TRIP REPORT
C.R. JACKSON - D G CUMMINS
PEANUT CRSP PLANNING
October 5-30, 1980 - Itinerary:
IRHO(Paris), UNCTAD (Geneva), FAO (Rome)
ICRISAT (Hyderabad), Thailand, Indonesia and Philippines

JACKSON

Meeting with Dr. Pierre Gillier on October 8, 1980 Director of the Peanut Division of IRHO in Paris, and jointly also with Mr. Andre Bockelee-Morvan, who is Assistant Director of the Peanut Division of IRHO in Paris.

We asked them a number of questions relating to the constraints information on Section 1, General Information.

SENEGAL

1- D. Approximately 1.0 to 1.2 million hectare are cultivated for peanuts with a yield of approximately 1,000,000 tons (metric) of peanuts.
E. Peanuts are grown from the western coast through the center of the country into the southeastern part of the country.

F. 120,000 metric tons of peanuts in shell are kept for seed. 30,000 metric tons are exported in an edible form. That is whole peanuts, not oil; the remainder of the countries production are either eaten whole by the population or are crushed in five plants throughout Senegal. Part of the oil is exported and all of the oil cake is exported.

H. Covered above.

I. The average farm size is about 10 hectare of which 4-5 hectare are used for peanut production. Approximately 10 persons are involved with each farm.

J. The labor supply is entirely furnished by the family.

K. The government lends seed to each farmer on the basis of approximately 100 kilograms for each man and 50 kilograms for each woman, which comes out to an average of about 500 kilograms per family. The farmer must return the same quantity of seed to the governement plus 12% interest when his crop matures. The government also gives fungicide and fertilizer but expect a repayment for this out of the ensuing crop years profits. The government extends credit for equipment on a 3-5 year repayment basis. There are approximately 1,000 cooperatives in the country which act as a pass-through for government funds. This has been true in the past but there is a question as to whether this will continue in the future, because some of the cooperatives are unable to repay the government for the funds extended to them.

L. There are four scientists involved in peanut research in Senegal.

M. There are research facilities in Bambey, Louga, and Darou. These facilities have people stationed in a scientific capacity. There are two other research units that do not have resident scientists. The station at Louga is involved with cold storage of peanuts.

MALI

1-D The acreage in 1977-78 was 152,100 hectare which yielded 102,400 metric tons of peanuts.

1-E. Peanuts are grown in the northwest near the Senegal border and across the country to the east about halfway across the expanse of the country.

1-F. Peanuts are used directly by the people and some are exported as oil. For example in 1977-78, 42,000 metric tons were exported as oil and cake. We understand that the export of peanuts is going down so that in 1979-80 only 32,000 metric tons were exported. This is apparently due to an increase in population, a shortage of food and the need of peanuts for consumption within the country.

1-I. The average size of the farm is a maximum of 2 hectare.

1-J. The labor supply is furnished by the farm family.

1-K. The government does not furnish resources to the peanut farmer. Under the terms of an IBRD project the farmers are lent money for seed, fertilizer and perhaps pesticides and then the project itself buys the peanuts from the farmers and resells peanuts to the oil mills. In this way the project recovers its money from the farmer and makes a profit.

1-L. There are no research personnel in Mali.

1-M. There are practically no research facilities in Mali. The government is not interested in peanut research according to our information here.

NIGER

1-D. In 1979 there were 153,000 hectare of peanuts with an average yield of 530 kilogram per hectare.

1-E. Peanuts are grown along the east-west border with Nigeria, particularly in the areas of Maradias to Zinder.

1-H. In 1977-78 14,000 metric tons were crushed and 100,000 were produced. The difference between the crushed and therefore exported peanuts and total production is what was eaten locally or sold across the border into Nigeria.

1-I. The average farm size in the north is 20-25 hectares of which not all is planted in peanuts. In the south the average size is approximately 5 hectare of crops, of which 1 hectare, maximum, is used for peanuts.

1-K. The government apparently does not provide anything in the terms of resources. But as mentioned in the case of Mali, the IBRD/EEC project does provide seed, fertilizer and pesticides. In addition, this project sponsors small farm demonstrations and seed multiplication programs. Apparently the farmers repay the loans for seed fertilizer and pesticides through their own production.

1-L. In Naimey there is one genetist working on peanuts in the Ministry for Research and Education. There is no research being done under the auspices of the Ministry of Agriculture. There is one other scientist working on cultural aspects of peanuts in Maradis.

1-M. There is a new aflatoxin laboratory, a soil analysis laboratory, and a plant analysis laboratory in Naimey, but there is no one in Naimey to use the laboratories. A chemist who was trained at IRHO is being used as a bookkeeper.

We discussed a little bit about Chad, but the situation is so poor in Chad that we didn't get very far on that.

A final question that I asked to our respondents is "What is the principal constraints in all of these countries in which IRHO has worked?" They indicated that the constraint was the economic necessity of producing peanuts at a profit. The fertilizer and pesticides are too costly to use consistently". The peanut yield is so low that the goal for each country is to produce 1,000 kilogram per hectare and even if that production is reached farmers cannot afford to sell the entire production because they need peanuts for food.

CUMMINS

Dr. Gillier says the major problem in developing countries in peanut production is going from research knowledge to production practices in the field. His organization (IRHO) has had or does have work in Senegal, Mali, Niger, Upper Volta, Chad, and Guinea Bissau. The peanut work is concentrated in West Africa; they do have some work around the world such as castor beans in Indonesia and the palm oils in Indonesia. 80% of IRHO's work is with coconut and palm oils. The research on peanuts has been concerned with drought resistance, aflatoxin resistance, and now they are beginning to look at rust resistance in the varieties. They now have many rosette resistant varieties and many drought resistance varieties in the various countries. Seed multiplication in these African countries is hard because peanuts are a food crop. IRHO contracts with farmers to produce seed, but the seed return sometimes is low because the farmers keep the seed to eat rather than to return to IRHO in honor of the contract.

In Senegal, the government makes a large distribution of peanuts in the shell to the farmers for seed. They have a good organization for this.

In Niger, the seed production is 2,000 tons per year, but they need 15,000 tons for their use. They also distribute seed in the shell, because if they were distributed already shelled there would be seed damage and low germination. For planting they give the farmer seed in the shell plus a fungicide. 50% of the farmers use fungicide in Niger, and there is a higher percentage of farmers using fungicides in Senegal. The fungicides often arrive after the seed are already planted. Again, almost all the West African seed is distributed in the shell to prevent seed damage. Dr. Gillier feels that seed multiplication is a major constraint in the West African countries.

In Senegal, they do have a safety or cold storage unit in the northern part of the country to store a small part of the seed; some 700,000 tons annually. This assures some high quality seed in case problems of drought, low production, or some other adverse effect prevents good quality seed being produced in any given year. Northern Senegal needs drought resistant varieties; Southern Senegal does not.

We visited for a while with Mr. Fleury who is the General Manager for IRHO, the supervisor of Dr. Gillier. He says in Africa the techniques for peanut production are known, but that they need money and the will to apply the techniques to production which is the major problem as he sees it. For research they have a joint venture and support Senegal, but Senegal's choice of problems or problem areas in development often is for something besides the peanut. They do not make the proper choice in peanuts for problems

to work on. They have the feeling that peanuts can grow there so why do anything to improve production. The World Bank has proposed a five year program to build facilities. They do this, then they leave, but now they need money for a groundnut research program rather than buildings and facilities. He feels that there is no connection between research and development because there are no demonstration farms showing what good research practices can do in the way of increasing production. The African Groundnut Council was developed to promote peanut production. They now have interest only in Sudan and Senegal which were peanut exporters.

In the area of our CRSP, he feels that we could do something in seed multiplication of selected varieties in every country in West Africa. Only Senegal can support peanuts. There is a general shortage of peanuts for food in Africa, except in Senegal. Because of this shortage within the country he feels that our program will produce no competitive disadvantage to the American farmers. Much of the seed produced in Niger goes to Nigeria along the border which is not protected in any way, or constrained as far as the movement to collect taxes for Niger. This has hurt the IRHO seed multiplication efforts because the farmers hold the seeds back and don't return them on their contracts, and then they take them across the border to sell.

Dr. Jackson asked the question "Is there a need for research on how to do development or how to translate research results into development?" Dr. Gillier said that we need a linkage between research and practice. We need to know how to give the techniques to extension and we need to show through one-to-three hectare demonstration areas rather than small research plots. Good production practices could be shown through a seed multiplication program. In the contracts that IRHO makes for seed production, they show or require the farmer to grow the peanuts in the best way possible. In the way of an example of what mechanization has done, or has not done, for peanut production in Africa, Dr. Gillier gave an example of the government of Upper Volta. They received a grant to mechanize peanut production in their seed multiplication work. Through this mechanized farming they grew one ton per hectare. On the other hand, farmers growing a small acreage by hand labor with good production techniques have been able to produce three tons per acre. They don't really know at this time, how to use mechanized agriculture to the proper advantage.

Dr. Gillier feels that there is no big research problem in the African peanut production scheme, but if you talk to the Africans they will say that they need everything. Many of the programs that have been there have built the facilities, then they haven't carried through from that point. When men are sent out of the country to be trained as researchers they go back home to go into politics rather than research.

Again, the statement was made that there is too much research and not enough development, or translation of research results into production practices. There are two ammonia plants in Niger for the detoxification of aflatoxins. The African Groundnut Council helped to build them, but they are not in use at this time. In Senegal,through IRHO, there is a program to control or to certify that peanut meal is safe or has a low quantity of aflatoxins. This is for export of the peanut meal rather than for the safety of their own people who might eat it. In the country they do eat some of the cake left after pressing the oil.

We then went over to the Ministry of Cooperation for a visit with Mr. Casse in the Development Section and, I believe, the Assistant Director of the Development Section of the Ministry of Cooperation. We had a short talk with him and he took us to see Mr. Robinet, who is the Assistant to the Director for Research in West Africa. This is a part of this Ministry of Cooperation. Robinet discussed with us some of his feelings of peanut production and possible research needs and various constraints that may be present in West Africa. He said that there were three types of constraints:

1. Local - which I assume means people, the type of competition for other crops.

2. Vegetative - which would be varieties, cultural practices.

3. Market constraints - Not having markets available for the excess nuts that they would produce over what they used themselves.

There is a food shortage in most of the countries such as Niger, Mali, and Senegal. He thinks that varieties which would yield higher and that can be used for human and animal consumption rather than for oil export are needed. Countries depend on this oil and export for financial gain. Because of this need for money, peanuts are exported rather than used for local consumption, which lowers the amount of peanuts that is left in the country for food. The Sahel areas are far from the seacoast which makes export difficult. Production in many of these countries is decreasing because the price of peanuts is low so they cannot make money by growing them. Again, the oil is exported for money to operate the government. He restated the same thing that someone had said earlier, that Niger peanuts go to Nigeria because Nigeria has ports,etc. The production crosses the border without any receipted taxes to Niger. Niger considers production to be a national problem because of some of these factors of movement of peanuts across the border.

Mr. Robinet emphasized one point that we should remember - They feel that our CRSP research should not interfere with their IRHO programs, but they would be pleased if we can cooperate with IRHO to do a better job. If Senegal should agree to a program with CRSP arrangement, they would like to know about it (IRHO) and would possibly like to cooperate and at least be sure that we are not overstepping something that they are interested in, or maybe have already done.

