# Acha (*Digitaria spp.*) a "Rediscovered" Indigenous Crop of West Africa

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## ABSTRACT

There are over 300 *Digitaria* species of acha, which are sometimes grown as fodder. Only three or four are sometimes grown as cereals (CIRAD, 2004). In West Africa the common species cultivated are *Digitaria exilis* or fonio, white fonio, fundi of findi, acha, hungry rice and *Digitaria iburua* or black fonio, iburu etc. Acha (*Digitaira spp*), considered as one of the lost crops of Africa, remains an important food crop for millions of people in West Africa. The intimidating challenge today is to produce enough acha to meet the growing demands for its products. This paper considers acha as a once "lost crop of Africa" whose potentials of providing enough food for the increasing population of poor people in the Continent cannot be ignored.

**Keywords:** Acha (*Digitaria spp.*), cereal, rediscovered, "lost crop of Africa", Potentials

## 1. INTRODUCTION

Food insecurity remains one of the major problems of modern Africa, where famine continues to threaten peace and stability in Africa. For thousands of years, Africans have depended mostly on their fruits, root/tuber and cereal crops for their subsistence. However, due to the decline and total neglect of their production in the Continent, they were once regarded as "lost crops of Africa". Acha falls into this group of "lost crops of Africa", and part of the reason it has been neglected is as a result of misunderstanding by scientists and other decision makers. The unique size (0.4-0.5mm) of acha (figure 1) makes its production tedious, coupled with the fact that its mechanization is virtually non-existence. The English name, "Hungry Rice", believed to have been coined by Europeans is considered misleading by some authors (Kwon-Ndung and Misari, 1999; Ibrahim, 2001; Anonymous, 2003).

Acha is now being gradually "rediscovered" and considered for improvement as a cultivated species (Ibrahim, 2001; Morales-Payán et al., 2002). There is a clear indication that farmers do value acha because of its unique taste and nutritional value. A lot of Research Institutes are working together in partnership to increase the knowledge of its distribution and genetic diversity.

Figure 1. Paddy acha

## 2. LITERATURE REVIEW

### 2.1 Pre-and Post-Harvest Processes

#### 2.1.1 Cultivation

In the year 2002, a total area of 347,380 hectares was devoted to acha production in Africa, with Nigeria alone providing almost half of that area (FAOSTAT, 2003). Acha is a small annual herbaceous plant that grows to a height of 30-80 cm (Figure 2). Acha is grown in various parts of Nigeria, Sierra Leone, Ghana, Guinea-Bissau, Togo, Mali, Benin Republic and Cote d' Ivoire (Jideani, 1999; Gyang and Wuyep, 2005). Acha is not a demanding crop and will tolerate a wide range of soils, be they sandy, loamy, even stony and shallow. Very clayey soils are less suitable.

Figure 2 a) Acha farm b) Harvested acha sheave

### 2.1.2 Land Preparation

Acha is often prepared on a small scale mostly below 1 ha and only few farmers cultivate between 1-2 ha using traditional hand-tools. No proven technology/mechanization exists for its production. The ridging hoe (figure 3) is mostly used to make ridges for planting acha. The soil may not be loosened at all if it is of light texture. The hoe has the following parameters defining its size: length of handle is 60-70 cm; length of blade is 30-40 cm; width of blade is 15-25 cm; thickness of blade is 3.5 cm and rake angle is $60^0$.

Figure 3. Ridging hoe

### 2.1.3 Planting

Seeds are broadcasted on the soil and lightly covered manually. The seeds are planted between May and June at about 12 Kg/ha (Jideani 1990). Some farmers sow more densely between 30 to 50 Kg/ha to reduce competition from weeds at the time of emergence. The seeds germinate a week after planting. Some varieties of acha can mature quickly that they are ready to harvest long before other grains and are sometimes regarded as “grain of life”.

