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COLLECTION OF KAURA, FARA-FARA AND GUINEENSE SORGHUMS IN NORTHERN NIGERIA

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Résumé. — Le sorgho est la principale culture vivrière de la région nord du Nigéria. Bien qu'une grande partie de la variabilité génétique du sorgho ait été collectée au Nigéria, très peu des types Kaura, Fara-fara, et Guinéense sont actuellement disponibles dans la collection mondiale à l'ICRISAT. Suite à une demande pressante des sélectionneurs du sorgho, une collection spécifique de ces types a été entamée.

Les types Kaura, (surtout des durra-caudatum), sont des sorghos à rendement élevé qui s'adaptent quelque peu aux conditions hydriques faibles. Les types Fara-fara (surtout des guinée-caudatum) sont des variétés hâtives à rendement élevé, dont les grains blancs sont appréciés par la plupart des paysans. Les sorghos de type Guinéense (Race : Guinée, sous-race : Guinéense) ont des grains blancs cornés résistants aux altérations. Les pieds de type Guinéense observés ont été presque exempts des dégâts causés par des insectes ravageurs ou par des maladies par rapport au type Kaura qui est sensible aux maladies et aux attaques des insectes ravageurs.

Les populations locales originaires du Nigéria du nord s'avèrent prometteuses dans les programmes de l'amélioration pour les zones tropicales semi-airdes en Afrique de l'Ouest. Le matériel prélevé a été amené à l'ICRISAT, rajeuni et conservé dans la banque des ressources génétiques de l'Institut.

Summary. — Sorghum is the principal food crop grown in northern Nigeria. Although sorghum germplasm has been extensively collected in Nigeria, very few Kauras, Fara-faras and Guineense types are presently available in the world collection at ICRISAT. In view of a pressing need by breeders for sorthums with drought tolerance, high yield and grain quality a collection was launched to collect these land races.

Kauras (mostly durra-caudatum) are high yielding sorghums, partially adapted to low moisture conditions. Fara-faras (mostly guinea-caudatum) are early-maturing and high yielding. Guineense sorghums (guinea, subrace guineense) have white flinty grain with weathering resistance.

Landraces from northern Nigeria are potentially good parents in breeding programs for the semi-arid tropics. The collected material was rejuvenated and are being maintained in the ICRISAT germplasm bank.

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Grain sorghum (*Sorghum bicolor* (L.) Moench), also known as guinea corn, is a traditional crop in northern Nigeria. The grain is used as human food and the stalks and foliage are fed to livestock.

The most common landraces in northern Nigeria are Kaura, Fara-fara and Guineense. These races are grown as rainfed crops in all ecological zones of the country. Sorghum is also grown in small areas, generally called "Masakwa", during the dry season on clay soils near Lake Chad. These fields are flooded at the end of the rains, and the crop grows to maturity without irrigation (CURTIS, 1967). Landraces are well adapted to local conditions and farmers grow them over extensive areas. Unlike cotton and groundnuts, of which commercial cultivars are grown, the use of traditional sorghums still predominate, although high yielding cultivars are available (ANDREWS, 1970, 1975 ; WEBSTER, 1975).

Kaura sorghums (fig. 1) have large grains with yellow endosperm and show a wide range of variation in panicle shape and compactness, glume color, size and shape. These sorghums, with their characteristically elongated panicles are considered high yielding and of excellent grain quality by farmers.

Fara-fara (fig. 2) is the common name given to large-seeded white-grained sorghums grown in northern Nigeria. They display a range of variation for panicle compactness and shape, glume and testa color.

