Peanut Production Methods in Northern Ghana and Some Disease Perspectives

F.K. Tsigbey[1]. R. L. Brandenburg[2], and V. A. Clottey[3]

ABSTRACT

The northern regions of Ghana (Northern, Upper East and West Regions) cover Latitudes N [8 50.333 to 11 04. 146] and Longitudes E [0 02.540] to W [2 42.272]. The Northern Region of Ghana alone covers 70,380 km2 of land, corresponding to 29.5 % of the total country's area. The region is located in the Guinea Savannah agro-ecological zone. The rainy season is monomodal, starting in April/May and ending in September/October, with an annual rainfall varying between 900 and 1100 mm. Peanut is a major cash crop for the people in Northern Ghana whose mainstay is agriculture. The crop is the most widely cultivated legume in the region but is faced with major challenges. These include diseases, pests, and poor soils. Most peanut cultivation activities are done by hand. Except for land preparation and shelling in some instances all farm practices are done manually. The predominant cropping pattern is a mixture of cereal/legume with maize being the major staple food. Other food crops are in the following order of importance: yam, cassava, sorghum and millet. Cash crops comprise peanuts, vegetables (pepper, garden egg, okra and tomato), rice, cotton and tobacco. In most instances no form of chemicals (fertilizers, weedicides, fungicides and insecticides) are used in peanut cultivation. Livestock is also of importance in the Northern Regions with the region alone contributing one third of the national livestock population. Dry peanut haulms are fed to livestock and are sold in the open market. Farmer interviews established that no form of disease control was being practiced with the farmers associating leaf necroses and defoliation to crop maturity. Surveys revealed high disease incidence and severities of late leaf spot (*Cercospora personatum*) and rust (*Puccinia arachidis*). Other minor diseases recorded include peanut rosette. Severe leaf defoliation (>80%) was recorded at most locations during harvest, with associated poor pod formation. Pod loss due to Cercospora leaf spot was as high as 78% on-farm, whilst losses due to rust alone was on the average 23 % in on-station yield loss studies. Efficient disease control was achieved through the use of fungicide (tebuconazole [Folicur 3.6F @ 0.22 kg ai/ha]) sprays resulting in decreased leaf spot severity (2.3.) on the Florida scale. In the absence of fungicide sprays disease severity score was 9.5 (Florida Scale) whilst pod and haulm yields were 700 kg/ha and 4,000 kg/ha respectively. Pod and haulm yields also increased (1,700 kg/ha and 9,900 kg/ha respectively) for fungicide spray plots. Local soaps evaluated have been found to be efficient in disease management.

KEY WORDS: Ghana, Peanuts, *Cercospora personatum*, *Puccinia arachidis*, Tebuconazole, Local soap, cropping system.

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[1] IFAS, Department of Plant Pathology, University of Florida. NFREC.155 Research Road, Quincy FL 32351-5677, e-mail**:** fktsigbey@mail.ifas.ufl.edu

[2] Dept. of Entomology, North Carolina State University

[3] Savanna Agricultural Research Institute, P.O. BOX 52 Nyankpala-Tamale, Ghana

INTRODUCTION

The northern regions of Ghana is made up of three separate administrative regions (Fig. 1) which is made up of the Northern, Upper East and West regions. The Northern Region of Ghana alone covers 70,380 km² of land, corresponding to 29.5 % of the total country's area (MoFA, 1997). The region is located in the Guinea Savannah agro-ecological zone. The rainy season is monomodal, starting in April/May and ending in September/October, with an annual rainfall varying between 900 and 1100 mm.

