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A study of farmers seed selection methods in the Kpandai district of the northern region of Ghana

Emmanuel Asiedu-Darko

Council for Scientific and Industrial Research-Plant Genetic Resources Research Institute, P. O. Box 7, Bunso Eastern Region, Ghana

Email address

easiedudarko@yahoo.com

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Abstract

Low productivity of agricultural crops is among the factors leading to low income and food insecurity for rural folks in most farming communities in Ghana. One measure in which productivity could be boosted is through the use improved seeds. Among other agricultural inputs, seed is probably the most important input to farmers, thus for seed to be catalyst in agricultural production the source must be regular and the methods of seed selection must be effective. However it should be appreciated that little has been done to understand how informal seed development operates though many interventions have been put in place to cope with farmer's seed insecurity. This paper accesses farmer's practices for maintaining seed security in Kpandai district of the Northern region of Ghana which provides a broader picture of the various sources of seeds available to farmers. The discussion explores the possibilities of blending traditional and modern science to ensure regular supply and good quality seed to farmers at all times. Helping poor farmers' access good quality seed will not only increase their productivity but also sustain their interest in the farming activities.

Keywords

Farmers, Seed Selection, Food Security, Seed Security, Agricultural Productivity

1. Introduction

Farmers ability to cope with and overcome agricultural crises such a drought or natural disasters should be a legitimate interest to agricultural scientists. [7] and [8]. Seeds are major input to farming, and vulnerability involving seeds can damage farmer welfare [17], [16] and [14]. Farmers are the major source of seed in most countries, with formal seed supply particularly weak in high stress areas [20], so it follows that "farmer seed systems "their seed saving, selection, and ex-change practices, associated knowledge, and social relationships are at the heart of strategies for coping with stress. Increasingly, both emergency aid and development interventions seek to support farmer seed systems by minimizing vulnerability or by strengthening post-stress recovery [14], [5] and [17]. However, these efforts are constrained by limited, and mainly descriptive, information about practices in farmer seed systems, particularly in response to stress.

Farmers are the principal managers of crop genetic diversity. They develop agricultural crops and varieties from wild plants through crop cultivation. They decide which crops and varieties to plant; select and store seeds for next season; and exchange seeds with other farmers from the same or other communities to obtain new or lost varieties, and to replace degenerated varieties [13].

Farmers' seed production, selection, storage and exchange, in combination with natural crossing between varieties and wild species, mutations and environmental conditions, represents an integrated, dynamic and evolving Plant Genetic Resource (PGR) system. Hence, farmers produce food and seeds, while at the same time they practice a form of crop development and maintain genetic diversity *in situ*. The integrated character of these systems also implies that support to local PGR management forms a combination of support to seed supply, crop development and *in situ* maintenance [23].

Local PGR systems are the most important systems of seed supply and variety diffusion in developing countries.

Depending on the crop and country, 60-90% of the seed planted is farmer-produced and exchanged. For crops and countries where there is no formal sector breeding or seed supply, farmers supply 100% of the seed planted. Varieties maintained by farmers occupy the major part of the crop land, many of them being local varieties. Diffusion of new varieties through exchange of seeds from farmer-to-farmer has been shown in many cases to be more important than formal sector seed distribution [19].

Historically, seed production was only carried out by the public sector, however over the past twenty years, Government of Ghana has increasingly liberalized the seed industry. The Government of Ghana first privatized certified seed in 1989 based on its inability to serve increasing demand. Foundation seed in 2010 as public sector production was unable to meet growing demand. By law, however, a business that commercially produces foundation seed may not commercially produce certified seeds [6].

The production and distribution of quality seed has been emphasized as a key area of focus for the continued growth of Ghana's entire agribusiness sector. The benefits of using certified seed in Ghana have been widely demonstrated, contributing to increasing yields of the focus crops at 15.8% between 2007 and 2010 [6].

Some interventions were being put in place by the Government of Ghana to make available good quality seeds to farmers. For some years now the Crops Research Institute (CRI) and the Universities have been responsible for the development of cowpea and maize varieties. These Institutions have released a number of improved crop varieties to help improve agricultural productivity in the Country; some of the high yielding maize includes *Obatanpa*, *Abeleehi*, and *Okomasa*.[6].Despite these intervention farmers still have the challenge of access to good quality seeds because promotion of seed to farmers has been limited since the reduction of Sasakawa-Global 2000 activities some years ago.

Seed insecurity comes with various dimensions; a household may lack sufficient seed to replant, may only have poorly-adapted or unhealthy seed, or need to sacrifice other productive valuable to obtain off-farm seed. Seed insecurity thus constraints potential production and farmers strategy for maintaining seed security in impoverished communities [7].

