Appropriate Pest Management Practices:
Two local soaps, "Alata and Amonkye" have been found to be as effective as synthetic fungicides for the control of peanut foliar diseases and also prevention of rosette viral disease. Grain yields from the local soaps plots were comparable to those of the fungicides plots (Figure 1).

ENHANCED PEANUT PRODUCTION EFFICIENCY IN GHANA: OVERVIEW OF PEANUT IPM RESEARCH ACTIVITIES IN GHANA

M. Owusu-Akyaw[1], M. Abudulai[2], M.B. Mochiah[1], I. K. Dzomeku[3], S. K. Nutsugah[2], A. A. Dankyi[1], G. Bolfrey-Arku[1], K. Osei[1], S. Osei-Yeboah[1], J. N. L. Lamptey[1], H. Braimah[1], I. Adama[1], B.W. Amoabeng[1], K. O. Fening[1], H. Asumadu[1], H. Azotiba[4], Rick L. Brandenburg[5] and David Jordan[5]

[1] CSIR-Crops Research Institute, Kumasi, Ghana, West Africa; [2]CSIR-Savanna Agricultural Research Institute, Tamale, Ghana, West Africa; [3] University for Development Studies, Nyankpala Campus, Tamale, Ghana, West Africa [4]Ministry of Food & Agriculture, Ejura, Ghana, West Africa; [5]North Carolina State University, USA

◆ Introduction

Peanut plays an important role both as a food crop and a cash crop in Ghana. Pests and diseases are, however, important constraints to production. The crop is attacked by a number of soil pests and diseases. The soil pests include millipedes, termites and nematodes whereas diseases, such as rosette are caused by viruses, and leaf spot and rust by fungi. Damage to the crop can result in significant loss in yield. The CSIR-CRI and CSIR-SARI in collaboration with North Carolina State University with funding from USAID therefore initiated projects to address these constraints during the first (1996-2001), second (2002-2007) and third (2007 to Date) phases of the CRSP program.

◆ Production Thrust

The present projects were developed in response to the following priority opportunities:

i) Multidisciplinary (including breeding for host plant resistance, pathology, entomology, economics, and others), integrated pest and disease management of foliar diseases, viruses, soil borne arthropod pests, weeds, nematodes etc.

ii) Recommendation domains, adoption and socioeconomic impacts of technologies developed.

◆ Country sites

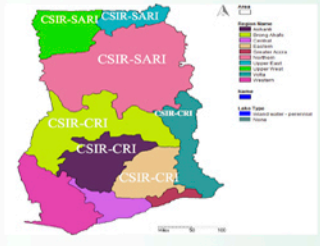

Figure 1: Operational areas of CSIR-Crops Research Institute (CSIR-CRI) and CSIR-Savanna Agricultural Research Institute (CSIR-SARI) in Ghana

◆ Project Impacts:

▲ Aflatoxin Contamination

Work done at CSIR-SARI indicated traces of aflatoxin in peanut harvested in the northern part of Ghana (Tables 1 & 2). The high frequency of *A. flavus* on shelled peanut has serious health implications since the aflatoxigenic potential of the contaminants is unknown. The Aflatoxin levels in samples ranged from 0.4 to 47.6 ppb (Table 2). Sample 11 contained more than the acceptable aflatoxin level of 30 ppb by the WHO/ FAO/UNICEF Protein Advisory Group's limit for protein supplement (Frazier & Westhoff, 1987).

Participatory research activities with farmers to manage aflatoxin contamination have concentrated on the following:

Selection and planting of healthy seeds (Plate 1), effective weed management strategies (Plate 2), effective disease management (Plate 3), management of soil arthropods that create holes in the pod (Plate 4) that serve as entry avenues for disease pathogen, timely harvest, drying the harvested peanuts to the required moisture content before storage, sorting out shriveled and rancid peanut grains or seeds and storing under appropriate storage conditions.

◆ Production Efficiency

The following production technologies have been transferred to peanut farmers aiming at ensuring production efficiency: Site selection, germination test (Plates 5), and proper land preparation to ensure optimum weed management, planting of healthy seed (Plate 1), use of improved high yielding seed (Plate 6), harvesting on time (Plate 7), drying before storage (Plate 8) and use of appropriate pest management practices. All the above technologies have contributed to increased yield over local peanut varieties under reduced cost of production (Plate 6).

▲ Appropriate Pest Management Practices

Two local soaps, "Alata and Amonkye" have been found to be as effective as synthetic fungicides for the control of peanut foliar diseases and also prevention of rosette viral disease. Grain yields from the local soaps plots were comparable to those of the fungicides plots.