JACKSON

Meeting with Mr. Abdelaziz Megzari, Economic Affairs Officer, UNCTAD and Mr. A. Ben-Amor, Commodities Divisions, UNCTAD, Palace of Nations, Geneva, October 9, 1980, 10:00am.

After explaining the purpose of the CRSP and our purpose in visiting with them, they were very interested and suggested that the objectives of the UNCTAD program were nearly the same as the CRSP program. The United Nations Conference on Trade and and Agricultural Development (UNCTAD) developed a resolution in 1976 in Nairobi, Kenya for an Integarted Program for Commodities. Under this resolution, 18 commodities were to be considered on a world wide basis and UNCTAD was to launch a round of global negotiations on price stabilizations, prices, market promotions, and research and development.

The less developed countries did not want to stabilize prices because they feared they would lose in the market. Therefore the only positive actions that have come from the Integrated Program for Commodities (IPC) have been the development of plans for research and development on coconut and groundnuts.

Their initial approach was to go to a gap-searching procedure and then identify projects which filled the gaps in research knowledge. Proposals were invited from the entire world and were first reviewed at Dakar, Senegal in 1979. Later a second review was held in Geneva in 1980, and finally a group of experts convened at FAO in Rome for three weeks to prepare a final draft of the UNCTAD Groundnut program in Research and Development.

The UNCTAD projects must be sponsored by both consumers and producers. The sponsoring body could be a new international group for peanut research and development or a group already in existence. Several characteristics of the UNCTAD program that will be proposed result from the fact that country-specific projects cannot be included for use of common funds. Hence, the peanut project that will be developed in this final draft have no location, no host government resources indicated, or no buildings involved. They will be multinational or in ecological zones or regional project formats. The UNCTAD program will very likely include training and extension aspects. There is some political sensitivity about the second account or second window funds of the common fund. Voluntary contributions and pledges have been received in the amount of approximately $350,000,000. The United States of America is presently opposed to pledging any amount in the second account. Hence, the CRSP may appear to be unprofitable to a less developed country from the point of view that if they accept a CRSP project they might be excluded from a common fund project. Another point was mentioned that the U. S. may continue to refuse to contribute to the second account if AID funds are used for the same purpose as the second account funds.

CUMMINS-FAO, ROME

October 10, 1980, 9:30am, meeting with Mr. Pierre Poetiray, Senior Officer, Crop and Grassland Production Service, and Dr. Alessandro Bozzini, Chief, Crop and Grassland Production Service, FAO, Via delle Terme di Caracalla, 00100 Rome . We first went to the office of Mr. Richard F. Hancock, Senior Commodity Specialist, FAO, Via delle Terme di Caracalla, 00100, Rome and visited with him for a few minutes. We then went to the office of Mr. Poetiray.

We had a visit with him of a general nature and left with Mr. Hancock to go to the office of Dr. A. Bozzini. Dr. Bozzini, in his discussion, gave us several ideas about the UNCTAD research plan and what he feels should be in this program:

1. Establish a network of research centers in developing and LDC countries. These centers should concentrate on the crop of high interest as an industrial and food crop. Such a program should include institutions such as ICRISAT, TPI (Tropical Products Institute in London), and the University of Georgia. Problems that need working on are: a. breeding; b. drought resistance; c. pest and disease resistance, and d. study of the quality of the peanuts and e. develop processes for preparation and preservation. The program should focus primarily on Africa because peanuts are an acceptable food crop in Africa and have possibilities for processing. He thinks that studies should include processing oil cake to make an acceptable food source. He thinks we should study the technology of mixing peanut flour with millet and maize for better nutrition, preservation and storage. He gave the example of pasta spreading among the nomad tribes as a food because they can keep it for long periods of time and he feels that it could be carried into peanut products. Industralization for development for this type of product should not be done on a large level but do it on a medium level and on a smaller scale that could even be used in the home; to develop equipment that could be used in the home. The product should have good taste and acceptability for people wanting to use it as a food. The Sahel area of Africa exports most of their oil cake, and it may contain aflatoxins which need to be detoxified before using as a food source. Dr. Bozzini suggested that there are varieties of peanuts that appear to be resistant to aflatoxin and these varities do have strong shells that do not break easily and become toxic In summary, Dr. Bozzinin gave the idea that a large part of a research program in a LDC country should be devoted to food processing and development of new food products for use in these countries and that we use the high protein cake that is left after the oil pressing for human food instead of exporting it to some other country for use of animal feed.

At the end of our discussion, we visited with Dr. Harris from the Tropical Products Institute in London who was at FAO and also Dr. El Hadi El Nur of the African Groundnut Council in Lagos, Nigeria. These two men, along with Dr. Hammons were serving on an expert panel to evaluate the UNCTAD Research project. They were completing this work today.

At 2:30, we met with Dr.Bonte-Friedheim, Director, Agricultural Operations Division, FAO and Brian N. Webster. Both men expressed the idea that we know much through research, about the production of peanuts but we need extension programs that will get these results down to the farmer. They gave the example of some of the needs of some of the developing countries such as Zambia which is a one-crop country (peanuts) and they need to diversify their crop programs. Dr. Bonte-Friedheim is concerned about the development of too high a level of technology through our research programs which is above the use level of the farmers. He is concerned also about researchers occupying too much of the time on more research and getting more answers to various problems, and then not taking the time to get their results to the farmer so he can use it, because there is no extension program to do it for them. He feels that a researcher should spend a goodly portion of his time in extension. Dr. Webster commented that 15 years ago while he was working in Nigeria that he tried to get the Nigerian government to stop research or place a moratorium on research for a period of two years and let the workers all do extension work. He feels that the research findings are 20 years ahead of the field practices. Dr. Jackson at this point asked the two men "Is research needed to learn how to do extension?" Dr. Webster answered " yes, we need to know how to do extension; we need to know why the traditional ways of doing extension are not working in these developing countries." Dr. Webster commented that CIAT has a beginning program in research on how to do extension and he feels that high priority should be given to a research program to learn how to do extension work. In a question from us concerning possible funding of the UNCTAD research project Dr. Webster estimated that 25% of the requested projects would be funded. He said that the report of the UNCTAD will not show his views on extension but will include research problems only.

JACKSON

The first groundnut workshop at ICRISAT, October 13-18, 1980 was very successful. Details of the presentations over the 4 1/1 day program will be available in printed form and are not reviewed in this report.

The following notes are mainly transcripts of interviews with scientists from various countries.

Some of the interviews relate to a specific outline set of questions. Questions were:

1-A. Name; 1-B. Job/Title; 1-C. Address; 1-D. Acreage; 1-E. Where peanuts are grown in your country; 1-F. How peanuts are used; 1-G. Acres/Metric tons; 1-H. What is the market system for peanuts, infrastructures, processing plants, oil plants; 1-I. Average farming size - are farmers small commercial or subsistence; 1-J. Labor supply; 1-K. Amount of resource supply furnished by government; 1-L. How many people involved in peanut research; 1-M. Facilities for peanut research.

Report by Dr. L. D. Swindale, Director of ICRISAT

His report had to do with the general nature of ICRISAT as follows: The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has a mandate to work on several crops in the Semi-Aid Tropics. One of these crops is peanuts. The client group for ICRISAT are researchers and trainees. The target group for ICRISAT are poor farmers. The area of assignment includes the vertisols, which are the dark, cracking clays and the ultasols, which are the red, sandy soils with clay subsoils.

Dr. Swindale mentioned that West Africa is an area of rapid population increase and a food shortage is predicted in the 80's. In 1981 a program will be mounted on groundnuts in Malawi, with approximately 3 scientists stationed there. In 1982, plans are for 2 persons to be stationed in West Africa to work on groundnuts.

The original evaluation for the groundnut program at ICRISAT began in 1974. The program actually started in 1976. The present workshop is the first International Workshop on Groundnuts to be held at ICRISAT.

The major constraints for groundnuts as ICRISAT sees them are:

Pests and diseases and unreliable rainfall. The most important diseases are rust and leaf spots and aflatoxin has just begun to be worked on at ICRISAT. The elements of the Groundnut Research Program include: Germ plasm research, microbiology, plant physiology, entomlogy, plant pathology, plant breeding, cygo genetics, farming systems, economics.

The ICRISAT program has a strong training program element. These training programs are mostly for less developed country people who come to ICRISAT at the expense of the center to learn techniques and research and get information on production of various crops.

Conference with Dr. J. C. Davies who is Director for International Programs at ICRISAT.

We asked Dr. Davies his opinions about the major constraints to peanut production and utilization in West Africa. His opinion was that at least in some countries it is a matter of marketing and price structure for peanuts where the prices are so low that farmers who could grow peanuts will not do so because it is unprofitable. Another reason is that yields have been very low due to drought, and this includes India. A third reason he gave is that people such as those in Nigeria are leaving their land and quitting farming because of those drought situations and desire to go to the cities. We also obtained from Dr. Davies a list of ICRISAT contacts throughout the world which are contained in the back of a document called "A Long Term Plan for Developing ICRISAT programs in Africa". It should be noted in connection with the Davies interview that none of the constraints he mentioned are constraints for research. Rather they are sociological, political and technical problems having to do with the government.

Interview with Mr. J. R. Pietrarelli,of the Manfredi Research Station in Argentina.

This research station is part of INTA (Instituto Nacional Technico Agropecuria). The use for peanut oil is declining in Argentina and the production is going more and more to Western Europe as edible stock. This has resulted in a serious decline of peanut acreage in Argentina.

The average farm size is 50 - 150 hectare. The farms are mechanized but there are no drying facilities in general. The usual weather at harvest time does not require drying facilities, but quality is becoming a problem, especially as peanuts are being shipped as edible stock to Europe. The biggest need now in Argentina is for improved harvesting techniques and increasing the acceptability of peanuts for export.

There are 2 1/2 scientist years at Manfredi devoted to peanut research. There are also additional researchers at the Botanical Institute at Corrientes, Argentina. This group is associated with a university and not with INTA.

Interview with K. Middleton of the Department of Primary Industries, Bjelke-Peterson Res. Station, Kingaroy, Queensland, Australia.

The production of peanuts in Australia is located in the northeastern coastal areas in the state of Queensland.

In 1979 32 35,000 hectare of land was cultivated with peanuts, and the average yield was 1,250 kilogram per hectare. The national production during the past few years has varied from 30 to 62,000 metric tons per year.

Two-thirds of Australian production is planted to a large-seeded erect bunch type peanut, one-third is planted to a Spanish-type peanut.

The industry in Australia is highly mechanized and heavily capitalized.

All peanuts are sold to the Peanut Marketing Board in Australia. All peanuts are used for edible purposes, that is, they are not crushed into peanut oil. Some are sold to the UK, New Zealand, and for the Orient.

Yields must be improved. This is a constraint. The high costs of peanut production require that greater yeilds be obtained.

Drought stress is a major problem since the average rain is 550 millimeters per year.

The nature of the soil limits yield increases regardless of inputs, and the soil problem is one of the principal constraints that Australia has.

Another major problem is aflatoxin in pre-harvest peanuts. In one year recently, 60% of the peanut crop was too high in aflatoxin for human food use.

