in man's diet in West Africa are rice (*Oryza* spp.); maize (*Zea mays* L.) and a variety of species belonging to the sorghums and millets (species of *Pennisetum*, *Digitaria* and *Eleusine*). Plants collected in times of famine include species of *Echinochloa*, *Panicum*, *Paspalum* etc.

## RÉSUMÉ

### UTILISATION DE PLANTES GRAMINÉENNES DANS L'ALIMENTATION DE L'HOMME EN AFRIQUE OCCIDENTALE

La famille des Gramineae, qui compte plus de 7 000 espèces, est la cinquième famille en importance du règne végétal et elle a, au cours des âges, joué un rôle très important dans l'approvisionnement alimentaire de l'homme sous forme de céréales parmi lesquelles les exemples les plus importants sont: le riz, le blé, le maïs et d'autres encore.

Les graminées principales qui entrent dans l'alimentation humaine en Afrique occidentale sont: le riz (*Oryza* spp.); le maïs (*Zea mays* L.) et une variété d'espèces appartenant aux sorghos et millets (espèces de *Pennisetum*, *Digitaria* et *Eleusine*). Les plantes récoltées en temps de disette incluent espèces de *Echinochloa*, *Panicum* et *Paspalum* etc.

The cereals are all members of the great grass family, Gramineae, and are alike in possessing the characteristic fruit of the family, the caryopsis. In this fruit the wall of the seed becomes fused with the ripening ovary wall to form the husk. The term 'grain' is also applied to this type of fruit.

The reasons for the importance of graminaceous plants as food plants are many. One or more of these grasses is available for each kind of climate. They have a wide range of soil and moisture requirements. They can be cultivated with a small amount of labour and have a high yield. The grains are high in food value and easy to handle and store because of their low water content. They contain a high percentage of carbohydrates, together with a considerable amount of proteins and some fat and vitamins.

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These tropical African food plants follow a more or less strict climatic zonation. (Fig. 1). Above 10° latitude they form the basis of human food. South of the 1 000 isohyet the sorghums predominate; to the north they are slowly replaced by millet which is less demanding on water and practically disappears between the 400 and 600 isohyets.

In the intermediate zone between forest and savanna, rice and maize especially, play a large part in man's food, in association with tuberous plants, such as *Dioscorea* sp. *Manihot* sp. etc.

First in the list of West African food plants is *Zea mays* L. or maize as it is more commonly known. It is a native of tropical America and was introduced into West Africa in the sixteenth century. Maize is cultivated from the forest regions to the savanna areas. Two harvests are possible in forest regions, but one only in savanna areas during the rainy season. At harvest, a small proportion of the maize is eaten roasted, the rest turned into flour through the process of first drying the cobs, shelling the cobs, and then pounding the grains into flour or grinding in a mill. In this form, maize flour is used in the preparation of porridges.

Second on the list is *Oryza glaberrima* Steud., the indigenous African cultivated rice. It is grown on the flood plains from Senegal to Lake Chad. Nowhere in West Africa is this swamp rice specially irrigated as it is in many parts of the great rice growing countries of the East. The only irrigation done is natural irrigation, when the low-lying land in valleys becomes flooded in the rainy season and gradually dries off again after the rains have ceased.

Three main centres of origin of *Oryza glaberrima* Steud. exist: the first is in the Central Nigerian delta the second in Gambia and the third in Guinea (Fig. 2).

Preliminary attempts have been made to grow superior varieties of imported rice, *Oryza sativa* L. These varieties are better than local varieties in that they are heavy yielders and also do not shed their grain so easily during the period of harvest. Imported varieties thrive when the depth of water is regulated, but in West Africa where the irrigation of rice consists of natural flooding and the depth of water is very variable, the local varieties are much better suited to the sudden changes of water level.

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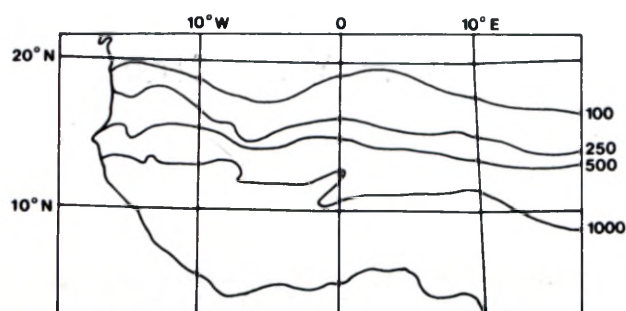


FIG. 1.—Mean annual rainfall in West Africa.

Two species of rice collected in the wild state include *Oryza barthii* A. Chev. and *O. breviligulata* A. Chev. & Roewr.

Third on the list are the sorghums which include a large number of widely cultivated grasses, known under a variety of names, common and scientific. Equatorial Africa is their native home. Although somewhat less nutritious than maize, they constitute a staple food for millions of native peoples in Africa especially in Senegal, Mali and Niger.

The plants are tall, coarse annuals; growing to a height of from 1–1.6 m and resembling maize in habit. The inflorescence is a dense head or panicle, and the grains are smaller and rounder than those of maize. The root system is shallow and twice as extensive as that of maize and the leaf area is half as great. The highly absorptive nature of the roots and the ability of the leaves to roll up in dry weather, enable the plants to withstand a great amount of heat and consequent evaporation. Their low water requirement renders them exceedingly drought resistant, so that they are well adapted to semi-arid and arid regions, where maize will not grow.

