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Peanut Collaborative Research Support Program

Peanut CRSP
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PEANUT

COLLABORATIVE RESEARCH

SUPPORT PROGRAM

External Evaluation

Report

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PREFACE

The purpose of the 1992 Annual Evaluation of the Peanut CRSP by the External Evaluation Panel (EEP) was to provide advice to the investigators and management as to the degree that we are attaining goals established for the Peanut CRSP, and how we are adopting recommendations made by the EEP, Administrative Management Review Team, and the JCARD Committee during the 1989 extension efforts and the 1991 EEP Review.

The review was conducted by Dr. Allan Norden, retired Peanut Breeder, University of Florida, who coordinated the preparation of the report; Dr. John Cherry, Director of the USDA/ARS, Eastern Regional Research Laboratory, Philadelphia; and Dr. Ray Hammon, retired Peanut Geneticist, USDA/ARS, Tifton, GA. Dr. Johnny Pendleton, retired Agronomist, University of Illinois, and former EEP Chairman, had resigned from the EEP prior to the Review.

The Scope-of-Work for the Review follows.

1. Project Research Performance

   - Evaluate progress in 1990/91 as documented in the 1991 Annual Report against the proposed activities in the 1990/91 Work Plans. Do project work plans accurately reflect the research conducted for the year?

   - Is research progressing according to general goals of Global Plan? Are international and domestic research objectives complementary?

   - Is the technology being developed having impacts? Or is there potential for impacts? Are the results meaningful? Should the project(s) be redirected to increase the probability of impact?

   - Evaluate the social/gender ramifications of the research. Should any changes be make to better address these issues?

   - Does project output justify financial input? Are international and domestic activities properly balanced?

   - Is travel adequate to backstop international activities, including reciprocal U.S./host country scientists visits? Note that the Gulf Conflict hampered travel during the 1990/91 year.

2. Institutional Development Performance of Projects

   - Evaluate effort of project to provide graduate level training to collaborating country scientists? Other graduate students in absence of students from host country? Balance of training of U.S. and non-U.S. students?

   - Evaluate other institutional strengthening activities; equipment, supplies, shortterm training.

   - Extent of collaboration with other organizations, IARCs, other CRSPs, etc. Has this collaboration enhanced project output?

   - Is there evidence of interdisciplinary cooperation? What can be done to increase such cooperation?

3. Project Rating

For each project summarize findings and recommendations into a succinct synopsis describing the project's strengths and weaknesses. Recommendations should be clear and concise in terms of who (Board, TC, ME, PI) would be responsible for implementing the recommendation.

4. General Performance of the Peanut CRSP

- Evaluate general progress in solving problems which constrain production and utilization of peanut - based on the Global Plan. Does the mix of projects adequately meet goals to resolve constraints? Are there projects reaching maturity, or not any longer addressing viable constraints? Are plans to expand into new countries/regions in the best interest of the CRSP overall?

- Is the process of planning annual activities, implementation, reporting, monitoring, reporting, and evaluation adequate? Recommendations for improvement?

- Are there overlapping objectives in projects? If so is the work coordinated, complementary?

- Are overall training outputs - graduate and shortterm - adequate to maintain a scientist base?

- Is a continued or enhanced program to evaluate economic impacts justified? Is there evidence of impacts or potential impacts that could be evaluated?

- Evaluate other activities such as workshops, regional or international meetings, work group meetings, general publications? Do they enhance progress in reaching CRSP goals?

- Evaluate the proposal to develop a longterm Strategic Plan for the Peanut CRSP that would be a basis for development of the next extension proposal. A consultant (i.e. Ron Gibbons after June 30, 1992 retirement) would be employed to develop the framework for wide review and finalization of the Plan. Is such an exercise justifiable?

5. Other issues perceived by the EEP may be commented on.

I would like to thank the EEP for the vast amount of time and interest they have given to the Peanut CRSP since 1989, since this is the last activity for the present EEP. Their advice and criticism has been invaluable. The collective knowledge of research in general and peanut science particularly is exemplary. Moreover, they have been a pleasant group with whom to be associated. Best of luck in your future activities.

David G. Cummins
Program Director
Peanut CRSP

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PEANUT CRSP 1992 EEP REVIEW

INTRODUCTION

The External Evaluation Panel (EEP) is complimentary of all those involved with the Peanut Collaborative Research Support Program (CRSP), the Management Entity (ME), Board Directors (BD), Technical Committee (TC), and especially the Principal Investigators (PI's), Co-Principal Investigators (PI's), and cooperators for the extensive high quality research that is being accomplished with the allotted funding. The accomplishments and the goals for the future are impressive, and the EEP hopes that any comments or suggestions that are made will be taken constructively; as the successful attainment of the goals of the Peanut CRSP is the main reason for the EEP's existence.