JACKSON

Dr. Vikram Singh, Director of All India Coordinated Research Program for Groundnut reported that the Indian Counci for Agricultural Research has undertaken a broad scale program which is now 12 years old and which includes many projects. An attempt to coordinate much of the research on the major crops in India. The crops that are included in the coordinated research programs for oil seeds are: Niger, safflower, groundnuts, sesame, flax, castor bean, and mustard seed.

The overall program involves 62 research centers in India, but only 8 or 11 of these are concerned with oil seeds, particularly groundnut. At each center there are about 6 scientist years. At the sub-centers there are about 2-3 scientist years at each centers. There will be one national research center for basic research.

Dr. Singh stated that the major constraint in India in the production of groundnuts was the uncertainty of rainfall. Groundnuts have a government price support. Yield growth rate in groundnuts is about 5% per year but the government wishes to have at least an 8% per year growth rate.

Mr.Vikram Singh requested a meeting with me for the purpose of outlining some interest that the All India Oil Seeds Program, which includes most of the researchers in the Groundnut field in India, have in the CRSP. I met with Mr. Singh and five other researchers Mr. Singh outlined to me seven basic points of technology need that groundnuts in India were facing.
They are:

1. There is a need for basic research and the identification of sources of resistance to drought stress, diseases, and other hazards of production. This should involve a study of wild species of the genus Arachis including cyto-genetics of the inheritance of resistance to diseases and other environmental hazards.

2. The development of varieties for irrigated situations including agroproduction technology for irrigated areas. India has very little experience, especially in South India, with varieties and methods for growing peanuts under irrigation.

3. Operational research. This area of research was somewhat vague, but included socioeconomic studies of farmers concerning reasons that they did or did not wish to adopt new technology; simple demonstrations of new technology.

4. Seed production technology: India is faced with the gigantic problem of providing good seed of newly developed varities. They believe they need research in this area, although I personally feel that the technology is at hand, but just needs to be applied by a consultant to the government of India.

5. Crop - weather phenomenon: As it influences yield, and disease development, including disease prognosis or forecasting.

6. Physiology and microbiology. In this area Mr. Singh was speaking generally of studies on the number of leaves required for maximum fruiting, the partitioning coefficient, and all other such supporting research for breeding. In microbiology he was particularly concerned with the genotype-soil-rhizobia interactions. The general feeling among some Indian scientists is that rhizobia that are specific to various varieties should be developed so that they can be used to influence increased nitrogen fixation.

7. Production, protection and harvesting machinery and technology. In this area, the main interest was in developing planting implements, spraying machinery and harvesting implements that could be used behind an oxen. Again, in this area, I feel that much technology is available around the world and needs to be introduced to India.

JACKSON

Interview with H. B. Hamat, Research Officer-Commodity Research, Field Crop Research Station, Lot 206/94, Section 20, Jalan Raja Dewa Hulu. Kota Bharu, Kelatan, Malaysia

1-E. Peanuts are grown mostly along river banks in four states in northeastern Malaysia. All groundnuts grown in Malaysia are used in the Menglembu process. This process is as follows:

Peanuts are harvested at 30 or 35% moisture and the fresh pods are washed and boiled. During the boiling procedure two chemicals (unspecified) are added to the water. After boiling, the peanuts are dried in the sun for two days to approximately 11% moisture. The peanuts are then roasted slowly for 48 hours over charcoal or some other heat. The peanuts, thus processed, are bagged and exported to Hong Kong and Los Angeles, where they apparently sell well as a speciality item. He admitted that some of the peanuts that are grown in the country are eaten by the local farmers.

1-G. Mr. Hamat reports 5,000 hectare of peanuts grown per season. There are 2 seasons so this would equal 10,000 hectare per year. The yield he reports as 2.2 metric tons per hectare which gives us about 22,000 metric tons production per year for Malaysia.

1-H. Apparently many peanuts are grown under contract to five or six processing plants in the country which process the peanuts as indicated above. There are practically no peanuts crushed for oil in the country.

1-I. The average size of farms in Malaysia is one hectare. The farmers would in the above sense be small commercial farmers, who contract with the processing plants or are free to sell on any market. The price of peanuts last year was $28.00 Malaysian dollars per pikul. The price is now $45.00 Malaysian per pikul.

1-J. The labor supply is provided by the family. The average family is approximately 5 persons.

1-K. The government presently supplies fertilizer and seed on request to farmers. Factories or processing plants which contract for peanuts also supply seed to the farmer. There are three extension agents in the country for peanuts on a full or part time basis.

1-L. The people involved in peanut research in the country are associated with the Malaysian Agricultural Research and Development Institutue (MARDI) wnich is located at Serdang. Serdang is the headquarters for agricultural research and is approximately 14 miles from the capital Kuala Lampur.

The personnel involved in research are as follows:

One Groundnut breeder - full-time.
One agronomist - 25%
One soil fertility specialist - 25%
One weed scientist - 25%.
One agricultural engineer - 25%.

1-M. The research facilities are located at the headquarters (MARDI). They are apparently adequate for most kinds of applied research.

These are the constraints he listed:

1. Development of suitable varieties. Malaysia is now using a peanut that is practically a land-race, having been in the country for many decades. Malaysia probably needs at least four adapted varieties for four different locations that they have in mind to develop into peanut culture.

2. Cultural practices, including fertilizations in all four of these zones.

3. Need for mechanization, especially as related to planting and lifting. The country would apparently like to develop a sharing system using a tractor on small farms. Since they use peanuts in their fresh state they have no need for harvesting and drying equipment other than the lifting machinery.

4. Seed technology, including seed certification and seed production. The production of seed is under the control of the Department of Agriculture.

As a final note, Mr. Hamat mentioned that work with leafspot and rust is probably needed and that the varieies should include at least one Virginia type peanut. Also Mr. Hamat, who has a Masters degree in peanut breeding from the University of Florida, is quite interested in getting back to the United States to work on his PhD.

JACKSON
MISCELLANEOUS NOTES - ICRISAT

There was no mention during the whole session of this workshop about the need to develop an economical process to detoxify groundnut cake and to prepare it for human consumption. The groundnut is 50% oil and 25% protein. When the oil is extracted the remaining cake is about 50% protein. Presently this cake is being exported for cattle feed. There are two problems concerned with the use of the cake for human food. The first is aflatoxin contamination which is generally assumed to be terrible in most developing countries. The second is the difficulty in getting certain cultures to change their food habits so that they will incorporate peanut meal in their diet. However, Colin Harkness of the Amadu Bello University in Zaria, Nigeria told me today that a company in Kano, Nigeria had begun to prepare peanut flour from oil cake in 1959. The product was an immense success in Nigeria, but the advent of aflatoxin information in the early 60's led the company to take the product off the market, because they did not wish to be liable to claims against them because of aflatoxin.

CUMMINS

Meeting with Dr. Darell E. McCloud, International Programs Chitedze Agricultural Research Station, P. O. Box 158, Lilongwe, Malawi (AID Project with University of Florida).

Constraints outline:

Part 1-E. The peanuts are grown mainly in the central part of the country, less in the south and the north.

I-F. They grow some for oil, which are the Spanish varieties; and some for human food, and they grow a lot of the variety Chalimbama which is a large seeded variety - they are hand shelled for British confectionery trade.

1-G. Their yield is about 600 pounds per acre.

1-H. The oil that is pressed is not exported and the cake is used for livestock feed. The country is short on oil crops.

1-I. They are mostly family farmers, usually are about 1 hectare. Maize or corn is the main food crop and half of the farm will be in maize and the other half in peanuts and other crops. Labor is from the families; the mechanization, as they call it, is oxen power; most of their cultivation and preparing for planting is done with a hoe. They do this during the dry season when the ground is too hard to break with oxen power.

1-K. This government organization ADMARC provides seed and fertilizer to the small land holder through a development project. After they make their sale at the end of the year they deduct the amount of money they had borrowed from the sale. The only credit now is through this development scheme and there is an AID project which is going to extend this to other farmers.

There are also some pesticides and insecticides used at this time but not very much because of the cost. Farmers cannot afford to buy the chemicals.

1-L The crop research is done in 8 branch stations and 1 main experiment station; they have an effective staff. There is a peanut breeder and two other professionals that work with the peanuts who are less trained. They have 4 laborers. The general level of training in the research organization is not very high. In the whole of Malawi, there are only 6 PhD's in agriculture research.

1-M. Facilities for research are probably adequate for the present level of training and the number of staff . The USCAD staff is to train other PhD's in the U. S. and possibly Britain and other countries to return and help increase the level of competence in the organization.

We discussed constraints to peanut production and he listed these in this order:

1. Plant diseases, including rust, leaf spot, viruses. This could be overcome by resistance varieties and less expense chemicals.
2. Better varieties are needed which would respond to various management practices to give higher yield. A better system of producing seed is needed. There are really no seed growers.

3. Cultural practices restrict production such as low plant densities,and low fertility.

4. Magnesium is low in the soil and they have no magnesium supply in the country. What they get is from Zimbawe. They do have a calcium suppply for fertilization. The soil resources will have to be improved as varieties and other practices are improved that would cause yields to be higher. It would take more fertilizer to produce food yields.

5. Weed controls. They don't use any chemicals because of cost. All the weeding is done by hand and often the peanuts are weeded too late to help yields at all.

Malawi does have an extension service which is fairly effective. Farmers are cautious to adapt new practices because of the risk of doing something that they don't know how to do. They think it might cost them money and if they lose one crop they go broke or they may starve because they have no fooo. Dr. McCloud thinks that learning how to do extension and getting people to accept a new practice would be a research problem.

CUMMINS

Interview with Dr. Dunstan Malithano, Project Advisor, International Development Research Centre. University Eduardo Mondlane, Maputo, Mozambique.

Most of the peanuts are grown along the coast.in the south, some in the north and a little bit in the middle part of the country.

1F. The use of peanuts are primarily for seasoning food - they pound the kernel and then add the whole powder to vegetables, meats and fish and this type of food. There is no export of peanuts from Mozambique.

1G.Their peanuts are grown by the small non commercial farmers ; they have from one-third to 2 hectares of land. The figures are rather old for production in the country. In 1969, which was the last date he had, there were 65,000 tons of peanuts produced in the country and production has gone down since then. Only 3% of the land (in 1969) was devoted to peanuts.

1-H. The country is not crushing any peanuts for oil now, but they do have a factory which may be being used now for soybeans or some other oil. Farmers used to sell peanuts to the Portugese traders but since the independence in 1975 all the peanuts are going to local markets. The government does buy the peanuts and stocks them for sale to stores.

1-I. I believe deals with some of the points in acreage that was made up in G.

1-J. The labor all comes from the families because it is grown on the small 3/10th to 2 hectares plots the crops are made by hand using hoes . The peanuts are usually grown as inter-cropping with maize or some other sorghum or cassava.

1-K. The family farms are operated in a very primitive way. They keep their own seed and there is no advice used from the Ag Offices or the Extension people Most of the peanuts are grown in this situation.There is no technical assistance given to these farmers.

There are four types of farms which are common on Mozambique. First, the family farm. Second, are cooperative farms that the groups of farmers work together and the government, through the cooperative, provides help in fertilizer, seeds, tractors, etc for farming. They do give advice to producers and all the producers share in the returns each year equally. Third, there are private enterprises, which are large farms and the fourth are state farms which are large and were previously private farms that were abandoned by the Portugese when they left.

1-L. The research staff, there is one plant breeder - this gentlemen that I am talking to, there is one FAO expert in the country who devotes some of his time to peanuts but he is mostly working with soybeans now. He is from Brazil and has been in the country one and one-half years.

