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Meeting with the Heads of Programs at the Institute of Agricultural Research (IAR)

Present at the Meeting:

Dr. J. H. Davies, Acting Director, IAR

Dr. Joe Yayock, Deputy Director

Professor Collin Harkness, Groundnut Breeder

Dr. L. Olugbemi, Dean, Faculty of Ag. and Head of Dept. of Plant Science

Dr. Davies, who is the Acting Director of the Institute, welcomed us and went on to indicate the status of groundnut production and research in the country. He pointed out that groundnuts are not being produced as they were in the 60's due to various factors:

1. Unprecedented drought, aphid and rosette infestation in the major growing areas.
2. Lack of confidence in growing the crop by the farmers because of these natural disasters.
3. Changes in the economic climate resulting in extra money in the rural areas.
4. Increased demand in the rural areas.
5. The basic staples went up in values so that the farmers could make more money growing sorghum and millets.
6. Buying power of groundnut did not go up accordingly, so economically it was no longer a profitable proposition for farmers to grow it.
7. Universal primary education put children into school and the young labor was no longer available on the farm and this was very important for the peanut production which has a very intensive labor requirement.

All these various factors contributed to the decline in the production of groundnuts in Nigeria to the point that today Nigeria spends about N180 million to pay for about 200,000 tons of edible oil per year when before it used to export more than that quantity.

It was pointed out that the present groundnut situation is also true with cotton. These formed the major cash crops for the area. The government has, therefore, earmarked groundnut as a rehabilitation crop and has thus established a five-year program designed to once again make the country self-sufficient in groundnuts. The Institute has been mandated to increase groundnut production or expand their program in order to help achieve that goal of self-sufficiency. Their major constraint, however, was shown to be lack of qualified professionals to do the job and to a certain extent inadequate research funds.

Dr. J. Yayock, Deputy Director of the Institute, indicated major priority areas for their research program. These were:

1. Areas of breeding - development of varieties suitable to dry areas of the country, varieties resistant to pests, area specific varieties for Morkwa, Samaru and Kano which are the three (3) major producing areas.

Major constraints associated with this priority area are shortage of professional staff and funds. The political changes in the country seemed to have affected them adversely rubbing them, two of their faculty members who left to become either ministers or members of the legislature.

2. Agronomic area - agro climatic studies, e.g. moisture and extremes of temperature on growth, flower initiation, flower production, pod formation, pod development and pod fill.

Nutrient uptake with moisture relations. Plant nutrition - nutrient balance for plants.

Major constraints hinge on trained personnel although they have one person training at the moment in plant nutrition at the University of Gualph, Canada.

3. Crop protection - seedling rot, aphid infestation, rust, tarmite, rosette and weed are the major problems.

Similarly, inadequate trained personnel is a major problem.

4. Mechanization of the production process (farming system as a whole), nature of cropping and cropping systems, socioeconomic aspects--all these need to be looked at.

The oil boom seems to provide various other types of alternatives than farming and those who are still in farming would consider crops which provide them better returns than groundnuts.

From all indications we can no longer dismiss the need for or the notion of mechanization of peanut production and agricultural production for that matter in the agricultural scene of Nigeria as being inappropriate if that country is to achieve any improvement in its food production.

Everybody we talked to indicated that the farmer can no longer find available labor and even when there is any, the cost is prohibitive. The major reason is that the young men and women who used to form a major part of the labor force are either in school or have gone off to other forms of activity that would be less demanding and still would provide them a quicker and bigger reward. To sustain agricultural production in Nigeria, the farmers can no longer depend on "cheap human labor" and, therefore, must seek a solution in a certain degree of

mechanization, particularly animal power should be seriously explored.

On the socioeconomic aspects, there seemed to be no information dealing with the issue and people appeared quite ignorant of the situation. Thus, there has been no systematic or even haphazard study of what the farmer thinks about growing peanuts nor has there been any peanut consumption studies done in terms of who consumes it, in what form it is consumed, to what extent it is consumed, and all the other aspects associated with any food consumption.

Discussions were held with many faculty members in the department of agricultural economics and rural sociology in an effort to elicit information on the socioeconomic aspects. They pointed out that since most of the activities of groundnut production—planting, weeding, harvesting, shelling of harvested nuts—are very labor intensive, and since most of the formerly available local labor is no longer available, this scarcity and, therefore, high cost of the labor is a major constraint in production of groundnuts in Nigeria. It is true of all sectors of agriculture.