The EEP in 1989, found numerous advancements were achieved during the 1982-89 period. Continuing progress on research actions taken to alleviate constraints, and advancing food science and technology of peanut to 1992, is reviewed. Noted research actions include, reduce or eliminate mycotoxin contamination, enhance use as a primary food source, strengthen resource management (agronomic, engineering, economic and sociological), increase numbers of trained researchers and support personnel and information transfer to beneficiaries. This review provides advice for attaining established goals and examines adoption of past recommendations. Also, the following questions are examined. Is progress according to general goals of the Global Plan? Is the technology having impact? Are social/gender ramifications being met? Does output justify financial input? Is equipment, supplies, short-term training in place? Are collaboration efforts being enhanced? Is interdisciplinary cooperation strengthening?

PROJECT RESEARCH PERFORMANCE

TX/BCP/WA - Disease-Resistant Peanut Varieties for Semi-Arid Environments; Dr. O. D. Smith, Texas A&M University, Principal Investigator.

The 1990/91 Work Plan specifically projected the research conducted and intermeshed with Global Plan goals. International and domestic research are complementary and properly balanced. The project output justifies financial outlays.

Impacts included development and release in Senegal of new cultivar 'Fleur 11' which should improve both the nutritional value of food at the family/village level and the income of Host Country farmers. The project is focused to enhance probability of continued impact. Since common constraints that limit peanut production in Sub-Saharian West Africa are similar (rainfall, cultivars, cultural practices, diseases, pests, etc.), the EEP suggest the possible extension of 'Fleur-11' into other host countries (Burkina Faso, Niger, Mali) for evaluation.

Studies on yields of Aspergillus flavus-resistant lines and conditions/states of pod development, growing temperatures are underway in West Africa and Texas. Confectionery peanut varieties high in oil content were found to have resistance to foliar diseases. Large-seeded lines of edible peanut that are desirable were identified. These results were specifically noted in Senegal. Advances noted for production programs are exciting and need to be extended to postharvest research on food science and technology of peanut, other CRSP projects, ICRISAT and CIRAD. Future ICRISAT/CRSP Regional Groundnut Workshops like the one held in Niamey, Niger during 1990, should include presentations that encourage such discussions.

Travel approached adequacy. The four host country PIs participated in the Second International Groundnut Workshop at ICRISAT in India. One US PI made a major presentation at the West African Regional Groundnut Workshop, held in a host country. The French collaborating agency's head participated in the APRES meetings in the U.S.

The project provided quality graduate level scientific training to two African researchers and one U.S. personnel was awarded the MS degree; PhD and MS studies continued for one student each from host countries Burkina Faso and Senegal; MS for student from the Philippines, and one from Colombia, initiated MS and PhD, respectively, studies.

We commend the extraordinary effort and work by personnel of TX/BCP to save their most valuable research materials when an exceptionally early fall freezing temperature killed plants, and wet conditions impacted timely harvests. This is but another example of the effort made by Peanut CRSP scientists to ensure progress even under unexpectedly harsh environments.

The placement of U.S. peanut shelling-grade equipment in the four host countries of the project can establish greater uniformity in obtaining data for comparative analysis with statistical parameters of progress. However, investigators should remember that even this level of sophistication may give a false reading of progress, unless human judgment is a benchmark of agronomic vs. statistical or mechanical progress.

The project researchers collaborate in Africa with <u>four</u> HC IARs, with CIRAD-FRANCE, CORAF-FRANCE, and the ICRISAT Sahelian Center. Collaboration has developed with INTSORMIL and LUPE-HONDURAS. This collaboration complemented and supplemented research between and within each agency. The TX/BCP/WA PI was instrumental in extending and expanding this collaboration. Within HCs the project cuts across disciplines. In the U.S., the project involves personnel in at least two departments at Texas A&M University, and has coPIs at two principal regional stations.

The Inter-CRSP linkages are being strengthened. The principal U.S. PI's skills are being used to explore, develop and expand other linkages, not only in West Africa but in Central America. The Board, TC and Management Entity (ME) continue to be strongly supportive of project TX/BCP/WA and its PIs.

NCS/BCP/TP - Peanut Varietal Improvement for Thailand and the Philippines; Dr. T. G. Isleib, North Carolina State University, Principal Investigator.

The transition of the PI leadership on this project in North Carolina was accomplished with no loss in progress toward attaining the goals of increasing yields and quality of peanut while decreasing the dependency on chemical inputs in the U.S. and the cooperating Asian countries. On the basis of the 1991 Annual Report the Work Plans and Budget proposed for 1990-91 appeared to be adhered to exceptionally well. The work plans for the breeding project in Thailand are quite general and there appears to be a contradiction about who is responsible for the hybridization work; the DOA, KKU, or both?

Breeding for improved short season (80-85 day maturity) lines will have broad application. We presume that this research is in cooperation with the TX/BCP project work in West Africa. The same may be said for the aflatoxin studies to identify resistance to infection by <u>A. parasitious</u> and toxin accumulation.

Failure to indicate the experimental design, plot size, number of replications or level of significance for most of the Department of Agriculture pathology experiments make it difficult for the reader to draw any solid conclusions from these experiments.

