

Traditional African Grains

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Summary

Africa is the centre of origin, and major producing area for a number of cereal grains. These traditional African grains have great advantages as crops in a world threatened by Global Warming. They are also exciting foodstuffs. There is a vast range of traditional African grain food products. Today, African grains are starting to be made into modern, convenience type foods. They also have tremendous potential as niche foods and beverages in the health food market.

Introduction

Africa is the centre of origin, and still today the major producing area for a number of cereal grains (Table). These are sometimes called “Orphan Crops” or even “Lost Crops”. This is despite the fact that they are staple foods of millions people in the semi-arid regions of the world. These traditional African grains have great advantages as crops in a world threatened by Global Warming. For example, sorghum is uniquely drought-tolerant and pearl millet can be cultivated under conditions of very low rainfall.

They are also exciting foodstuffs, as they are in made into a vast range of traditional foods and can be made into modern food products with health-promoting properties. This short article cannot do justice to the potential of

African grains. Thus, some hopefully interesting examples will be given here and for more detailed information, the reader should consult the articles in the reference list.

Table: Common African Cereal Grains

English name	Proper name
Sorghum	<i>Sorghum bicolor</i>
Finger millet	<i>Eleusine coracana</i>
Teff	<i>Eragrostis tef</i>
White fonio	<i>Digitaria exilis</i>
Black fonio	<i>Digitaria iburua</i>
Pearl millet	<i>Pennisetum glaucum</i>
Guinea millet	<i>Urochloa deflexa</i>
African rice	<i>Oryza glaberrima</i>

Nutrition and Health Aspects

A very important nutritional feature of sorghum and the millets is that many varieties contain substantial quantities of phenolic compounds that have strong antioxidant activity. Phenolic compounds can be categorised into three groups: simple phenolic acids, flavonoids and condensed tannins. The latter seem to be only present in certain sorghum and finger millet varieties. Phenolic acids have the lowest antioxidant activity and condensed tannins have the highest. Up until recently there has been an emphasis on the negative aspects of the antinutritional effects of the tannins, particularly in the respect of them reducing protein and starch digestibility. Certainly, for

people whose diet is nutritionally deficient, it would be better for them to eat grains that do not contain tannins. However, for people who are obese and at risk of Type II diabetes, tannin-containing cereals appear to be a potentially useful food for fighting obesity and its associated diseases. Considering phenolics in general, many health benefits have been claimed in respect of their antioxidant activity including prevention of cardiovascular disease and cancer. Unfortunately, as yet much of the evidence in support of these claims is only circumstantial.

Sorghum wax, which is rich policosanols, may also have some unique health properties. Policosanols are reportedly effective in lowering the amount of low-density lipoprotein (LDL) cholesterol and raising the amount of high-density lipoprotein (HDL) cholesterol, thus improving the LDL/HDL ratio.

Of particular interest to many health conscience consumers is that none of these African cereal grains contain gluten or gluten-like proteins.

Malting and fermentation are two traditional processing technologies that are used to prepare many foods from these grains. Both technologies have several nutritional benefits. Malting involves sprouting the grains in moist air. Its nutritional benefits are:

1. Improvement in protein and starch digestibility and essential amino acid composition
2. Improvement in vitamin and mineral bioavailability
3. Increase in nutrient density
4. Decrease in antinutritional factors like phytate and tannins

Fermentation is a microbial metabolic process, usually anaerobic. Fermentation can

be by yeast to produce alcoholic beverages and by lactic acid bacteria to produce non-alcoholic foods and beverages. The nutritional benefits of lactic acid fermentation are:

1. Improvement in protein and starch digestibility.
2. Increase in B vitamins, especially thiamine
3. Improvement in mineral bioavailability

Traditional Foods and Beverages

Despite the fact that these cereal grains do not contain gluten, flatbreads can be produced from them. These pancake-like products are staples in Northeast Africa (Ethiopia, Eritrea and Sudan). They are made from a variety of different of different cereals, especially tef, sorghum and finger millet. A feature many of these products is that they undergo a mixed lactic acid bacteria and yeast fermentation that gives them a somewhat leavened texture and an acidic flavour. Probably the two most well-known flatbreads are injera from Ethiopia and kiswa from the Sudan.

