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ABSTRACT:

This paper reviewed Acha production status and utilization in contemporary West Africa. The epilogue ends with the way forward, which includes policy for liberalization of access to credit by the Acha farmers, redistribution with growth and appropriate markets and income policy. The recommendations are that, Acha production should be mechanized through funding by government and private stakeholders and above all, promoting the concept of decision analysis which allows all Acha production stakeholders to participate in decision process towards revitalizing Acha value chain in West Africa.

Keywords: Acha, Production, Utilization, West Africa and Way Forward.

INTRODUCTION

For thousands of years, Africans have depended mostly on their fruits, root/tuber and cereals crops for subsistence. However, due to the decline and total neglect of production in the continent, they were once regarded as “lost crops of Africa” (NRC, 1996). Acha falls into this group of lost crops in Africa, and part of the reason it has been neglected is as a result of the misunderstanding by scientists and other decision makers. Many Research Institutes are working together in partnership to increase the knowledge of its distribution and genetic diversity. Acha (Digitaria specie) also known as fonio, findi or hungry rice is a cereal grown and utilized in many parts of West African Savanna (Cruz, 2004)

The unique size (0.4 – 0.5 mm) of Acha makes its production tedious, coupled with the fact that its mechanization is virtually non-existence. The English name hunger Rice, believed to have been coined by Europeans is considered misleading by some authors (Kwon-Ndung and Misari, 1999; Ibrahim, 2001). Acha is now being gradually “rediscovered” and considered for improvement as cultivated species (Ibrahim, 2001; Morales – Payan et al., 2002). There is a clear indication that farmers do value Acha because of its unique taste and nutritional value (Okeme, 2016).
Acha or Fonio is a great crop of antiquity and the most ancient indigenous cereal of West Africa with cultivation history dating back to 7000 years (Cruz, 2004) but has low yield of 931 kg/ha (FAO, 2011). It is the most important of the diverse group of wild and domesticated Digitaria species that are harvested in the savannah of West Africa; the smallest seed of all species of millets (Seignobos and Tourneux, 2002). Currently Acha is the most vital food material for millions of people in the world. Acha is a low input demanding crop which tolerates a wide range of soils, including loamy, sandy and stony and shallow but not waterlogged clayey soils (Philip and Itodo, 2006). Among the cereals, Acha is the most nutritious grain containing crude protein (7%) that is high in leucine (19.8%), methionine and cysteine (7%) and valine (5.8%) (Temple and Bassa, 1991). It has been reported that the methionine and cysteine in Acha supply sulphur and other compounds required for normal body metabolism and growth while cysteine is a major constituent of the proteins that make up hair, nails, skin and is involved in major detoxification process in the body (EFRT, 2000; Belton and John, 2002).

Acha is also reported to have lower glycemic index than sorghum, corn and white rice which are intermediary in glycemic indexes (Belton and John, 2002). Acha has the potentials to improve human nutrition, boost food security, foster development and support land use; being one of the world’s fastest growing cereals that can mature in three to four months (Seignobos and Tourneux, 2002) the crop can be relied upon in semi-arid areas where rain is scarce unreliable and on marginal or poor soils not suited to other crops. According to FAO (2011), world production, harvest area and global yield of Acha are put at 558,937 mts, 686,000 kg/ha and 931 kg/ha⁻¹, respectively. Digitaria iburua or black fonio is one of the species of digitaria that has few tillers, internodes, thicker stems, wide and longer leaves, bigger seeds with black seed coat and white seeds when processed.

It is grown mainly in the Republic of Benin, Burkina Faso, Gambia, Mali, Niger, Nigeria, Togo, Senegal and other countries of West Africa (FAO, 2011). The tedious and time-consuming process of dehulling and pounding in mortar using pestle (Kwon-Ndung and Misari, 1999) was usually performed by women (Gyang and Wuyep, 2005) enacting grains in protective hulls are released by pounding in a mortar using pestle, a tedious time-consuming process called dehulling, (Kwon-Ndung and Misari, 1999), done mostly by women (Gyang and Wurep, 2005). The utilization of Acha by rural communities adopting traditional practice has largely sustained the crop at subsistence level. The practice usually is to broadcast seeds at unspecified rates depending on availability and farmers’ proficiency which is liable to uncertainties in terms of grain yield. With the current awareness of its nutritional potentials being widely circulated and increasing, it is important and imperative that scientists should undertake more relevant researches to improve Acha production and processing technologies.