1-M. There are several experiment stations but the personnel staff is low in these and they are not well trained to take care of the various problems that come to them relative to the groundnuts and specific crops.

We discussed constraints to peanut production and he listed some four constraints. 1. Lack of high yield and variety; 2. unimproved methods of production or I think as he phrased it, better cultural practices for peanuts; 3. diseases, such as rust, leaf spots and rosettes. This could be controlled either by determining effective chemicals for them that would be economical or back into constraint No. 1 to varieties that would be resistant. 4. Fertilization. No fertilization is used and there is little knowledge on what fertilizer might be needed for better yields.

In a general discussion on how he is developing his research program, he said he is trying to divide his research into two or three areas. A. First to concentrate on crop production in the north part of the country where there is better rainfall. They could grow later, long-season, later maturing varities, which would produce more and because of the better season. In the south he is trying to look at early maturing varieties which would mature in less number of days because there is less rainfall and the rainfall is erratic. He feels in these two areas they need more manpower and better trained people for the research at these two sites. B. They need more germ plasm introduced in their breeding program. He has done some collection over the past year for a short period of time to collect land races of peanuts in the country and also the FAO man is attempting to collect them and he would like to introduce germ plasm from other countries to help in improving new varieties for their use. C. He feels that they need to better cooperate with Groundnut researchers or peanut researchers in adjacent countries such as Zimbawbe and Tanazia that are close to them.

Miscellaneous Notes

In the general discussion today, one of the men from Punjim, Mr. J. S. Chohan, who was chairing one of the sessions, made a comment in his introductory remarks that I think should be recorded. He said that in the Punjim area of India they have the technology to increase peanut fourfold, but that the farmers do not have the resources for disease control, insect control, fertilizer to attain these yields and it is important to produce varieties that are resistant to insects and diseases that might produce better under low fertilizer conditions so that they can produce seed or higher yields without costly input .

I had a short discussion with Dr.A. S. Pompeu of the Institute of Agronomy at Campinas, Brazil. We didn't go into the first part of the outline on page one, but we discussed briefly some constraints to production on the yield.

1. Foliar diseases, he feels are of the high quality in research needs. 2. The control of insects such as thrips and other types of insects. 3. Aflatoxin. 4. In some parts of the country cultural practices are lacking and need to be researched to improve them. In general comments, he said that 70% of the peanuts are crushed for oil, and both the oil and the cakes are exported; 10% are saved for seed and the rest are consumed locally in various ways. The primary interest for increased production in Brazil is for oil production to use as a motor fuel. This point came out in talking with other people from South America. There is a great interest in peanut oil as a motor fuel. As you know it can be burned directly in a diesel motor without any change.

CUMMINS

October 16, 1980 - Khon Kaen, Thailand.

I arrived at the Bangkok Airport at approximately 10:00am, and was met by Mr. Det, who is USAID project Director for 2-3 different projects that AID has here. He and his driver then took me to Kharat for a visit to Seed Center No. 2. Mr. Panoo Satayabibul is the Chief of this Seed Center.

I explained the purpose of my visit and what the CRSP and the objectives of the program are. I also gave him a copy of the CRSP analysis and a copy of the paper that we gave at ICRISAT which outlines the purpose of the program and how it is to operate. Mr. Panoo has a Masters Degree in seed technology from Mississippi State. The seed center is a part of the Department of Agriculture Extension. Under this comes the Seed Division, then the four seed centers and an innoculation development unit. within the Seed Center, there is a managment section, a seed farm section, a processing and storage section and a seed testing and quality control section. The crops that they are concerned with at the No. 2 Center are sorghum, rice corn, and peanuts. Peanuts are a big part of their program in this particular center. Corn is the other major product in this Center. Thailand has a seed law that will increase the amount of seed quality control that there is in the country, but it has not yet been enacted and funded. This will provide essentially the type program we have in the U. S. The breeder seed are maintained by the breeder, the foundation seeds are grown and handled by this Seed Center. As they expand the program with more funding it will inaugrate essentially what we call a certified seed program that will guarantee seed variety and purity so the farmer will know that he is buying good seed when he purchases it from a dealer.

The tour of the facilities - They have a very neat office and good facilities. In the lab section they do germination tests, purity analyzes, for content of dirt and weed or other type of impurities in the seed, moisture tests, and essentially most any seed quality tests that are needed. The third area we visited was the room that contained the trash cleaner two sizing separators, and the gravity separator for separating heavier and lighter seed. There was a seed treater for insecticides and fungicides. Finally, there was a bagging machine. We went into the cold storage room where they can keep seed at controlled temperatures for preservation of germination. This has been enlarged (at the present time it is not completed) to have a larger area for cold storage.

We then went outside to the drying facilities. There is a modern dryer, a big bin with forced air heat heated by diesel fuel, and in the second drying area they have an open building that has a slat-type floor This is for bag drying. After the seed are prepared, cleaned, and bagged, they are sold primarily to the government agency which promotes the use of these superior seed through farm demonstrations. As the project enlarges and the seed development capabilities grow they will extend this to larger farmer scale. At this time they cannot meet the farmer demand for good seed. The seed are often prepared late after the farmers have already seeded their crops and then they no longer need seed from the seed lab.

The seed are then stored for next year and with germination loss often drops, especially when they are not stored under cool conditions.

They feel there are policy problems with the government that prevent a faster development of the seed program. One is that an organization besides the seed development group is the only one that can sell to the farmer directly. This needs to be changed so the foundation seed program can sell directly to the farmer. Secondly, as a policy matter, they really don't produce the kind of seed that the farmers want, and although recommendations are made back to the people in authority, they really don't implement programs that would meet the farmer demands.

The only peanut variety that the seed program maintains is Tainan nine. This variety is from Taiwan.

The seed tends to be low in germination - some 70-80%germination after six months in storage, which is the normal storage time for them.

There are two seasons of the year when peanuts can be grown for seed in this area. The low rainfall time is in July and August and if they plant in the early part of the year, they can harvest during July and August. There is another dry period that begins in October and lasts into April. Again, they can plant after harvest in August and harvest the seed during this dry period in October. They feel, though, that the best situation for growing peanuts for seed is to plant October, November and harvest in the dry period which begins in April. They feel they can produce the best quality seed during the dry season with irrigation. So, in essence, there are three periods during the year when peanuts can be grown in Thailand.

Mr. Panoo listed the following major constraints to producing quality seed in Thailand.

1. Poor cultivation methods, improper planting dates, causing maturity in wet weather result in low quality seed.

2. Seed are often harvested too early in maturity to obtain the best quality seed.

3. Post harvest considerations:
   a. Improper field drying by farmers often result in low seed quality.

   b. Post harvest handling in the seed unit.

      1. Pre-processing:There is a lack of knowledge as to how to keep before processing and how long they can be kept before they are processed, graded, sized, and stored.

      2. Comparative seed quality from sun, and bag or the bin drying with heat is not known. A researchable problem would be how to get the best quality seed using the least energy input.

      3. Socioeconomics of marketing. What incentives need to be given to the farmer to encourage him to produce better seed. Possibly there could be a system developed that would price the seed based on quality.

      4. Storage problems. Insects, and fungi are often problems during storage, which could be reduced by better storage conditions and varietal resistance. There is a question in Mr. Panoo's mind when the fungi attack the seed. His observations have been that he can put what appears to be a high quality seed in storage and then in a few weeks or months when they are brought out for sale, they are infested with insects and fungi which lower germination.

In the northeast part of the country, where Dr. Panoo feels is one of the most important areas for peanuts, the farms are 10 to 15 acres in size. They are mostly family units and the labor is most family. During peak seasons there is some hired labor. Two acres is considered a large peanut field for most farms.

There are four seed projects and one inoculation project in the seed program in the state. The inoculation project will produce inoculation for all the legume crops entirely. Joe Burton from the Nitrogen Company in the U. S. and Loyd Frederickson who is with AID in Washington helped develop and design the inoculation unit. There is a Thai, Nanthakoin Boonkeid, in the program that is very knowledgable in microbiology and rhizobium studies. He is presently on a PhD. program at Texas A & M University under Richard Rivers.

In the northeast section of the country peanuts are very responsive to inoculation. There is a question and some disagreement among the people in Thailand as to whether the rhizobium bacteria survive the flooding of a rice crop. Dr. Deloach, a seed technologist from Mississippi State feels that rhizobium do not survive flooding. The need for annual inoculation and rhizobium survival under flooded conditions where peanuts may be the second crop following a rice crop should be studied.

The USAID is developing a comprehensive project for Northeast Thailand, which they call the Rainfit Project. It covers a lot of areas and one of the areas that it will include is cropping systems. Presently rice is grown without being following by another crop. They feel they could improve crop production, and soil fertility by having a legume in the crop rotation. They feel one of the major crops that could fit this bill would be a rather short season peanut. There is some interest in mung bean as a legume crop also. Mr. Det feels that Thailand could utilize 10 times more peanuts than are grown. Most of the peanuts that are grown are utilized as oil, and the protein cake is primarily used in the poultry industry as a protein supplement One of the reasons for increased need for vegetable oil, is that in the past the primarily source of fat for cooking has been lard from pork. At the present time the cost of pork production is going up rapidly and is making the use of the animal fat for cooking unattractive.

The strong emphasis on peanuts in the northeast area may result in many researchable questions. The CRSP could be valuable in helping solve these problems.

End of first day with Mr. Det. October 16, 1980.

October 17, 1980 at 7:00am Mr. Det and I drove from Khon Kaen to the research station at Kalasin. This station is a part of the Ministry of Agriculture, and was at one time called the Seed Multiplication Station, but has recently been renamed the Field Crop Station. We met with the Station Director, Mr. Chamroen Satayarak. He has a B. S. in Agriculture and has been director for some 19 years.

The station has two basic activities, plant breeding and cultural practices,(including weed control, planting date, depth of seeding, fertilization, etc). Policy for the peanut program comes from Dr. Awood in the Ministry of Agriculture, Department of Agronomy.

The breeding program for peanuts has three full time scientists. The breeder, Mr. Charat-Kitbamrung is now on leave from the station in a PhD. program at Oklahoma State. He is assisted by Mr. Thewa Maolanout who has a B. S. degree from Khon Kaen University and Miss Sonjintana Nilapau who has an M. S. degree from Kasasert University. Dr. Awood is collaborating with the ICRISAT peanut program and several varieties are being screened here. Tainan Nine is still the most popular variety of peanuts grown, but they do have another Tainan selection and a Punjab selection in the second year of testing that look promising. (Mr. Thewa Malaguwa was also in the conference). Mr. Pote Pimpanit leads the research in the cultural area. He has a B. S. degree from Kaesasert University. Work in this area includes plant spacing, weed control, water management and utilization which relates to use of irrigation water. Mr. Term Pong Nunanon who has a B. S. degree from Majo Agricultural Technology Institute is a co-worker in the cultural practices program and also does research with cropping systems.

The station is mainly responsible for work in the area of peanuts, but they have other work that is directed from the Department of Agriculture in Bangkok, such as vegetables and fruits, corn and sorghum. They have sorghum tests in this northeast area on saline soils and they run a variety test with corn.

There are some special projects that have been conducted from the Northeast Field Station through money borrowed from the World Bank.