It is my candid opinion that the situation is not likely to be reversed soon. Therefore, in the Nigerian agricultural scene without some form of mechanized inputs, they can hardly revive their production of not only groundnuts, but also other farm crops. The agricultural engineering section of IAR, ABU has recognized this fact and is proceeding assiduously to develop or adapt suitable machinery for land preparation, harvesting and shelling of the groundnuts. They need a great deal of assistance in this direction in order to accomplish their objectives quickly. We suggested that they start experimenting on animal power as well.

The economists also pointed out that the low price ceiling which the government approved for the marketing board was another major disincentive

to the farmers and hence contributed to the collapse of the groundnut production. The new crop rehabilitation program has changed this ceiling to a more favorable level. It became clear to the farmers that they could produce other crops such as millet and sorghum or guineacorn more readily and cheaply than groundnuts.

One other cause of scarcity of groundnuts in the country was, according to them, that businessmen bought up the little that was produced and smuggled them across to Niger for processing in order to earn foreign exchange for their other import activities.

The major difficulty we found with regard to socioeconomic and food consumption patterns was that nobody seemed to have paid any attention to these aspects and, therefore, hardly any documented information based on hard data could be obtained. It is very clear to me that this is an important area that needs to be looked into.

Besides the direct human consumption of groundnuts as snacks, either in the boiled or roasted forms, we were unable to find any other form of direct use for human consumption. In Northern Nigeria, the cake from the oil extraction (homemade) is sometimes made into what they called "kulikuli". Of course, the major use of the cake is for animal feeds. Perhaps research is needed to improve the method of preparation of the kulikuli so that its consumption can be expanded. Neither the IAR nor the university has any food science or nutrition departments and, therefore, nobody addresses these areas and related problems.

SUDAN

We arrived in Khartoum on February 2, 1981, and were met at the airport by Dr. James Riley from Washington State University working with the Western Sudan

Agricultural Research Project (WSARP) as Senior Advisor to the Director General, Agricultural Research Corporation and by Mr. Abdul M. El-beid, Agricultural Management Specialist, Food and Agricultural Office, USAID.

Meeting with USAID mission representatives, Mr. Arthur Mudge, Mission Director, and Mr. Robert Sweet, Agricultural Officer - This meeting was mainly to brief them on the purpose of our visit and to review the program that they had drawn up for us.

Meeting with the State Minister of Agriculture, Dr. Mohammed Hassan El-Jack - We were told that the government's program includes expansion of production to include ½ million acres of irrigated groundnut crop under the Rehad scheme and the groundnuts from here are mainly for oil extraction.

The Southern region of Sudan is dependent on rainfall for growing groundnuts. They consume most of what they produce. Western Sudan is the major area of production mainly for confectionary purposes and not for oil. According to the Minister, the Sudanese needs in groundnuts include new techniques or improved practices, improved seeds and extensive use of extension services to increase production and yield.

Their constraints in addition to the above needs seem to be around labor availability. The scarcity of labor was said to be due to other industries competing for the same labor, the sugar and textile industries.

The consumption of the peanut as a household food is hampered by lack of simple method for its processing. Even in the use of the peanut oil, the housewife prefers to use first cottonseed oil followed by sesame oil. The only wide application of groundnut in the country was said to be in the making of groundnut "salad" in which roasted peanut is ground, mixed with onions

and prepared into a slurry-like butter and used for different purposes including salad dressing. It is suggested that the method of preparation could be improved in order to provide for better storage and longer shelf life.

We also held discussions with Mr. Sayed Toufik Hashim, the Director General of Agricultural Economics and Planning, Ministry of Agriculture, Food and Natural Resources and with Mr. Sayed Kilani who is the Chairman of the Oil Seeds Company of Sudan. Mr. Kilani pointed out that groundnut production has declined in the country, perhaps due to two reasons: (1) the lack of improved seeds, for example, the Barbarton variety which has been used for many years has declined in performance and there has been no attempt to improve it; and (2) labor scarcity, as many young men have drifted to big cities from the rural areas.

