PEANUT

COLLABORATIVE RESEARCH

SUPPORT PROGRAM

ANNUAL REPORT

EXECUTIVE SUMMARY

1992

Supported by USAID Grant No. DAN-4048-G-00-0041-00
and the Participating U.S. Universities
and Host Country Institutions

FOREWORD

The Peanut CRSP has completed ten years. Impacts of the research program are becoming evident. Several CRSP trainees are back in their host countries leading research programs, and U.S. students trained are becoming research leaders.

The Peanut CRSP was marred by the tragic and untimely death of Dr. Bharat Singh, the Food Technology Project Principal Investigator at Alabama A&M University, following a September 1992 visit to Burkina Faso. The 1992 Annual Report is dedicated to his memory and in appreciation to the many contributions he made to the Peanut CRSP, which is described on the following page.

Dr. Singh's illness and death came as he was developing his 1992 Annual Progress Report to include information obtained on his September 1992 visit with cooperators in Burkina Faso. We realize that the report presented has omissions in accomplishments, which will be included in the 1993 Annual Report as the new project leadership has opportunity to evaluate and assimilate the information.

Appreciation is given to the U.S. Agency for International Development for financial support of the program through Grant Number DAN-4048-G-00-0041-00, and to the participating U.S. and Host Country Institutions for cost sharing in the program. Moreover, commendations go to all the researchers and administrators whose efforts have made the program successful.

I look forward to working with all of you in the future, and anticipate that the program will extend beyond the present authorization date of June 30, 1995.

David G. Cummins
Program Director
Peanut CRSP
December 1992

The 1992 Peanut CRSP Annual Report
is Dedicated to
Dr. Bharat Singh
Principal Investigator, Alabama A&M University

Dr. Bharat Singh died at the age of 53 on October 11, 1992 after a short illness. He was born on February 21, 1939 in Gahmar, U.P., India. He received a B.S. Degree in biology from Banaras Hindu University in 1958, and an M.S. Degree in chemistry and botany from Ranchi University in 1961. He was a lecturer at St. Columbia's College in Bihar, India from 1961 to 1964. He left India in 1964 to pursue a Ph.D. in plant biochemistry at the University of British Columbia, Canada with the degree awarded in 1968. Dr. Singh worked from 1968 to 1972 as post-doctoral scientist and visiting assistant professor for the Medical Research Council of Canada and the Department of Nutrition and Food Sciences at Utah State University (United States). Since 1972 Dr. Singh was in the Department of Food Science and Animal Industries at Alabama A&M University, Normal, Alabama (United States) reaching the rank of professor in 1975. During the final year of his tenure until his sudden death he served as the interim department chairman. He initiated the action to organize the department in order to obtain and maintain Institute of Food Technologists accreditation of the food science program. He organized a cereal quality laboratory and coordinated research on utilization of agricultural wastes for ethanol production, funded by the U.S. Department of Energy. He was associated with the Peanut CRSP since 1980. He collaborated on the preparation of a State of the Art paper on the utilization of peanut under the Peanut CRSP Planning Grant with the University of Georgia. Beginning in 1982, he coordinated two Peanut CRSP Projects supported by a USAID Grant to the University of Georgia with a Subgrant to Alabama A&M University. One, entitled "Peanut Utilization in Food Systems in Developing Countries" with focus on the Caribbean, was in cooperation with the Caribbean Agricultural Research and Development Institute. The second, entitled "An Interdisciplinary Approach to Optimum Food Utility in SAT Africa", was in collaboration with the Food Research Center, Shambat, Sudan and the University of Ouagadougou, Burkina Faso.

For his research and training efforts, the Association of Research Directors of the 1890 Land-Grant Colleges and Universities in 1980 awarded Dr. Singh the prestigious Morrison-Evans Outstanding Scientist Award. During his career, his name appeared as an author on more than 75 technical presentations at professional meetings. He was the author or co-author of more than 85 technical publications. At Alabama A&M University, he taught several courses in food science, guided about 40 M.S. students to the completion of their degrees, and guided one Ph.D. student for the University of the West Indies, Trinidad. He was a member and served in various capacities of several professional organizations including the American Association of Cereal Chemists, the American Association of Oil Chemists, the American Peanut Research and Education Society, the Dixie Section of the Institute of Food Technologists, the Institute of Food Technologists, Sigma Xi, and the Southern Association of Agricultural Scientists.

He organized and served as first president of the Huntsville, Alabama India Association (1980-1982), and as vice president of the Federation of Indian Associations in North America, South Region.

Dr. Singh is survived by his wife Bibha, daughter Dibya, son Niten, son-in-law Sanjay, and granddaughter Dipty.

Bharat was a friend to many of us associated with the Peanut CRSP. He was always friendly and pleasant with something positive to say. His ardent support of the Peanut CRSP as a Principal Investigator and Technical Committee Member will be missed. Because of his life the world is a better place.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION

Peanut is a crop grown in most countries, both developing and developed, between 40 degrees North and 40 degrees South latitude. The constraints to peanut production and use are similar worldwide, which gives a potential for collaborative research to relieve these constraints. Peanut can contribute to an increased food supply in areas where total food and protein supply is marginal.

It is becoming more and more evident that agriculture must be sustainable. Peanut contributes to sustainability because it can be productive while maintaining or enhancing the environment in at least these ways.

- Fixation of atmospheric nitrogen through bacterial symbiosis, thus returning nitrogen to the soil for its own use and for use by future crops.
- Provides a nearly closed canopy that minimizes soil erosion.
- A relatively short growing season that makes it fit within a range of cropping systems, both monoculture and multicropping, as well as intercropping with grain crops and under-story planting in tree crops. It can be planted late in the season in case previous crops have been lost or were poor producers.
- An important source of high protein and energy for humans, as well as a high-quality animal feed.
- Provides a source of cash income for rural and urban people.
- Helps meet need for vegetable oil.
- Tolerates drought conditions, including the drought-prone of Sub-Sahelian Africa. Peanut is also able to mature in the short rainy season of that area and escape drought.
- Suppresses weeds when intercropped with grain crops, which reduces labor-intensive weeding activities.

The Peanut CRSP was implemented in 1982. The CRSPs were created to implement the Title XII program of the United States Foreign Assistance Act of 1975 with a goal to prevent famine and establish freedom from hunger through land-grant university involvement in international development. To attain the goals, the research capability of both developing country and United States institutions is enhanced through training and support of research. The CRSP concept requires work on constraints that have global implications.

CONSTRAINT DRIVEN

The Peanut CRSP was designed around a set of constraints to sustainable production and utilization identified during the 1980-1982 Planning process. Based on the numerous advancements achieved by the Peanut CRSP during the 1982-1989 period, the External Evaluation Panel in 1989 evaluated the continuing validity of the following constraints and found them to be valid as a basic framework for the Peanut CRSP for the 1990-1995 period.

- Low yields because of unadapted cultivars and lack of cultivar resistance to diseases, insects, and drought;
- Yield losses due to infestations of weeds, insects, diseases, and nematodes;
- Health hazards and economic losses due to mycotoxin contamination;
- Food supplies inadequate and lack of appropriate food technologies to exploit a relatively well adapted peanut crop that is not generally considered a primary food source;
- Physiological and soil microbiological barriers to higher yields;
- Resource management (agronomic, engineering, economic and sociological) situations preventing efficient production and utilization;
- Inadequate numbers of trained researchers and support personnel;
- Lack of adequate equipment to conduct research ;
- Information not available to beneficiaries for support of production and utilization efforts.

In short, the Peanut CRSP enhances the potential of peanut as a crop for human food and animal feed in developing countries and the United States, as it contributes to the increase of rural incomes and sustains agricultural land. The collaborative research on peanut is producing new and improved technology that improves the well-being of people in developing countries and, in turn, benefits citizens in the United States.