The upland soils are generally shallow and gravely with plinthite and ironstone. They occur as different soil units classified as Lixisols, Regosols, Leptosols and Plinthosols. The upland soils are light textured at the surface and as a result they dry up quickly after rainfall. Additionally, most of the sub soils have impeded drainage. At the valley bottoms are various soil units namely, Vertisols, Gleysols and Fluvisols, which are deep and non-concretionary (Fosu, 1999). The soils in the region have pH values of 4.5 - 6.7, organic matter content of 0.6 - 2.0 %, total nitrogen ranging from 0.02 to 0.05 %, available phosphorus varying from 2.5 to 10.0 mg P/kg of soil and the value of available calcium ranging from 45 to 90 mg/kg of soil (Soil Research Institute, 2001).

The population census held in 2000 indicates that 10 % of the Ghanaian population of nearly 18.5 million lives in the Northern Region. Three quarters of this population live in rural areas (MoFA, 1997). The average population density is 26 persons/km², but differs among the different districts of the region. The Northern Region is of economic importance to the country: it produces more than a quarter of the national supply of millet, rice and sorghum and more than 80% of the country's peanuts. The region's economic importance of some other food crops (maize and yam) drastically diminished in the last decade. The majority of agricultural production comes from small-scale farmers, as more than 60 % of the holders, farm less than two hectares (MoFA, 1997).

MATERIALS AND METHODS

The approach adopted in this study was farmer interviews during surveys and other studies. Disease management studies were conducted using fungicide and local detergent sprays both on-farm and on-station. Disease control studies were conducted through the spraying of fungicide (tebuconazole [Folicur 3.6F @ 0.22 kg ai/ha]) and a local detergent at 1% (wt/vol). Plots were sprayed on the average three times during the growth period before harvest.

RESULTS

The Administrative Regions of Ghana

Ghana has ten administrative regions (Fig. 1), with each region made up of separate administrative districts. Each district plans its developmental agenda including its agricultural development programs to fit into the overall national program.

Fig. 1. The ten administrative Regions of Ghana

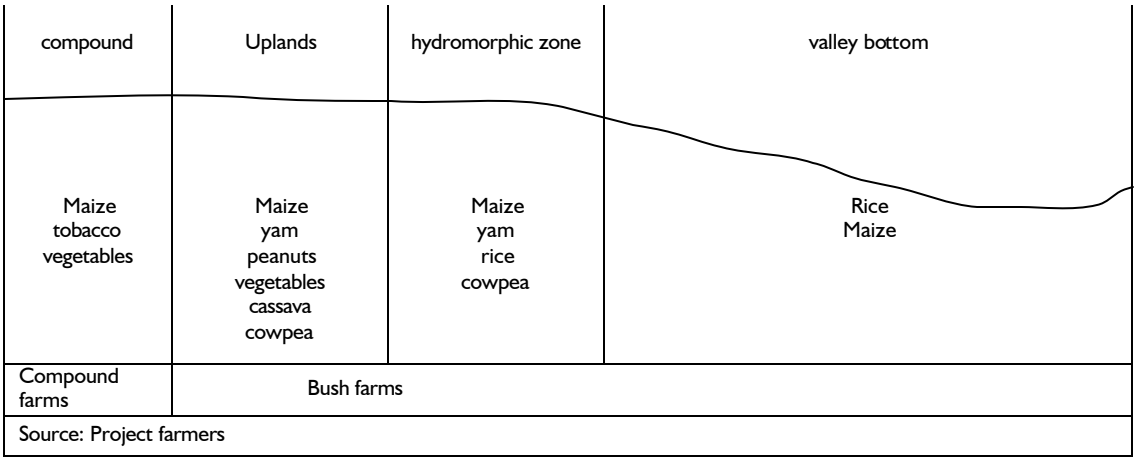
Fig. 2. Typical peanut farm intercropped with millet

The peanut farming system

The predominant cropping pattern is a mixture of cereal/legume (Fig. 2). Maize is the major staple food. Other food crops are in the following order of importance: yam, cassava, sorghum and millet. Cash crops comprise peanuts, vegetables (pepper, garden egg, okra and tomato), rice, cotton and tobacco.