The oil seed company's responsibility includes monitoring the quality of groundnuts. Their work of grading was labor intensive, especially the picking and selecting of good kernels. The method was the H.P.S. (hand picked and selected) process. Now the work is done at the port of Sudan by an electronic device. Most of the groundnuts are milled at the port of Sudan near Khartoum. About 2/3 of the country's production is consumed at home mainly in the form of oil crushing. They do not have much problem with aflatoxin but they have a test laboratory used for testing for aflatoxin contamination. Mr. Kilani pointed out that there is a resurgence of interest in the country in the growing of groundnuts.

We met with the faculty members of the School of Agriculture, University of Khartoum. About 12 people were present at the discussion. The professors did mainly teaching and whatever research they did seemed to be in cooperation with the Agricultural Research Corporation which has the responsibility for research.

Meeting with the scientists at the ARC Food Research Centre - All the

morning hours and part of the afternoon of 2/3/81 were spent in discussions with scientists and touring their chemistry, quality control, food processing and microbiology facilities. The centre is well staffed with highly qualified people but their work seems to be hampered by lack of funds, appropriate equipment and as a result many of these people leave to take up appointment in Saudi Arabia. Some of the people we met included Dr. Abdul Wahab Khidir (Food Technologist), Dr. Abdul Azin Nour (Biochemistry), and Dr. Abdel Hadim R. Ahmed (Food Quality Control) who took us around the facilities.

The work at the centre which was established in 1965 embraces research on fruits, vegetables, oils, fat and meat including the processing and post harvest preservation technologies. They collaborate with different areas or divisions of the government. Their main function is research, training and extension. They did not seem to be involved in basic research due perhaps to lack of proper equipment and money. Most of what they frequently get involved in is simple chemical analysis, the packaging of fruits and vegetables, canning of beans, and processing of cereals. Their backing facilities were provided by FAO and UNICEF. We were unable to meet with Professor Harbish who was said to be the man involved with aflatoxin work. Professor Harbish had just been appointed a regional Minister of Agriculture.

The group pointed out to us that they did not seem to have any problem in terms of protein availability for the people of Sudan. If there may be any shortage, it would be in the southeast. Thus, the abundance of animal proteins makes the consumption of other forms of vegetable protein quite minor. However, they estimated that more than 42% of the groundnuts produced in the country were consumed directly by man one way or the other as shown by the following figures:

Total production	919,000 tons
Total export	130,000 tons
Total crushed for oil	200,000 tons
Total eaten directly	389,000 tons

Export was only about 14%.

They suggested that the cost of peanuts was a factor that could affect human consumption as most other crops are less expensive. The Sudanese seem to enjoy eating peanuts, especially the ones prepared with a special "ash" rubbed on the nuts. People do not seem to find enough of that type. The peanut "salad" is either consumed directly or used with vegetable salad.

They pointed out that they are interested in continuing their work in the area of aflatoxin, composite flour with groundnuts, the development of a more acceptable ground nut salad and transfer of peanut butter processing technology. Their needs for accomplishing these objectives include provision of advisory service from U.S. scientists in Food Technology and assistance in providing necessary laboratory equipment.

It is interesting to note that some of the people we talked to in Sudan collaborated the opinion expressed by some Nigerians with regard to groundnut consumption. That is, that groundnut is quite filling, thus one can only eat so much groundnut at a time. This is probably attributed to its high calorie density in the form of fat.

Visit to ARC, Gezira Research Station, Wad Medani

Present at the Meeting:

- Dr. H. M. Ishag, National Coordinator for Groundnut Research
- Dr. A. B. El Ahmadi, Plant Breeding
- Dr. M. A. Ali, Pathology
- Dr. F. M. El Amins, Entomology
- Dr. Tigain, Pest Control
- Dr. Hamdoun, Pathology
- Dr. Musa, Deputy Director General

We later paid a visit to the ARC Director General, Dr. Hamid O. Burhan in his office.

Dr. Ishag, who led the group, gave an overview of some of the activities they are involved in and the problems confronting them in Sudanese groundnut production efforts. He indicated that in Western Sudan, rainfall is getting less and less and, therefore, drought resistant varieties are needed in the Sudan. Harvest losses due to failure to harvest groundnuts at optimum harvesting time are up to 50%. Since cotton and groundnuts are ready about the same time and since in this country cotton is king, the farmers tend to put their labor in picking the cotton first. By the time they get to harvesting the groundnuts, most of them are spoilt. Both crops are manually harvested. It was suggested that they try staggering the planting periods for the two crops and see whether the problem could be eliminated. Dr. Ishag emphasized their high need for assistance in agricultural extension.