The EEP is hopeful that the problem involving the long delay in transfer of funds from the new grant to the participating institutions; and the suspension of federally supported travel to Thailand following the military coup are past history.

Progress in the development of varieties with adaptation to acid soils and to shade in the Philippines, as well as to full sunlight, is noteworthy. The EEP is pleased to note that 47, 57, and 23 kg of clean seed was produced in the Philippines in 1991 from the most promising entry in each of the growing condition trials: full sunlight, partial shade, and highly acid soils, respectively. Can we assume that the promising material yielding 20 to 40% above the check variety in Thailand is also being increased? Seed maintenance facilities in the Host countries need to be improved to avoid rapid deterioration of seed viability. The addition of Dr. Weissinger to the program at NCS as a cooperator to work in transformation of genes from other organisms to peanut could have a major impact in the long term particularly in disease resistance.

The cooperation with Georgia scientists in the breeding for resistance to nematodes, viruses, and insects is highly commendable. It would seem, however, that the probability of success in breeding for insect resistance in Thailand, utilizing only 8 F_2s would be quite low (Para. i, Page 28, 1991 Annual Report).

The breeding for resistance to Sclerotium stem rot in Thailand and improvement of boiling-type peanut in both Thailand and the Philippines could also have a significant impact in the Southeastern peanut belt of the U.S. Research on the improvement of peanut for the boiled market has been a neglected area of research in the U.S., even in the Southeast where boiled green peanut is a prized food snack for many people. No mention was made concerning the criteria being used to measure improvement, or the market demands for boiled peanut in Thailand or the Philippines. What are the traits being sought in a good boiling-type peanut, and are they the same in Asia as in the U.S.?

The EEP suggest that the TX and NCS/BCP CRSP projects consider interacting in the further exchange of germplasm, particularly in the testing of genotypes with promise for use where soil acidity is a constraint. Candidates for cross-CRSP testing: (1) the three most promising genotypes described as tolerant to highly acidic soil conditions in the Philippine (1991 AR, page x); (2) the most promising Uruguayan genotypes from TX/BCP/BF tests on high aluminum soils could be reciprocally evaluated in the Philippines and Thailand; and (3) the ten potentially acid-tolerant materials under evaluation at UPLB and Siniloan, Laguna could be introduced into West Africa for field trials at TX/BCP and ICRISAT Sahelian Center. Such research could shorten the time gap in developing suitable material to allow the crop to be grown on thousands of hectares in areas hitherto impossible, but where needed for a sustained food source by the local population. Such close cooperation between CRSP projects should also show greater strength in convincing the US Agricultural Experiment Stations that the CRSP is not merely exporting research.

The EEP also calls attention of the principal investigators of the TX and NCS BCP projects to an extensive collection of 187 Venezuelan genotypes available for possible screening for tolerance to high soil acidity. Developed in an area of South America where acidity is endemic, these genotypes came into the U.S. Plant Germplasm system as P.I.'s 259572-259758 from samples acquired by the USDA-Georgia breeding project at Tifton.

Studies with selected breeding of early maturing large-seeded lines and boiling-type peanuts are underway. Stress due to drought conditions was related to fungus colonization and aflatoxin production. Released cultivars were found to be susceptible to fungus colonization, but only limited aflatoxin production was detected. Breeding studies are strong in U.S., Thailand and Philippines with many cultivars and crosses being examined. Clearly, the work underway is progressing impressively well.

Studies to advance aspergilli-resistance in peanut should be closely coordinated with storage/quality studies at Kasetsart University. An impressive publication list of abstracts and manuscripts from U.S. and developing countries was presented. Of five students receiving advanced degrees, two (M.S. degrees) were from Khon Kaen University.

TX/MM/S - Mycotoxin Management in Peanut by Prevention of Contamination and Monitoring; Dr. M. N. Beremand, Texas A&M University, Principal Investigator.

Progress in 1990/91 in the U.S. institution, Texas A&M University, was well documented in consonance with activities proposed, viz, the Work Plan was carried out. On the other hand, reports for research in HC Senegal failed to reach the U.S. in time for inclusion in the Annual Report.

The impending retirement of the U.S. PI and the undue delay in naming and affirming the replacement(s) initially impacted progress of the project toward its international goal. However, on the use of aluminasilicate clays in detoxifying aflatoxin contaminated peanut, the technology continues to have potential for impacts since the mycotoxins are important naturally-occurring food contaminants not only in semi-arid tropics but, also, in much of the developed world.

Specific project output -- on the use of clays to detoxify peanut, on the clarification of the mechanism(s) by which certain compounds in peanut tissues act as defense mechanisms against invasion by aflatoxin-producing fungi, and on the search for a weak link in the life cycle of the fungus -- together with the very strong level of training justifies both the financial outlay and the continuation (even expansion) of this CRSP research under new leadership and with a revitalized plan of work.