This study examines the sources of seeds available to farmers in the Kpandai district of the northern region of Ghana and also to ascertain the methods used in the selection of the seeds

2. Materials and Method

The Kpandai district lies in the tropical continental climatic zone with the mid-day sun always overhead, as a result; maximum temperatures are high and range between 29oC-40oC. Maximum temperatures are usually in April towards the end of the dry season and also mark the beginning of the wet season. The People are predominantly farmers using the fertile lands for the cultivation of Root and Tuber crops like yam and cassava. Legumes like soybeans, cowpea, groundnuts and Cereals like maize, rice and sorghum.

A self administered questionnaire was used to collect data from 200 farmers in the district. A simple random sampling was used to select the households and ten communities for the study. Twenty farmers were interviewed in each community. The researcher visited the communities moved from house to house, (i.e., third or fifth house depending on the size of the community) to interview the farmers.

In-depth interviews were conducted with 200 farmers in the district Two types of schedules were developed for data collection. Both instruments were pre-tested in the communities for modification to meet the study requirements. A closed ended questionnaire was used to collect data. Key informants were also interviewed. Individual farmers were interviewed using a questionnaire that had a mix of closed and open ended questions. Most of the items related to the demographic and socio-economic characteristics of the farmers were closed ended. On the other hand, items related source of acquisition of seeds and the methods of seeds selection were mixture of close and open ended questions. Information was collected through one-on-one interviews by the researcher.

3. Results and Discussions

The age distribution of the respondent indicated that, 55% of the respondents were more than 55 years of age. It implied that people engaged in agricultural activities in the communities were quite experienced. (Table 1).

Table 1. *Age distribution of the Respondents*

Age	Frequency	Percentage
45-55	90	45
56-65	85	43
66 and above	25	12
Total	200	100

Out of 200 respondents, 80% were men and 20% were women (Table 2). This was not unusual since most of the people involved in agricultural activities were men.

Table 2. *Gender of the respondents*

Gender	Frequency	Percentage
Male	160	80
Female	40	20
Total	200	100

Farmers interviewed derive seeds through four main sources namely friends and relatives, Agriculture Extension Agents, Non Governmental Organizations (NGOs) and Seed dealers (Table 3). The table further revealed that farmers source of yam seeds were mostly from friends and relatives which accounted for 66% of the respondents. This could be attested to the fact that most of the farmers rely on traditional landraces for yam cultivation. Concerning maize a good

number of farmers used improved variety seeds for cultivation, 43% of the respondents revealed that Agriculture Extension Agents were the source of their seeds.

Table 3. *Sources of farmer's seed*

Crop	Source	Frequency	Percentage
	Friends and Relatives	132	66
	Agriculture Extension		
Yam	Agent (AEA)	56	28
	NGO	12	6
	Seed Dealers	0	0
Total		200	100
	Friends and Relatives	104	52
	Agriculture Extension		
Maize	Agent (AEA)	86	43
	NGO	6	3
	Seed Dealers	4	2
Total		200	100
	Friends and Relatives	124	62
	Agriculture Extension		
Legumes	Agent (AEA)	72	36
	NGO	4	2
	Seed Dealers	0	0
Total		200	100

Farmers reliance on friends and relatives for seeds have been common phenomena in most of the communities in Ghana. In a study conducted by [6], it was revealed that in many communities there were farmers who were known for being good source of seed. Although they may not always be the first to experiment or use the variety, they play an important role in disseminating new varieties and promoting seed to farmers who have not stored seed. They tend to be older men with large farms and were motivated by altruism and social pressures.

Farmers also exchanged seed for several reasons including loss of seed due to poor harvest, insect damage in storage and lack of seed choice because the sharecrop. A principal reason however, is the belief that the same seed should not be planted in the same plot in successive seasons, because yield would decline. This concept of 'tired' variety and the need to exchange seed to 'renew' it might be uncommon among farmers [1], [10], [15], [18] and [22].

On legumes and vegetables the pattern was not much different from yam. Majority of the respondents 62% indicated that Friends and relatives were the source of their seeds.

The farmers seed selection method was not different from one community to the other. The major crops cultivated by the farmers in the district were yam, cassava maize, soybean, groundnut, guinea corn and vegetables. According to the farmers interviewed it is not culturally acceptable to cultivate millet in most of the communities in the district.

The farmers predominantly cultivate yam which is their major source of income. In terms of seed selection of yam two methods were used by the farmers, the farmers generate the seeds whilst harvesting the tubers. The tubers were removed from the mounds without destroying the vines and the remaining head and roots were covered with soil. The head sprouted again to yield small tubers which were used as seeds. This method is similar to what pertained in East Akim and Fanteakwa districts in the Eastern region of Ghana which is known as *mpo* (milking). With the *mpo* method farmers dug around the yam to expose it, they then decapitated it, leaving the head and roots in the soil [2]. This method is applied to *pona* which is commonly known as *dabreko* in the communities. Smaller yams are split into setts, dried and kept in a dry cool place preferably under trees covered with vines to give it shade and prevent direct sunshine. With time the seeds sprout which are used for the planting season.