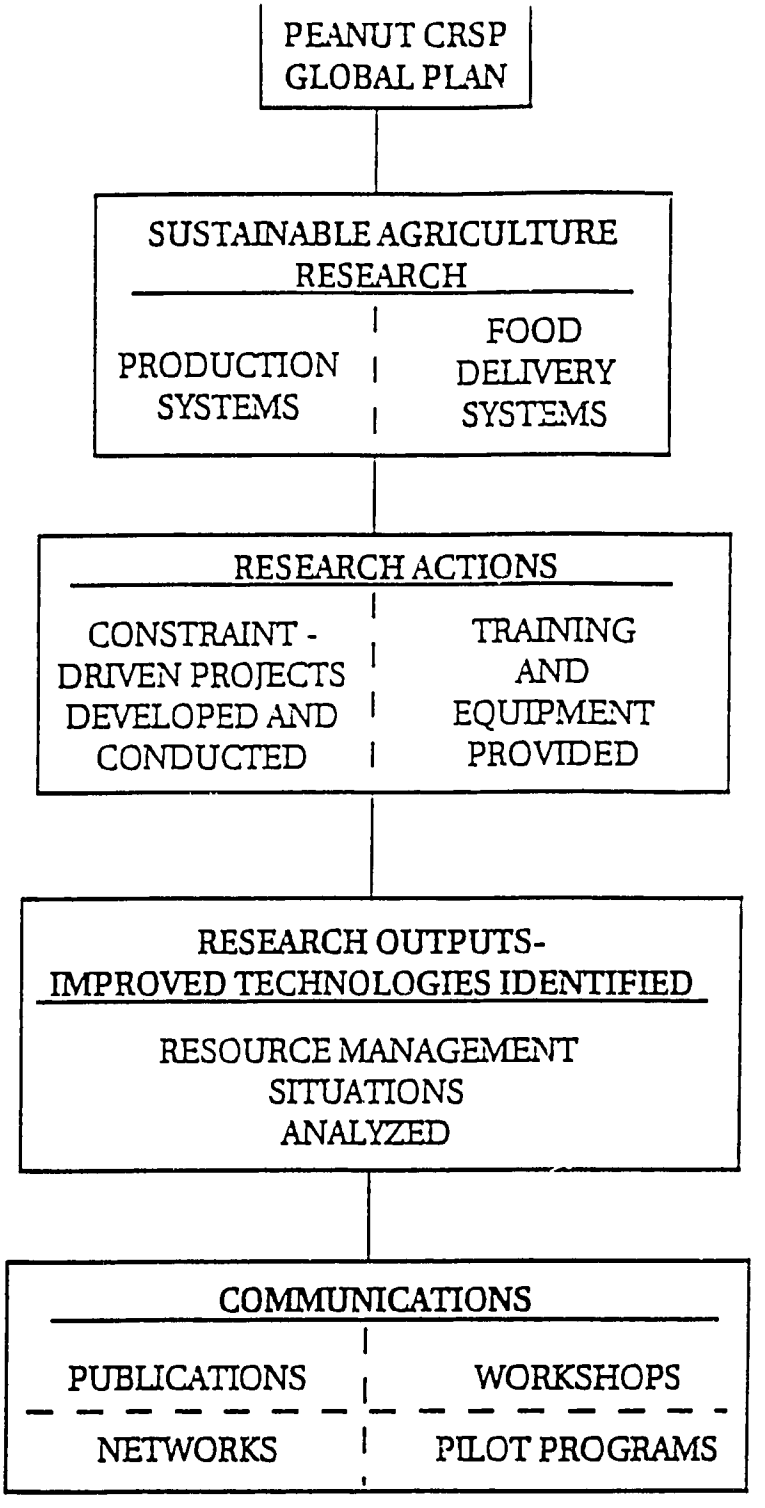
THE GLOBAL PLAN

Peanut has a global nature as a result of the wide distribution of the crop, the importance of the crop in both developing and developed countries, the marked similarity of production and utilization constraints worldwide, the potential for research to relieve production and utilization constraints so to better realize the potential of peanut to contribute to an increased food supply in countries where total food and protein supply is marginal, and the synergistic effect of international cooperation among international agricultural research centers and other donor groups.

Global Thrusts - Sustainability of production and delivery of food to the human population is a primary problem in the developing world. Based on the importance of peanut in contributing to sustainable production of food, and the problems facing optimization of the crop, the Peanut CRSP has three global thrusts to relieve the identified constraints to peanut production and utilization.

1. To develop sustainable agriculture production and food delivery systems that are environmentally sound is the major global research thrust of the Peanut CRSP to relieve the identified constraints to peanut production and utilization.
2. To resolve resource management research situations that restrict efficient management of production and utilization systems.
3. Communication of research outputs to clientele.

An integral part of the research actions is an enhancement of research capability for both the U.S. and the host countries through collaborative research, the provision of equipment, and the training of research and support personnel.



Beneficiaries: Developing country small farmers including rural women, food processors, rural and urban consumers.

United States farmers, processors, rural and urban consumers.

Figure 1. Peanut CRSP Global Plan.

Since its inception, the Peanut CRSP has enhanced research and technology transfer activities through synergistic relationships with other international organizations. Cooperative planning, support for research, and conduct of workshops and other outreach activities characterize these global relationships. Organizations include International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), ICRISAT Sahelian Center (ISC), French Center for International Agricultural Research and Development - Annual Crops (CIRAD-CA), International Development Research Centre-Canada (IDRC), and Australian Centre for International Agricultural Research (ACIAR). The External Evaluation Panel and the Administrative Review Team both recognized the benefits of cooperation with these organizations.

Paramount in the goals of the Peanut CRSP is providing information of value to its beneficiaries. The collaborative nature of the CRSP provides in two-way benefits with:

- Focus on solving constraints and improving the well-being of people in host countries,
- Results of value to the constituents of the participating U.S. institutions.

Host country beneficiaries are small-scale farmers, which include rural women, as well as food processors and both rural and urban consumers. Benefits come in the form of adequate quantities of more nutritious and safe food, and increased incomes.

United States beneficiaries are farmers, processors, and both rural and urban consumers.

The Peanut CRSP Global Plan (Figure 1) is a framework for the implementation of the program, and is a template against which progress toward reaching goals can be measured. Research is a dynamic process, not an event: consequently, Peanut CRSP management will revisit the Global Plan on a continuing basis to keep the CRSP abreast of changes in the international peanut research environment, while keeping in mind the contribution of advancements in research and maturation of technologies for transfer to beneficiaries on the continuing development of the program.

COLLABORATION

Peanut CRSP research programs are conducted collaboratively between scientists in host country and U.S. institutions. Constraints are addressed in the research that solve problems with the host country, while at the same time have regional and global implications. The research also has return benefits to the U.S.

MAJOR ACCOMPLISHMENTS

Research to address the constraints and solve the identified problems of peanut production and food delivery have been approached through the following major thrusts: Genetic Resources, Integrated Pest Management, Natural Resource Management, and Food Products and Consumer Use. In addition, research capability is enhanced through Human Resource and Institutional Development and Communication and Outreach of new and improved technologies is supported. Administrative and Management activities support the implementation and conduct of the program.

GENETIC RESOURCES

Improved Yield Ability

- Approval for release of Fleur 11 in Senegal was given based upon documentation of pod yield increase in excess of 30% compared to 55-437 (a common cultivar) during five-years of on-and off- station research.

- In Mali, the decision was made to increase seed of four breeding lines (73-28) M 13, HYQ (CG) S-49, and EH 310-9) for on farm tests in prospect of release to farmers based on performance in three years of on-station tests.

- In the Philippines, JL-24 was approved as a Philippine Seedboard cultivar in May 1992 and released as UPL Pn10. It yielded 11% more than the national check cultivar, BPI Pn2. UPL Pn10 is high yielding, large seeded, resistant to leafhopper, highly resistant to defoliators and moderately resistant to Aspergillus flavus invasion.

- In Thailand, Taiwan 2 x UF71513-1 was identified as a high yielding-boiling type peanut in Farm Trials by the Department of Agriculture and is being considered for recommendation as a new cultivar. It yielded more than Khon Kaen 60-2, the check cultivar.

