

A baseline survey of tiger nut (*Cyperus esculentus*) production in the Kwahu South District of Ghana

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SUMMARY

Tiger nut (*Cyperus esculentus*) is a minor but important crop in Ghana. In a survey conducted on the production and marketing of the crop at Aduamoa in the Kwahu South District of Ghana, it was observed that tiger nut production was predominantly the work of women, with 70 per cent of farmers being women and 30 per cent men. Most men farmers were younger, with 73 per cent of them within age group 15-40 years. The women farmers were older, with 70 per cent of them within the age group 41-65 years. Farm sizes were small, ranging from 576 to 4200 m². Two distinct types of tiger nuts, the Kwahu type with yellowing brown nuts and the Fanti type with a mixture of dark brown and black nuts, are cultivated in the area. Consumer preference for the Kwahu type is higher. The crop is grown on mounds, and it may be intercropped with maize, cassava, or cocoyam. Yields range between 2.3 and 11.3 t/ha. Harvested nuts may be dried with or without washing, and stored up to 6 - 12 months in aerated containers. The major constraints to production include high labour cost for land preparation and harvesting. However, the crop has a high export potential.

Original scientific paper. Received 12 Sep 96; revised 7 Dec 98.

Introduction

Tiger nut, *Cyperus esculentus*, also known as yellow nutsedge or earth almond, is a minor crop grown in temperate and tropical zones of the world. In the temperate zone, it is grown in Spain, Italy, and the United States. In the tropics, it is found largely in India and West Africa (Cobley, 1962).

RÉSUMÉ

TETTEH, J. P. & OFORI, E.: *Enquête de base de la production du souchet comestible (Cyperus esculentus) dans le district de Sud Kwahu du Ghana.* Le souchet comestible (*Cyperus esculentus*) est une culture mineure mais importante au Ghana. Dans une enquête menée sur la production et la vente de la culture à Aduamoa dans le district de sud Kwahu au Ghana, il était observé que la production du souchet comestible était prédominée comme le travail des femmes, avec 70 pour cent des cultivateurs étant des femmes et 30 pour cent des hommes. La majorité de cultivateur masculins étaient plus jeunes avec 73 pour cent d'eux dans le groupe d'âge de 15-40 ans, alors que les cultivateurs féminins étaient plus âgées avec 70 pour cent d'elles dans les âges de 41-65 ans. Les dimensions des champs étaient petites variant entre 576 et 4200 m². Deux espèces distinctes du souchet comestible, appelées la variété de Kwahu avec le souchet brun jaunâtre et la variété de Fanti avec un mélange des souchets bruns foncés et noirs, sont cultivés dans la localité. Il y a une préférence supérieure du consommateur pour la variété de Kwahu. La culture est cultivée sur les buttes et elle pourrait être interplantée avec le maïs, le manioc ou le taro. Les rendements varient entre 2.3 et 11.30 t/ha. Les souchets récoltés pourraient être séchés avec ou sans le lavage, et mis en réserve jusqu'à 6-12 mois dans les corbeilles aérées. Les contraintes majeures comprennent le coût élevé de main d'œuvre pour la préparation de la terre et la récolte. La culture a, cependant, un potentiel élevé d'exportation.

In Ghana, it is cultivated at a few places such as Aduamoa in the Kwahu South District, Asukese, Odomasua, and Demso in the Afram Plains, Agona Kwanyaako, Bawjiase, and Elmina in the Central Region, and around Techiman in the Brong-Ahafo Region.

Tiger nut has many uses. It can be used as

substitute for almonds in confectionery. The dried nuts contain between 19 and 24 per cent oil (Eyeson & Ankraah, 1975) called Chufa oil which is used in cooking and for the manufacture of body and hair creams. Dried nuts are also ground into flour and incorporated into various foods.

In Ghana, the nuts are chewed like sweets, or made into a highly cherished milk-like beverage referred to as *Atadwe milk*. It is also believed to have some medicinal values. For instance, it is alleged to have an aphrodisiac effect when chewed by men.

The demand for tiger nuts for local consumption is quite high, and as a result it is quite expensive. There are again indications of a viable export market for the crop. In 1998, \$8,687.78 was obtained from tiger nut exports (Ghana Export Promotion Council, 1998). The total area under tiger nuts and the tonnage produced annually in Ghana are not definitely known, but are believed to be rather low. A concerted effort is required to encourage farmers to grow the crop to meet local and export demands.