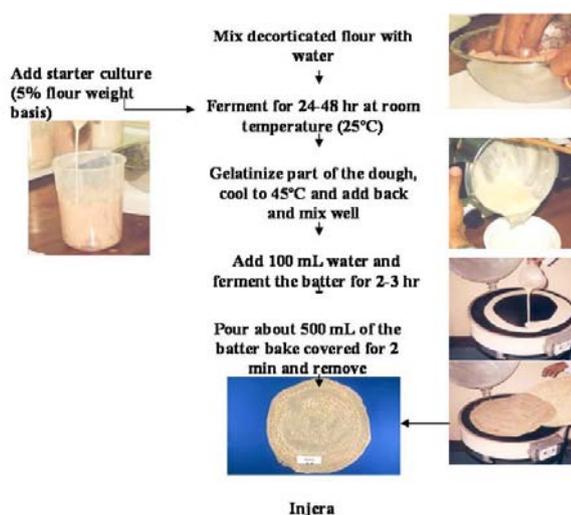


Figure 1. Typical process used for making injera

Injera is a large (approx. 50 cm diameter), spongy textured pancake about 5 mm thick. It has a honeycomb-like appearance, very similar to an English crumpet, which is created by the escaping carbon dioxide. Figure 1 shows a typical process used for preparing injera in Ethiopia. Of note is the pre-cooking of part of the dough. This gelatinises the starch making the dough viscous, allowing the injera to hold gas and rise during baking.

In Africa, the traditional beers are made from sorghum, pearl millet, finger millet and today increasingly maize. The sorghum and millets are normally malted. Traditional beers are characteristically cloudy in the case of the beers of West Africa commonly known as dolo and pito, or opaque as in the beers of East, Central and southern Africa, often referred to as sorghum beer or opaque beer (Fig. 2).



Figure 2. L to R. Zulu beer pot, commercial opaque beer, traditional grass beer strainer and wooden drinking vessel

The cloudiness and opaqueness are due to the fact that they are coarsely filtered so that still present are yeast cells, pieces of cereal and especially starch. Another characteristic of these traditional beers is that they undergo lactic acid bacteria fermentation, in addition to the yeast alcoholic fermentation. This gives them a characteristic sour taste. Unlike

beers of European origin they are not hopped. Traditional African beers are also not pasteurised, but often consumed in an active state of fermentation. Unusually for beer, they are a source of complex carbohydrates in the form of starch and dietary fibre and because they contain yeast cells, they are also a good source of B vitamins.

Modern Products

Probably the most popular modern African grain product is Morvite (Fig 3), an instant sorghum porridge or beverage powder, which is produced in South Africa. It comprises pre-cooked sorghum with added vitamins and minerals. To make a porridge or beverage, one simply mixes in boiled water or milk and makes in a proportion to give the desired consistency. In Nigeria, there is an excellent similar product, an instant pearl millet beverage kunun tsayima (Fig. 3). It contains pre-cooked pearl millet flour flavoured with tamarind oil.



Figure 3. Instant sorghum and pearl millet beverage/porridge products

To manufacture such products the cereal is either extruded or gun-puffed to pre-gelatinise the starch, which results in a viscous porridge with a pleasant toasted flavour.

Most people are familiar with wheat semolina couscous. Couscous consists of particles of cereal endosperm meal agglomerated together and cooked by steaming to partially gelatinise the starch. In the Sahel region of West Africa, pearl millet and sorghum are used for couscous production. Figure 4 shows examples of Senegalese pearl millet semolina and couscous products designed the European market.



Figure 4. Pearl millet semolina and couscous

Conclusions

Traditional African grains are very diverse and have not been bred to bland uniformity like most grains grown in Europe. They therefore have tremendous potential as niche foods and beverages, particularly in the health food market.

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