Among the strong points of this project is the level of training provided at Texas A&M University for PhD candidates J.E. Fajardo and M.B. Sarr. In addition to preparation of dissertations, each has prepared manuscripts for publication of research results making a definite contribution to the scientific literature. Although the search for a genetic solution to the aflatoxin problem is in progress at many research locations throughout the world, the dual goals of reducing A. flavus penetration and aflatoxin elaboration are at the forefront of much current research. The EEP calls attention of the PIs to a current report indicating that "Tifton-8" had 80 to 90 percent reduction in aflatoxin compared to the Florunner variety. (Agri-Search, a University of Georgia AES publication, vol. 6, No. 2, p. 4, Spring 1992). Crop Science 25, 203, 1985 documents the release of germplasm line Tifton-8, which has multiple resistance to fungal diseases and insect pests.

Travel appeared to be adequate within the time period under review and the quality and scope of the publications and presentations are noteworthy. The project meshes with three major institutes in Host country Senegal and with CIRAD with which Peanut CRSP has developed a MOU. The Board, TC and ME are working with the new PI's to expand the scope and geographical area of this research.

Electrophoretic analysis of isozymes relative to A. flavus contamination were conducted with 11 enzymes. Results suggested the possibility of relating peroxidase activity in infected peanut cotyledons of selected genotypes to A. flavus susceptibility. Other than variations, quantitative and qualitative, only limited information is available relating fungal susceptibility and stress (drought, temperature) to isozyme patterns. Field screening studies of 4 peanut cultivars for A. flavus resistance failed to reveal significant differences.

Work at Texas A&M University is very productive and is contributing much to the understanding of the potential role of selected enzymes in A. flavus contamination of peanut seed. However, there needs to be a discussion on how these studies will lead to an understanding of resistance mechanism to A. flavus infection and aflatoxin biosynthesis in the peanut seed. Moreover, it is not clear how researchers in Senegal can collaborate in these studies.

Chitosan was shown to induce the formation of free phenols within peanut seed and may be related to a mechanism for resistance to A. flavus and aflatoxin contamination. The work with phyllosilicate clays from West Africa as chemisorption indexes for aflatoxin should be emphasized. More efforts are needed to determine the mechanism by which these compounds bind aflatoxins. Understanding this chemistry could lead to new advances in selected aflatoxin removal from peanut products. The studies that relate to these developments and are linked to the ammoniation work in Senegal, should be strengthened. Note: It is clear that this project serves as an example where Peanut CRSP is greatly benefiting in research advances from limited funding, largely through collaboration with researchers at Texas A&M University. However, these collaborations need to be extended to training of researchers in the developing countries so they too can contribute to the advancing technologies.

GA/IM/BF - IPM Strategies for Peanut Insects in SAT Africa;
Dr. R. E. Lynch, The University of Georgia, Principal Investigator.

The research, based on the work plans and budget, is progressing nicely toward reaching the goals of the project. The data, presented in 18 tables, is statistically analyzed including levels of significance giving the reader an opportunity to readily make critical comparisons between treatments.

In addition to the progress demonstrated in insect control, the evaluation of peanut varieties and 671 introductions for resistance to insect injury, is noteworthy. The increased peanut yields of 69% for the first harvest and 38% for the second harvest due to the use of the insecticides Temik + Lorsban is also impressive, as is the significantly greater aflatoxin content found in seed from injured pods than in seed from uninjured pods. In the evaluation of the recommended peanut varieties in Georgia, could the lower percentages of uninjured pods in GK-3 and NC-7 compared with Florunner, Sunrunner, GK-7 and Southern Runner be due to differences in hull thickness?

The EEP recommends a higher priority be given to seed multiplication of insect resistant lines for evaluation in Georgia and Burkina Faso; as well as the initiation of the program to identify resistance to rosette virus in Burkina Faso preferably as a joint program with TX/BCP.

The training of 6 Burkina Faso students by Peanut CRSP at the University of Ouagadougou and one at the University of Georgia is commendable.

Termite injury results in A. flavus and aflatoxin contamination of peanut seed. Drought-stressed, especially insect-damaged plants had significantly increased aflatoxin in seed compared to those of irrigated plants. Research needs to focus on the identity of major economic pests of peanut. The work with neem seeds is encouraging and should be speeded up; this work has been underway for a number of years and should be shown as having, or not having, potential as a natural insecticide. Noted were Food Scientists as collaborators. What research are they doing on the project to advance the food science and technology of peanut? Publications and presentations are mainly by U.S. researchers. Training of seven students from Burkina Faso is occurring, yet this effort has resulted in their producing only one co-authored publication.

NCS/IM/TP - Management of Arthropods on Peanuts in Southeast Asia; Dr. R. L. Brandenburg, North Carolina State University, Principal Investigator.

The principal investigator in North Carolina, Dr. Rick Brandenburg, began work on this project in October, 1990, and the Co-PI, Dr. Mary Barbercheck was added to the project later, thus the opportunity for the collection and summarization of data was rather limited.