1. Study on inter-cropping of kenaf with peanuts.
2. Relay planting of kenaf and peanut kenaf intercropping system.
3. Time of harvest of kenaf for paper pulp and sequential cropping.
4. Study of kenaf and other field crops stripped intercropped in northeast Thailand.
5. The study of intercropping kenaf with mung bean.

This World Bank project has provided the following of items:

a. Three scientist positions have been approved, but funds have not yet been made available.
b. Equipment, such as plows, tractors and accessories.
c. Buildings which have been completed.
d. Housing for project personnel.
e. Vehicles.

In the area of seed multiplication this Station is responsible for seed increase of peanuts, soybeans, mung beans, castor beans, corn,(especially sweet corn), upland rice, and fiber crops such as jute.

The following constraints to peanut production and utilization northeast Thailand were listed by the Director.

1. Improvement of scientists and technicians and ability to do breeding and cultural practices research is needed. They need additional training, leading to B. S., M. S., and PhD degrees. On the job training is also needed, such as six months work in another country. The ICRISAT training programs are relevant to this location because climate, soil and other environmental factors are similar.

2. Marketing. This is not the direct responsibility of this Station, but if the peanuts are grown by the farmers, they must be marketed profitably. Development of better market facilities would aid the farmer in moving into greater peanut production. He sees marketing as a problem, but does not know if it is a researchable problem.

There is inadequate cooperation between MOAC and Development in the Ministry of the Interior and Commerce. There are no meaningful production targets or sales goals set. He feels that a Farmer Cooperative should be developed that would teach them how to meet sales goals. Research could be conducted to see how communications between the markets and the farmers could be improved to develop a better marketing system.

3. Storage. They are not faced with any real seed storage problems at this point. Research to help solve problems of insect and fungi infestation, and lowered germination during storage may be needed if more seed are produced.

4. Continuing breeding to overcome varietal constraints.
   a. Rust Resistance.
   b. Aflatoxin resistance. Varietal resistance to aflatoxins would reduce aflatoxin build up during storage. A sizeable volume of peanuts are used for making noodles for Chinese food in Thailand, and often aflatoxins are detected in these peanuts and the merchants refuse to buy them for this purpose. The Food and Nutrition Program operated by the Health Department and by the Ministry of Agriculture spot checks for aflatoxins and make it known to the merchants who buy peanuts for these Chinese noodles.

   In thirteen promising varieties in the breeding program, there is one that seems to be resistant to aflatoxin. This is now in the second generation of breeding. Presently this variety is identified as

J-11.

c. Screening varieties that are resistant to saline soils. The saline soil problem is increasing in northeast Thailand, There is a salt layer at some depth under the surface of the soil. When the soil is continuously flooded, as in rice culture, the salt is pushed further down in the soil profile and there are no detrimental effects due to the saline conditions. But in the case of peanuts which are not flooded with water and are grown in the drier period and usually with irrigation, the saline problem increases because the salts tend to rise to the surface. This rise of the salt in the profile occurs after 7 days of irrigation. The soil water researchers are investigating the saline problems. When rice hulls are used for mulch to conserve water during the dry season, less irrigation is needed and this results in less salinity problems. In summary, a saline resistant peanut variety would lessen the problem.

5. Harvesting problems. Peanuts are planted so the harvest can take place in the dry season which comes in October. To do this, they plant in June. The Tainan Nine variety which is very commonly used often sheds a lot of nuts when they are pulled by hand. Also if they use a plow to lift the nuts they lose a lot of pods. He wonders if some research can be done to learn how to lower the loss of peanuts during harvest. This may be a varietal characteristic in the Tainan Nine variety to cause it to have a weak peg and shed off during harvest or it may have something to do with the climatic conditions under which it is growing in the northeast region.

6. Plant diseases and insects. There are effective insecticides available which the farmers must use. One of the main foliar feeding worms is what he called the leaf ruiner, which is a butterfly larvae. Insecticides are expensive and insect resistant varieties to insects would help lower the production costs for the farmers. Rust is one of the main diseases and is increasing in northeast Thailand.

7. Physiology and production. The soil fertility section in the Division of Agronomy has responsibility for fertilizer trials at this station. He feels that at this time they do have fairly adequate knowledge of how to fertilize peanuts.

8. I questioned about the need for inoculating peanuts with rhiozobium . He stated that they do not inoculate peanuts at this time. There seems to be feeling among many people that there is not a need to inoculate peanuts but on the other hand, some people have mentioned to me that one of the big problems in peanut production is inadequate inoculation. An area of research for Thailand may be to determine how to inoculate effectively, and if the rhizobium live through flooded conditions during the rice phase of the crop rotation.

9. Farming practices and management. Areas of research that need to be done in this area are intercropping of peanuts with other crops and losses during harvest. These two points have been discussed earlier.

An associate of Dr. Awooth came in, and I met him; Mr. Nark Potan, in the Oil Crops Branch of the Field Crops Division, dealing with seed production.

The soils of this northeast region are generally a fine sandy soil, and remind me of the soils of the coastal plain region of Georgia. A clay layer tends to accumulate at some three meters and below this three meter depth is where the salts accumulate to give the saline conditions. There is generally a rolling topography somewhat like the Piedmont around Griffin, possibly not quite as rolling.

We made a quick tour around the station. We first started with the main building, and went through an kenaf and peanut intercropping study, a castor bean and cassava intercropping study, a peanut-soybean study for saline soils, and the peanut drying area. Over 1,000 soybean varieties have been screened for tolerance to saline conditions and at this time they have 36 of these varieties are lines that have shown promise of being tolerant. Over 400 lines of peanuts have been screened and 26 of these have shown adequate saline tolerance. They will continue screening for tolerance for the saline conditions with both soybeans and peanuts.

We drove back to Khon Kaen and ate lunch and at 1:15, we met with the staff at the Northeast Regional Office of Agriculture at Tha Phra. There are at least five people here that, in the past,have done research with peanuts, but at this time, due to a change in policy from the Ministry of Agriculture they are doing full time extension work. It is very evident that they are well trained research people. This change in policy has not met with much favor with them. The facilities are very adequate in the way of equipment and land to do research with peanuts. This is a large station and has had a lot of inputs, monetarily, from AID, and also from the Thai government. Although these people are not doing research at this time and have not been for some two years, they do have a very good comprehension of peanut production in northeast Thailand, and we did discuss some of the problem or constraint areas that they feel are present with peanuts. These were discussed by discipline areas since the people present represented several disciplines.

1. Plant pathology.
   a. Fungal diseases. More varieties that are resistant to the various fungal diseases are needed. Chemical controls are expensive for the farmers in northeast Thailand, and work needs to be done in varietal improvements so that diseases can be controlled with less input of resources by the farmer. They note that Cercospora leaf spot becomes a pronounced problem if peanuts are grown more than three years on the same soil. They have noted some 50% reduction in yields. Rust is becoming a problem in the area and varietal resistance to rust needs to be introduced. Some control of diseases could be attained by crop rotation and through better cultural practices.
   b. Virus diseases. The peanut mottle virus was detected here in 1967. A survey of the problem was made and the mode of transmission was determined and the effect on yield was measured. Aphids were determined to be the insect factor which were the same results that Dr. Kuhn of Georgia had found earlier. The peanut mottle virus infection resulted in yield reductions up to 28%. Aphid control was attempted to reduce peanut mottle virus infections, but no good chemicals were found to do this. Varieties resistant to the peanut mottle virus are needed, but at this time there is no resistant variety in Thailand. The symtoms are subtle and often may be present without detection by the grower. There are some line introductions that are resistant to PMV, but more breeding needs to be done to transmit this characteristic into a agronomically suitable variety. Invasions of sclerotium rolfsii have been a problem especially in the irrigated areas. A microplasm disease has been detected also in peanuts.

2. Entomology. (has a typed list which will be entered into the report later). Leaf miner is one of the most serious pests, but is easy to control with insecticides. Subterranean ants are becoming a serious problem, and insecticides are available to control this, but again are too expensive for the Thai farmers to use. They have in the past studied residues of chemicals in peanuts using gas liquid chromatography and they have checked residues in peanuts from the marketplace. They have looked at varietal resistance to the leaf miner. Dr. Terd Charonewatana, who is a peanut breeder at Khon Kaen University nearby has peanut lines that are resistant to the leaf miner and is continuing work to develop a resistant variety. They feel that the main problem in the use of chemicals for control of insects in peanuts is the residue problem.

3. Soil fertility. They have obtained good response to fertilizers and gypsum. Gypsum is not readily available in Thailand and the farmers cannot afford it when it is available because of the extremely high prices. The farmers often get good top growth but there will be no nuts produced, which has been related to calcium deficiency. Work to relieve this calcium problem is needed.

4. Varieties. There is a shortage of certified seed in the country, although the Ministry of Agriculture does produce some certified seed. Most of the seed comes from what the farmers sold in the market and generally very low in quality.

5. Seed production. Good harvest methods for seed production need to be developed. The best quality seed are produced during the dry season when they can be grown under irrigation, but this involves better land management and land preparation during a dry period when it is harder. The farmers need better seed, but there is presently not an adequate supply of high quality seed.

The people that I visited with were:

Dr.Kasen Chompoonutparpa, and Dr. Chaleremchai Prasartsee (plant pathologists), Mrs. Vilai Prasartsee (Virologist), Mr. Wisuthi Amaritsut (an entomologist), Sarnsan Bhodingurn (a seed production specialist). Three other people have worked with peanuts but were not present today: Piboon Ratanapateep (soil scientist), Chaiwak Hongngam (an agronomist working with crop rotations), and Witoon Watanaputi (also an agronomist working with crop rotation).

This concluded our visit at the Northeast Regional Office of Agriculture at Thaphra.

October 17, 1980 - 3:00pm. I met with two Faculty of Agriculture members at Khon Kaen University. The faculty of Agriculture is made up of several departments; Plant Science, Animal Science, Soil Science, Entomology and Plant Pathology, Ag Economics, Agricultural Products and Rural Development. Plant Sciences include field crops, horticultural crops, vegetable crops, ornamental crops, forage crops, plant physiology, seed technology, agricultural mechanics, and the Chula Pora Dam Training and Experiment Station. Mr. Sanid Landthong is an agronomist and Dr. Virye is a plant physiologist and both of them have at least a part of their time devoted to peanuts. A third person I should mention that we met at ICRISAT who is responsible for breeding work is Dr. Terd. They have a Canadian supported program which will be completed in 1981. It is six years old and has some peanut breeding and cropping systems programs in it. (I have copies of annual reports on these projects, which will help us determine what they have done). At Khon Kaen University they seem to have a pretty well rounded program of agricultural research and the teaching program. The breeding and cropping systems programs are fairly intensive ut the plant physiology works is new. Dr. Virye is not very well quipped and is just beginning in peanuts and doesn't know the literature and the past research very well . They gave the following constraints to peanut production.

1. Breeding. There is a need for breeding for drought and salt tolerance. They feel they need to breed for specific characteristics, such as higher oil or higher protein content, and for better quality for human consumption (resistance to aflatoxin for example).