METHODOLOGY

This study was based on desk review of relevant literature on Acha production and utilization in West Africa. Secondary sources of information such as journals,
textbooks, magazines, research findings, monograph and web search etc. were adopted.

**PROSPECTS OF INCREASED INTEREST IN ACHA PRODUCTION AND UTILIZATION**

The use of staple crops in global food security faces a major challenge in the near future and a diversification from over reliance on them is an important goal of achieving security of food production. The underutilized or neglected crops or orphan crops which Acha is considered as a member, are often indigenous ancient crops which are still used at some level within the local community, national or even international levels but they have the potentials to further contribute to the mix of food sources that they currently do (Mayes et al., 2011).

Kwon-Ndung (2013) identified that enhanced Acha production has the potential to play an important role in the improvement of food security that will include:

i. Being part of a deliberate effort to help the poor for subsistence and income, majority of whom live in the south.

ii. Reducing the risk of over-dependent on very limited numbers of major crops.

iii. A means of increasing sustainability of agriculture through a reduction in inputs such as inorganic fertilizers and fossils fuels for agriculture.

iv. Increasing food quality.

v. A means of preserving and celebrating cultural and dietary diversity.

Compared to major crops, there is relatively little research or breeding programme on less utilized species, even though they can be very important locally or regionally. Such crops often have important and unique nutritional qualities or can grow in environments where other crops fail. There is need for global and/or regional strategies or initiatives to be developed to promote research on, and improvement of, underutilized crops.

**ACHA PRODUCTION AND UTILIZATION IN WEST AFRICA**

**Acha Production in West Africa**

In the year 2002, a total area of 347,380 hectares was devoted to Acha production in West Africa with Nigeria alone providing almost half of that area (FAOSTAT, 2003).

According to FAOSTAT (2003), the average world production of *Digitaria species* in 1999-2003 amounted to 257,000 tones. Although FAO statistics indicated that there is a world – wide increase in Acha production, the average yield per hectare (600 – 700 kg) remains low (Cruz, 2004). Production of *Digitaria exilis* on 350,000 hectares in West Africa was 128,000 tonnes, 78,000 tonnes, 21,000 tonnes, 13,000 tonnes and 11,000 tonnes for Guinea, Nigeria, Mali, Burkina Faso and Cote d’Ivoire, respectively (Cruz, 2004). Acha is not a nutrient demanding crop and will tolerate a wide range of soils, be they sandy, loamy or even stony and shallow. Very clayed soils however are not suitable
for the crop (Philip et al., 2006). The yields of some varieties of Acha can be improved through timely seeding, better weed and pest control and timely fertilizer application.

Furthermore, the existence of considerable genetic diversity in morpho-agronomic traits was confirmed (Kwon-Ndung and Misari, 1999). Acha has been designated as a medium priority commodity by the National Agricultural Research Board (NARB) which believes that the revitalization of Acha production in Africa could enhance diversification and food security (NARB, 1999).

ACHA UTILIZATION IN WEST AFRICA

Industrial value of Acha

Various value – added products are made from cereal grains in countries of sub-Saharan Africa. In special bakery products, health and organic foods including the expanding gluten – free market (Lovis, 2003); cereal grains such as rice (Kadan et al., 2001), sorghum, millet (Rooney and Awika, 2005) and teff (Bultosa et al., 2008) are of particular interest (Tilley, 2009). Acha, Ituru and Tamba grains are found in West Africa region (Jideani and Jideani, 2011) and they can be exploited in similar ways as conventional cereals. Animal study showed rats fed with Acha-soybeans and Acha biscuits had feed efficiency ratios of 0.154 and 0.151; and protein efficiency ratios of 0.996 and 0.985 respectively (Ayo, et al., 2010). Investigations to a guided utilization of Acha and other related cereals in the production of malted and roasted products by the food industry have been done (Coda et al., 2010). In the same vein the pharmaceutical industry can use alpha amylase from Acha in the production of syrup form starch of pharmaceutical importance. This is on the recognition that these processes produce more nutritious beverage products (Coda et al., 2010). There is prospect of the commercial use of these non-conventional cereal grains indirectly as adjunct or directly in alcohol and non – alcohol beverages (Lasekan et al., 2010).