A large amount of data was presented from Khon Kaen University (6 Tables). However, much of the data was presented without an analysis of variance, plot size, replication and plant numbers, leaving the reader with little opportunity to draw any significant conclusions. For example, in Tables 1 and 2 are the number of damaged pods and the percent damaged pods on a per plant or per plot basis? Are the low seed yields presented g/plot, or possible g/plant? What is the significance of the duplicate entries in Tables 1, 4 and 5?

Poor seed germination and shipping problems hampered the research on screening genotypes for insect resistance in both Thailand and the Philippines. A second seed shipment did arrive in good condition so the seed shipping problem apparently has been corrected. The EEP were pleased to read that the host countries are concentrating on saving and increasing their own seed for future testing.

Support of one scientist from each host country for travel to the 1992 APRES meeting, along with a 1 to 2 week training session at NCSU is commended. The new NCSU PI and Co-PI have an ambitious program underway and the EEP feels that, despite some set backs, the work is in capable hands.

GA/PV/N,TP - Peanut Viruses: Etiology, Epidemiology, and Nature of Resistance; Dr. J. W. Demski, The University of Georgia, Principal Investigator.

Progress in 1990-91 reflected certain changes in geographical areas of research focus and in HC personnel. With the return of HC PI P. Olorunju to Nigeria following completion of her PhD in virology at the University of Georgia, the program there was re-activated for breeding/development of improved cultivars with resistance to rosette virus. Good progress was achieved. The EEP strongly support the renewal of research emphasis for transferring resistance from long to short season cultivars needed for more stable crop production.

The effort of this project devoted to screening peanut germplasm for natural infection by TSWV in U.S. nurseries seems to be paying off, if the research finding (Quarterly Prog. Rept. No 6, 1991) that eight of 156 genotypes tested were virus free can be confirmed. But, since leafspot defoliation may have masked virus incidence in 1991 (Univ. GA Agri-Search 6 (3): pg. 3, 1992), rigorous retesting, under both natural and artificial conditions, is prerequisite to demonstrating true resistance.

Changes in the Thai cooperative program necessitated a reassessment of progress and HC commitment which refocused work in that nation. In view of the lack of trained virologist to conduct sustained research in the Philippines, the EEP supports termination of project work there.

In the United States, the PI led a team whose research screening of peanut germplasm for natural infection by the tomato spotted wilt virus (TSWV) detected several apparently resistant genotypes. The technology developed in this project has tremendous potential for both scientific and practical agricultural impact. Meaningful results include development of a system to transform and regenerate peanut, which holds considerable promise of a major advance in peanut science by incorporating genes for reduction or elimination of diseases (e. g., bacterial, fungal, nematodal, and/or viral).

We commend the cooperative support for breeding efforts to develop short-season rosette-resistant cultivars in West Africa. The EEP commends the PIs and their collaborators for: (a) sustained high-quality scientific journal articles and lay information publications (in both the U.S. and H.C.), (b) their participation and leadership in the rosette coordinators meeting, (c) planning the tomato spotted wilt virus consortium, and (d) the development and distribution of genetically-altered peanut plant materials.

AAMU/FT/BF - An Interdisciplinary Approach to Optimum Food Utility of the Peanut in SAT Africa; Dr. B. Singh, Alabama A&M University, Principal Investigator.

Progress - The design of the experiments is to increase utilization of peanut for human consumption. Based on earlier survey studies, increased utilization would have to involve more refined/processed products; packaging for increased shelf life; improved protein value of cereal-based foods; advanced storage, postharvest handling and inventory management; the result being improved nutritional value. Research has advanced understanding of supplemented sorghum flour-peanut flour composites as foods in Kisra (Sudan) and Toe (West Africa). Functionality studies included water-oil absorption, viscosity, gelation, emulsion capacity, nitrogen solubility value and protein dispensibility index. Storage of packaged products at low temperature were most stable; polyethylene bags maintained quality better than those stored in clay-coated or double waxed paper bags. Extrusion processing with a single screw cooking extruder, to produce a peanut-wheat snack, was successfully completed.

Researchers at the University of Ouagadougou completed analysis-protein, oil, fiber, carbohydrates - of 1990-91 grown peanut seed. One hundred samples from an entomology study for aflatoxin contamination were analyzed. These data are being extended to studies developing the means to process nutritionally wholesome peanut products at affordable costs.

Noted: There needs to be a strengthening of collaborations between plant researchers, microbiologists and food scientists. The data showing variation in seed and product compositions and aflatoxin contamination should be transferred to the processors of peanut products. More time should be spent exploring new packaging ideas with the processors. The extrusion technologies at Alabama A&M University, although doing much to advance new peanut products, should be transferred to Burkina Faso. However, extruders are very expensive and not available in Burkina Faso. No work was presented on efforts to understand the biological cycle of Aspergillus species in collaboration with agronomists. Work in collaboration with agronomists at Texas A&M University on quality evaluation of peanut is planned. These researchers also have a strong program on Aspergillus species and aflatoxin contamination related to enzymes in peanut seed and possible avenues for disease resistance (see TX/MM/S), an ongoing program that is not mentioned in this project's plan. Although not discussed in the report, work by scientists from Burkina Faso on the effect of blanching on soluble sugars, organic acids and fatty acid composition of peanut, and nutritional quality of peanut paste from various regions, was published. Also important is the development of a memorandum of understanding for collaboration between the Sorghum/Millet, Bean/Cowpea and Peanut CRSP projects. These are major developments! With the sad and unexpected death of Dr. Bharat Singh, and Dr. Casimir Akoh leaving Alabama A&M University for a new job, quick actions are needed to identify a new Principal Investigator(s). The progress being made on the plans for the project seems to be slowing, and these losses of key personnel will only add to this problem.