2. Crop production. They feel that the crop production people should work closely with the plant physiologists to better utilize the characteristics of the plant and the cropping systems. Too, they feel that they need to look at the large seeded Virginia type peanuts rather than the small seeded Spanish types which have already been extensively studied. They need to study spacing and plant density, or seeding rate for the newer spreading type of peanuts. Other problems that they have is unfilled pods or pops. In the area of plant physiology, they feel that they need to look at the translocation of carbohydrates, defoliation, the leaf sources of photosynthates, and plants that would grow better under the short day and low light intensity times that they have during rainy periods. The third area under crop production that they have that needs study is nutrient requirements. They do have equipment within the soils department to do this work. The fourth area in crop production is the place of peanuts in cropping systems such as interplanting, or double cropping, or relay cropping.

3. Insect and disease problems. The primary insects they have problems with in the northeast is subterranean ants, leaf roller, and leaf miners.

4. Agricultural products. Within the agricultural products department they feel can make some progress in trying to develop new food products or new uses for peanuts.

5. Soil fertility. Often they've noted a low shelling percentage in the nuts because of calcium deficiency. The soil pH's are often around 4.5 and they do respond to lime applications. Lime is available in northeast Thailand but gypsum as a soil amendment for peanuts is very high and unavailable. They feel that they could make some progress in plant breeding by selecting plants that would grow under lower pH's and poorer soil fertility. They feel that peanuts do tolerate a low soil fertility and can produce fair yields without use of fertilizer. One of the problems that they have in introducing peanuts into their cropping systems in the northeast is that they cannot compete with cassava which is cheaper to grow.

6. Socioeconomic problems. They have a problem of introducing peanuts into farm programs. The farmers are resistant to adding peanuts into their cropping program because of the higher cash inputs that are required to grow peanuts rather than a crop like cassava. The farmers are reluctant to change to a new crop. Peanuts are beginning to be used more in this region as a interplanting crop with cassava.

The program at Khon Kaen University is coordinated with the Peanut Research Program in the Department of Agriculture under Dr. Awooth. They are attempting not to duplicate each other's research, but to let each program be complementary to the other.

As a matter of record, I want to list several research projects that they have had or do have that in Khon Kaen University that are specially funded projects from various foundations or groups.

1. The Semi-Arid Crops Project with IDRC which is to be completed this year.
2. Crop Insistence Project with Ford Foundation.

3. Pasture Improvement Project with the Australian government.

4. The Intensive Farming Project with the Asis Foundation.

5. Vegetable breeding for Industrial Production supporteed by the Thai Government.

6. The Development of Horticultural Crops in Northeast Thailand, supported by the Thai government.

We completed our visit and returned to the hotel at 5:15pm; this also completes the report on my visit to northeast Thailand.

At 10:30 am, October 20, 1980, Dr. Jackson and Dr. Cummins visited the USAID offices and met briefly with Robert Queener, Assistant Mission Director and with Jerry J. Wood, the Rural Development Officer. This was only a brief introductory meeting with them. We also met with David Thomas is a Project Director for several of the Agricultural Projects, and Mr. Det, his assistant.

In our discussion with David Thomas, he pointed out a few things that I think are of interest to list.

The Northeast rainfed project which has been developed has identified 10 village districts over northeast Thailand. The program would introduce practices known to the farmers. The World Bank, Japanese Government and other places have money awaiting to support this project.

Short season rice varieties can be harvested early in this area, so there is moisture left for a second crop. Peanuts can be planted as early as November when the rain stops and can grow most of the season on residual ground water.

Mr. Thomas feels that peanuts will be basic to the programs that are being developed through this Rainfed Project. They have a good research network and he feels that the CRSP can be very beneficial to tie together their researchers in the country as well as giving them contact with researchers in other countries. As much as possible, the program should be in the northeast region.

The government is very interested in developing the northest since it is the poorest area of the country. They want to improve the standard of living so they won't be influenced by other political systems that might try to come into that region of the country.

Dr. Jackson mentioned that we had discussed several times that there is a need for good research in peanut physiology. Peanuts have a high light requirement,but light is low in the tropics due to short day lengths and often overcast skies during the rainy period.

Dr. Jackson and Dr. Cummins then went to the Department of Agriculture, Division of Agronomy and visited with Awooth Malampang.

Thailand is divided into four regions agriculturally and geographically, the south, central, north and northeast. In the northeast region which is an area of concern for peanuts, they have 10 experiment stations of various levels. There are twenty stations in the country.

Kalasen, is the main station in the northeast for peanut research. They have peanut researchers located there as well as the work being overseen by Dr. Awooth from Bangkok. They have a lab in Bangkok that is responsible for aflatoxin detection and research. It is in the Department of Plant Pathology. Dr. Awooth's group cooperates with them in work with aflatoxins.

There has been some reorganization in the Department of Agriculture. The Tha Prah Station is in the Field Crops Division, Department of Agronomy. They were organized as a research group but because their work was duplicated in other places they are now going to be listed as Khon Kaen Field Crop Station. They will have duties in agricultural leadership, primarily dealing with extension, and training.

Constraints listed by Dr. Awooth are as follows:

1. Peanuts are considered a marginal crop and they put the production of rice first and don't do as good a job as they should in peanut production.

2. Better quality seed is needed.

3. The level of management in the farmers fields is low. Research plots have produced around 2 1/2 tons per hectare, but 1.3 is a good yield in farmers fields.

4. There is a socioeconomic problem of why farmers are not utilizing better practices.

5. The staff needs to be upgraded,(which he feels is the main problem in peanut research) through staff training, workshops and advanced degrees.

6. Varietal development. The present cropping systems demand a 100 day variety. They do have less disease incidence in the short season crop. Larger seed is needed to meet the market demands. Varieties need to be developed for dual purpose uses; large and medium size seed for direct consumption and smaller seed for oil extraction. The present varieties have a rather small seed size in the range of 50 grounds per 100 seed. Varieties need drought tolerance and disease resistance.

7. Soil Fertility. Rock phosphate is used for fertilizer to provide calcium and phosporous. Phosphate is available in the northeast. Peanuts are important in the cropping systems to contribute nitrogen, organic matter and to generally improve soil fertility.

8. Rhizobium problems. They have an inoculum project in the Department of Agriculture which is attempting to find better suited rhizobium for their conditions.

9. Salinity problem. There is some 10% of the arable land in the northeast that has a problem of soil salinity and this is increasing.

10. Food technology problems. He feels that progress could be made in developing new products and this should be no. 2 or 3 in priority.

Dr. Awooth feels that the national program of peanut development should be handled by the Department of Agriculture and more basic research by Khon Kaen University (genetic inheritance, physiology, etc.). As noted in a discussion with the Khon Kaen University staff, the Department of Agriculture and Khon Kaen University are trying to coordinate their programs so they won't have duplications in their research.

Dr. Awooth feels that 2 tons per hectare is a reasonable goal for production. The average is now 1.3 tons which will be about a 33% increase. They could grow 2 1/2 - 3 tons per hectare with good management.

A later point he mentioned as a constraint is the need for small equipment for farmer mechanization. Dr. Jackson commented that there is equipment scattered all over the world that is available for use for small farmers but no one has taken the time to put it all together in a book to show what is available.

Conclusion of discussion with Dr. Awooth.

October 21 - 2:40pm we met with the seed technology group in the Department of Agriculture Extension. This consisted of Bill Gregg and George M. Daughtery, who are on an AID grant with Mississippi State and are stationed here for a period of time, and Mr. Petcharat Wannapee, who is Thai. They pointed out that the lack of seed is a major constraint in the production of peanuts in Thailand. There is no private company that devotes itself to the production of peanut seed. There is competition for peanuts with other crops that are easy to grow such as cassava, which has lower input cost. The government is trying to encourage the farmers to produce less cassava and more peanuts for land improvement.

Thailand is one of the six food exporting countries in the world, but they feel that the population increase will overtake their rice export in 10-20 years. There is a 2 1/2 -3 % annual population growth in Thailand.

Farmers can get credit from the government for farm production. It is hard for low income farmers to obtain credit. The government also provides a source of fertilizer and they can get aid for pest control through the distrct pest control units. They have extension workers in every district and each province contains from 6-15 districts.

The marketing system for peanuts in Thailand moves from the farmer to a local merchant who, after he obtains a certain volume sells to the larger provincial merchant. He in turn sells to merchants in Bangkok or to a shelling merchants for either direct consumption or oil production.

Peanut seed in Thailand costs about 15 bahts per kilogram and they shell out about 65%. Farmers sell their peanuts for 67 bahts per kilogram on the normal peanut market. In contracting from growers to produce seed, the seed division buys or pays them about 10-12 bats per kilogram for the seed produced. The average farm size in Thailand is generally 5 acres or less. There are few capabilities in the research system to do seed technology research. This contract from AID is responsible for setting up 4 pilot seed facilities. They handle corn, sorghum, rice, soybeans, and peanuts. Its pilot project is rather small in terms of the total production in the country. The purpose of this pilot project is to try to stimulate private development of the seed industry.

They are now working with the Department of Agriculture to try to encourage them to contribute more of their time to seed technology research, but at this time, they have a shortage of personnel to put in this area. The Department of Agriculture program has primarily been concentrated on production rather than with seed technology.

There were about 5 constraints listed to production of high quality seed listed by this group.

1. Crop Management to enable seed harvest to occur in the dry season. This is primarily the date of planting.

2. Harvesting at the proper stage of maturity.

3. There is a need for lime applications to get a well filled, better quality more vigorous seed.

4. Harvest practices need to be improved to produce better quality seed.

5. Processing and storage. There needs to be research done to learn how long seed can be stored under the Thai conditions without refrigeration to maintain good germination and seed vigor.

This Concludes the discussion with the Seed Technology Group.

October 21, 1980 - Meeting with part of the staff with the Agronomy Department at Kasetsart University. Kasetsart University has responsibilities in the areas of education, research and extension. Their research stations cover the four regions of the country and the research in each region depends upon the cropping system located there. Kasetsart has produced the most popular corn variety in Thailand. They have a sorgum variety which is almost ready for release to the farmers. They try to develop a multi-disciplinary approach to each crop to include breeders, agronomists, entomoligists, economists, etc.. Their research is mostly basic type, but they have some applied work including farmer field testing.

Their program with peanuts is very limited; their researchers are not generally devoted or assigned to full time work with a particular crop but have many responsibilities in addition to being heavily involved in teaching. They had a plant breeder Dr. Soontorn Dunaploy who had begun to develop a fairly extensive breeding program, but he has since left the university. The breeder who will take over his work is Dr. Srinives Peerasuk. They have a seed physiologist, Dr. J. Doungpatra who is interested in some of the problems of harvesting and storage, but she is just beginning her research and doesn't have anything underway at this time. Dr. Supat Faungfupong is a physiologist - crop production specialist who has some time to devote to peanuts. Also in this area of research and teaching is Dr. Isara Sooksathan. They have someone in food technology who is interested in problems of quality and aflatoxin contamination, but there is little with peanuts at this time. There is a line in the collection that was developed by Dr. Soontorn that has some resistance to aflatoxins .

The Department of Agriculture Extension has primary responsibility for contacting farmers and distributing information from the research programs. The Kasetsart University group has responsibility for providing workshops, seminars and other type training programs for extension workers and in some cases for farmers. The University has both graduate and undergraduate research programs. The graduate programs now only lead to a Masters degree, but next year they are going to establish a PhD.program. There are some 40 staff members in Agronomy, 15 with PhD's and the rest with masters degrees. Among these masters degree staff members some are abroad at the present time working on PhD programs. These PhD. students are supported by the government, from institutes such as Rockefeller, from the U. S. Government. and other type programs. Dr. Izara has just received money from the government this year to expand her research in management practices. This research will be carried on in the coastal plains region because the Department of Agriculture has the responsibility for work in the northeast part of the country.