Guineense sorghums are tall, and mature later than Kauras or Fara-faras. They have semi-loose, pendulous panicles with long branches (fig. 3). At maturity, the flattened grains are obliquely twisted ans exposed between the long, widely gaping glumes. Guineense sorghums grown in northern Nigeria belong to subrace Guineense

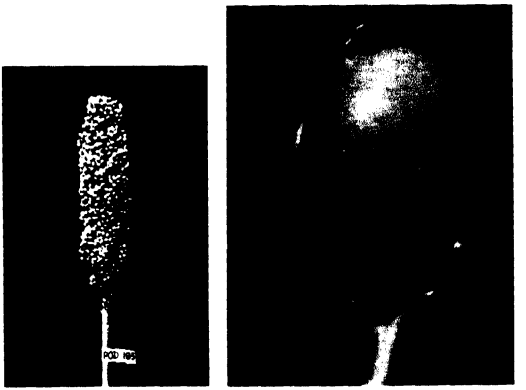
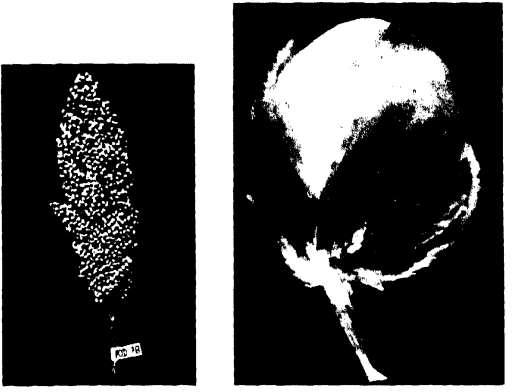


FIGURE 1. – Panicle and grain of Kaura sorghum.



— Panicle and grain of Fara-fara sorghum.

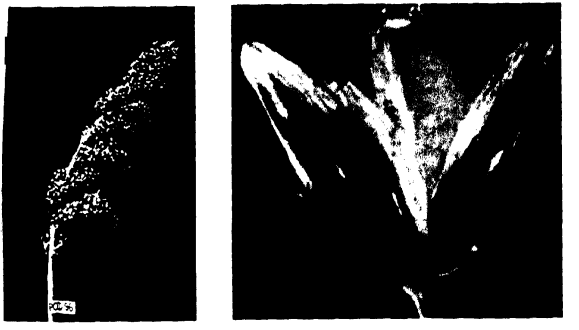


FIGURE 3. — Panicle and grain of Guineense sorghum.

of race Guinea. Grains of Guineense sorghums disarticulate readily from the spikelets and are of good quality. Pericarp color vary in shades of red, yellow or white. The mesocarp is often thin, giving the grain a translucent appearance. Colored testas are rare. Corneous endosperm is common. Guinea sorghums of West Africa are known to have weathering resistance (HARLAN and de WET, 1972).

Sorghum germplasm in Nigeria is fairly well collected. Few Kaura, Fara-fara or Guineense types, however, are available in the world collection maintained at ICRISAT (MENGESHA and PRASADA RAO 1982). In view of the growing importance of these races, an expedition was launched into the northern parts of Nigeria to collect them before they are replaced by modern cultivars.

SORGHUM IN NORTHERN NIGERIA

Sorghum is cultivated extensively in the Sudan savanna, sub-Sudan savanna, Northern Guinea savanna, Southern Guinea savanna and on the Jos Plateau of Nigeria. In southern Nigeria, it is predominantly grown in the Southern Guinea savanna and to a limited extent in derived savanna and rain forests (MORTIMORE, 1969). In the Sahel savanna and drier parts of the Sudan savanna, sorghum is largely replaced by pearl millet (CURTIS, 1967).

Sorghum is grown on 6 million ha in Nigeria (FAO, 1980) either as a pure or mixed crop. The most common crop combinations are sorghum, pearl millet and cowpea or sorghum and cowpea, with groundnut sometimes intercropped with sorghum. The majority of sorghum-growing areas in Nigeria are occupied by traditional landraces. Improved cultivars such as short Kaura are sporadically grown.

Sorghum grain in Nigeria is used as food, for brewing beer, and for medicine. The stalks are used to build shelters and as a livestock feed. The most common food prepared from sorghum is **Tuwo**, a thick porridge eaten with soup. Sorghum flour is also made into a paste and cooked as a porridge called **Kumu** or **Ogi** ; or fried in groundnut oil as a thick pancake. Unripe heads and grains are occasionally roasted and eaten.

There is a strong preference by farmers for white sorghum flour. White-grained Guineense sorghums are mainly distributed in the Southern Guinea savanna, probably because of their weathering resistance associated with flinty grain, loose panicles and open glumes. Flour produced from Kaura sorghums has a yellow tinge, and is slightly bitter. In spite of this, Kauras are extensively grown in the Sudan savanna, probably due to their high yield and adaptation to low rainfall.

