

# **Survey of Production and Pest Practices for Peanut (*Arachis hypogaea* L.) in Selected Villages in Ghana, West Africa**

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## **ABSTRACT**

Ninety farmers from three villages in the Ejura-Sekyedumasi district of the Ashanti Region of Ghana were surveyed during September 2003 to determine practices used to produce peanut. Surveys were conducted in a district where farmer field schools were initiated by collaboration among scientists and practitioners from Ghana and the United States. Results from the survey of growers and components of the peanut farmer schools are presented in this article. Surveys indicated that performing germination tests prior to planting and planting peanut in rows were practices adopted most by peanut farmers attending formal farmer schools. Surveys also suggest that soil fertility and lack of host-plant resistance and disease-control practices are yield limiting in the region. Results from these surveys and discussions in farmer field schools will be used to target production and pest management practices that can be improved through research and education efforts to improve peanut production and well being of farmers in the district.

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**Key Words:** Agronomic practices, groundnut, integrated pest management.

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Groundnut is an important food and cash crop in Ghana and other countries in West Africa (Debrah and Waliyer, 1996). A variety of biotic and abiotic stresses can reduce peanut yield (Attuahene-Amankwah et al., 1990), and developing and implementing sustainable practices to manage these pests are important. Successful transfer of new technologies to farmers can be challenging as sociological aspects can influence acceptance of new technologies. In the development of appropriate technologies for farmers, it is imperative to understand the production practices and conditions of the farmers (CIMMYT, 1988).

Information from surveys can be used to orient research and extension activities and to plan research and provide baseline information that can be used in future impact assessments (Tripp and Woolley, 1989). The underlying importance of monitoring and evaluation including impact assessment, as a planning tool to facilitate effective research management cannot be overemphasized (Mudhara et al., 1997).

Understanding how peanut farmers in Ghana perceive the benefits of integrated pest management (IPM) is important in developing methods to transfer technology to a wide range of farmers in order to increase yield. A collaborative IPM program was developed among scientists and practitioners at North Carolina State University (US) and the Crops Research Institute (Ghana) to develop a research base for peanut production and pest management and to extend pertinent findings to peanut farmers in the region. Sound agronomic practices are one of the most feasible and practical ways for controlling aflatoxin (caused by *Aspergillus flavus*) because fungal attack may begin in the field at pre-harvest (Dorner et al., 1992). Preventing aflatoxin contamination at pre-harvest requires high quality seed (Ellis, 1999). One component of this project was to survey farmers and determine what pest management practices are currently being implemented and to define factors that influence farmer acceptance of new technologies. The survey also sought to provide some baseline information upon which future impact on pest management practices could be compared. The objective of project was to develop and transfer production technologies that will reduce negative impact of pests and increase yield.

## **Materials and Methods**

A survey of 90 farmers was conducted between September 5 and 14, 2003 in the Ashanti Region of Ghana, West Africa in the Hiawoanwu, Bonyo, Dromankuma, and Ejura villages in the Ejura-Sekyedumase district. The survey consisted of questions related to production and pest management practices by farmers in the region. Additionally, farmer field schools consisted of 20 farmers

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**Table 1.** Descriptive statistics for the survey of ninety peanut farmers in the Ejura-Sekyedumase district of Ashanti region in Ghana, West Africa.

Characteristic	Minimum	Maximum	Mean
Age of farmer (years)	20	74	40.9
Number of Male adults over 18 years in farmer's household	0	19	3.38
Number of Female adults over 18 years in farmer's household	0	10	3.12
Number of farmer's own children under 18 years in household	0	20	4.4
Formal Schooling (years)	0	23	3.8
Number of years growing groundnut in village	1	30	8.5
Percent of annual income from peanut	1	80	41.9
Land owned in 2003 (ha)	0	14.8	1.03
Land rented in 2003 (ha)	0	10.8	1.17
Land sharecropped in 2003 (ha)	0	3.6	0.07
Other land arrangements (ha)	0	3.2	0.13
Size of largest field in 2003 (ha)	0.2	3.2	0.68

exposed to a variety of pest management and production practices including land preparation, seed and cultivar selection, production practices, pest management, fertility, and post-harvest handling during the peanut production cycle from 2002 and 2003. Farmers and researchers met bi-weekly at one on-farm site to follow crop development and discuss production and pest management issues. Chi-square test was used to compare responses (Steel and Torrie, 1980).

## Results and Discussion

**Survey Responses.** Mean age of farmers was 40.9 years, and the number of years farmers received formal education was 3.8 years (Table 1). The mean number of male and female adults over 18 years in farmer's households was 3.38 and 3.12, respectively (Table 1). The mean number of the farmer's own children was 4.4. Although farmers received relatively little formal education, farmers produced peanut on average 8.5 years (Table 1). The mean percent of total annual income from peanut was 41.9 (Table 1). Fifty-seven percent of the farmers owned the land, 36% cash rented, 2% sharecropped, and 5% had other land arrangements (Table 1).