Out of discussions with the farmers, it became clear that a distinction could be made between the compound and the bush fields. The compound fields are situated on the uplands in close proximity to the living quarters of the communities and weave between the houses. These farms are situated very close to the homes and the buildings virtually part of the farms. The compound farms are situated on the richest soils since farmyard manure and other organic amendments are often dumped there due to their close proximity. The bush fields consist of uplands and lowlands and are situated most often further from the homes. Fertility of these bush farms depend on either crop rotation or the application of inorganic fertilizers. These fields may be poorer in fertility depending on the cropping systems and the availability of land. The lowland is made up of the hydromorphic zone - a transitional zone between the upland and the valley bottom proper that does not get flooded but is rather soggy - and the valley bottom that gets temporarily flooded by the rains. The bush farms are normally found in the uplands, hydromorphic and the valley bottoms. Each type of land has its own cropping pattern (Figure 3).

Fig. 3: Crops cultivated on the different types of land in the Tolon-Kumbungu district



The farmers explained that on the compound fields as well as in the valley bottoms no rotation system is practiced. Maize is the dominating crop on the compound fields, where it is cultivated annually. Some farmers double crop maize with tobacco within the same cropping season. Sometimes vegetables (okra, pepper or tomato) are grown in monoculture or on the fringes of the maize fields. This provides the few occasions when some diversity is introduced into the cropping pattern on the compound fields. In the valley bottom, rice is grown every year. If rains start early, some farmers grow a short cycle variety of maize on ridges, after which rice is planted as an intercrop in the furrows. In the hydromorphic zone maize and yam are the major crops. Sometimes maize is preceded with cowpea or rice. The rotation system practiced on the uplands differs among villages and even between the generations of farmers within the same village. Farmers explained that the type of rotation depends on two indicators: (1) ownership and (2) size of holdings. With respect to land ownership an important difference is made between the young and elderly men. The number of fields a farmer has access to influences the choice of the crops to be cultivated and the type of rotation system. Out of the interviews with the farmers, it appeared that young men are cash crop oriented and grow mainly vegetables or peanuts. The rotation cycles vary between two and nine years.

Peanut cultivation is a major agricultural activity for the people of the northern regions of Ghana. It is both a commercial and subsistence venture for majority of the inhabitants. In a typical farming community in the north more than 90% of farm families will cultivate peanut. This explains the concentration of peanut cultivation (Fig. 4) in northern Ghana.

Fig. 4. Peanut distribution map of Ghana.