VARIATION IN THE COLLECTION

The collecting mission was launched in 1981 during harvest time (November-December). Although it was a little late for the Sudan savanna zone, collecting was ideal in the sub-Sudan savanna, Northern Guinea savanna and the Jos Plateau. Late January

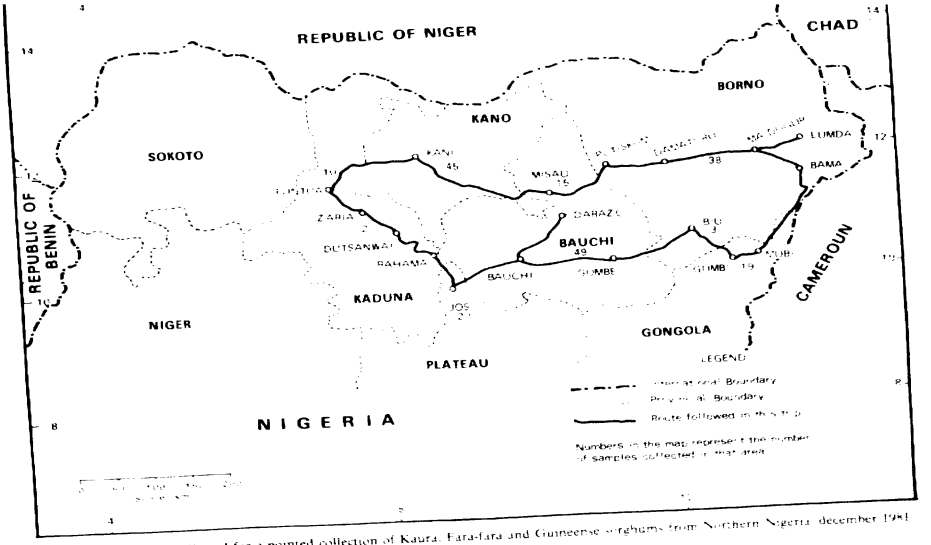


FIGURE 4 — Route followed for a pointed collection of Kaura, Fara-fara and Guineense sorghums from Northern Nigeria, december 1981

is the best time to collect "Masakwa" sorghums grown under residual moisture in th dry season near Lake Chad. During the mission 215 samples of different sorghun landraces were collected. The route travelled is shown on the map (fig. 4). A detailec report of this expedition is presented by Prasada Rao et al., 1981.

Most collections were panicle samples, either harvested from farmers fields, o drawn from panicles in their stores. Panicle shape and spikelet morphology were recorded, and the samples were classified into races and sub-races.

Curtis (1967) classified Nigerian sorghums into races Guinea, Kaura, Fara-fara, Chad, Sokoto, Umbellate and Tunicate. Among these, the first four are of most agronomic importance. The aim of this mission was to make a specific collection of Kaura, Fara-fara and Guineense sorghums. Samples collected in different ecological zones are listed in Table 1.

TABLE 1

Collection of sorghum germplasm in different ecological zones of northern Nigeria

Name of ecological zone	Average annual rainfall (mm)	Kaura	Fara-fara	Guineense	Others	Total samples collected
Sudan savanna	500-1 000	36	28	16	18	98
Sub-sudan savanna	900-1 100	18	3	35	15	71
Northern Guinea savanna	1 050-1 400	12	3	—	1	16
Jos Plateau	1 350-1 400	11	3	—	6	20
Total		77	37	51	40	205

Kaura Sorghums

In the Hausa language the word Kaura means migrant, suggesting that Kaura sorghums were introduced from the north or northeast into Nigeria. Kauras are characterised by large round grains that protrude from tightly adpressed glumes. The pericarp and endosperm are usually yellow. Kauras occur in several forms which differ primarily in panicle compactness. Panicles range from semi-compact to compact, with rare semi-loose examples (fig. 1). The "Kaura complex" was classified by Snowden (1936) as *S. caudatum* var. *kerstingianum*. Phenotypically similar cultivars as those from Nigeria with different vernacular names are reported to be grown in Benin and Togo (SNOWDEN 1936). Following the classification system of Harlan and de Wet (1972), the majority of Kauras fall into the intermediate race durracaudatum. Most Kaura sorghums mature in 130 to 150 days, are high yielding, and some have panicles upto 55 cm in length.

