

DEVELOPMENT AND APPLICATION OF  
INTERMEDIATE TECHNOLOGY (DAFIT)



REPORT ON THE RECONNAISSANCE OF THE  
POSTHARVEST MAIZE SYSTEM IN THE  
ASHANTI AND BRONG AHAFI REGIONS OF GHANA

by  
C.K. QUARTEY

DECEMBER, 1982

LET US HAVE FAITH THAT RIGHT MAKES MIGHT  
AND IN THAT FAITH LET US DARE DO OUR DUTY  
TO THE END AS WE UNDERSTAND IT.

Abraham Lincoln

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## A C K N O W L E D G E M E N T S

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Special mention must be made of Mr. J.E.M. Bartels, who as Manager of the DAPIT project was instrumental in getting this work started, and also for forgoing his numerous duties to share with me his own knowledge of the subject during the writing of this report.

I am very grateful to Mr. Ross Kreamer of the Peace Corp Secretariat, Mr. Bill Flyn of USAID, Mr. Frank Robinson of the DAPIT programme and Mr. K.K. Eyeson, Acting Director of the Food Research Institute for their pieces of advice, encouragement and assistance.

And to the numerous people who gave the trek team their time and energy in the gathering of data and in finding accommodation, we say thank you.

C.K. Quartey

## A B S T R A C T

- 1) The report outlines the postharvest maize system in the Brong Ahafo and Ashanti Regions and delineates problem areas and needs which when addressed would lead to the increase of maize output by the reduction of postharvest losses.
- 2) Such problems include the harvesting of infested cobs, the **lack** of adequate transport facilities to cart produce to avoid second rains which is gradually merging with the first rains, lack of appropriate structures, lack of facilities as dryers, shellers, jute bags, agro chemicals, the indifference to storage hygiene and the lack of standardisation in the marketing of maize.
- 3) Improved structures were remarkably absent in the area.
- 4) The impact of institutions on the postharvest system is marginal but could be significant in the longrun if breeding trials for varieties with good husk cover are conducted seriously.
- 5) Government policy effect on the system is briefly discussed and recommendations are made for the location of Food Research Institute DAFIT project.

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INTRODUCTION

A research team comprising of two Food Research Institute employees and two Peace Corp Volunteers carried out a two-week survey of the postharvest maize system in the Ashanti and Brong-Ahafo regions of Ghana with the aim of obtaining baseline data and assess needs of the system and technology. This stems from the DAFIT project envisaged by the Institute, the ultimate goal of which is to increase maize output through the reduction of postharvest losses.

The DAFIT programme, is a G.OG/USAID funded project which seeks to tackle Ghana's development problem of low productivity by the transfer of appropriate technology to the rural sector, accounting for over 80 per cent of Ghana's agricultural output. DAFIT, however, specifically addresses baseline studies and needs assessment as the basis for any technology transfer. The reconnaissance was therefore the first and necessary step in the appropriate technology process for any sub-project, couched under the umbrella of DAFIT.

Baseline data concerns in-depth knowledge of the system under review and includes improved description and the quantification of the important factors as cost, life span, capacity etc. of existing practices and facilities.

The Food Research Institute's reason for the emphasis on the postharvest system was aptly put by the 1975 Resolution of VIIth special session of the United Nations General Assembly on Postharvest Food Losses.

The Resolution commits member states to reduce postharvest food losses by 50 per cent by the year 1985. It took note of the fact that the traditional approaches at meeting current and future food supplies have ignored the postharvest system. These are the campaign to control population growth aimed at reducing future demand and that of increasing food supplies by expanding production.

As this report title suggest, the focus is not only on the postharvest system but also on maize. Maize as is well known is an important food-grain to the agricultural economy of Ghana. It is a major staple food item used by almost all ethnic groups for various products, and is a source of income to a large proportion of the farming population. It is widely distributed in the country and is the food grain that received the biggest financial assistance from government in the past and continues to occupy a strategic position as evidenced in the National Maize Plan (October 1982). Short falls in production leads to the channelling of scarce foreign exchange in its importation. The need to improve the whole maize system cannot therefore be over emphasised.