Only 6% of respondents received financial credit for production of peanut (data not presented). Four percent received loans from local banks while the other two percent of respondents received credit that came from Non-Governmental Organizations (NGO) or family members (data not presented).

Ninety-two percent of the 90 farmers planted peanut as a monocrop system, with the majority of farmers planting only one field of peanut per year (data not presented). The majority of the farmers (73 of 90) cultivated only one field of peanut in 2003 (data not presented). Sixteen percent of farmers cultivated two fields while 3% of respon-

dents cultivated more than two fields of peanut (data not presented). The mean size of the largest field cultivated in 2003 was 0.68 ha (Table 1). Fields were tilled using tractors by 96% of the farmers. Only two percent of respondents used animals to till and another 2% planted without tillage.

The cultivar China was planted by 63% of farmers (Table 2). The cultivar Konkoma was planted by 14% of farmers while a combined total of 20% of cultivars was either of local origin or not defined in the survey. F-mix, Manipintar, and a mixture of cultivars were planted by 3% of farmers collectively. Cultivars planted by 73% of the farmers were estimated to be mature in approximately 90 days after planting while 23% of respondents indicated that cultivars required at least 120 days to reach optimum maturity (data not presented).

Farmers began planting peanut between January and September with 30% planting in March, 28% in April, and 16% in August (data not presented). This region of Ghana has two rainy seasons with one running from March through July (major season) and a second running from September through October (minor season). Seventy-seven percent of respondents planted during the major rainy season while the remaining 23%

**Table 2.** Percentage of respondents planting specific cultivars.

Cultivar	Percent of farmers
China	63
Konkoma	14
Local	10
Others	10
F-mix	1
Manipintar	1
Mixture of peanut	1

planted peanut during the September through October period (data not presented).

The majority of the farmers (87%) tilled their fields and planted flat with only 12% planting on ridges and only 1% planting on mounds (data not presented). Thirty-two percent of the farmers planted peanut in rows and 68% planted at random. Only 2% of the farmer's applied synthetic fertilizer to improve their soil fertility and increase peanut yield, and just 1% used animal manure to increase soil fertility (data not presented).

Rosette, a viral disease transmitted by aphids (*Aphis craccivora*) and early leaf spot [*Cercospora arachidicola* (S.) Hori] were mentioned by 51% and 44% of the farmers, respectively, as the most yield-limiting diseases (data not presented). Rust (*Puccinia arachidis*) was mentioned by less than 3% of farmers as a significant problem. Eighty-two percent of farmers did not introduce any control measure for disease. Thirteen percent removed diseased plants while 4% sprayed a local soap or synthetic fungicide to suppress foliar disease.

Squirrel (*Myosciurus* spp.) and rabbit (*Oryctolagus* spp.) were mentioned by 74% and 3% of the farmers, respectively, as mammals affecting peanut production. Millipedes (Myriapoda: Diplopoda) were mentioned by 13% of the farmers (data not presented). In terms of controlling these pests, 74% of respondents did nothing, 10% set traps, 8% sprayed, and 8% physically removed pests (data not presented). Eighty-eight percent of the farmers weeded once and 12% weeded twice (data not presented). Eighty-nine percent of the farmers used manual weeding with hoe or cutlass and only 11% applied herbicides (data not presented).

Eighty-eight percent of the farmer's stored peanut unshelled and 12% of farmers shelled peanut prior to storage. Reasons given for storing in unshelled condition were that no chemicals were needed (17%), extending shell life (52%), avoiding insects (20%), high prices of peanut (6%), and 6% did not give a reason for storage approach.

Peanut was marketed virtually throughout the year, however, peaks of marketing were observed in March and November (data not presented). Marketing constraints listed by respondents included traders dictating prices (29%) and low prices (32%) while 36% indicated that they had no constraints to marketing peanut (data not presented).

**Involvement and Potential Output from Farmer Field School Activities.** Twenty of the 90 farmers in the original survey were involved in farmer field school activities during 2002 and 2003 (data not presented). Only 5% attended farmer field schools prior to 2002 (data not presented).

**Table 3. Sources of information farmers used to adopt the practice of testing seed germination prior to planting peanut.**

Sources of information	Percentage of farmers
Farmer field schools	40
Other farmers	35
Extension and research scientist	20
Radio	5

Determining seed germination was an important component of the farmer field school. Forty percent of farmers implemented seed germination tests after observing this technique at farmer field schools (Table 3). Thirty-five and 20% of respondents discovered this approach from other farmers or from research and extension collaborators, respectively. Five percent of respondents learned of this technique from radio programs. The percentage of farmers using seed germination tests prior to 2002 ranged from 4 to 23% (data not presented). Forty-five percent of respondents implemented this technique in 2003.

The majority of respondents had never planted a disease-resistant cultivar (97%, data not presented). Ninety-one percent of farmers did not know host-plant resistance was a possibility while 9% indicated that searching for resistant cultivars was extremely time consuming (data not presented).