Despite the drought that prevailed in the Sudan savanna zone especially near Birninkudu during 1981, Kaura sorghums produced some grain, indicating their

adaptability to drought. Although white sorghums are prefered for grain quality in Nigeria, Kaura sorghums with yellow grains are grown because of their drought toferance. Field observations indicate that Kaura sorghums are generally susceptible to stalk borer *(Busseola fusca)*, leaf diseases and long smut *(Tolyposporium ehrenbergii)*. They appeared to be tolerant to *Striga hermonthica*. In several fields practically no decline in yield at maturity was noticed in spite of severe infestation with *Striga*. Other details of Kaura samples collected are given in Table 2.

TABLE 2
Kaura sorghums

Ecological zone	Harlan and de Wet's classification	No. of samples
	Race	
Sudan savanna	Durra-caudatum Durra-guinea Guinea-bicolor Guinea-caudatum	27 2 6 1
Sub-Sudan savanna	Durra-caudatum Guinea-caudatum	16 2
Northern Guinea savanna	Durra-caudatum Guinea-durra	10 2
Jos Plateau	Durra-caudatum Durra-guinea	8 3
Total		77

Fara-fara Sorghums

Most white-seeded sorghums of Nigeria are locally named Fara-fara. The name, however, applies more specifically to a group of sorghums with mostly white grains, semi-compact panicles (fig. 2), slightly gaping glumes, and slight grain asymmetry. Some Fara-faras have a colored testa. Snowden (1936) included some Fara-fara sorghums under *Sorghum guineense* Stapf var. *involutum* Stapf, and others under *Sorghum caudatum* Stapf var. *feterita* Stapf. They mostly belong to race Guinea-caudatum of Harlan and de Wet (1972).

Fara-fara sorghums are primarily grown in the Sudan savanna. They mature earlier than other guinea sorghums, are high yielding with the added advantage of white grain. Details of collected Fara-fara sorghums are given in Table 3.

Guineense Sorghums

Nigeria is predominantly a Guinea sorghum country (CURTIS 1967). Two sub-races of race Guinea, Guineense, and Margaritiferum are grown in Nigeria. Guineense

TABLE 3
Fara-fara sorghums

Ecological zone	Harlan and de Wet's classification	No. of samples
	Race	
Sudan savanna	Guinea-caudatum Guinea-caudatum	25 3
Sub-Sudan savanna	Guinea-caudatum	3
Northern Guinea savanna	Guinea-caudatum	3
Jos Plateau	Guinea-caudatum	3
Total		37

sorghums are cultivated in northern Nigeria, mainly in the Sub-Sudan savanna and Sudan savanna zones. They have semi-loose panicles (fig. 3), and spikelets with gaping, involute glumes and medium grain size.

Guineense sorghums have mostly hard, white grains with weathering resistance. Red and yellow grained cultivars are occasionally grown. The plants we saw (unlike the Kauras) were relatively free of insects and disease. Guineense sorghums may not compare with Kauras and Fara-faras in yield, but are superior in grain quality (as indicated by the farmers' preference), weathering resistance and resistance to pests and diseases. Guinea sorghums are adapted to high rainfall areas of Nigeria, and require a long growing season. Guineense sorghums of the Sudan savanna zone, however, are adapted to low rainfall areas. These sorghums can become useful to breeders because of their excellent grain quality, drought tolerance and resistance to insects and diseases. The details of samples collected are given in Table 4.

TABLE 4
Guineense sorghums

Ecological zone	Local name	Harlan and de Wet's classification		No. of samples
		Race	Subrace	
Sudan savanna	Chekkalarija Kirbuji Chekkalari-fari Galwali	Guinea Guinea Guinea Guinea	Guineense Guineense Guineense Guineense	5 8 2 1
Sub-Sudan savanna	—	Guinea	Guineense	35
Total				51

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