Health benefits of Acha (Digitaria exilis)

Traditionally, Acha is used in preparation of unfermented porridge food and other dishes in Africa (Nnenna, 1998). The following are the health benefits that could be derived from the grain.

Protective Cancer Prevention

Investigation is ongoing to establish the protective cancer preventive and healthful compounds in cereals grains (Jenkins et al., 2008; Poutanen, 2009), there cereals are considered as health grains in the sense that they are often consumed whole and are gluten – free, hence suitable for coeliacs (Pasupuletu and Anderson, 2008). There is now evidence that the consumption of whole grains and whole – grain products is implicated in the prevention of cancer and other chronic diseases (Poutanen, 2009), hence Acha, and other related cereals usually consumed as whole grain may have more significant roles in human health than conventional cereals fibres and other bioactive compounds.

Scavengers of free Radicals

In the same vein it is speculated that natural antioxidants from whole flours
from Acha and other related grain: Iburu and Tamba may contain scavengers of free radicals in biological systems, and therefore, it would provide health benefits to consumers. Studies have shown that plant food materials with polyphenolic constituents have more potent antioxidant and anti-inflammatory activities. Therefore, investigation into Acha grain could reveal economic potentials for development into health promotion products (Shewry, 2009).

**Source of Essential Amino Acid**

Like other cereals, Acha is widely reported to be rich in amino acids but particularly in the amino acids methionine and cystine (Ruskin, 1996; Franc and Martina, 2006) which supply sulfur and other compounds required by the body for normal metabolism and growth. Methionine is an essential amino acid, which the body needs for healthy purposes but cannot synthesize; it can only obtain if from food. It helps the liver to process fat, and is also a methyl donor, capable of giving off a molecule needed for a wide variety of chemical and metabolic reactions inside our body, including the manufacture of the amino acid taurine. Cystine is a major constituent of the proteins that make up hair, nails and skin, and is involved in major detoxification processes in the body.

Methionine levels in *Digitaria exilis* are higher than those found in sorghum and other millets and the amino acid is reportedly deficient in other major cereals such as wheat, rice, barley and rye (EFRT, 2000). When tested, Acha also appeared to be richer than other grains such like pearl and finger millets in phenylalanine, another essential amino acids (Franc and Martina, 2006). The body needs phenylalanine to create various brain chemicals and thyroid hormones as well as tyrosine (Belton and John, 2002) another amino acid that is used to make proteins. It has been shown that the methionine level in Acha is twice that found in egg protein, leading to suggestions that Acha might be used to complement standard diets (Belton and John, 2002). Suggested also that the high content of these sulphur amino acids would make Acha an excellent nutritional complement to legumes as most legumes are low in methionine (but high in lysine, which is lacking in cereal grains).

**Low Glycemic Index**

The Glycemic Index (GI) ranks foods based on their overall effect on blood glucose levels. Foods that are slowly absorbed produce only small fluctuations in blood glucose level therefore have a low rating. Choosing low GI foods is important for those with diabetes because these foods can help regulate blood glucose levels. They can also reduce the risk of heart disease. Santé Diabete in Mali conducted a study of influence on glycaemia of different cereals and sauces consumed in Mali showed that Acha had a low GI of 56.95 = 8.73 compared to sorghum, corn and white rice which had intermediary GLs and sorghum paste and corn paste which had elevated GIs (NMDA, 2013).