Disease Resistance

- In Texas, another 250 peanut accessions, bringing to a total of 2260, were field screened for leafspot reaction at Yoakum. About one percent of the 2260 accessions have been considered worthy of further testing.

- In Texas, populations with selected parentage were developed and are under agronomic selection and generation advance to select for resistance to rosette virus (and termite) in Africa, and sclerotinia blight, spotted wilt virus, leafspot, rust, and/or Aspergillus flavus in Texas.

- In Thailand, peanut lines have been identified that have increased levels of leafspot and rust resistance. The lines will be further evaluated in the 1992 rainy season.

- In North Carolina, twenty-seven interspecific hybrids between cultivated and wild species were evaluated for resistance to early and late leafspot. Four of these lines were released as breeding lines.

- In Nigeria, fifty-seven lines (selected from 260) having less than 10% rosette virus infection in 1991 were planted in 1992. Thirty-three of these lines were free of rosette virus infection and show promise of some being acceptable to growers. Promising lines that yield from 2.5 to 3.0 metric tons per hectare are being multiplied for state trials.

Insect Resistance

- NC 343 has been identified by the Georgia/Burkina Faso Insect Management project as one of the lines most resistant to termite damage. Crosses were made by the Texas breeding project NC 343 and West African germplasm and a limited number of advanced lines sent to Burkina Faso for field testing.

Aflatoxin

- In Burkina Faso the breeding and food technology projects cooperated to determine possible differences in aflatoxin contamination in seed from different breeding lines of peanut. Although no line was aflatoxin free, comparatively less contamination was apparent in some lines than in others at all three locations. Evaluation of lines for aflatoxin production to avoid release of cultivars highly susceptible to aflatoxin production might be an important aspect in cultivar development.

Short Season

- Four short season (early maturing) lines and cultivars were again compared with check cultivars in Mali. This was the third consecutive year in which the four lines performed satisfactorily and seed will be increased in 1992 for on-farm trials in prospect of future release to farmers.

- In Thailand, breeding for earliness to develop high yielding peanut lines which mature in 80-85 days for use in short-season cropping systems have resulted in three lines which are superior to the local check. These lines will continue to be tested in expanded yield trials.

Drought

- Line-source irrigation was used in Texas to select for drought tolerance in peanut lines. The results show some variation in response to water levels among entries. Work will continue to identify drought tolerant germplasm.

Shade Tolerance

- On-farm trials of promising shade-tolerant lines were grown under coconut at four locations in the Philippines. IPB Pn82 82-25 consistently had the highest pod and seed yields.

Acid Soil Tolerance

- In the Philippines, some six lines continue to show tolerance to highly acidic soil conditions.

INTEGRATED PEST MANAGEMENT

- In Georgia, peanut lines have been screened for resistance to viruses for three years. Arachis diogoii and A. helades are two species that have good resistance, although not immunity, to peanut mottle and stripe viruses. Some lines have shown resistance, but not immunity, to tomato spotted wilt virus.

- In Burkina Faso, field treatment with various neem products has not provided any significant control of a variety of insects.

- The trips vector of TSWV continued to be surveyed in Georgia in different seasons. Brachypterous adults are prevalent during the winter in old peanut fields and are being tested as an overwintering source of the virus.

- In Burkina Faso, significant differences among peanut lines were noted in the percentage of pods injured by termites. A delay in harvest increased the incidence of pod scarification and

penetration. Several lines, NC Ac 343, NC Ac 2240, NC Ac 2242, NC Ac 2243, M 13, RMP 40, and RMP 12 had relatively high resistance to termite damage even when harvest was delayed.

- Termite injury to peanut pods increased linearly with an increase in days to harvest in Burkina Faso. This increase in pod injury was directly related to a decrease in soil moisture from an average of 6.8% at 90 days to 1.4% at 120 days. Maximum yields were recorded at 100 days after seeding to harvest.

- Twelve of 54 peanut genotypes were selected in Georgia in cooperation with the North Carolina State Insect Management Project for further evaluation for thrips, corn earworm and velvetbean caterpillar resistance. Compared to the Florunner cultivar, one line showed less thrip damage, two less leafhopper damage, and five less velvetbean caterpillar damage. Crosses with the line NC 343 continue to show resistance to a number of insects, including the three in this experiment.

- The improved use of insecticides was studied at several locations in the Philippines. Studies to evaluate insecticide timing, off-target effects, and incorporation into an IPM system, as well as the economic benefits, have improved the understanding of the use of pesticides.

- An excellent data base on genetic resistance of a number of peanut lines has been developed in the Philippines. The genetic resistance can be used in developing host plant resistance for use in IPM programs.

- Biological control studies in the Philippines on peanut using Trichogramma sp. and Bacillus thuriengensis for the control of Lepidopterous pests have been successful. The studies evaluate the thresholds and efficacy of alternate control strategies in farm settings, demonstrate the results to peanut farmers, and evaluate new techniques under farm conditions.

- In Thailand, studies emphasized the continued development of a sound data base for refinement of the IPM program, which included basic insecticide evaluations to improve the timing of application to increase pod fill. In addition, the IPM program uses host plant resistance, cultural, and biological control measures. Studies continue to follow the migration of thrips and the impact of thrips feeding on peanut yields along and in conjunction with the transmission of virus diseases.

- In North Carolina, studies using floral and feeding attractants provide information regarding rootworm treatment decisions. Current pheromone trap technology has enabled elimination of chemical treatments when less than 45 adult beetles are caught per week. Chemical treatments were reduced by about 16%, and work is now underway to refine the use of the trap by using the feeding attractants, oviposition traps, and soil moisture data along with the pheromone with an anticipation of further reducing chemical use.

- Current research in North Carolina on thrips overwintering and migrating into peanut fields have shown that thrips do not overwinter in the soil and only a limited number appear to migrate from small grains. When migration into the field occurs, the number of thrips in the air is quite large and this migration occurs before peanut emerges. There is continued movement into the field all season long. This overwintering and movement have direct

implications to the management of tomato spotted wilt virus in peanut.

NATURAL RESOURCE MANAGEMENT

- In Burkina Faso in a five-location yield trial, peanut yields were relatively low at the Bobo Dioulasso and Niangoloko locations despite high rainfall at these locations. Recent collaboration between the Peanut and Soil Management CRSPs has shown a low soil pH and high aluminum content at Bobo. The first-year of a multiple-year experiment to study the effect of soil amendments on soil pH and peanut yields was completed. Treatments included lime, phosphorus, lime + phosphorus, ash, and a control with three locally grown peanut cultivars. First year results showed a cultivar x soil amendment interaction.

- In response to grower concerns regarding relative performance of Tamspan 90 and Starr under non-irrigated production, replicated tests were conducted at eight locations in Central and Southeast Texas. Pod yields for the two cultivars in Central Texas were equal, while in the Southeast Texas tests Tamspan 90 yielded significantly more. Earlier results have shown its superiority over Starr under irrigated production, especially in soils infested with Sclerotinia minor, Pythium myriotylum, and Rhizoctonia solani.

- A socioeconomic study in Jamaica to determine the impact of a CRSP developed peanut variety, CARDI-Payne, showed that yields were 42% higher than traditional varieties.

- Studies in Senegal used row-spraying of conidial suspensions of Aspergillus flavus at different times in the growing season to increase aflatoxin contamination in peanut. Soil inoculation at pegging time resulted in higher aflatoxin levels in seed at harvest. Thus, the pegging-period is a decisive stage for peanut preharvest infection by A. flavus and subsequent aflatoxin contamination in the seed.

FOOD PRODUCTS AND CONSUMER USE

PRODUCT DEVELOPMENT AND EVALUATION

- Tests to determine the acceptability of a cheese-flavored peanut-based spread were conducted cooperatively between The University of Georgia and the University of the Philippines at Los Banos. The work involved 416 respondents at six central locations in the Philippines. The spread was acceptable to consumers who were willing to pay more for the spread than for peanut butter, but less than for a dairy-based spread. Discussions are now underway to work with a private Philippine food company to commercialize the product.