Currently, information documented on the crop is scanty in the types available, cropping systems and other agronomic practices, acreages cultivated, and yields.

This study, therefore, aimed to identify the following:

- (1) the major problems hindering the production and marketing of tiger nuts, and
- (2) the types and systems of production in the Aduamoa sub-district of the Kwahu South District.

The district was chosen for the study because it produces the bulk of the nation's tiger nuts. It is also the most important agricultural enterprise in the area, with most farmers actively producing it.

Materials and methods

The survey was carried out in the Aduamoa sub-district of the Kwahu South District from 28 Aug 93 to 12 Sep 93. Data were collected through the use of questionnaires, personal interviews, and

discussions with randomly selected farmers and tiger nut sellers. Farmers' fields were also observed. A total of 200 questionnaires was administered with the help of six enumerators. Information on prospects for export was provided by the Ghana Export Promotion Council (GEPC), Accra. Frequencies, ranges, percentages, and rankings were used to analyze the data.

Results and discussion

Types of tiger nuts

The study showed that varieties of tiger nut are lacking in Ghana. Instead, there were two main cultivars which growers and sellers referred to as the Kwahu and Fanti types. The Kwahu type has yellowish brown nuts. Four different sub-types of the Kwahu type were identified by nut shape and size. These were designated as Kwahu Types 1, 2, 3, and 4. Type 1 has small round nuts, Type 2 has fairly large round nuts, Type 3 has large but slightly elongated nuts, and Type 4 has long, slender nuts which may be straight or sickle-shaped. The Fanti type has a mixture of dark-brown and black nuts that are generally round in shape but vary considerably in size.

Retailers indicated that consumers prefer the Kwahu type to the Fanti type because the former looks more attractive, and is sweeter. The agronomic performance of the two types could not be compared because the farmers in the survey area cultivated only the Kwahu type.

Age and gender of tiger nut farmers

Table 1 presents the age and gender of tiger nut farmers. It was shown that up to 70 per cent of farmers engaged in tiger nut production at Aduamoa were females. The age group ranged from 15 to 65 years and varied according to gender of farmer. Most men farmers were younger, with 73 per cent of them within the age group of 15 - 40 years. The women farmers were older, with 70 per cent of them between the ages of 41-65 years.

Women are mostly into tiger nut production because considerable time and patience are required to retrieve the nuts from the soil during

TABLE 1

Age Distribution and Gender of Tiger Nut Farmers

| Age group (years) | Percentage of farmers | | | Cumulative per- centage for | |
|----------------------|-----------------------|---------|-------|--------------------------------|---------|
| | Males | Females | Total | Males | Females |
| 15 - 20 | 5 | 0 | 5 | 18 | 0 |
| 21 - 30 | 8 | 8 | 16 | 42 | 11 |
| 31 - 40 | 9 | 13 | 22 | 73 | 30 |
| 41 - 50 | 7 | 25 | 32 | 96 | 66 |
| 51 - 60 | 1 | 17 | 18 | 100 | 90 |
| > 60 | 0 | 7 | 7 | - | 100 |
| Total | 30 | 70 | 100 | | |

harvesting time. Women are more patient than men, and consequently, tend to be more efficient at harvesting. In addition, tiger nut farms are usually located close to the villages, thus making them more convenient for women to work on their farms and at the same time attend to their household chores. The higher percentage of young men in tiger nut production may be because despite the drudgery, it is a quick way of making money. Consequently, young school leavers who need quick initial capital to start a trade often prefer to grow the crop.

Farm size

Tiger nut farm sizes are indicated in local units called *ahoma*. One *ahoma* is about 24 m × 24 m, equivalent to 0.06 ha. Table 2 shows the range of farm sizes in the survey area. Farm sizes ranged from 0.06 to 0.40 ha. About 48 per cent of the farmers have only 0.06 - ha farms.