#### Objectives.

The specific survey objectives were:-

1. To outline the existing traditional postharvest system/ technology for maize.
2. To identify the needs of the system ie. appropriate technology needs.
3. To delineate problem areas and losses within the system.
4. To pre-test questionnaire for follow up intensive survey.
5. Recommend project site for proposed Food Research Institute DAPIT Project.

The possible user-agents for this survey are:-

- i) The Food Research Institute for the selection of specific project site(s).
- ii) Change/Development agents for the diffusion of innovation to target groups.
- iii) Research Technologist for designing of appropriate technology.
- iv) Farmers, Co-operative and Market women for increasing maize productivity (indirectly )
- v) Policy Makers in prioritising the allocation of reduction resources

Methodology:- No sampling techniques were applied.

The method used for the collection of data was by personal interviews and observation, using interview guides in the case of secondary sources and questionnaires for primary sources. The itinerary included Kumasi, Sunyani, Techiman, Wenchi, Nkroanza Ejura, Sekedumasi, Ashanti Mampong and Atebubu all of which fall within the belt identified by the Ministry of Agriculture, Food Distribution Corporation etc. as foremost maize producing areas.

The secondary sources include the following institutions:-

- 1) Ministry of Agriculture
- 2) Crops Research Institute
- 3) Grains Development Board
- 4) Kwadaso Agricultural College
- 5) Ejura Farms
- 6) Food Distribution Corporation
- and 7) Technology Consultancy Centre.

The primary sources were field extension officers, farmers (handpicked by field agents) and traders encountered at markets visited.

The data from secondary sources covered the following:

- 1) Nature of work
- 2) Constraints



- 3) How work relates in particular to the post-harvest maize system.
- 4) What community services and facilities are offered farmers for the improvement of postharvest system.
- and 5) Suggestions for the improvement of system.

With respect to the primary source (farmers, field agents, traders) use was made of three sets of questionnaires. The information sought covered the broad area of the postharvest maize system, starting with the mature crop awaiting harvest through harvesting, drying, threshing, storage, processing and finally to the consumer.

The information obtained was supplemented by observation enroute, on farms, villages, project sites and at local markets.

#### Scope and Limitations

This was a preliminary study carried out three months after harvesting, from November 16 to November 30, 1982. Given the short time at the survey team's disposal and the very nature of the study, very little of the data is expressed in numbers, and measures given are only approximations. Farmers who were hand-picked turned to be very good ones who could be categorised as intermediate scale farmers, instead of small scale farmers which the study mainly sought to reach. To obtain a balanced view agricultural extension officers were requested to dwell on the small scale farmer's operations.

#### CHARACTERISITICS OF SURVEY AREA

The survey area falls within the forest ecological zone, and is noted for its cocoa production. The area is densely populated varying between 250 persons per square kilometre around Kumasi and Sunyani to 50-80 persons per square kilinetre in the rest of the area. The area however depends mainly on migrate labour from the Northern sector of the country and from the Upper Volta.

Of the primary economic activities in the region, cocoa cultivation is by far the most important. Cocoa thrives in the region mainly because of the suitable soils and the conducive climate. The survey area is also well known for its kola trees, which yield another of the country's agricultural exports, kola nuts. Other cash crops in the survey area are rubber, coffee, tobacco and jute (at Ejura).

In the past, emphasis on cocoa cultivation reduced food farming to a minimum in the area under study. Now however, there are vast areas devoted to food crops, like maize, cocoyam, cassava plantain and banana. Indeed, the maize belt was indicated to have shifted from the Asesowa area in the Eastern Region to the area under review.

Timber logging is another important economic activity in the area.

About 75% of the population live in rural settlements which are nucleated and consist of rectangular earth buildings with gable or inverted V shaped roofs.

The river Tano is the main river draining the area. Other important rivers are the Tain and Subin, both tributary of the black Volta, near Wenchi, while the Pru a tributary of the Volta drains the Nkoranza and Sokedunasi areas.

Land ownership in the area falls into two categories (1) land owned by the Traditional Chief who hold land in trust as vested in the stools and (2) Individual clans whose members have the right to farm portions of the stool lands for growing available crops. Land acquisition is not very easy as most lands fall in the first category.