- Sustained production of peanut products made with defatted flour depends on a local source of flour. In Thailand, production of defatted peanut flour was done at the Department of Agriculture's pilot scale oil extraction plant. Quality of the flour produced from the local cultivar, Tainan-9, met the Indian Standard Institute and U.S. flour standards criteria for peanut flour for human consumption.

- Shelflife and consumer acceptance studies on a buttered caramel-flavored peanut snack developed from defatted peanut (33%) and tapioca flours (46%) were completed. Products packed in aluminum

foil bags can be stored for at least two months at ambient temperature without loss of quality. Ninety-five percent of the consumers surveyed indicated that the product was acceptable.

- Peanut tempeh (Rhizopus oligosporus fermentation) has high potential for use in the Thai food system. Supplementation of Thai sausage with 30% dried peanut tempeh resulted in no differences in sensory scores for color, flavor, texture, and consumer acceptability. Replacing dried shrimp with dried peanut tempeh in hot chili paste resulted in no difference in acceptability between vegetarian and non-vegetarian consumers.

- Curd and yogurt products are popular products in the Philippines. A previously reported soft curd was improved. Agar-agar was most preferred as a firming agent. The product was comparable with a commercial soybean soft curd in its physico-chemical characteristics, and plain or flavored formulations were acceptable to consumers based on sensory evaluations.

- In the Philippines, peanut residue following peanut milk extraction was utilized to formulate a cheese-flavored spread. Stability was comparable with that of commercial spreads, thereby requiring refrigeration to prolong shelf-life. Spreads offer a potential for use of the peanut milk residue as a human food.

- In Alabama, food extrusion research using different blends of full fat peanut and sorghum showed that peanut should be less than 20% of the mixture for optimum processing. These results will assist in the formulation of peanut-cereal food products acceptable to West Africa consumers.

- Food scientists in Burkina Faso continue to assist a peanut butter processor in assessing the product market ability. The product had good quality (consistency, shelf-life, acceptability), but appropriate packaging is needed that is both economical and protective of the product.

AFLATOXIN MANAGEMENT

- In Senegal, fifty samples of unrefined village-produced peanut oil from the Kaolack district were analyzed for aflatoxin B_1. Ninety-six percent of the samples contained levels from 5-254 ppb with an average value of 54 ppb. Twenty oil cake samples from the same locations contained aflatoxin levels from 49-160 ppb with an average of 67 ppb. Twenty samples of hand-picked roasted peanut from markets did not contain detectable levels of aflatoxin.

- A new minicolumn method for the rapid detection of aflatoxin M_1 in milk was developed. The new method has a detection limit below the action level of 0.5 ppb.

- Previous studies in Texas have shown that highly adsorbent clays in the diets of farm animals prevented the deleterious effects of aflatoxins. Studies with rats showed similar protection from aflatoxins, and more importantly no new metabolites were found in rats fed the clay-treated diets containing aflatoxin.

- In the Philippines, periodic monitoring of aflatoxin in commercial peanut butter samples obtained in sales outlets has been done over the life of the Peanut CRSP. Often excessively high aflatoxin levels have been found. Samples representing eight brands from two cities and three stores were tested recently. Only one brand

contained over 20 ppb aflatoxin and had 30-50 ppb (minicolumn method of analysis).

- In Georgia, the fate of ^{14}C labeled aflatoxin B_1 in the presence of an aflatoxin-degrading bacterium (Flavobacterium aurantiacum) was determined. The preliminary results suggest that the bacterium metabolizes the toxin rather than binding it to cell walls. The amount of $^{14}CO_2$ evolved by the process suggest that the normally chloroform-soluble ^{14} C-B_1 is rapidly converted to a water soluble degradation product. Bacterial degradation of aflatoxin could be of value in fermented food or feed products.

- The feasibility of separating aflatoxin-contaminated peanut seed from non-contaminated seed by treatment in hydrogen peroxide was studied in Georgia. Concentrations of hydrogen peroxide from 0.075 to 0.225% resulted in a reduction in aflatoxin content of the seed in the "sinker fraction" by 90% within one minute regardless of the initial aflatoxin content. The method promises to be of value as a separation technique in peanut processing.

- In Burkina Faso, peanut paste/butter samples were collected from industrial and traditional, small-scale manufacturers. Aflatoxin levels were higher in the paste from traditional sources. Since the major portion of the paste used is from traditional sources, methods to help these processors reduce aflatoxin content of pastes are needed.

- In Belize, the San Antonio Cooperative has adopted dryer and storage technology developed by the Peanut CRSP. The aflatoxin level in peanut is being monitored at the farm level in storage and when moved to market. Aflatoxin has not been detected above the tolerance level of 20 parts per billion in any sample. Moisture content of all stored peanut was recorded at less than 10%.

POSTHARVEST HANDLING AND STORAGE

- A harvester (lifter) is being fabricated in Belize based on designs developed by the Jamaica collaborating engineer, while he was a CRSP supported student at the University of the West Indies. It was tested and proven adapted to Jamaica soil conditions, and if it works on the heavy soils of Belize it will be a breakthrough in reducing harvest costs.

- A locally fabricated tractor-power-take-off-driven thresher was further modified in Belize to alter the size of the feeding tray and the slope of the discharge screen. The thresher is being evaluated by a number of farmers.

- In Georgia, a manual is being finalized that provides detailed plans and cost estimates for building the thresher that was modified, tested, and now used on farms in the Caribbean.

- In Georgia, a manual is being developed that will describe plans and estimated costs for construction of storage facilities that have been developed and evaluated in the Caribbean.

HUMAN RESOURCE AND INSTITUTIONAL DEVELOPMENT

TRAINING

Completed Ph.D. Degree in 1991-1992

Bachir Sarr, Senegal, at Texas A&M - Veterinary Public Health (Aflatoxins)
Julius E. Fajardo, Philippines, at Texas A&M - Plant Pathology

Completed M.S. Degree in 1991-1992

Therese Malundo, Philippines, at The University of Georgia - Food Technology
Rocelle Clavero, Philippines, at The University of Georgia - Food Technology
Xiaoyong Yan, China, at Alabama A&M - Food Technology
Tunde Koleosho, Nigeria, at Alabama A&M - Food Technology

Initiated or Continued Ph.D. program in 1991-1992

Mahama Ouedraogo, Burkina Faso, at Texas A&M-Breeding
Wootisuk Butranu, Thailand, at North Carolina State - Plant Pathology
C. M. Bianchi-Hall, Argentina, at North Carolina State-Cytogenetics
T. P. S. Rau, India, at North Carolina State-Cytogenetics
Eric Line, United States, at The University of Georgia-Food Technology
Nelly Duarte, Colombia, at Alabama A&M-Food Technology
Rolfe Bryant, United States, at Alabama A&M - Food Technology
Linda Griffith, United States, at Alabama A&M - Food Technology

Initiated or Continued M.S. Program in 1991-1992

Yolando Lopez, Colombia, at Texas A&M-Breeding
Jason Goldman, United States, at Texas A&M - Breeding
Rodante Tabien, Philippines, at Texas A&M-Breeding
G. F. Chappell, United States, at North Carolina State-Breeding
Gail McIntyre, United States, at North Carolina State-Breeding
Witoon Prinyawiwatkul, Thailand, at The University of Georgia-Food Technology
Rudeepan Wattanapat, Thailand, at The University of Georgia-Food Technology
Ashok Mishra, India, at Alabama A&M - Food Technology
Teresa Coleman, United States, at Alabama A&M -Food Technology

Shortterm training in 1991-1992

Mahama Ouedraogo, Burkina Faso Ph.D candidate at Texas A&M, to University of Ouagadougou to review collaborative research program.
Dr. Phindile Olorunju, Nigeria, P.I. virus project, to Malawi for Regional Groundnut (Peanut) Workshop.
Dr. Sopone Wongkaew, Thailand, P.I. virus project to Georgia for laboratory procedures.
Dr. Luthgarda S. Palomar, Department of Agricultural Chemistry and Food Science, Visayas State College of Agriculture - Philippines, to Georgia for product development training.
Chintana Oupadissakoon, Thailand-Food Technology, to U.S./APRES, Georgia

Host Country Institutions

The Peanut CRSP provides partial support to graduate students in host countries. During the past year, twenty-four graduate students completed or were enrolled in programs at Kasetsart University (six in Food Technology) and Khon Kaen University (six in breeding/agronomy) in Thailand; The University of the Philippines at Los Banos (three in Food Technology), and at the University of Ouagadougou, Burkina Faso (three in Food Technology).