GA/FT/TP - Appropriate Technology for Storage/Utilization of Peanut; Dr. L. R. Beuchat, The University of Georgia, Principal Investigator.

Progress - Major accomplishments have occurred on crispy peanut-starch-based snacks (wheat-rice flour, sweet potato and peanut ingredients - nutritional value shown); defatted peanut flour; pregelatinized tapioca flour; single screw

extruder snacks with peanut flour (to 10% protein) in collaboration with the food industry, Bangkok, Thailand. Successful is a tempeh product from partially-defatted peanut that is produced at cottage-industry scale. A restaurant evaluated a ground roasted peanut paste product and found high acceptance by consumers. In the Philippines, a soft peanut curd with acceptable sensory characteristics was prepared. Peanut yogurt fermented with Streptococcus produced desirable aroma. Two peanut sauces (gadogado, lumpia) were developed and organoleptically accepted. Nutrient requirements of Cladosporium fuloum for inhibiting Aspergillus species were partially defined. U.S.-Filipino coworkers developed the methods for pilot scale processing of peanut paste and formulation of an imitation cheese spread. The formulation closely resembled consumer-panelists' perception of a cheese-flavored spread. At the University of Georgia, researchers spray-dried a peanut liquid coffee/tea whitener that had functional quality for replacing similar products from casein and soybean. Substituting up to 40% wheat flour with defatted peanut flour produced consumer panelists-accepted tortilla formulations. A yogurt-like product with highly acceptable sensory qualities was developed from lactic acid bacteria fermentations of peanut milk. A very impressive list of achievements!

Efforts are underway to introduce a socio-economic survey of farmers in a Thailand village for selected peanut products. Strong programs are in place for training of M.S.-and Ph.D.-degreed students. A highly successful workshop on "Quality Evaluation and Utilization of Food Legumes and Coarse Grains" was conducted at the Department of Product Development, Kasetsart University. Four companies are actively working with Kasetsart University scientists on advancing peanut products in collaboration with Peanut CRSP. The research is being technologically transferred to the industries and consumers. Publications and presentations are productive, especially from Thailand and Philippines. Women Scientists are an intricate part of the program. Clearly, the GA/FT/TP project scores extremely high in meeting all of its objectives and planned approaches.

GA/PH/CAR - Postharvest Handling Systems for the Small Peanut Producer; Dr. M. S. Chinnan, The University of Georgia, Principal Investigator.

Progress - In Belize, work with mechanical thresher, dryer and blanching equipment is progressing well. Thresher and harvester equipment, drying and storage facility studies, and recruitment of an engineer received high marks in Jamaica; work done by CARDI-University of West Indies. A motorized thresher was fabricated in Belize, based on the engineering drawings developed at the University of Georgia, successfully engineered drawings for dryers and storage facilities were completed. These studies included assessment of aflatoxins during storage, the results showing elimination of contamination by these toxic substances.

Efforts to publish and present the research are underway, as well as training of students and scientists/engineers in postharvest technologies for small farmers. The PI, University of Georgia, traveled to Khon Kaen University, Kasetsart University, Asian Institute of Technology and ICRISAT, India, to observe peanut postharvest handling equipment developed or adapted and examined ways to develop future project linkages and collaboration with CARDI and the farmers in Caribbean countries.

Ghana Developments:

New plans to include Ghana in Peanut CRSP show promise of advancing developments in West Africa. The Food Research Institute in Ghana has well equipped laboratories and a pilot plant. Interest is in purchasing extrusion equipment. This would expand research on the use of new technologies being developed on extruded foods at Alabama A&M University for West Africa. Other opportunities include collaborative research on boiled and roasted peanut, peanut butter for soup and oil processing at village scale production; peanut butter extended with cassava flour; and weaning formulas with maize, cowpea and peanut. Aflatoxin in

peanut products, e.g., peanut butter, is a major concern; postharvest drying, handling and storage technologies that eliminate aflatoxin contamination are needed and technologies now being used in Thailand and the Caribbean countries can be transferred to Ghana.