### 2.1.4 Weeding

Weeding is done manually using a weeding hoe (Figure 4). This weeding hoe has length of handle as 50-60 cm; length of blade is 20-25 cm; width of blade is 15-20cm; thickness of blade is 2-3cm and rake angle is $80^0$. Weeding is carried out 2-3 times from the time of planting to harvesting.

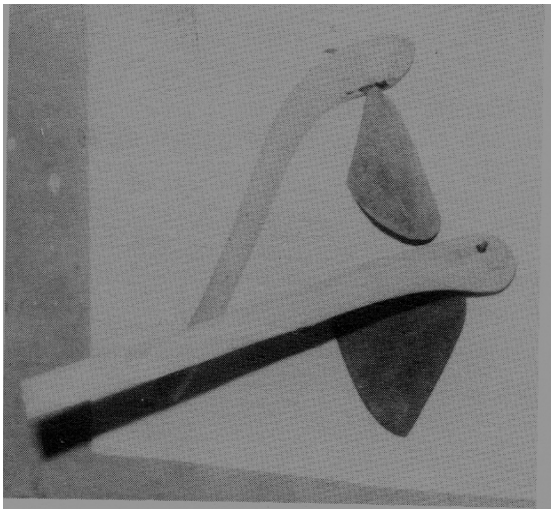

Figure 4. Weeding hoe

### 2.1.5 Harvesting

Acha grows to a height of 30 to 80 cm. The grain is ready for harvest between 60-120 days (Morale-Payán et al., 2002; CIRAD, 2004) after plant emergence, depending on the local strains and the growing conditions (Morale-Payán et al., 2002)

After the crop matures, acha is harvested by cutting the stock with curved sickles or sharp knives (figure 5). The stem tops with pinnacles are tied into small sheaves after which they are tied on the floor (Gyang and Wuyep, 2005). Harvesting contributes to the high cost of the production process, involving the farmer, his family and friends coming together to harvest the crop manually (Jideani, 1990). Mechanization of the harvest is difficult because the stems are often lodged. Getting them upright again is difficult considering the slenderness of the haulms and, what is more, it may cause shattering.

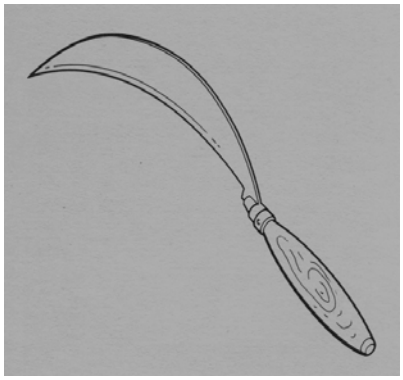

Figure 5. a. Curved Sickle b. Sharp Knife

### 2.1.6 Threshing

Threshing of acha takes a great deal of time, and current methods often contaminate the final product with sand (IPGRI, 2003). The grains are obtained by beating the sheaves with a club-ended stick (traditional threshing method) on a swept floor. At this stage, the grains get contaminated with pebbles, sand and other debris. In other to guard against these various forms of contaminants and reduce drudgery, the sheaves are covered with a thick tarpaulin and a heavy-duty vehicle made to ride over the pile. Another way of threshing is by beating bundle-tied-sheaves on hard ground.

### 2.1.7 Winnowing

After threshing the largest pieces of straw are collected by hand and are generally used as animal feed. The mixture of grain and small pieces of straw left in the threshing area is transferred to a rough disc-like-woven surface. The grain with straw is lightly lifted into the air, where the heavier grains fall back on the disc-like-woven surface and the light straws blown off by air current; this is done continuously until the grains are free from straws.

### 2.1.8 Dehulling

The enacted grains in protective hulls are released by pounding (impact and rubbing action) in a mortar using pestle (figure 6), a process called dehulling (Gyang and Wuyep, 2005). This activity is usually carried out traditionally by women. This manual dehulling has a very low output, with each woman hulling between 1 and 2 Kg/h (CIRAD, 2004), it is very tedious and time consuming (Vietmeyer, et al., 1966; Kwon-Ndung and Masari, 1999), constituting a major bottleneck in its processing and utilization.