Demonstrating planting peanut in rows rather than at random was an important component of the farmer field schools. In 2003, 32% of farmers seeded peanut in rows. Fifty-five percent of the farmers planting in rows indicated that they modeled this approach after other farmers (Table 4). Seventeen and 21% of respondents indicated that they learned this approach through the farmer field schools or Extension, respectively. Seven percent learned this approach from local radio broadcasts. Of the respondents who did not plant in rows, 69% indicated that this approach of production required too much time, while 28% indicated that they did know how to plant peanut in rows (data not presented).

Accurate identification of pests and the damage they cause is an essential component of IPM. Only 29% of farmers indicated that they could accurately

**Table 4. Sources of information farmers used to adopt the practice of planting peanut in rows.**

Sources of information	Percent of farmers
Farmer field schools	17
Other farmers	21
Extension and research scientist	55
Radio	7

**Table 5.** Percentage of farmers involved in Field Schools or farmers not participating in Field Schools who adopted specific production and pest management practices.

Activity	Farmer field school participant	Farmer field school non-participant	Chi-square
Test seeds before planting: <i>How do you plant your seeds?</i>	50	17	*
Bed	14	12	NS
Flat	86	87	NS
<i>Do you plant resistance cultivars?</i>	7	3	NS
<i>How do you control disease?</i>			
Spray	7	3	NS
Rogue	7	15	NS
None	79	80	NS
<i>How do you control pests other than disease?</i>			
Spray	21	5	NS
Rogue	14	7	NS
Set traps	7	11	NS
None	50	65	NS
Row planting in 2003	64	26	*
Ability to recognize foliar pests early enough to apply a control measure	50	26	*
Able to recognize beneficial insects or natural enemies.	7	3	NS
(N)	(14)	(76)	

identify pests (data not presented). Additionally, only 3% of farmers could identify beneficial insects (data not presented). Of those farmers who could identify pests, farmer field schools were mentioned as the source of information.

Fifty percent of farmer school participants tested seeds for germination prior to planting compared with only 17% of non-participants (Table 5). No differences were noted when comparing whether or not farmers in either category planted on beds, methods employed to control disease and other pests, and their ability to recognize beneficial pests. However, farmers attending farmer field schools adopted row planting, and

these farmers were better able to identify pests and their damage compared to non-participants.

The majority of farmers indicated that area planted, yield, quantity of peanut sold and consumed, and income increased over the duration of the farmer field school initiative (Table 6). Results from this survey and farmer field schools have defined current production and pest management practices for peanut production in one region of Ghana. These data can serve as a baseline for determining research objectives and areas of outreach by Extension colleagues. Addressing issues associated with soil fertility and developing sustainable pest management practices are areas where increased research is needed and development of alternatives considered. Harvesting and storing practices also need to be addressed and improved.

**Table 6.** Changes in peanut production and consumption observed by farmers after attending farmer field schools.

Indicator	Percentage of farmers observing changes			
	Increased	Same	Decreased	Unknown
Area planted	57	24	18	1
Yield	56	18	23	3
Quantity consumed	54	22	23	0
Quantity sold	64	16	20	0
Income	67	12	21	0

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## Literature Cited

Attuahene-Amankwah, G., M.A. Hossain, and M.A. Asibi. 1990. Peanut production and improvement in Ghana. In ICRISAT 1990.

- Summary Proceedings of the First Reg. Peanut Mtg. for West Africa. September, 13–16, 1988. ICRISAT Sahelian Center, Niamey, Niger, ICRISAT, Patancheru, India.
- CIMMYT. 1988. From Agronomic Data to Farmer Recommendations: An Economics Training Manual. Revised edition. Mexico, D.F.
- Debrah, S.K., and F. Waliyar. 1996. Groundnut production and utilization in Africa; past trends; projections and opportunities for increased production. Paper delivered at the 5<sup>th</sup> Regional Groundnut Workshop for West Africa. Nov. 18–21, 1996. Accra, Ghana.
- Dorner, J.W., R.J. Cole, and P.D. Blankenship. 1992. Use of bio-competitive agent to control preharvest aflatoxin in drought stressed peanuts. *J. Food Protection* 55:888-892.
- Ellis, W.O. 1999. Recommendations for controlling fungal growth and aflatoxin production in groundnuts. pp. 19-21. *In* R.T. Awuah and W.O. Ellis (eds.) Proc. Nat. Workshop on Peanut and Peanut Aflatoxins. 19–21 September, 1999, Santasi, Kumasi, Ghana.
- Mudhara, M.P., D. Anandajayasekeram, E. Martella, E. Mazhangara, and M. Murata. 1997. pp. 1-2. *In* Impact Assessment of Soybean Research and the Enabling Environment in Zimbabwe: 1965–2000. Published by SACCAR, Gaborone, Botswana.
- Steel, R.G.D., and J.H. Torrie. 1980. Principles and Procedures of Statistics: a Biometric Approach, 2<sup>nd</sup> edition. McGraw-Hill, Inc.
- Tripp, R., and J. Woolley. 1989. The Planning Stage of On-Farm Research: Identifying Factors of Experimentation. Mexico, D.F.Cali, Colombia; CIMMYT and CIAT.