GENERAL PEANUT CRSP PERFORMANCE, RECOMMENDATIONS AND COMMENDATIONS

The Peanut CRSP has now been funded for ten years and before long it will be necessary to show expressions of progress in tangible terms and not merely projections. For example, changes in acreage, production, farm income, diets, etc. resulting from the 13 high-yielding cultivars tolerant to pests and environmental stresses that have been developed and released as a result of the Peanut CRSP. When the request is made for renewal of the grant a few years from now those responsible for funding will be justified in expecting to see tangible results. The EEP feel that too little attention was given to the impact (or potential impact) of the newly developed lines in the 1991 report.

The EEP was pleased to read in the minutes of the latest Board meeting of their interest in identifying new technologies developed that should be identified for economic impact; and commend the Technical Committee (TC) for acknowledging the importance of impact studies and backing up their interest with an allocation of dollars for this work in Burkina Faso and Nigeria

The EEP supports and commends the actions of the TC for taking some difficult but necessary stands on project redirection, and/or the discontinuing of phases of projects. (E.g. the termination of Olin Smith's TX/BCP efforts in Niger and Jim Demski's GA/PV work in the Philippines.) No mention was made of the GA/PV work in Thailand. Since Dr. Sopone Wongkaew, Virologist and Co-PI on the PV project in Thailand, had resigned from KKU in 1990 and work on virus diseases had been suspended (bottom of page 30 in the report), we suggest discontinuation of GA/PV in Thailand and focus on the original goals in Nigeria and the U.S. With TX/BCP shifting out of Niger, any confusion with this project may have been with the use of the letter "N" in both titles, and should be eliminated.

The EEP notes the increasing emphasis being placed on the use of bioengineering to develop plants with resistance to insects and viruses, and supports this new emphasis to some degree, but certainly would not support this work at the expense of or as a substitute for conventional breeding methodology. So far these new methods for plant improvement are unproven. The Peanut CRSP should be cautious in the expenditure of funds for bioengineering research and certainly avoid any duplication of efforts between projects.

There seems to be a considerable amount of effort still being expended in surveys, particularly in the insect management projects. It would seem that host country PIs and cooperators would know from years of experience what disease and insect problems are of most concern to the crop in their respective countries, unless some new pest problem has surfaced.

The EEP specially notes the promotion of Dr. Johnny C. Wynne to director of the Agricultural Research Service in North Carolina State University's College of Agricultural and Life Sciences, and of his being named the recipient of the National Peanut Council's Research and Education Award. Recognition for Dr. Wynne, a current member of the Board of Directors and former PI for NCS/BCP/TP, focused upon his achievements in developing and releasing improved peanut cultivars for use in U.S. agriculture. Dr. Wynne now has a broader venue for bringing increased recognition for successes in the Peanut CRSP to the attention of agricultural policy makers and budget planners.

The EEP notes that the training components led to the awarding of four PhD and 5 Master degrees at U.S. institutions during the period of the report. Although developing nations were the home countries for most of the degrees, only one among the nine was from a Peanut CRSP host country. The EEP is familiar with the reasons for this situation, and are aware that the majority of degree students currently in training are from host countries.

One major bonus of the Peanut CRSP for the United States is the explosion of peanut 'knowledge' added by the thesis and dissertation research at the participating universities, and continued flow of prestigious journal papers that enrich the literature data bank. Information gained in these studies not only can cut the cost and time for future breakthroughs, but these findings will show up in farmer's fields, in the marketplace, and on consumer's tables as products with enhanced quality and nutritional value. A second bonus lies in the fact that CRSP PIs have become more articulate, more polished in their presentations; when they speak their peers listen!

The EEP commends Drs. David Cummins, Dudley Smith, Olin Smith and others for efforts: (a) to evaluate potential for Peanut CRSP collaborative research in Honduras with the possibility of INTER-CRSP linkage; (b) to explore interest in Malawi for initiating technical assistance in program planning; and (c) to participate in an inter-CRSP team (INTSORMIL,Bean/Cowpea, Peanut CRSP) evaluation on the potential for building joint projects in Egypt, and for the work by Dr. Cummins to implement the Peanut CRSP grant there.

We commend the 23 Peanut CRSP scientists who attended and participated in the Global Peanut Workshop (a.k.a. the SECOND INTERNATIONAL GROUNDNUT WORKSHOP) at ICRISAT in India. Major production constraints were reviewed together with progress in research since 1980. The trip reports of Peanut CRSP participants understate the full impact of their contributions through making quality presentations, leading program sessions, and, above all, exhibiting scientific professionalism. Many third world participants gained a first-hand view of the training and vitality that the Peanut Collaborative Research Support Programs have given to researchers in various disciplines in Burkina Faso, CARDI, Niger, the Philippines, Senegal, and Thailand and to other country nationals who experience 'side-effects' by training in peanut research during the past decade at a CRSP US or HC University. The ICRISAT Director General and the Legume Research Team there have high praise for this work.

We commend the implementation of plan for a member from each major Peanut CRSP geographical area to represent that area in TC meetings concurrent with annual PI meeting.

We commend the developing of the Policy and Operating Procedures Manual, the institution of election procedures, term of office, and rotation for the Board chairman; and the Board of Directors for establishing the rotation schedule for EEP members.