**Minerals**

Acha is reported to be richer in magnesium, Zinc, and manganese than other cereals. It is also significantly richer in thiamine (Vitamin B1), riboflavin (Vitamin B2), calcium and phosphorous than white rice. (Ruskin, 1996) levels of phosphorus, an essential mineral needed...
by all human cells for normal functions, are high (Belton and John, 2002) and tests by the laboratory of Food Technology and Animal Nutrition in Mali indicate that phosphorous and potassium are major minerals in Acha grains (Nutritional Management of Diabetes in Africa), phosphorous is found mainly in bones and is a constituent of many vital compounds in the body, including ATP, DNA and phospholipids. Potassium is crucial to heart function and plays a key role in skeletal and smooth muscle contraction, making it important for normal digestive function, while it is also an important electrolyte.

Acha also appears to have appreciable amounts of iron and compared to white rice is significantly richer in this essential mineral (Ruskin, 1996). In another study Acha which had been cleaned, steam cooked and drums dried contained 10.74 mg iron/100 g. compare this to brown rice which is a separate study, contained 1.1 = 0.1 mg/100g appreciably less than Acha. However, levels of zinc in Acha appear to be consistent across regions there is more variation for iron levels (Trinidad, 2009).

PROBLEMS ASSOCIATED WITH ACHA PRODUCTION AND UTILIZATION IN AFRICA

The greatest problem with Acha in production and utilization in Africa is that, mechanization in Acha farming is virtually non-existent. Thus post-harvest management such as threshing, winnowing and dehulling depend mostly on traditional technologies such as mortar and pestle for dehulling and that threshers and dehullers were non-existent in Kogi State, Nigeria. Okeme, et al., (2016) revealed that, mechanization of Acha production and processing technologies was constrained by lack of awareness, poverty barrier, high cost of farm machinery, withdrawal of subsidy on farm inputs, inadequate trained mechanics and lack of spare parts.

WAY FORWARD FOR ACHA PRODUCTION AND UTILIZATION IN AFRICA

(a) Redistribution with Growth: Governments of African countries need to design multi-lateral agricultural programmes that, redistribute the benefit of growth more evenly with more emphasis on value chain of neglected crops of Africa such as Acha.

(b) Appropriate Markets and Income Policy: The efficiency of the market where the Acha farmers buys and sells is very important to the quality of his life. There is need to ensure stability and income of Acha farmers. With special regard to Acha production, close monitoring is necessary to safeguard the interest of Acha farmers especially to ensure a favourable input – out-put price ratio.

(c) Policy for Liberalization of Access to Credit by the Acha Farmers: In Nigeria, and other most African countries, policy measure of access to credit by the poor have been characterized by weak management as a result of which its effectiveness in alleviating the problems of poor farmers remains insignificant. The establishment of the Peoples’ Bank by The Federal Government and several
Community Banks by the private sector in 1989 were examples of such policy measures. The operations of Peoples Bank have faced a number of problems among which are the unsustainable rate of branch expansion. Even so, the people’s bank is no more; it was later merged with Nigerian agricultural credit bank (NACB) to form Nigerian Agricultural Credit Co-operative and Rural Development Bank (NACRDB) now known as Bank of Agriculture (BOA). To date, the effect of this meager is yet to be seen. Therefore, a more sustainable and inclusive measures aimed at easy access to credit by Acha Farmers should be adopted by government so that Acha production expansion can be enhanced.

CONCLUSION

This paper reviewed Acha production and utilization in West Africa. The problems associated with Acha production and utilization and way forward were also highlighted. The quality of life of rural people centers mostly on appropriate nutritional standard and availability of basic improved technologies. Consequently, policy efforts are required in the areas of liberalization of access to credit by the Acha farmers, appropriate market and income policies and redistribution with growth.

RECOMMENDATIONS

1. Acha production should be mechanized through funding by government and private stakeholders.

2. The concept of decision analysis which allows all Acha production stakeholders to participate in decision process towards revitalizing Acha production and utilization in Africa should be promoted.

3. There is need for an adequate level of strategically targeted investment in Acha production, upgrade Acha production technologies, and increase competitiveness of Acha output through appropriate policy measures.

4. There is great need for credit facilities and government support grants to assist Acha farmers for sustainable production of Acha.

REFERENCES