COMMUNICATIONS AND OUTREACH

WORKSHOPS

Second International Groundnut Workshop, 25-30 November 1991 -held in cooperation with ICRISAT Center - India.

Five Representatives from the Georgia-Thailand-Philippines Food Technology project participated in the Fourth ASEAN Food Conference in February 1992 in Jakarta, Indonesia.

SPECIAL PUBLICATIONS

Simpson, C. E. 1991. Global collaborations find and conserve the irreplaceable genetic resources of wild-peanut in South America. Diversity 7:59-61.

Haruthaithanasan, V. 1991-92. Series of six articles in Bangkok Daily News (second largest newspaper circulation in Thailand) on peanut utilization research activities sponsored by Peanut CRSP.

Peanut CRSP Update - 1991. Available from Management Office.

Aflatoxin Research Review. Peanut CRSP Research Report 91-01. Available from Management office.

New Directions in Integrated Pest Management Technology Transfer: Research on Farmers, Attitudes, and Socioeconomic Impacts. Troost, Kay M. and others. Peanut CRSP Research Report 92-01. Available from Management Office.

Aflatoxin management brochure to increase awareness of problem - Published in French by Texas A&M/Senegal mycotoxin project. Available from Management Office or Texas A&M University.

International Arachis Newsletter. No. 10 Nov. 1991 and No. 11 May 1992. Published in cooperation with ICRISAT.

NETWORKS

ICRISAT - The Peanut CRSP networked with ICRISAT in general research exchanges, co-sponsored The Second International Groundnut Workshop from November 25-30, 1991, publication of the International Arachis Newsletter, and other special publications.

CIRAD-CA (Centre International en recherche agronomique pour le development - cultures annuelles) - Dr. Robert Schilling attended the APRES meeting in San Antonio, TX in July 1991 and discussed peanut research in West Africa.

CARDI - Peanut CRSP collaborates with the Caribbean Agricultural Research

and Development Institute, which helps extend technology to the CARDI countries.

PILOT PROGRAMS/TECHNOLOGY TRANSFER

- Technologies for processing oil-roasted and ground-roasted peanut developed by the Peanut CRSP were transferred to a group of seven housewives near Cheingmai, Thailand. The training provided included processing and marketing technology. The oil-roasted peanut has provided an 84% return over cost of the product and the ground-roasted has returned 40% over cost.

- A Pilot Program continues in the Philippines that extends CRSP technology (varieties and IPM) to farmers in the Cagayan Valley of Luzon, which is the major peanut growing region.

- New peanut varieties are being multiplied in a program with farmers in Thailand, which will accelerate the adoption of the new varieties on a wide-scale.

- An extensive program in Jamaica led by CARDI and the Jamaican Extension Service has caused adoption of the new CRSP developed CARDI-Payne variety, reported to be 20% of the Jamaica production in 1992. Yields are 42% higher than the traditional varieties as determined in a socioeconomic survey funded by the CRSP.

- Members of the San Antonio Cooperative in Belize and other farmers in the village that are not members of the Cooperative are using a dryer facility that was modified and enhanced through Peanut CRSP postharvest research and outreach. It is serving as a multi-purpose dryer for both peanut and corn. Other cooperatives are interested in constructing their own dryer.

ADMINISTRATION AND MANAGEMENT

The Peanut CRSP Management Group includes the Management Entity Office at the University of Georgia; the Board of Directors with representatives from Alabama A&M University, The University of Georgia, North Carolina State University, Texas A&M University, and ICRISAT; the Technical Committee with representation of the above four universities, an External Evaluation Panel with four independent members; an AID/R&D/AGR Project Manager; and a BIFADEC liaison.

Management Entity Activities - The Management Entity is responsible to AID and to the Participating U.S. and Host Country Institutions for management of fiscal and programmatic activities.

- Provided support to Investigators in project management, including travel requests, equipment purchase requests, and other activities.

- Prepared necessary reports including; Annual Report for 1991, quarterly reports, and quarterly Newsletter. Upgraded documentation of Annual Work Plans and Budgets.

- Prepared three special publications: Peanut CRSP Update-1991, Aflatoxin Research Review - Peanut CRSP Research Report 91-01, and New Directions in Integrated Pest Management - Peanut CRSP Research Report 92-01.

- Arranged and participated in two Board of Director's meetings plus

one conference call and two Technical Committee meetings (see Board and TC activities).

- Arranged Principal Investigators meeting at APRES-San Antonio, Texas, July 10-11, 1991.

- Active monthly with CRSP Council to foster Inter-CRSP research activities. Participated in Council meeting in Washington, DC in December 1991, and in March 1992. A major activity has been the development of a concept paper for a potential Inter-CRSP program in Niger.

- Coordinated CRSP inputs into the International Arachis Newsletter. Prepared articles for AID Weekly Newsletter.

- Coordinated Peanut CRSP component of grant from AID for socioeconomic impact studies in Thailand and the U.S.

- Traveled to Malawi in November 1991 and Ghana 1992 to discuss program linkages in these countries.

- Prepared a Peanut CRSP MOU and Work Plan for Inter-CRSP activities in Honduras. Proposal awaiting Mission approval.

- Finalized plans as member of Steering Committee and participated in the International Groundnut Workshop held at ICRISAT-India November 25-30, 1991.

Board of Director's Activities - The Board is the Policy making group in the CRSP, and is responsible for establishing the general directions for the CRSP as carried out by the ME. The Board also acts on recommendations from the Technical Committee on budgets and programs.

- Conducted three meetings during the year: a meeting in San Antonio, Tx July 11, 1991, a meeting in Griffin, GA on April 13, 1992 and by conference call on June 30, 1992.

- Reviewed recommendations of the AID Administrative Review Team and EEP and assisted the ME in formulating actions on the recommendations, some of which had recommendations from the Technical Committee. Examples are; Policy and Operating Procedures Manual, a Strategic Plan, expansion of the TC, plan for increased EEP involvement, and increased socioeconomic activities.

- Considered recommendations from the TC and approved 1992-1993 Work Plans and Budgets.

- Dr. Johnny Wynne represented the Board at CRSP Council meetings in Washington, DC, December 11-12, 1991.

Technical Committee Activities - The Technical Committee is responsible for formulating and recommending to the Board program and budget plans.

- Conducted two meetings during the year: July 12, 1991 at San Antonio, TX , and May 20, 1992 at Griffin, GA.

- Prepared budget and work plan recommendations for 1992-1993 which included programming of the 10% budget decrease.

- Held elections to expand the TC to six members, which provides broader disciplinary representation.

- Dr. Olin Smith represented the TC at CRSP Council meetings in Washington, DC, December 11-12, 1991.

External Evaluation Panel - The EEP is designed to give an unbiased view of how the CRSP is progressing toward meeting its objectives. Plans were implemented during the year to have the EEP involved in evaluation on a more regular, continuing basis.

- Reviewed annual progress through an evaluation of the Annual Report and the Work Plans and Budgets.
- Reviewed plans for the use of the 20% increase in funds.
- In conjunction with another trip, one member visited Jamaica and briefly reviewed CRSP activities there.

AID Project Manager - The Project Manager interacted with the CRSP on a continuing basis, and provided the primary linkage for the CRSP with AID.