The British term "groundnut" appears in some projects when the noun PEANUT (a word both singular and plural like "corn" or "sheep") should be used. Examples of the appearance of the term "groundnut" occur in reports of projects in African host countries where French is the official language. The careless use of terms can be offensive to HC administrators.

The EEP recognizes the innate problems in the transition from the previous budget cycle to renewed funding under the extension. We share the concern for the research delays; we understand the frustrations and the personnel (and personal) stresses that arise from a lapse of funding during the preparation, distribution, signing and return of new MOUs for host country project linkages.

Industrious research plans are in place for most of the projects in 1991/92. Since funds are limited, one recommendation would be to focus the resources on the highest priority plans to enhance success. The constraints to sustainable production and utilization of peanut are yields, drought, diseases, insects, mycotoxins, food science/technology, resource management, equipment/instruments and information transfer. The Peanut CRSP Global Plan should evaluate each of these constraints, determine available funding and resources in the U.S., advanced developing and developing countries. A carefully planned, and focused, strategy should be developed that will optimize these resources - i.e., enhance success by carefully matching selected research programs to available expertise, equipment/instruments and facilities. Also, eliminate duplication except where plans are complementary.

The TX/BCP/WA plan lists 10 items for West Africa and 14 for the U.S. Among these, of importance to food science and technology are efforts to develop A. flavus resistance, shelling and grading data, quantitative aflatoxin contamination and compositional quality factors (a collaboration with AAMU/FT/BF). Similar strategies are in place for NCS/BCP/TP. Success in control of A. flavus infection and elimination of aflatoxin would have enormous impact on peanut as a food supply in developing countries. Availability of cultivars producing high yields of nutritional peanut seed is also high priority. And proper handling, storage and processing to consumer-accepted products must result. All of these needs must be closely coordinated to ensure success in overcoming the constraints. The TX/MM/S plan adds molecular studies on defense mechanisms for fungal invasion or mycotoxin production, use of phyllosilicates toxin adsorptivity and ammoniation processing. Studies on insect damage and pod injury of aflatoxin contamination and neem as an insecticide, are emphasized by GA/IM/BF. The Burkina Faso AAMU/FT/BF project is an example of a need to focus plans (9 noted) to what can realistically and successfully be accomplished with the limited funds and resources. Emphasis should be on improved handling/storage conditions to reduce aflatoxin contamination and development of selected peanut products, including those that are cereal and legume-based. In the Philippines and Thailand, GA/FT/TP, the technologies developed are extensive. Efforts to fine tune quality, scale up production and test-market peanut products are strongly supported. The studies to transfer technologies developed on harvesting/handling systems, drying and storage facilities are on target for GA/PH/CAR in Caribbean countries; efforts to collaborate with Thailand engineers are applauded.

In general, the Peanut CRSP work in food Science and technology is doing much to advance the impact peanut has as a source of nutrients in advanced developing and developing countries. Noted is the start of communication of research outputs to clientele. This is especially true in Thailand as snack food fortified with peanut protein ingredients are attracting the interest of the food industry and consumers in Bangkok. In the Philippines, new yogurt fermentation technologies with selected bacteria are formed from peanut milk, and peanut pastes are being used to formulate an imitation cheese spread that closely approximates the consumer panelists' perception of a cheese flavored spread. The food processors in Burkina Faso have the potential of improving nutritional value and shelf life through new packaging technologies of peanut products. New postharvest handling, drying and storage technologies developed in Thailand and Caribbean countries are producing quality peanut seed for processing to food ingredients and products. The extensive efforts of all countries to reduce Aspergillus growth and aflatoxin contamination in peanut via genetic mechanisms or improved harvesting/handling/storage conditions are showing signs of success; a breakthrough here would give Peanut CRSP the recognition as one of the most important ventures ever started in agricultural research. Especially impressive is that a socioeconomic study in Jamaica has led to 10% of the farmers in two years growing a CRSP developed peanut cultivar, CARDI-Payne with yields 42% higher than those traditionally grown. Sharing of these technological advances among Peanut CRSP countries is happening but should be strengthened via more workshops and other exchange/communication mechanisms. This can be accomplished

by exchange of graduate students and scientists-engineers between Peanut CRSP advanced developing and developing countries; present exchanges are mainly with the U.S. New opportunities with Ghana could be enhanced via such exchanges of scientists and engineers.

The 1991 annual report "Improving Global Production and Use of Peanut" is impressively done; especially valuable is the Executive Summary presenting major accomplishments, human resources and institutional development, communication/outreach and administration/management. This report does much to advertise the progress of Peanut CRSP. And the new Peanut CRSP Global Plan described in the report shows the way this will be done -- the beneficiaries being developing country small farmers, women, food processors, and rural/urban consumers; and U.S. farmers, processors, and rural/urban consumers. The exercise is justifiable to prepare a needed long term strategic plan for Peanut CRSP to continue development of focused objectives and approaches/plans and transfer of technologies already developed to beneficiaries.