In the area of physiology immature seed are the problem. Only about 25% of the peanut seed is good quality. Farmers dig on time schedule rather than on maturity. Seed dormancy is also a problem and breeders are trying to introduce a dormancy character into new lines. The following constraints were listed:

1. Poor land preparation, usually done by contract results in poor stands and growth.

2. There is a need for varietal improvement, especially in seed dormancy and aflatoxin resistance.

3. Seed is of poor quality and in short supply. The seed division only produces 5% of the needs. At this time there is no private companies produicing seed. Shellers do not screen for size, therefore the seed sold contain a lot of immature kernels.

4. Low yields in farmer fields do not produce enough peanuts for consumption in Thailand. Improved management practices are needed to increase yields. Some of the practices can be imptroduced, but research answers are needed in areas of fertilization, cultural practices, and disease and insect control. Improved harvest practices would result in better seed quality and better quality peanuts for human consumption.

5. There appears to be a need to socioeconomic studies to learn why farmers resist bringing a new crop such as peanuts into their cropping program.

The four people that we visited with at Kasetsart University were Dr. Srinives Peerasuk, Plant Breeder; Dr. J. Doung Patra, Seed Physiologist; Dr. Supot Faungfupong, Physiologist - Crop production; and, Dr. Isara Sooksathan, Physiologist and cropping systems.

Indonesia - We arrived in Indonesia on the evening of October 22 from Bangkok, Thailand. On October 23, we contacted the USAID Mission in Jakarta and met Mr. Ken Prussner, Mr. Mike Korin and the Principal Agricultural Officers, Mr. W. C. Tappan. They explained that the principal contracts in Indonesia were an IRRI Rice Contract that had been going since 1979 and will end in 1982. There is a contract with IADS to establish 10 research stations on the island of Sumatra. There is another $40,000,000 contract to set up research in islands other than Java. There are projected 17 farms to be established under an AARD program covering livestock, fisheries, forage crops and forestry. Finally, there is a World Bank Project in two phases, Research I and Research II designed for the outer islands which will be an $80,000,000 expenditure.

Following this information AID gave us a vehicle and we proceeded to our first meeting of the morning.

Meeting on October 23 with Goeswono Soeparoi, Department of Soil Sciences, Faculty of Agriculture, Bogor Agricultural University, Bogor, Indonesia, and Dr. Justika Baaharsjah, Researcher, Department of Agronomy, Faculty Pertanian Institut, Pertanian, Bogor. Dr. Goeswono works with peanuts on a part-time basis. He has been studying the effect of liming on yield using calcium carbonate and calcium hydroxate applied 4 inches either side of the row. He has found that 60% field capacity is most favorable per pod set and that potassium influences pod filling most importantly. Peanuts are also grown in dry areas upland on high ph's. He has screened 10 varieties for tolerance to aluminum and acidity. He has found four varieties which are tolerant. They are Kidang, Gajah, Banteng, and Macam. These varieties, at least the latter one, are derived from Schwartz 21 which is a wilt resistant variety which began early in Indonesia. Peanuts are grown in central and east Java in the southern Celebes and in southern Sumatra. At the latter locations the soils are acid and shallow. Where they do not apply lime the yields are less than one ton per hectare. The national average is 0.8 to 1 metric ton per hectare. Under optimum conditions in experimental plots these varieties have a yield potential of 3 1/2 tons per hectare.

The constraints that were listed are improper fertilization practices.

a. Lime is needed but not often applied by the farmers.
b. There are often deficiencies in the area where peanuts are grown.
c. Some areas have low magnesium which is often induced by applications of potassium. He has not seen boron deficiency.

Seed of new varieties are given to advanced farmers. Farmers save their seed. Fertilizer prices are subsidized by the government but the fertilizer available is Urea, Ammonium Sulfate, and Phosphate only.

Farmers usually try to control bugs, but not diseases, with pesticides.

The peanut crop is directly consumed in large part. Some peanuts are pressed for oil, but the peanut cakes are fermented and eaten by humans as well as given to animals.

According to the information we have there are four or five part time people interested in peanuts at IPB. Additional names given to us were: Komaruddin Idris, Master Science Degree in Soils, Sutawri Suroqinoto, Master of Science Degree in Agronomy.

Funds for research for IBP come from the university through research proposals to other organizations.

The federal research is conducted at CRIA (Central Research Institute for Agriculture) and is located in Bogor. The leader of the peanut breeding program at CRIA is Mr. Sadakin Somaatmadja has a Master in Science Degree. Assisting on the peanut breeding staff is Mr. Lasimin Sumarsono and Mrs. Sri Astuti Rias. Address is: CRIA, Jalan Mereka-99, Bogor, Indonesia.

Mr. Sadakin feels that the future of peanuts in Indonesia depends on good varietal resistance to cercospora leafspot and to peanut mottle virus. They feel that they get around 50% yield reduction due to peanut mottle virus. They have no research in the physiology of peanuts and in food technology, but they do have one man who does socioeconomic research. They have a pathologist, and an entomologist for their legume crops. Peanuts are planted on a 25 x 25 centimeter spacing which should figure out to about 120,000 per hectare. Most peanuts are grown on small family farms of 0.3 hectares per farm. The farmers pull the pods, then dry them for about three days. In drier areas they dry them in a field. One problem pointed out in peanut production is seed sprouting in the 100-110 day varieties prior to digging.

We visited the plots and saw several of the diseases; witches broom, leafspot, rust, peanut mottle virus and bacteria wilt. The common cropping system in this area is rice from October to April, followed by a second crop of corn or legumes such as peanuts or soybeans, and a third crop, of legumes, which again might be peanuts, soybeans, or mung beans.

October 24, 1980. Meeting at Department of Agronomy at IPB, Bogor

We met with the Department Head, Mr. Achamad Surkata Abadin and Mr. Amaris Makmur and Mrs. Jajah Koswara, they are at the also at the Institute Pertanian Bogor, Bogo Indonesia.

From our vist with this group in Agronomy, we were satisfied that there is little research going on in the Department of Agronomy other than small demonstrations in the training of students in undergraduate research programs. They do have programs leading to the Masters and PhD degrees, but up to this time, they have no students that have done research projects in peanuts, either in plant breeding, crop management, or other fields of Agronomy.

The other individual in this department that we met yesterday is Mrs. Justika Baharsjah. Dr. Gaswano Sapardo that we met with yesterday was from the Department of Soil Science. Dr. Justika is in Agronomy and her work deals with cropping systems which sometimes do include peanuts, but not on a scale that would justify any linkage with the CRSP at this time.

JACKSON
PHILIPPINES

Arrived on the October 25, 1980. All meetings started on October 27, 1980. At 0810 we visited the USAID Mission and found that a schedule had been prepared for us to make visits on Saturday, October 25 and to fly to the north part of Luzon on Monday and Tuesday, October 27-28. We had no knowledge of these plans which had been made by Dr. Batugal, therefore it was necessary for us to get a USAID car to take us to Los Banos.

We missed seeing Mr. Everett Headrick, Officer in Charge, USAID, Raymond Magsaysay Center, 1680 Roxias Boulevard, Manila. Telephone 59-80-11, Ext. 2419 or 2404. We arrived in Los Banos, at approximately 1030 and went directly to our first appointment.

This was an interview with Dr. Ponciano A Bataugal, Director, Philippine Council for Agriculture and Resources Research, Los Banos, Laguana, Philippines. Dr. Bataugal is with the International Projects Division, Telephone No. is 2308-2540-2269-2375-2469.

Constraints.

1. E. Peanuts are grown in the Philippines throughout the country in small patches, but the concentration of acreage is in tne northern portion of the island of Luzon. The districts where peanuts are grown in greatest abundance are Cagayan and Isabella in the northern and eastern portion of Luzon. The Ilocos del Norte and Ilocos del Sur are also peanut growing areas. These districts are located in the northeastern portion of Luzon. In the northern parts of Luzon, there is an approximate dry period of six months, (rainfall is not torrential). Peanuts are cultivated in northern Luzon on alluvial soils in river valleys. In general the soil is rather high in organic matter. Peanuts are planted at the beginning of the dry season and harvested approximately 3 1/2 months later.

Peanuts can be grown in Leyte, Palawan, Mindinao and other southern islands, but the rainfall is greater and more regular and presents a different kind of problem than in northern Luzon.

1-F. Peanuts are used in the Philippines mostly as snack foods, confection, and peanut butter. There are one or two large peanut butter manufacturers, notable among which is the California Manufacturing Company who sells Ladies Choice brand. This company is a subsidiary of Proctor & Gamble in the United States. There are many cottage industry peanut butter makers, however and this peanut butter appears on the market in the form of minor brands. There are virtually no peanuts used for oil in the country.

The Philippine Council for Agriculture and Resources Research (PCARR)is presently interested in fostering a scheme in which one or two peanut oil companies wish to have farmers produce sufficient peanuts in Cagayan and Isabella to support an oil mill in northern Luzon located at a northern-most seaport. To support the oil mill would require at least 300,000 hectare of new peanuts to be grown in northern Luzon. The project by which this may be done is a three way project, which is apparently a project authority in its own right.

1-G. The figures that we received were rather tentative insofar as the total production of hectares involved, however, our information is that there are approximately 90,000 hectares of peanuts in the Philippines now, giving a total yield of approximately 45,000 metric tons per year. This figures out to approximately 4-600 kilograms per hectare as a national average. Trials which have been run at university locations or at experiment stations have achieved up to 2 metric tons per hectare in production with the same varieties that farmers use to achieve only 500 kilograms per hectare. This is not unusual and is somewhat the same story in every country we have visited.

1-H. The market system for peanuts generally consists of a series of collectors who buy the peanuts from the farmer and then re-sell them to large wholesalers. There are several large shelling and processing plants located in northern Luzon. Many of them belong to Chinese merchants who lend farmers money for seed and perhaps fertilizer and buy the crop in advance at a very low price. There are practically no oil plants in the country today. Philippine commerce prefers coconut oil for use in cooking and human nutrition so that peanut oil is not used widely, although it is available, probably imported from the United States or India.

1-I. The average farm size is 2-3 hectare of which about 1/3 or less is used for peanut production. The farmers must be considered as small commercial farmers insofar as peanuts as concerned, because peanuts are an important cash crop for the farmer. In the government's view this is one of the important aspects in increasing peanut production; that is, increasing cash for the small farmer.

1-J. The labor supply is apparently adequate and is furnished mostly by the farmers' family, although outside laborers may be called upon during the harvest season when the majority of the work in peanut production is at hand.

1-K. The federal government does not supply any inputs into peanut production except as farmers can qualify for credit programs with the government which will include the purchase or seeds, pesticides and fertilizers. As mentioned before, Chinese merchants are more apt to advance credit in return for buying peanuts at a very low price. The availability of markets are relatively restricted.