The reasons given for the small-sized farms are as follows:

- (1) High cost of labour, especially for har-

TABLE 2

Tiger Nut Farm Sizes in the Kwahu South District

| No. of ahoma | Area (ha) | Percentage of farmers |
|--------------|-------------|-----------------------|
| 1 | 0.06 | 48 |
| 2 to 3 | 0.12 - 0.17 | 33 |
| 4 to 5 | 0.23 - 0.29 | 18 |
| 6 to 7 | 0.35 - 0.40 | 1 |

vesting; because the nuts need to be promptly harvested as soon as they are matured, to prevent excessive field losses due largely to extensive pest damage, and weakening of the attached stolons. The nuts are harvested by hand-picking singly from the soil, a slow and labour-intensive process. Any efforts to expand production of the crop should aim at solving the problem of harvesting.

- (2) Farmers also claim that since yields are high (up to 11 t/ha), produce from a small plot is sufficient to satisfy their financial needs.

Agronomic practices

Planting method. Tiger nut is grown during the major and minor seasons. It is planted in the major season between March and April, and in the minor season from August to September. All farmers plant on mounds. The spacing between mounds is not definite, but up to 10 nuts may be planted on one mound. Nuts are usually spaced at 10 - 15 cm apart on the mound. Most farmers make small mounds because they are easier to dig out during harvest.

Planting materials. Nuts are used for planting. They are not washed after harvest, but are sun-dried thoroughly and stored in jute bags or specially woven baskets called *kentenku* for up to 12 months. No preservatives are applied.

Before planting, the nuts are soaked in water for 3 to 4 days to facilitate germination. The water is changed every day to prevent rot. The soaked nuts may be planted direct, or kept in a basket until they begin to sprout between 7 and 12 days after soaking. The sprouted nuts are picked every day and planted. Pre-sprouting before planting ensures uniform emergence and a perfect stand.

Intercropping. Although tiger nut grows well when planted as a sole crop, most farmers in the study area usually intercropped with maize, cassava or cocoyam. About 90 per cent of the farmers intercropped with both maize and cassava, 35 per cent interplanted with only maize, and 25

per cent with only cocoyam. The interplants were spaced 2-3 m apart to allow enough light for the tiger nut plants. Farmers claimed that heavy shade drastically reduced yield.

Weed control. Only 5 per cent of the farmers weed once during the growth of the crop. The others indicated that weeding was unnecessary when pre-sprouted nuts were sown on newly made mounds. The pre-sprouted nuts sprout early and grow faster to suppress any weeds that germinate later. Weeding becomes necessary only when inter-mound spacings are too wide. The weeds are hand-picked to avoid disturbing the developing nuts.

Fertilizer application. No form of manure (organic) or inorganic fertilizer is applied. The crop depends solely on the inherent fertility of the soil. Growers claimed that when any form of manure was applied, it resulted in larger but less tasty nuts. Such nuts are unattractive to consumers.

Maturity and harvesting. The crop matures in about 2.5 - 3.0 months after planting, depending on soil fertility and moisture availability. Signs of maturity include yellowing of leaves and cessation of new inflorescence.

The nuts are harvested by gradually loosening the soil around the plants to expose them. The plants are then lifted and any nuts attached are removed by hand. Nuts left in the soil are slowly and tediously hand-picked singly. Hired labour is often used for harvesting. Nuts recovered from the soil during picking depends on the attitude of the labour force, which in turn depends on incentives provided by the farmer, besides the regular daily wages and the size of the farm. It is claimed that the larger the farm, the lower the recovery rate of nuts.

Post-harvest handling. Seed nuts are handled separately from ware nuts. Ware nuts are thoroughly washed and dried before storage. Seed and ware nuts which are stored for a longer period before sale are dried without washing. Farmers claimed that unwashed nuts could store for 6-12 months whereas washed ones tend to loose

viability or rot quickly. This claim could not be verified, but most probably the thorough washing bruises the nuts and creates entry points for pathogenic organisms to infect the nuts.

Storage. Dried nuts are stored in jute sacks or special baskets which are kept out of reach of termites and rodents by placing them in raised donnages in airy places. Most farmers sell their produce immediately after harvest at cheaper prices.

Yields. Yields of nuts range from 2.0 to 10.0 minibags per unit plot of 576 m². This translates to 2.3 - 11.3 t/ha (Table 3). Yield is greatly affected by the proportion of nuts that are recovered from the soil during harvest. Nuts are attached to the plants by thin, threadlike stolons which may range in length from 0.5 to 20 cm. The stolons (especially the longer ones) easily sever during lifting. Such nuts are picked by hand. Varieties with thicker and relatively shorter stolons that would not easily break during harvesting should be developed.