- Met with the Board in July 1991 and April 1992, and by conference call in June 1992. Met with the Technical Committee in May 1992.
- Provided necessary actions on travel clearances, equipment purchases, etc.
- Coordinated and promoted CRSP Council activities for the Peanut CRSP.
- Provided liaison with the CRSP for all information from AID important to the functioning of the program.

BIFADEC Liaison - The liaison provides a link with BIFADEC for information and actions important to the Peanut CRSP.

- Participated in the Peanut CRSP Annual Meeting in San Antonio, TX in July 1991.
- Provided information on a regular basis to the CRSP from BIFADEC.

PEANUT CRSP IN RELATION TO THE EXPORT COMPETITION

SUMMARY

Host countries of the Peanut CRSP are not competitors in the export market for edible peanut. Some of the West African countries export some oil and oil meal, particularly Senegal, but the United States does not export oil and meal. Minor amounts of export show up in the U.S. Department of Agriculture-Foreign Agricultural Service data, i.e. Mali, which evidence shows is probably oil seed being shipped to a mill in another country. West African peanut production is now largely used for domestic oil and food.

INTRODUCTION

Activities of the Peanut CRSP are consistent with the overall goals of the Title XII program of the United States Foreign Assistance Act of 1975, which is to prevent famine and establish freedom from hunger through land-grant university involvement in international development. To attain the goals, the research capability of both developing country and U.S. institutions is enhanced through training and support of research. Inherent in the CRSP concept is the need to address constraints that have global implications.

In short, the Peanut CRSP enhances the potential of peanut as a crop for human food and animal feed in developing countries and the United States, as it contributes to the increase of rural incomes and sustains agricultural land. The collaborative research on peanut is producing new and improved technology that improves the well-being of people in developing countries and, in turn, benefits citizens of the United States.

Host countries for the Peanut CRSP were selected based on several criteria, among which was the importance of peanut as a food crop and as an income generator for the rural population, the presence of an established research effort on peanut that would be enhanced by the CRSP collaboration to better meet the goals of Title XII, and the potential for the program to have regional and global impacts as well as in country. Presently, the Peanut CRSP is active in Burkina Faso, Mali, Niger, Nigeria, Senegal, Philippines, Thailand, and the Caribbean with focus on Jamaica and Belize.

Section 1.I.7. of the Grant precludes the use of funds provided by USAID for work in connection with the growth or production in countries other than the United States of an agricultural commodity for export which would compete with a similar commodity grown or produced in the United States. The purpose of this statement is to show that funds have not been used in a way to enhance competition with the U.S. peanut export market. In order to demonstrate this, the present export outlook of the Regions and Countries of the Peanut CRSP will be reviewed and analyzed.

PRODUCTION AND USE

Peanut production and use data for the CRSP host countries presented in the following table was compiled by Dr. Stanley Fletcher, Department of Agricultural Economics, The University of Georgia, Georgia Station. Dr. Fletcher is a part of a team that maintains a data base on the world peanut supply and movement in support of the U.S. peanut industry. The data is based on U.S. Department of Agriculture, Foreign Agricultural Service information. Another source of information, especially descriptive information on the West African peanut industry was "Peanut Production, Marketing, and Export: Senegal, Gambia, Mali, Burkina Faso, and Niger" by W.H.M. Morris and published by the Peanut CRSP.

West Africa - Peanut in West Africa was promoted by the French during the colonial period as a source of vegetable oil for France. Similar activities were supported by the British in the Anglophone countries of the Region. Following the independence of the West African countries in the early 1960's, a general decline in the production has occurred due to the loss of the oil market in Europe. Other oil crops produced in Europe have replaced the imported oil, and most of the export market for peanut oil has disappeared except for part of the Senegal production. These countries have traditionally never been exporters of edible peanut. West Africa is a vegetable oil deficit Region and imports palm and other oils to satisfy these needs. The imported oils are lower in price than the locally produced peanut oil, depressing demand that could be a satisfied with locally produced peanut. Peanut is an important food crop in the Sahelian region of West Africa with most of the oil and edible production consumed domestically, and the primary goal of the Peanut CRSP is to enhance the food use of peanut because of the high protein and energy content of peanut. Peanut is an important small-holder, subsistence farmer crop because of its importance as a food item for the farmer, as a cash crop on the local-urban market, a valuable forage for livestock especially in West Africa, and as a nitrogen supplying legume for sustainable production systems.

Export of peanut from these countries was and is primarily in the form of oil and oil meal. Some exports sometimes show up in the table, but this is oil seed for crushing in another country such as France.

Burkina Faso - Annual peanut production in Burkina Faso is about 155,000 metric tons per year. There is some peanut oil export, but the country is a net importer of vegetable oil. There is both commercial and village-level traditional oil production for domestic use. Food use is in pastes for soups and as snack and confectionery foods. Peanut CRSP research is underway to enhance the use of peanut flour in composite flours with cereals and in weaning foods.

Mali - Annual peanut production in Mali is about 95,000 metric tons annually. Similar to Burkina Faso, peanut oil production for export declined in the 1970's. There is commercial and village-level oil production for domestic use, and as a domestic food crop in the form of pastes for soups and as snack and confectionery foods.

Niger - Niger follows much the same pattern as Burkina Faso and Mali with peak peanut production in the 1970's. Rosette virus, drought, and prices has reduced production and export of peanut oil. Present production is about 60,000 metric tons per year. Domestic oil production from commercial and artisanal producers, peanut paste for soups, peanut cake for a fried cake called kulikuli, and snack peanut accounts for much of the production.

Nigeria - Nigeria is the most populated country in Africa. The need for vegetable oil and export to Europe during the British Colonial period stimulated a large production of peanut. During the early 1970's, drought, rosette virus, and urban migrations following the development of the petroleum industry caused a decline in peanut production. Hence, peanut has changed from a commercially important export oil crop to a domestic crop. The 400,000 metric tons of peanut produced is used for commercial and village-level domestic oil production, pastes for use in soups and other dishes, and other local food and snack items.

Senegal - Senegal is an exporter of peanut oil, but not edible peanut. In 1984-1985, 83,000 metric tons of oil was produced in Senegal and only about 33% was exported with the remaining 55,000 metric tons consumed locally. Additionally, considerable amounts of peanut is consumed as condiment in stews, soups, and as snack food. This puts Senegalese domestic consumption in the range of 75% of production.

Southeast Asia - Peanut is not an export crop in the countries of Southeast Asia. Many farmers grow small plantings for food and sale on the local markets. Peanut is an important rotation crop in many cropping systems. Domestic production and hence consumption in The Philippines and Thailand, host countries for the Peanut CRSP, is about 38,000 and 164,000 metric tons annually, respectively. Consumption is peanut butter, ground roasted for prepared dishes, roasted, boiled, confectionery, and other prepared dishes.

Caribbean - The Peanut CRSP collaborates in the Caribbean through the Caribbean Agricultural Research and Development Institute, with work primarily in Jamaica and Belize. Production is low, but peanut is an important crop to the small-scale farmers. Jamaica production is about 5,000 acres, and Belize production is less than 1,000 acres. Production is consumed domestically as peanut butter, snacks, and confectionery products. Production does not show up in world production data. Very small quantitites are sometimes traded within the member countries of the Caribbean Community (CARICOM), but since imports into CARICOM are restricted by extremely high tariffs it is of no concern in the export market.

Table 1. Peanut production and disposition in Peanut CRSP collaborating countries.