1-L. We are not quite sure how many people are involved in peanut research in the Philippines because like in other countries that we have reported on, the situation is one of part time research by a number of people and it may not be on a yearly basis. As far as we have been able to tell, there are approximately 50 college graduates, with the highest degree being an M. S., up in the province of Cagaan located at an Agricultural Experiment Station which has recently been developed with Japanese Aid. These people, or at least a portion of them, are available to run simple experimental procedures, like variety trials, fertilizer trials and such things. In the Manila area the people at PCARR do no research. They are coordinators, rather. The University of the Philippines at Los Banos supplies some research capability. I would guess, however, that in equivalent full time (EFT), are not more than 1.0 EFT peanut research actually being done at the University of the Philippines and the Institute of Plant Breeding at the present time. We did not talk with representatives of the Ministry

of Agriculture, Bureau of Plant Industry. We know that they are doing some limited research with peanuts. But, again, I doubt that the EFT involved is more than 1.0 scientist years. However, there is a potential that given funds to work with, the program at the University of the Philippines at Los Banos could be greatly accelerated and personnel might be made available for peanut research. The primary problem with PhD researchers at the University of Philippines is that there is absolutely no money from the University for research. All funds are for teaching activities.

1-M. There are adequate field and laboratory facilities for peanut research at various field stations and at the University of the Philippines at Los Banos.

Miscellaneous notes

The primary interest in peanuts by the government is in developing a sources of cash income for small farmers, particularly those in the northern part of Luzon.

The figures given to us by several respondents in the Philippines are that 70% of all school age children are malnourished. I'm not quite sure whether they have bad nourishment in general or a slight deficiencies or proteins, but it is a startling figure at any rate.

As mentioned before in Cagayan province, there are 50 college graduates in Agricultural demonstration and research. There are people who have agronomic degrees and who can do variety testing programs. In fact, we were asked by Batugal to send him 25-50 kilograms of each variety that we could spare for a testing program which he would like to get underway in December. He is interested in two types of peanuts because there are two distinct uses. One type is for oil and one type is for the peanut butter and confectionery trade.

Much of their peanut variety testing is done in farmers fields in the form of regional trials. Tests are also run at bureau plant industry locations throughout the country, at state universities also. There are 30 state universities in the country.

Seed production in the country is very low. There is no good system presently developed for producing seed.

Farmers are very receptive to innovation once it is demonstrated by the Extension Service.

The research center in Cagayan where apparently 30 to 50 college graduates are doing research is at Iguig.

The small farmer in the Philippines has no mechanized help. Eseentially he has a caribou, a wooden plow, and a hoe to do all of his operations in producing and harvesting peanuts.

In the province of Isabella, the government wishes to try some mechanized peanut farming on 3-5 hectares. This land is owned by a private company and the company may be interested in making up to 10,000 hectares available if mechanized farming can be proven.

The average farmer income in the Philippines is approximately $150 per capita.

Constraints:

1. The need for improved germ plasm from which varieties can be developed. This need includes the need for seed production of varieties as they are developed so they can be used.

2. Agronomic practices. Information is needed on:
   a. Density of plants per acre or per hectare.
   b. The advisability of flat or ridged culture, including hilling up around peanuts to increase productivity.
   c. The need for irrigation and the proper way to apply it and,
   d. Fertilization practices.

3. Concerns pests and diseases. Leaf spot and rust are the two major diseases that are recognized in the peanut producing area.

There was no mention, made by the respondent, of aflatoxin, although it is well known that aflatoxin is very prevalent in the peanuts produced in the Philippines.

That is the end of the interview with PCARR. But there is another name we need to record: Mr. Richard M. Juanalio, Senior Research Assistant, InternationalProject Division PECARR, Los Banos, Laguana. Mr. Juanalio accompanied us on the visits to the University of the Philippines at Los Banos and made a car available for us to make these trips. On October 28 we returned to USAID in Manila and discussed briefly our findings with Mr. Headrick, the Officer in Charge. We then departed and went to the Manila Hotel where the Consultaltive Group for International Agricultural Research was holding its annual meeting. At the meeting we met Dr. Ralph Cummin. We also met Dr. Clive James and Dr. Patricia Roberts-Pichet of the Canadian Foreign Aid Agency. We discussed briefly our visit to ICRISAT, with Dr. Swindale, the Director General of ICRISAT and told him of the Steering Committee decision not to use an ICRISAT representative on the Technical Panel.

CUMMINS
PHILIPPINES

October 27, 1980 meeting with Rudy S. Navarro, Inst. for Plant Breeding College, Cagula, Philippines.

Mr. Navarro is responsible for the plant breeding program in the Institute for Plant Breeding. The IPB is a part of the Ministry of Agriculture, but the staff is housed with the Department of Agronomy, UPLB. There are two agencies responsible for varietal improvement of peanuts, IPB and the Bureau of Plant Industry.

The breeding program with peanuts is a part of the total field legume program. Crops worked with are mung bean, peanuts, cowpeas and soybeans. Other crops such as corn are also the responsibility of IPB.

Mrs. Leonila Lanticon, Peanut Breeder, is associated with this program. She has a B. S. degree from UPLB. We also met a pathologist involved with the peanut program who has an M. S. degree from UPLB (I don't have his name).

The peanut breeding program is interdisciplinary with physiologists, plant pathologists, entomologists, etc.

The varietal improvement program , composed of the above disciplines, recommends varieties on a country basis rather than on a regional basis. The variety testing is cooperative between IPB and the Bureau of Plant Industry.

Germ plasm for the breeding program is obtained from Puerto Rico, ICRISAT, Indonesia, with most of the material coming from ICRISAT. There are some 800 lines and breeding lines in the program at the present time. The germ plasm is maintained with the cooperation of the National Plant Genetics Resources Laboratory located with IPB.

According to Dr. Navarro, diseases are the primary constraint to production.

1. Leaf spot, rust, peanut mottle virus, are the most common diseases. Presently, the varieties recommended have a high yield potential, but diseases often limit yields. Recommended varieties include: UPL-PN4, BPI-29, UPL-PN2,. which produce yields of approximately 1.6 metric tons per hectare of shelled nuts. During the past ten years shelled nut yields of three tons per hectare have been produced, which emphasizes his point of the high yield potential of present varieties.

October 27, 1980 visit to the Department of Agronomy - UPLB (University of Philippines at Los Banos). Dr. Jackson and Dr. Cummins visited with Dr. Issac Cagampang.

Dr. Cagampang is primarily a teacher but, does some research on the agronomic aspect of peanuts. Most of the research that he is responsible for is done by graduate students in their thesis research programs. There is little monetary support for peanut research, or for any research, except for the graduate research which is supported by the students themselves. Some support comes from NSDB (National Science Development Board), and from sources such as PCARR. (Philippines Council for Agricultural Resources Research). Agronomic research has dealt with cultural practices, plant populations, dates of planting, fertilization, etc.. Approximately 50% of the research has been conducted by graduate students and 50% through departmental projects. There has been no peanut research in the department during the last two years, except for that in IPB.

Constraints discussed by Mr. Cagampang were:

1. Lack of basic agronomic practices, such as proper plant populations, optimum planting dates, and proper fertilization, to take advantage of the yield potentials available in the present varieties. There is not yet enough knowledge of these practices to attain optimum yields. Research proposals have been made to the government and other sources, but at the present time, none of these have been funded.

2. Varieties of peanuts which are resistant to diseases are needed. Rust is a major problem. As mentioned by Dr. Navarro, present varieties have good yield potential, but are not disease resistant.

3. Post harvest problems. The lack of shelling facilities available to farmers restrict the amount of production because they have to resort to hand shelling. The primary market for their peanuts other than the confectionery trade is the California Marketing Company, which wants to buy the peanuts already shelled.

Most of the peanuts purchase by this company are used for peanut butter. CMC has proposed to locate shellers in farming centers and shell the peanuts for a small fee (this may not be a researchable restraint, but just indicates a need for applying presently known technology).

The Engineering Department at UPLB has tried to develop a pedal operated sheller, but have not been successful in reducing the manpowerrequired to make it an acceptable tool. There is a need for more small machinery for planting, shelling and cultivating. This machinery should be developed using indigenous materials instead of importing expensive machinery. Equipment ideas can be imported and adapted. Again, this may not be a researchable constraint area.

4. Fertilization. There is a need for further research to determine most efficient fertilization practices. In some soils lack of nitrogen limits production. Yield responses have been obtained from up to 30 kilograms per hectare of nitrogen. Most soils used for peanuts are generally high in phosphrous and potassium . The Bureau of Soils has isolated a rhizobium species which they feel will be more effective for peanuts, but it has not been evaluated sufficiently to determine its effectiveness. There is a project in the Department of Plant Science related to soybean-rhizobia relationships under the direction of a microbiologist, but at the present time he has not worked with peanuts. It appears that some research could be undertaken in this area of peanut-rhizobia relationships.

In all of our visits in the various countries there appears to be little appreciation for the contribution of symbiotically fixed nitrogen in legume production. Factors reducing nitrogen fixation efficiency appear to be high soil acidity, inadequate inoculation, and possibly inefficient species of rhizobia.

In general comments, Dr. Cagampang stated that the national production of peanuts over the past twenty years has been stable at about 45,000 metric tons. Hectare yields are in the range of 400-600 kilograms, but they would like to see these yields increase to 1 - 1.2 tons per hectare. He believes that farmers would accept new technology for peanut production should it be availole and presented to them. Peanuts are often interplanted into corn during the wet season prior to the harvet of corn. Some cropping systems research has been conducted by graduate students and at IRRI (International Rice Research Institute). He did not mention cropping systems as a constraint area, but this probably should be considered. Infestations of certain insects are lower in corn in the presence of interplanted peanuts.

October 27, 1980.Dr. Jackson and Dr. Cummins visited with Dr. Elias E. Escueta, Chairman of Food Science and Technology Department at UPLB.

The research in this Department is primarily an applied or extension type effort with local indigenous products. Problems are brougnt to the lab, solved, then taken back to the small, cottage scale industries in the various regions. Work with peanuts has primarily dealt with peanut brittle and peanut butter. At the present there is not much interest in new products, only in improving existing products. They have worked some in extracting peanut protein and adding it to caribou milk. Caribou milk is 9.55 % fat, which makes it unacceptable for direct consumption. The idea is to water down the milk to decrease the fat to an acceptable level, then fortify it with peanut protein.

Researchers in life sciences, chemistry, and food science have a working group with capability to study aflatoxins. They have surveyed the occurrence or sources of aflatoxins.

All the peanuts produced in the Philippines go into the confectionery trade as roasted peanuts and peanut brittle and for production of peanut butter. Presently no locally produced peanuts are used for oil production.

The following contraints in the Food Science area were discussed by Dr. Escueta:

1. Lack of raw materials. All of the production goes into the confectionary and peanut butter market, leaving no peanuts for the development of new products or uses. In Cebu Province sweetened grits are made from peanuts, but they have a problem of rancidity limiting storage time. Some work is now being done to lengthen storage life by the use of antioxidants.

2. New product development such as high protein beverages, and milk protein supplement would expand the use of peanuts in food stuffs. Also, this would aid in the reduction of malnutrition in school age children.

3. Tradiitional products which utilize peanuts need improvment. Since most of the peanuts are utilized through the cottage size industries, attention needs to be given to this area.

4. There has been some preliminary research towards utilizing peanut flour in noodles which needs to be continued and expanded.

In conclusion Dr. Escueta stated that the Department of Food Science would be interested in the peanut CRSP. Their interest would be in new product development and aflatoxins.

NOTE: The AID Secretary is Mrs. Fely C. Sunga should be remembered for her aid in arranging transportation to Los Banos.