As high as 33 per cent of farmers had yields in the range 9.0 - 11.3 t/ha. These high yields are attributed to the following:

- (1) The small farm sizes enable farmers to devote full attention to their farms.
- (2) Lands which have been fallowed for some years are often used. So, although no fertilizer is applied, yields are quite high.
- (3) Elaborate seed bed preparation (mounding) gives nuts enough room to develop.
- (4) When intercropped, the intercrop is sparsely populated such that they hardly compete with the tiger nut crop.

TABLE 3

Yield of Tiger Nuts

| Minibags/unit plot | Yield | |
|--------------------|------------|-----------------------|
| | Tonnes/ha* | Percentage of farmers |
| 8 - 10 | 9.0 - 11.3 | 33 |
| 6 - 7 | 6.8 - 7.9 | 8 |
| 4 - 5 | 4.5 - 5.6 | 29 |
| 2 - 3 | 2.3 - 3.4 | 30 |

* One minibag = 65 kg

At the other extreme, 30 per cent of farmers had yields as low as 2-3 t/ha. These low yields could be attributed to the high cost of labour, which compels some farmers to embark on the share-crop system. The farmer engages helper-harvesters to assist in harvesting. The latter takes a third while the former takes two-thirds of the harvest. Consequently, the yield declared is actually the share the farmer got but not the total crop yield. This gives inaccurate actual yields.

Marketing

Units of sale include minibags (50 kg), size 34 bucket, *olonka* (3 kg), and margarine tin (450 g). Usually, farmers sell their nuts to middlemen who in turn sell to retailers in the urban centres. Most farmers sell their produce immediately after harvest because of lack of appropriate storage facilities, or the need for quick money.

Constraints to production

High labour cost was identified as the major constraint to production (Table 4). Highly labour-intensive operations such as land clearing, seed bed preparation (mounding) and more especially, harvesting, limit the size of farms, yield per unit area, and even the number of farmers that produce tiger nuts. Any efforts aimed at mechanizing these operations would greatly expand the production of the crop.

There is the need to investigate the prospects of planting on ridges and on flats, the preparation of which can be easily mechanized. Plant breeders also have to develop varieties of tiger nut with short, stout stolons that are not easily detached during harvesting.

Other constraints to production include marketing, pest attack (termites and grasscutters), and erratic rainfall.

Future prospects

Farmers expressed the following opinions about the future prospects of the crop:

(1) All the farmers indicated that the crop is worth promoting, because it is the main

TABLE 4

Constraints to the Production and Marketing of Tiger Nuts

| <i>Constraint</i> | <i>Percentage of farmers</i> |
|-----------------------------------|------------------------------|
| High labour cost | 80 |
| Labour intensive | 76 |
| Land preparation (mounding) | 74 |
| Harvesting (too laborious) | 70 |
| Marketing | 60 |
| Pests (termites and grasscutters) | 15 |
| Erratic rainfall | 15 |

source of income for most people in the area.

- (2) About 85 per cent of the farmers claimed that it provides employment for women and the youth who are unable to further their education.
- (3) Twenty per cent of farmers indicated that the crop has export potential, and that the only limitation is inadequate production. This claim has been supported by data from the GEPC which indicated that 7 t, 43 kg, 16 t, 1.2 t, and 20 kg, respectively, were exported in 1989, 1990, 1991, 1992, and 1993, and that the supply is inadequate to meet demands for export.

Conclusion

The conclusions from the survey are summarized as follows:

- (1) Tiger nut is a minor crop in Ghana.
- (2) Its cultivation is localized in a few areas.
- (3) Women above 40 years dominate in the cultivation of the crop.
- (4) Demand for the crop is high.
- (5) Drudgery in harvesting and high labour costs are major limiting factors in its production.
- (6) There are no improved types, meanwhile two main cultivars (the Kwahu and Fanti types) are cultivated.
- (7) There is an urgent need to make a collection

of the tiger nut types available in Ghana to sort them out, and to evaluate them for yield as well as other agronomic and quality characteristics.

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