Groundnut is a relatively new crop in Sudan, introduced about the 1960s. It is not fertilized but this may change in the next three (3) to four (4) years. There is a Groundnut Improvement Working Group that was set up a year ago.

It was pointed out that 1/4 million acres are under irrigation in Gezira. The plant breeder, Dr. El Almadi, indicated that what was most needed was simple techniques for screening, development of Aspergixus flavus resistant variety, drought resistant variety, pod rot and water logging tolerant varieties. Breeding for oil content or important nutrient content is also important. They expressed need for a better oil extraction method that would render the cake more useful.

The constraints for the plant pathologist included lack of equipment, even an ordinary microscope was hard to come by. Current literature on work by other

scientists would be very helpful. The disease problems that they are encountering include rusts, leaf spot, leaf mottle and rosette.

Work is needed in the area of plant nutrition. Extension engineers for adapting new methods are also needed, especially if certain measures of mechanization are introduced.

INDIA - ICRISAT

February 6-12, 1981

We were met at the Hyderabad Airport by an ICRISAT representative and were driven to the centre where accomodation arrangements were made. A detailed program of activities for our stay had already been prepared by ICRISAT and immediately on arrival, we got started with the various programs arranged for us.

We met with Dr. A. L. Narayana who gave us an overview of ICRISAT through a slide show and a farm tour. We met with Dr. J. C. Davies, Director for International Cooperation, to brief him on the purpose of our visit. Our last engagement for the day was a meeting with Mr. Thierstein, Principal Engineer for Farm Implements. He explained some of the engineering efforts of the centre in the development of tools appropriate for the various farming systems being developed by the scientists at ICRISAT.

We visited Dochur, one of the four to six villages that ICRISAT uses for their Village Level Studies (VLS). It provided us an opportunity to chat with the farmers about the problems of groundnut production and consumption and how they are coping. The village we visited unfortunately was one of those that did not consume groundnuts. They were unable to explain why they did not eat groundnuts other than it was not part of their food or it was not introduced to them as a direct food item. Most or all of what they produced was sold for the extraction

industry. When we later met with Mrs. Pat Bidinger, the Nutritionist at ICRISAT, she confirmed that direct groundnut consumption in India is almost non-existent. She pointed out that irrespective of farm size, in Dochur they observed no groundnut consumption whatsoever. But groundnut oil consumption in the villages would vary depending on the extent of production. In the groundnut producing villages, this would range from 15-20gm oil/person and in non-groundnut producing villages, their oil consumption would range from 6-10gm/person. Groundnut to most farmers is a cash crop. In some parts it seems to be as a status food.

The non-consumption of groundnut per se is probably that it is not preferred food even though they use it for certain occasions as a prestige food. She pointed out also that they found that during fasting, women ate more groundnuts. No reason was given for this.

The major pull for groundnut production is the cash that its sale provides. It is very difficult to explain the Indian food habit over peanut consumption even though people would be very happy if they are being given groundnut chutney as opposed to other forms of chutney such as green chili chutney. Perhaps it is reasonable to infer from these conflicting attitudes and observations that if groundnut production is increased, more of it would be eaten directly. So the major constraint in the consumption is economic consideration. Even in terms of groundnut oil consumption, we find that if a family income increases, their peanut oil outlay increases.

We visited with other scientists in the Farming Systems Program at ICRISAT and were briefed on the various forms of research they are conducting. Dr. Virmani explained their use of determinate and indeterminate plants in intercropping arrangement, for example corn or sorghum as determinate crops intercropped with

pigeon pea as indeterminate or pearl millet intercropped with groundnut, the determinate crop. Dr. Virmani pointed out that part of the objectives of the Farming Systems Program are increased production, stability of production and resource management. He mentioned that the major constraint in the SAT areas is rainfall/water management.

Dr. Willey indicated that the cropping system, as being developed at the centre, is designed for efficient use of resources. This includes the use of long maturing with short maturing plants planted sequentially or in relay fashion.

The use of broadbed was said to improve surface drains and increase water absorption according to Dr. Miranda of the Land and Water Management Program. He also pointed out that aeration in broadbeds is better, drought is less, cracking of vertisol is less and seed levels under the ground are better controlled. The two (2) types of soil at the centre were said to be vertisols, which are clay soils, and alfisols, which are sandy loam.