◆ Socio-Economics Forces

The CRSP-IPM Peanut project as part of its objective in helping farmers to increase production and their income has conducted several training programs for farmers.

Farmers have been trained using the IPM concept in the production of peanut using farmer field school (FFS) approach and as result, grain yield of peanut in the FFS farmers' fields has increased more than three fold. One of the problems associated with the increased yield is how to manually shell such large volumes of peanut. Thanks to the Peanut CRSP/USAID, ACDI/VOCA and CSIR-CRI for sponsoring a volunteer, Joost Brender A. Brandis from USA, to train technicians of CSIR-CRI and CSIR-SARI in the fabrication of peanut shellers to solve the farmers' problem. Peanut and Sheanut shellers have been fabricated and distributed to beneficiary farmers who participated in the FFS organized by the program (Plate 9).

◆ Training and Information Management

A handbook on peanut production and management practices will be published by the end of 2011. This hand book is intended to help farmers and other practitioners identify and manage constraints in peanut production to enhance productivity.

◆ Other Impacts

The knowledge acquired by the farmers and extension staff trained since 2002 through FFS has diffused to other farmers in the areas covered.

A strong IPM team has been formed, through the Peanut IPM Project in collaboration with scientists from North Carolina State University, USA, for a multidisciplinary approach of solving pest problems of peanut and other mandate crops of CSIR-CRI and CSIR-SARI (Plate 10).

Table 1. Frequency of *Aspergillus flavus* from the kernels of peanut from the northern region of Ghana during 1998 rainy season

Source of sample	Frequency of *Aspergillus flavus* (%)
Demon-naya # 1	0
Demon-naya # 2	30
Sambu # 1	40
Sambu # 2	100
Gbungbalga # 1	100
Gbungbalga # 2	100
Komoayili # 1	70
Komoayili # 2	100
Gaa # 1	100
Gaa # 2	100
Dafearli # 1	60
Dafearli # 2	100

Table 2. Aflatoxin levels in eleven peanut samples in the northern region of Ghana during 2001 rainy season

Sample designation	Aflatoxin level (ppb)[1]
1	0.4
2	2.0
3	1.1
4	0.7
5	0.5
6	0.9
7	3.1
8	0.5
9	1.2
10	25.4
11	47.6

Plate 1: Farmers sorting seeds before planting

Plate 2: Peanut smothered by *Euphorbia* spp

Plate 3: Peanut leaves infected by *Cercospora* leaf spots

Plate 4: Peanut pods bored into by millipede

Plate 5: Extension officer assisting farmers count seedlings from germinating

Plate 6: Pod load of improved variety (left) and local variety (right)

Plate 7: Farmers and US P.I. harvesting early to reduce aflatoxin contamination

Plate 8: US P. I. assisting farmer to spread and dry pods (left), and improper drying method (right) that could promote aflatoxin contamination

Plate 9: Demonstration of peanut sheller to farmers in Ghana

Plate 10: US P. I. interacting with collaborating scientists and a peanut exporter in peanut field in Ghana

FUTURE THRUST

Post-harvest handling practices to address the issue of proper storage and aflatoxin

Very little research has been done in Ghana and published literature is scanty on invasion of the peanut seed by aflatoxin-producing fungi, which can pose health hazard to consumers. Research on peanut aflatoxin problem has been limited because of lack of awareness of the aflatoxin problem, trained personnel and facilities for aflatoxin analysis. Limited studies carried out in 2001 indicated some appreciable levels of aflatoxins in peanut samples in the north (SARI, 2002). Aflatoxin research is, therefore, a necessity.

Marketing of Peanut

Training of farmers in value addition for the different cultivars/varieties and linking them to appropriate industries and market avenues.

Expansion on capacity building into new areas of peanut production

More farmers would be trained to benefit from the improved production technologies that have already been developed and also equip them with new technologies on post-harvest handling that would be developed. The training would also be expanded into new areas of peanut production

Suitable intercropping partners for peanut

Farmers in Ghana especially in northern Ghana do intercrop peanut with other crops in addition to sole peanut cropping. However, there is lack of adequate information on suitable peanut cropping partners for enhanced peanut production under such conditions. Pests and disease dynamics are likely to change under such practices and need to be studied.

Acknowledgement

CSIR is very appreciative of the continued support of the USAID Peanut CRSP for Peanut research in Ghana; and the contribution of the technical staff of CSIR-CRI and CSIR SARI.