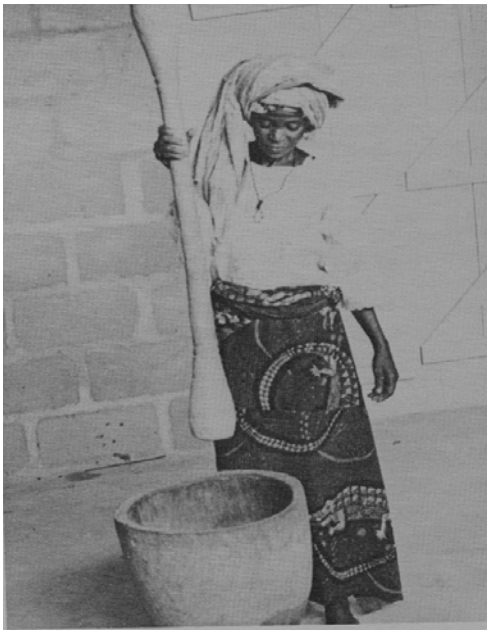

Figure 6. Traditional dehulling using mortar and pestle

### 2.1.9 Destoning

Destoning is carried out manually by vibrating the grains on a rough disc-like-woven surface. This is done locally by women and female adults in a skilled manner. The vibration results in the accumulation of the sand pebbles at one end.
The bran and foreign bodies such as sand are traditionally further removed by repeated washing before cooking. This is done using water and two calabashes; this action makes the heavier sand settles at the bottom of the calabash (figure 7) as vibration is gently applied, and is repeated from one calabash to the other, until grains are free of sand.

Figure 7. Destoning operation using calabash

### 2.2 Nutritional Composition

Acha contains about 7% crude protein that is high in leucine (9.8%), methionine (5.6%) and valine (5.8%). It is believed that its methionine content is twice as high as those of egg proteins (Temple and Bassa, 1991).

### 2.3 Uses

Acha can be made into porridge and cous cous, ground and mixed with other flours to make bread, pastries, popped and even brewed beer. It can be used as weaning food. It is highly recommended for diabetic patients by doctors.
The grains are efficiently digested by farm animals. The straw and chaff can also be fed to farm animals and can also be used for beddings. The straw can also be mixed with mud for building.

### 2.4 Review of Mechanization Efforts

Almost all the agronomic activities are carried out manually, indicating that acha is almost at a zero level of mechanization. An indigenous dehulling machine was developed in 1987 by Engr. Y. Kwa in Jos, Nigeria. Lack of Government's interest has made the machine go unnoticed. However, a dehulling machine has been developed and is in use in Bamako (Figure 3), while in Senegal Sanoussi Diakité has also developed a functional dehulling machine.

A destoning machine (pneumatic separator) was developed and fabricated in Jos the capital of Plateau State, Nigeria, by local artisans. The machine though is still fraught with low efficiency (Gyang and Wuyep, 2005)

**2.5 Future**

Acha is one of the most nutritious of all grains because they are rich in methionine and cysteine. Besides, it is among the World's best-tasting cereals (NRC, 1996). The potential for the production of this grain in Nigeria and West Africa is high, as it is superior to other cereals in performance under moisture stress and low soil fertility. It also has good capacity to respond to improved inputs.

a) Electric version b) Diesel version

Figure 8: Acha Dehullers

## 3. CONCLUSION

Acha has the potential of providing enough food for the increasing population of poor people in West Africa and in the Continent. It is regarded as "lost crop" due to the decline and total neglect of its production. Several factors are responsible for the steady decline and they range from inherent low yield potential to laborious unimproved husbandry practices. Acha has the problems of very small grain size, weak culms, low yield and susceptible to insect pests and diseases.

Acha production in West Africa has to be stimulated by initiating research activities toward addressing the existing biological, agronomic and mechanization constraints that currently discourage its expanded production. The most important plant products eaten by humans are the cereal grains. Therefore, the importance of looking for new sources of cereal grains like acha nourishment cannot be overlooked for the present and future generation.

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