We visited with Dr. Gibbons. He pointed out that we should make sure that efforts are made to find out what all the different agencies involved one way or the other with groundnut production are doing. Such an effort would ensure better coordination of activities. He suggested that a consideration of the conversion of groundnut cake into edible form is important. Since work at ICRISAT is mainly to push yield up and less emphasis is given to breeding for nutrition, it might be worthwhile considering some aspect of it.

In the Economic Program Division we met with Dr. James Ryan and other scientists. They explained some of the features of their work dealing with the socioeconomics of production or the farming systems.

Dr. Ryan indicated that it would be necessary to compare and contrast the role of women, men and children in farming systems. Efforts also should be made

to focus on factor markets for the farming systems.

Dr. Dorherty, the Anthropologist, suggested that in looking at the socio-economic aspects of groundnut production and utilization, it should be done on a cross cultural sense. For example, when can you get people to work cooperatively? If people cannot work cooperatively, what is the reason for this? If, for example, such things as the tool carrier (or tropicultor) developed at ICRISAT is too expensive for individual farmers to afford, can small groups of farmers get together to own one? If not, why not? Or joint ownership of tanks or wells for irrigation. Such studies would lead to a decision as to whether to develop inexpensive tools that can only be owned by individual farmers. He also suggested that the basis for the seeming resistance of South American farmers to the introduction of intercropping systems is worthy of study.

We were told that 94 to 95% of groundnut production of the farmers is sold. The farther away from commercial markets or centres, the lower the production levels of commercial crops like groundnuts. Small farmers were known to sell their groundnuts soon after harvest and to repurchase seeds for planting during planting season. The reason offered for this behavior was that they need the money to pay back the loans they had taken and also for lack of appropriate storage facilities. Lack of appropriate oil processing facilities affect the quantity of groundnuts retained for home consumption. Thus the amount retained ranges from 1.4 to 1.9%.

Dr. Ghodake pointed out that no systematic way of marketing exists in some parts of India. This results in a high variation in price up to 50%. Credit pressure makes the farmer to sell so soon after harvesting so he has no bargaining power. Dr. Ghodake confirmed what was said earlier that lack of storage facilities and

lower rate of sunshine in November are factors that induce the farmer to sell his groundnut immediately after harvesting. Thus appropriate storage methods and facilities would help to stabilize prices so that he does not hurry to sell his crops for fear of spoilage.

Dr. Walker suggested that what is needed is what he described as diagnostic research for increasing production in farmers' farms to see what the constraints are. Also, to design and test new technology and the impact of its introduction should be considered necessary. Post harvest technology and market development are important as well as acceptability tests of newly released or advanced lines. Another important aspect is price policy in a nation in relation to international market and in relation to utilization and domestic resources. Dr. Walker suggested that cross sectional analysis between countries could be a way of tackling some of these issues.

Some areas of research were suggested by Dr. Williams, the new groundnut physiologist:

1. Work to improve yield through development of drought resistant varieties should be part of the variety development strategy. Work on plant nutrition should include Ca/drought interaction in pod initiation. Soil/water potential and low pH soils should be considered.
2. Investigation into disease resistance. This should look into why high yielding varieties are highly susceptible to disease infestation.
3. Problem of nodulation with small farmers.
4. Aflatoxin - genotype/environment interaction. If there is such interaction, what is causing it? Breeders and pathologists should be involved. There should be greater emphasis in explaining why there are interactions rather than just reporting their existence.

5. Need to start and then increase or step up work on microrrhiza on groundnuts - phosphate/microrrhiza interaction or association. This should involve soil microbiologists and plant nutritionists.
6. Early growth - this is important because groundnut yield potential is greater with plants that grow vigorously from the beginning. Large environmental and genetic components are involved. It seems that biochemistry work is needed in identifying this potential threat in a plant. Thus to stimulate and improve early initial growth is important.
7. Use of herbicides - provisions and adaptations of herbicides application techniques for small farmer's use. Also, the economics of herbicide application by small farmers should be studied alongside with the development. It has been shown in Zimbabwe that mechanically weeded plots using tractors causes plant disturbance which results in more than 60% reduction in yield. So herbicides may be preferred and appropriate techniques for application should be developed for small farmers.



Dr. B. Onuma Okezie
Director, International Programs
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