Region/ Country/ Year	Harvested area (1000 ha)	Yield (MT/ha)	Supply (1000 MT)			Disappearance (1000 MT)					
			Beginning stocks	Production	Imports	Food Use	Crushing	Feed & Seed	Total Use	Exports	Ending stocks
Burkina Faso											
80	140	0.50	0	70	0	10	53	7	70	0	0
81	140	0.55	0	77	0	13	58	6	77	0	0
82	140	0.55	0	77	0	13	58	6	77	0	0
83	140	0.57	0	80	0	16	58	6	80	0	0
84	140	0.50	0	70	0	16	48	6	70	0	0
85	180	0.71	0	128	0	20	93	15	128	0	0
86	230	0.70	0	160	0	20	125	15	160	0	0
87	230	0.63	0	146	0	20	111	15	146	0	0
88	250	0.72	0	180	0	20	145	15	180	0	0
89	230	0.70	0	160	0	20	125	15	160	0	0
90	220	0.68	0	150	0	10	125	15	150	0	0
91	225	0.69	0	155	0	15	125	15	155	0	0
Mali											
80	97	0.95	0	92	0	14	68	7	89	3	0
81	97	0.95	0	92	0	15	68	6	89	3	0
82	97	0.82	0	80	0	12	59	6	77	3	0
83	97	0.52	0	50	0	11	30	8	49	1	0
84	97	0.46	0	45	0	9	30	4	43	2	0
85	97	0.93	0	90	0	17	60	8	85	5	0
86	97	0.93	0	90	0	17	60	8	85	5	0
87	110	0.91	0	100	0	17	70	8	95	5	0
88	115	1.00	0	115	0	17	85	8	110	5	0
89	100	0.90	0	90	0	17	60	8	85	5	0
90	110	0.91	0	100	0	17	70	8	95	5	0
91	100	0.95	0	95	0	17	65	8	90	5	0
Niger											
80	169	0.75	0	126	0	91	32	3	126	0	0
81	150	0.80	0	120	0	75	42	3	120	0	0
82	140	0.57	0	80	0	60	17	3	80	0	0
83	159	0.47	0	74	0	51	20	3	74	0	0
84	140	0.21	0	30	0	18	9	3	30	0	0
85	100	0.40	0	40	0	27	10	3	40	0	0
86	100	0.60	0	60	0	42	15	3	60	0	0
87	100	0.45	0	45	0	27	15	3	45	0	0
88	130	0.62	0	80	0	62	15	3	80	0	0
89	110	0.55	0	60	0	42	15	3	60	0	0
90	110	0.55	0	60	0	42	15	3	60	0	0
91	110	0.55	0	60	0	42	15	3	60	0	0

Table 1 -continued

Region/ Country/ Year		Harvested area (1000 ha)	Yield (MT/ha)	Supply (1000 MT)			Disappearance (1000 MT)					
				Beginning stocks	Production	Imports	Food Use	Crushing	Feed & Seed	Total Use	Exports	Ending stocks
Nigeria												
	80	650	0.82	0	530	0	220	204	106	530	0	0
	81	479	0.89	0	428	0	178	165	85	428	0	0
	82	600	0.66	0	396	0	165	152	79	396	0	0
	83	600	0.99	0	591	0	246	227	118	591	0	0
	84	550	0.91	0	500	30	220	210	100	530	0	0
	85	520	0.77	0	400	43	189	174	80	443	0	0
	86	660	0.61	0	400	30	166	184	65	415	0	15
	87	800	0.59	15	475	0	324	100	45	469	1	20
	88	700	0.50	20	350	0	234	75	40	349	1	20
	89	700	0.50	20	350	1	265	55	40	360	1	10
	90	740	0.50	10	370	0	265	55	40	360	0	20
	91	750	0.53	20	400	5	304	60	40	404	1	20
Senegal												
	80	1064	0.49	0	521	0	101	258	159	518	3	0
	81	1080	0.81	0	878	0	128	574	170	872	6	0
	82	1121	0.99	0	1109	0	154	636	249	1039	0	70
	83	937	0.61	70	568	0	187	285	150	622	16	0
	84	874	0.64	0	560	0	275	185	100	560	0	0
	85	607	0.97	0	587	0	181	284	120	585	2	0
	86	808	1.01	0	817	25	222	500	120	842	0	0
	87	846	1.10	0	932	31	165	580	142	887	1	75
	88	903	0.76	75	690	30	181	465	118	764	1	30
	89	784	1.04	30	815	30	149	582	116	847	3	25
	90	915	0.73	25	670	30	140	445	117	702	3	20
	91	900	0.77	20	695	30	148	450	119	717	3	25

Table 1 . continued

Region/ Country/ Year	Harvested area (1000 ha)	Yield (MT/ha)	Supply (1000 MT)			Disappearance (1000 MT)					
			Beginning stocks	Production	Imports	Food Use	Crushing	Feed & Seed	Total Use	Exports	Ending stocks
Philippines											
80	39	0.77	0	30	0	18	0	12	30	0	0
81	56	0.88	0	49	0	30	0	19	49	0	0
82	48	0.75	0	36	0	22	0	14	36	0	0
83	46	0.91	0	42	0	24	0	18	42	0	0
84	47	0.89	0	42	4	29	0	17	46	0	0
85	50	0.88	0	44	8	52	0	0	52	0	0
86	45	0.91	0	41	17	53	0	5	58	0	0
87	51	0.90	0	46	27	68	0	5	73	0	0
88	50	0.90	0	45	25	65	0	5	70	0	0
89	46	0.76	0	35	35	67	0	3	70	0	0
90	46	0.80	0	37	38	71	0	4	75	0	0
91	48	0.79	0	38	40	74	0	4	78	0	0
Thailand											
80	100	1.29	15	129	0	63	36	10	109	22	13
81	117	1.26	13	147	0	61	42	13	116	31	13
82	117	1.24	13	145	0	69	29	19	117	29	12
83	120	1.23	12	147	0	78	41	19	138	3	18
84	125	1.38	18	172	0	108	34	15	157	5	28
85	123	1.40	28	172	0	116	35	14	165	3	32
86	125	1.35	32	169	0	125	35	15	175	3	23
87	118	1.37	23	162	0	125	30	20	175	3	7
88	119	1.43	7	170	0	125	28	20	173	1	3
89	120	1.34	0	161	0	137	5	18	160	1	0
90	122	1.33	0	162	0	138	3	20	161	1	0
91	123	1.33	0	164	0	140	3	20	163	1	0

PEANUT CRSP BUDGET SUMMARY

July 1, 1990 - June 30, 1992

1.	From AID 7-1-90 to 6-30-91	$1,700,000
2.	From AID 7-1-91 to 6-30-92	2,040,000
3.	**Total from AID**	**$3,740,000**
4.	Amended to projects 7-1-90 to 6-30-91	1,328,000
5.	Amended to projects 7-1-91 to 6-30-92	1,567,765
6.	Total amended to projects	$2,895,765
7.	**Total expended by projects**	**2,045,616**
8.	Total University Cost Share (27% not including pass through funds)	417,601
9.	Management Entity and Contingency 7-1-90 to 6-30-91	372,000
10.	Management Entity and contingency 7-1-91 to 6-30-92	472,235
11.	Total to Management Entity and contingency	844,235
12.	**Total expended by ME and contingency**	**610,516**
13.	**Balance 6-30-92**	**1,083,868**

The balance is based on actual expenditures and does not include encumbered funds. The rate of expenditure was slowed down at the following 7-1-90, because of closing accounts on the old grant and establishing new subgrants, Memoranda of Understanding, and accounts for the new grant beginning 7-1-90. The pipeline is now reducing steadily.