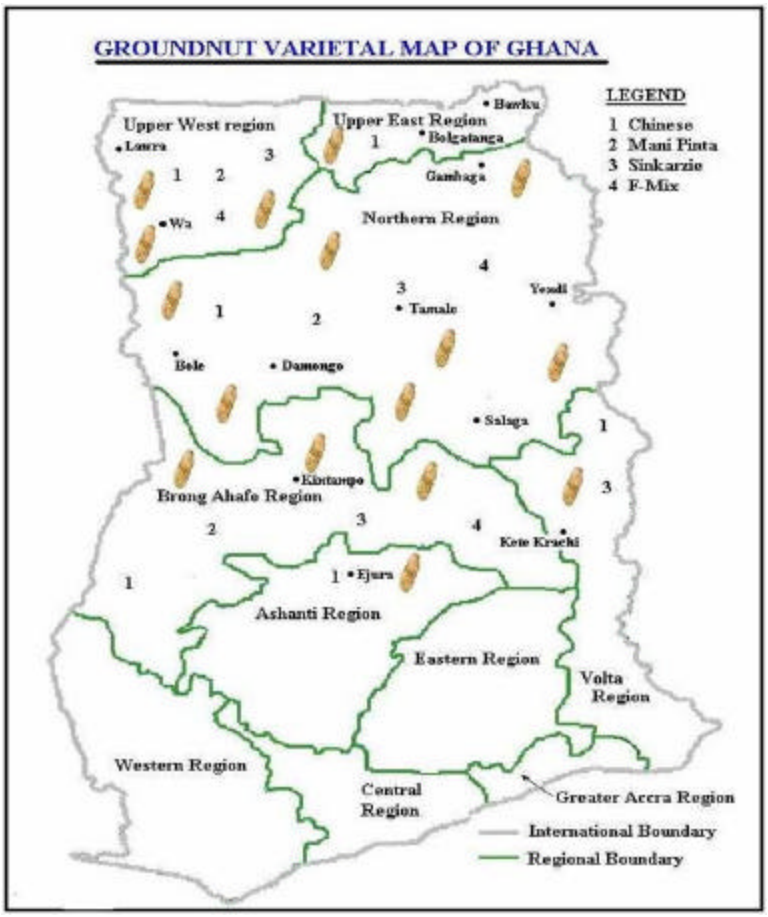


Fig. 5. Cultivation of peanut on mounds

Acreage cultivated range between less than an acre to more than 15 acres and is a purely rain-dependent cropping system. Peanuts are never grown under irrigation and are either planted in rows or staggered on plots and in some locations on mounds (Fig.5). This most often reduces plant population in fields. Field preparation is most often done using tractors in large holdings whereas in smaller holdings bullock plough or hand hoeing is the preferred method. Seeding is by hand and in most cases farmers use seed from their own stock or purchase from the local market. There is however an evolving formal seed sector that will regulate seed quality. Farmers are restricted to mainly three cultivars and the selection of any is dependent on the rainfall regime in that location.

Peanut harvesting and plucking is done manually (Figs. 6 and 7) and in some cases after harvesting the pods with the vines are carried home either by head, tractor or cart-drown using donkey. Peanut harvesting can become very laborious in the event of the rains ceasing early and in some instances farmers resort to carrying water from theirs homes to irrigate the soil that has become hardened before hand pulling. Severe pod loss often takes place under such circumstances.

Fig. 6. Harvesting of peanut in Ghana

Fig. 7. Gleaning of peanut field after harvest

Cracking of the pods is done mainly by hand and on a limited scale by the use of manually operated machinery (Fig. 8). Harvested peanut is dried in the open air on the soil and left at the mercy of the weather (Fig. 9), whereas after drying the produce is either stored in sacks or in specially constructed structure made from thatch (Fig. 10).

Practices that improve the soil organic matter status are not very common. Crop residues are usually carried off the field at the end of the rainy season as feed for livestock. Free-ranging cattle consume the residue left behind and the annual bush fires waste the rest. Incorporating cow dung into the soil is also difficult to realize, as cattle graze on the bush fields during the dry season in an uncontrolled way and the cow dung is therefore not easy to gather. Transport of dung to bush fields and the possible (re)introduction of weeds into the fields are two other problems preventing farmers from the use of farmyard manure. It is more common to use organic materials in the compound fields, because of its proximity to the living quarters and the smaller area to apply the manure on. The only option left for short-term fertility maintenance for the bush fields is an increased use of mineral fertilizers which is beyond the reach of most farmers.

Fig. 8. Shelling of peanut with hand

Fig. 9. Sun drying of peanut in the home after digging

Fig. 10. Alternative methods of storing peanuts in northern Ghana.
(Left: Specially constructed structure using thatch and right: Storage using sacks).

Diseases and pests

Major disease constraints include early and late leaf spots, rust, peanut rosette, Root Rot, and southern stem rot (Figs.11 and 12). Other minor diseases include leaf blotch and lesion nematode infestation. No form of disease control is practiced by farmers, who most often link crop maturity to leaf defoliation as a result of diseases thus overlooks the adverse effects on their crop. Disease severities are so high so much so that at harvest more than 80% of the leaves on peanut plants are defoliated due to the combined attack of Cercospora leaf spots and rust (Tsigbey et al., 2001). These diseases are endemic in all the production areas in northern Ghana. Yield losses due to these diseases are close to 100% in a wet year when farmers abandon harvesting their farms because of poor yields. Seasons with moderate rainfall could result in yield reductions ranging 28->50% depending on the predominant disease(s) in that location. Major insect pests on peanut include hoppers, millipedes, termites, and white grubs. Termite damage (Fig.13) is prominent during late harvested crop. However, no form of pesticides is used in their control mainly because their economic status has not been determined.