Concerning maize the good ones were selected from those harvested from the field and tied together and hung above cooking fire in the kitchen, the heat and the smoke from the fire expel weevils in the grain.

The methods used by farmers to select and keep seeds is characterized by some difficulties, farmers use different locations eg. above cooking fire, underground pit and treatments such as salt, chaff and soot for seed storage and these practices generally maintain seed viability. However, losses to pest, moisture, or seed borne diseases do occur. Farmers interviewed in the communities admitted having germination difficulties with some of their seeds [13] and [2].

Seed selection concerning groundnut, beans, guinea corn and vegetables such as *aleefu, ayoyo* follow similar pattern, the seeds are well dried in the husk and when it is time for planting the seeds are de-husked and put into water, the good seeds remain at the bottom of the water whilst the bad ones would float on the surface of the water. The good seeds are collected and planted.

Concerning soya bean the farmers contended that the seed are very strong and resistance to pest as such what is important is to have the seeds well dried.

Farmers traditional knowledge in seed selection is crucial in addressing problems of food insecurity. In Rwanda farmers evaluate new common bean varieties before adding them to one of their mixtures, and farmers in Sierra Leone and the Philippines select potentially valuable off-type rice plants. Chinese women farmers growing local maize harvest seed from the centre of the field to maintain 'purity', African sorghum farmers select heads for seed from a range of plant types to maintain diversity, Mexican farmers manipulate hybridization between maize cultivars, and Ethiopian farmers are reported to use the principles of grid selection and shuttle-breeding. The strength of farmers' seed selection under local conditions for adaptation is evident, for example, from the fine-tuned day-length adaptation of local sorghum cultivars in Nigeria and the extreme drought resistance of maize cultivars in the Southwest United States. Recent and ongoing studies show that farmer seed selection and exchange represent important dynamics for the local gene pool. The genetic effects of farmer selection were not at all well-understood. A study in Mexico found that seed selection of maize farmers had significant effects on the seed lot. However, in the field crop grown from the seed there was no measurable effect [23] and [12].

One important feature which play important role in the

preservation of seeds was a local silo known as *kachagla.* The silo is constructed using sticks covered with *zama* mat made from bahama grass and roofed with spear grass. The *zama* mats are used to cover the floor of the silo. The local silos are used mostly to store maize guinea corn and dried cassava.

The role women play in the selection of seeds in many communities around the world was evidenced in the district. Women especially the old ones were in charge of seed selection of vegetables and cereals seeds.

Zimmerer (1991) reported that in villages near Cuzco, Peru, the native potato is considered a luxury: potatoes are highly valued, but their yield is relatively low. The native varieties are mostly grown by the richer farmers in the community: the poorer cannot afford to grow them. It is the women who tend to know most about different native potato varieties since they do most of the seed selection and look after the seed tubers during the storage season. Among the women, it is the older and poorer women-farmers who know most about the native varieties; they hire their labour to the wealthier farmers in their community. They harvest and select the potatoes in the fields of the richer farmers' fields.

4. Conclusion

The quest to achieve food security could be possible when there is a blend between modern and traditional sciences since farmers over the years have their own traditional breeding systems. In recent years, "participatory" plant breeding has been proposed as a means of providing economic incentives for farmers to continue cultivating genetically desirable crop populations [9]. According to this point of view, certain techniques used by professional plant breeders may help farmers become more efficient in breeding obtaining varieties adapted to their needs. Close collaboration between farmers and breeders could promote yield increases or other improvements in marginal environments where modern varieties have been adopted for agronomic, social, or economic reasons. Proponents of this approach argue that while professional plant breeders have sought to develop fewer varieties that are stable over time and adapted to a wide range of environments, participatory crop improvement can support the maintenance of more diverse, locally adopted plant population [3], [4] and [21] and [11].

The information gathered from the study indicated that farmers have their unique way of selecting seeds for planting; however as to whether these could offer them a good yield is another matter. It is evidently clear that regenerating the seed every year without ensuring the purity of the species for a long time leads to the loss of genetic identity of the species. This could be accounted for low yield since the genes of the plant are eroded.

The need for regular supply of good and quality seeds to farmers is crucial to high agricultural productivity and food security.

Recommendation

As part of measures to salvage the low productivity in the agriculture sector, Government should open seed shops at the various district and some designated localities to sell seeds at highly subsidized prices to farmers.

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