Project Budgets for 1990/1991

	Budgeted			
	AID			Universities
Project	US	HC	Total	Cost Share
AAM/FT	94,408	30,453	124,861	30,159
GA/FT	54,874	78,987	133,861	13,719
GA/IM	67,198	14,563	81,761	55,286
GA/PH	70,082	49,779	119,861	17,521
GA/PV	53,292	33,570	86,862	43,487
NCS/BCP	150,289	128,372	278,661	48,810
NCS/IM	36,421	51,940	88,361	12,140
TX/BCP	165,303	108,408	273,711	57,929
TX/MM	83,580	56,481	140,061	44,089
Total	775,447	552,553	1,328,000	323,140

Project Budgets for 1991/1992

	Budgeted			
	AID			Universities
Project	US	HC	Total	Cost Share
AAM/FT	77,015	74,985	152,000	36,217
GA/FT	53,367	108,233	161,600*	12,792
GA/IM	51,308	44,282	95,590	77,013
GA/PH	67,746	80,340	148,086**	16,765
GA/PV	64,385	39,515	103,900	43,169
NCS/BCP	184,737	142,685	327,422***	58,998
NCS/IM	53,882	47,618	101,500	17,961
TX/BCP	197,457	135,010	332,467	66,743
TX/MM	87,352	57,848	145,200	47,995
Total	837,249	730,516	1,567,765	377,653

	Budget 2 Yr Total			
	US	HC	Total	Cost Share
AAM/FT	171,423	105,438	276,861	66,376
GA/FT	108,241	187,220	295,461	26,511
GA/IM	118,506	58,845	177,351	132,299
GA/PH	137,828	130,119	267,947	34,286
GA/PV	117,677	73,085	190,762	86,656
NCS/BCP	335,026	271,057	606,083	107,808
NCS/IM	90,303	99,558	189,861	30,101
TX/BCP	362,760	243,418	606,178	124,672
TX/MM	170,933	114,329	285,262	92,084
Total	1,612,696	1,283,069	2,895,765	700,793

* Added $2,200 to base budget for International W.S. Travel
** Added $686 to base budget for International W.S. Travel
***Added $7,743 to base budget for International W. S. Travel

Project Expenditures for 1990/1991

Project	AID US	AID HC	AID Total	Universities Cost Share
AAM/FT	27,368	15,879	43,247	33,025
GA/FT	31,099	74,752	105,851	6,644
GA/IM	38,781	27,445	66,226	20,725
GA/PH	36,700	63,457	100,157	5,990
GA/PV	7,255	9,590	16,845	0
NCS/BCP	116,190	61,915	178,105	48,810
NCS/IM	23,279	23,369	46,648	11,740
TX/BCP	128,041	59,644	187,685	90,281
TX/MM	67,818	15,927	83,745	22,999
Total	476,531	351,978	828,509	240,214

Program Expenditures for 1991/92

AAM/FT	60,928	38,609	99,538	8,252
GA/FT	41,648	103,039	144,687	21,055
GA/IM	60,402	20,160	80,562	27,000
GA/PH	50,212	50,437	100,649	14,959
GA/PV	33,233	26,063	59,296	0
NCS/BCP	166,119	91,979	258,098	56,210
NCS/IM	52,325	55,770	108,095	13,870
TX/BCP	156,495	106,636	263,131	38,917
TX/MM	44,054	61,998	106,052	12,452
Total	665,416	554,691	1,220,108	192,715

Total Expenditures 1990 - 1992

Projects	US	HC	Total	Cost Share Booked
AAM/FT	88,296	54,488	142,784 (52%)	41,277
GA/FT	72,747	177,791	250,538 (85%)	18,161
GA/IM	99,183	47,605	146,788 (83%)	47,725
GA/PH	86,912	113,894	200,806 (75%)	14,959
GA/PV	40,488	35,653	76,141 (40%)	0
NCS/BCP	279,309	153,894	433,203 (72%)	105,220
NCS/IM	75,604	79,139	154,743 (82%)	25,610
TX/BCP	284,536	166,280	450,816 (75%)	129,198
TX/MM	111,872	77,925	189,797 (68%)	35,451
Total	1,138,947	906,669	2,045,616 (71%)	417,601 (27%)

MANAGEMENT ENTITY BUDGET

1990/91

Management

	Budget	Expended	Balance
Salaries (3)	108,288	107,340	948
Staff Benefits	31,701	28,508	3,193
Communications	4,000	5,109	(-)1,109
Operating Sup.	2,715	5,942	(-)3,227
Travel (ME Int)	15,000	6,752	8,248
Meeting Costs ME Dom., BD,TC	20,000	6,965	13,035
EEP Costs	15,000	---	15,000
Sub-Total Direct Costs	**196,704**	**160,616**	**36,088**

Communications and Outreach

Workshops	15,000	11,012	3,988
Int. Arachis Newsletter	6,000	-	6,000
Misc. (publications, annual report, brochures, promotional materials	20,069	2,815	17,254
Sub-Total Direct Costs	**41,069**	**13,827**	**27,242**
Total Direct Costs	**237,773**	**174,443**	**63,330**
IDC (37%)	87,977	63,616	24,361
IDC on subcontracts	46,250*	15,548	30,702
	-	23,354**	7,348**
GRAND TOTAL ME	**$372,000**	**276,961**	**95,039**

* Indirect Costs on first $25,000 on each non-Georgia subgrant (total of 5); prorated across 9 subgrants or $5139/subgrant.

** Billed in 1991/92

MANAGEMENT ENTITY BUDGET
1991/92
Management

	Budget	Expended	Balance
Salaries (3)	113,766	108,241	5,525
Staff Benefits	33,783	29,536	4,247
Communications	4,000	6,341	(-)2,341
Operating Sup.	6,615	9,752	(-)3,137
Travel (ME Int)	15,000	10,216	4,784
Meeting Costs ME Dom., BD,TC	20,000	18,227	1,773
EEP Costs	15,000	5,049	9,951
Sub-Total Direct Costs	**$ 208,164**	**187,362**	**20,802**
	Communications and Outreach		
Workshops	15,000	19,819	(-) 4,819
Int. Arachis Newsletter	7,000	7,000	0
Misc. (publications, annual report, brochures, promotional materials	9,441	18,744	(-) 9,303
Sub-Total Direct Costs	**31,441**	**45,563**	**(-)14,122**
	Special Projects		
Inter CRSP	10,000	1,597	8,403
CRSP Council	10,000	3,144	6,856
Training/Margaret Hinds	1,500	1,951	(-) 451
W.A. Var. Test	12,000	-	12,000
Sub-Total Direct Costs	**33,500**	**6,692**	**26,808**
	Contingency		
Strategic Plan	20,000	-	20,000
Socioeconomics	20,000	7,141	12,859
Sustainable Agriculture	28,721	-	28,721
Sub-Total Direct Costs	**68,721**	**7,141**	**61,580**
Total Direct Costs	**341,826**	**246,758**	**95,068**
IDC (37%)	130,409	86,797	43,612
IDC on Subcontracts	-	(23,354)	(7,348)
Grand Total	**$472,235**	**$333,555**	**$138,680**

MANAGEMENT ENTITY BUDGET
Total 1990/91 - 1991/92
Management

	Budget	Expended	Balance
Salaries (3)	222,054	215,581	6,473
Staff Benefits	65,484	58,044	7,440
Communications	8,000	11,450	(-)3,450
Operating Sup.	9,330	15,694	(-)6,364
Travel (ME Int)	30,000	16,968	13,032
Meeting Costs ME Dom., BD,TC	40,000	25,192	14,808
EEP Costs	30,000	5,049	24,951
Sub-Total Direct Costs	**$ 404,868**	**347,978**	**56,890**
	Communications and Outreach		
Workshops	30,000	30,831	(-) 831
Int. Arachis Newsletter	13,000	7,000	6,000
Misc. (publications, annual report, promotional materials)	29,510*	21,559	7,951
Sub-Total Direct Costs	**$72,510**	**59,390**	**13,120**
	Special Projects		
Inter CRSP	10,000	1,597	8,403
CRSP Council	10,000	3,144	6,856
Training/Margaret Hinds	1,500	1,951	(-) 451
W.A. Var. Test	12,000	-	12,000
Sub-Total Direct Costs	**33,500**	**6,692**	**26,808**
	Contingency		
Strategic Plan	20,000	-	20,000
Socioeconomics	20,000	7,141	12,859
Sustainable Agriculture	28,721	-	28,721
Sub-Total Direct Costs	**68,721**	**7,141**	**61,580**
Total Direct Costs	**579,599**	**421,201**	**158,398**
Indirect Cost (37%)	**218,386**	**150,413**	**67,973**
IDC on Subcontracts	**46,250**	**38,902**	**7,348**
Grand Total	**844,235**	**610,516**	**233,719**

* Amended 10,628 to projects for International W.S. Travel.