Fig. 11. Impact of diseases on peanut. Upper plot was not sprayed whereas the lower plot was sprayed with fungicide.

Fig. 12. Poor pod formation and defoliation due to diseases. (Note: Left plants in both upper and lower pictures were not sprayed while the right plants were sprayed with fungicide).

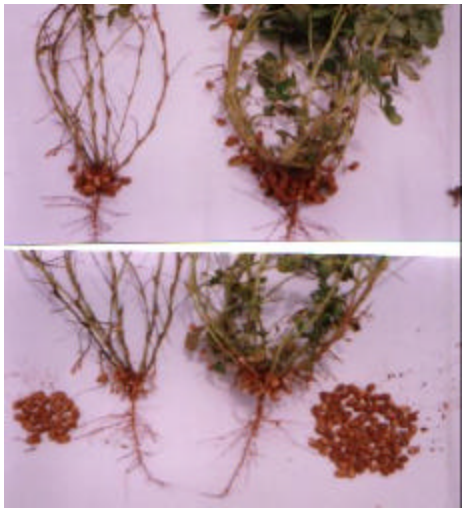


Fig. 13. Damage of peanut pods by termites (Note th e presence of scarified pods)

Some uses of peanut

Peanut is a major cash crop in Northern Ghana and also plays a major role in the diet of the citizens of Ghana. It serves as a major source of vegetable protein and is used extensively in many dishes. Roasted peanut is eaten as a snack in combination with bananas. Peanut butter is extensively used in the preparation of soup in homes and also as bread spread. The kernels are pressed for the extraction of vegetable oil. This activity is a major source of income for rural women. The peanut cake derived after the oil extraction is also used in the manufacture of other local delicacies that are rich in proteins. Peanut hay after plucking of the pods is either left on the farm or carried to the home as livestock fee. In some urban locations, peanut hay serves as an additional source of income to the farmer since the product is on sale in the market. The demand for peanut hay sometimes compare with the kernel since during the long dry season it is a more reliable source of livestock feed. It is not uncommon to see cyclists and motorcars carting peanut hay for storage and subsequent feeding to livestock (Figs. 14 and 15). Peanut husk is not of any immediate use but often used as a mulching material around homes.

Figs. 14 (left) and 15 (right) depict the importance of peanut hay in livestock feeding in northern Ghana and how it is carted

CONCLUSION

The constraints imposed on peanut cultivation are enormous, however this crop holds the future for farming in the region since soil fertility is fast declining and may not support economic cereal growth. Peanut diseases are one of the most predominant if not the most important constraint to the production of the crop in the regions. Losses due to diseases can be attributed to the high percentage defoliation due to leaf diseases, which thus affect pod filling and subsequent grain yield. The high defoliation percentage affects the hay quality of vine that is fed to animals after pod harvesting, since the harvested hay is only fibrous stalk. Preliminary results of hay analyses established that peanut hay produced from non-spray plots are low in crude protein and had high fiber content as compared to hay produced from fungicide treated plots that had high crude protein with low fiber content.

Research at SARI has demonstrated that these diseases can be controlled in an integrated manner using local soap and fungicides. This approach has become indispensable due to the high disease severities and inocula build up in croplands. Efficient control of peanut diseases therefore is a prerequisite to the attainment of food security, poverty alleviation and increase farm household. Any effort in this direction must therefore not be spared in salvaging income sources of several millions of people that are threatened by dwindling sources due to peanut diseases. Sustainable and economic disease control can be achieved through extensive on-farm technology transfer methodologies.

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