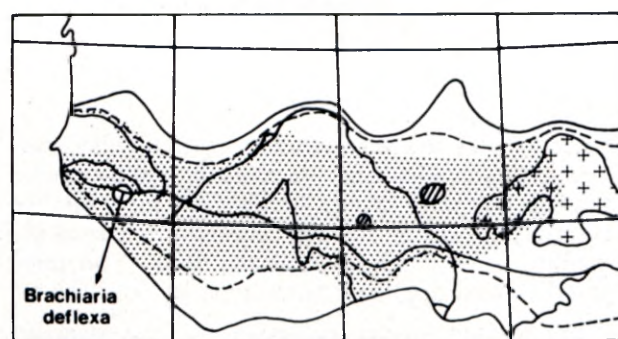
*Sorghum bicolor* (L.) Moench. is probably the commonest sorghum found in West Africa. All varieties are commonly used as food. It can be grown in districts with as low a rainfall as 30 or 50 cm per annum, but is generally found in those regions where the rainfall varies between 60–75 cm.

The main use of the *Sorghum* grains is as human food. The flour is generally mixed with water and made into foods resembling porridges. The seeds are also used in making intoxicating drinks.

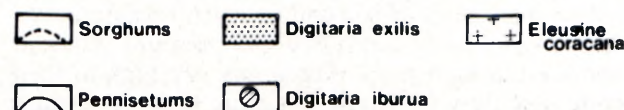
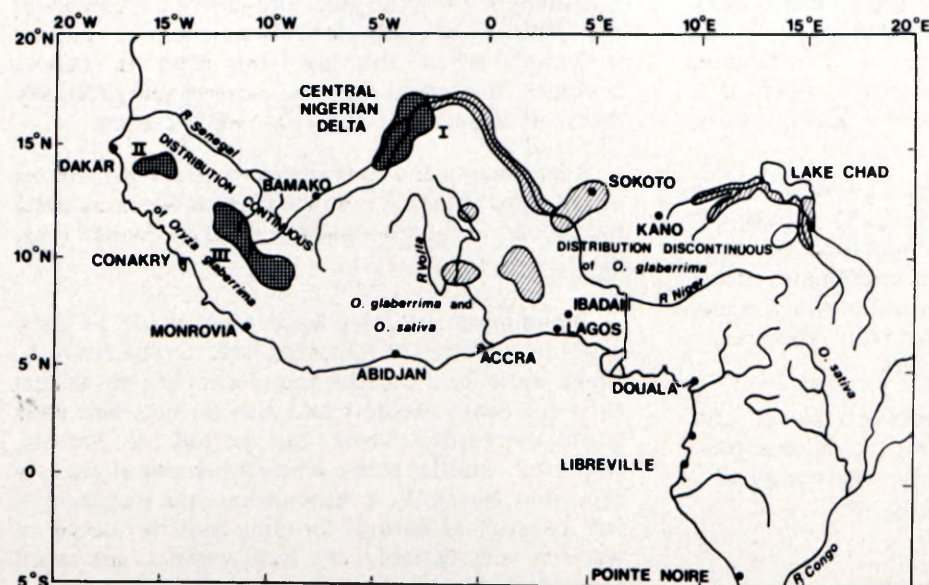
Next we have the genus *Pennisetum*. Its species are well adapted to light soils and to drought and therefore is the main food of the most arid countries of tropical West Africa. The grains of *Pennisetum* are small and the term 'millet' is loosely applied to it and a large number of cultivated grasses with very small seeds. These grains are eaten in porridges, in making pancakes and in the making of fermented drinks.

Similar to the *Pennisetums* in having small seeds, are the *Digitarias*. Two species of major importance are *Digitaria iburua* Stapf and *D. exilis* (Kippist) Stapf. Their distribution is shown in Fig. 3.

The cultivation of *Digitaria iburua* Stapf is reduced to two regions, one on the Bauchi Plateau in North Nigeria, and the second in North Atacora (Togo-Benin) between 400–1 000 m asl. The



NORTHERN AND SOUTHERN LIMITS OF:

FIG. 3.—Northern and southern limits of the Sorghums, Pennisetums, *Digitaria exilis*, *D. iburua* and *Eleusine coracana*.FIG. 2.—The distribution of *Oryza glaberrima* and its three centres of origin I, II & III in West Africa.



common name for *D. iburua* Stapf is iburua or black fonio. The grains are eaten as semolina by the Hausas. In Togo, they are used in making fermented drinks.

*Digitaria exilis* (Kippist) Stapf is the most important of the Digitarias. It is commonly known as fonio, fundi, acha or hungry rice. It is cultivated from Senegal to Chad. The grains have an agreeable taste, are easily digested and can be given to very young infants in the form of porridges. The common form in which it is eaten is semolina with meat, legume and other vegetables in sauce. The grains are also used in fermented drinks.

The following are graminaceous plants of minor importance as food. *Brachiaria deflexa* C. E. Hubb. is cultivated around Fouta Djallon in Mali (Fig. 3). In

all other areas of West Africa it is collected in the wild. Its flour is used in making cakes.

*Eleusine coracana* Gaertn. is found in the region of Chad and Central African Republic. It is used as food for man and in the making of beers from coloured grains, whereas the white grains are used in making flour.

During famine or difficult periods the West African and the nomads resort to collecting the grains of the following graminaceous plants as food: *Brachiaria stigmatistata* Stapf., *Cenchrus biflorus* Roxb., *Dactyloctenium aegyptium* P. Beauv., *Digitaria adscendens* Henr., *Echinochloa colona* Link., *Eragrostis ciliaris* R. Br., *Panicum laetum* Kunth and *Paspalum scrobiculatum* L.