### Organisation of Report

This report considers first the theoretical framework for the study and then present the findings on the existing traditional system, and highlights on the problems and sources of loss. Suggested solutions as to how losses could be minimized are also stated. Next, options for project site selection and mechanism for follow up work in the reduction of postharvest losses are presented and finally the conclusions are drawn.

### THEORETICAL FRAMEWORK

Use was made of the pipeline concept as the theoretical basis for the work. The flow of Maize from its source ie. farms to eventual consumer was considered for the purposes of the survey as a pipeline with many possible interconnecting pipes and resevoirs. Losses or leaks were expected to occur along the entire pipeline during harvesting, drying, transportation, storage and processing. For the purposes of this work the pipeline was classified as follows:-

- i) Harvesting
- ii) Pre-processing
- iii) Transportation
- iv) Storage
- v) Processing and Packaging
- vi) Marketing.

### FINDINGS.

#### (a) Postharvest Maize System

The national pattern of production where the small scale traditional farmers contribute the greatest proportion of overall output pertains in the study area. About 60 to 70 per cent of the maize output is considered by the field agents to come from farmers operating under 5 acres of land. The rest is taken up by the intermediate farmers with an average of 10 acre and the large scale farmers with 20 acres and above.

The small scale traditional farmer in the region usually waits for cobs to be dropping down and hanging from the stalk before harvesting. Sometimes harvesting is delayed till the stalks are lodging. Their reason is to allow the cobs sufficient time to dry before harvesting, so as to avoid handling maize with high moisture level as there are no facilities for drying. But in so doing the cob is harvested together with weevils and insect pests. The area has two periods of rainfall: the major and minor. Whereas in the past there was a distinct break between the two seasons, now the two are merging making it very necessary to cart produce from the farms to storage structures on the farms and at the villages to avoid the rains of the next season. The existing practice after harvesting is to headload produce in baskets and/or hire tractor services at a flat rate of ₦200 per trip per acre (where the average yield varies between 4 to 6 bags per acre). Some amount of tractor service is provided by the agricultural mechanisation units in the area and few private entrepreneurs. This was indicated, however, to be inadequate.

At the preprocessing stage as could be inferred, no drying facilities exist either at the farmer's level or at the community level. Shelling was indicated to be done by heaping dried produce and beating with sticks until the grains fall loose from the cobs. This is not only inefficient but leads to the damage of grains which become easily susceptible to further attack by pest. This practice is supplemented in the Nkoranza area by tractor mounted shellers (indicated to be old and inefficient) and by four privately owned shellers.

Whereas farm-village transportation is borne by the farmer, village market transportation is carried out by the manny women Respondents believe that where bags are well sealed and strong, losses in the form of spilling are minimal.

The transport services are provided by private articulator trucks. It was obvious that farm-village carting of produce was critical if sprouting and mouldy maize was to be avoided in the second rains and humid atmosphere.

Farmer Storage, trader storage and central depot storage of the Food Distribution Corporation constitute the important reservoirs of the grain system. The farmer storage was identified as the most important in terms of quantity and length of storage period. Farmers in the survey area store their maize in rectangular barns (Ashanti type) on the farms or at their villages. Some cylindrical cribs were also observed. In contrast to recommended cribs with narrow widths to serve both as driers and stores, barns in the survey area are large serving only as storage structures. The platform on which the maize are stacked is extremely low with the likely incidence of high rodent damage. Materials used for construction include thatch and iron sheets for roofing, maize stalks, palm fronds, giant grass, bamboo splits and wawa boards, for the container. The platforms are usually made from wooden mats and covered with palm branches. The framework is usually made of strong wood. Periodic smoking was mentioned in the Wenchi and Sunyani agricultural district, but this was not a popular practice in the survey area. With the exception of small pockets in Banda and Nsawkaw in the Wenchi district where the farmers store the cob without the husk, most of the farmers according to the field agents store on the cob with husk cover. Some farmers, however, were indicated to swing to in-bag storage in the shelled form as the season progressed, provided jute bags were available. Damage by weevil was indicated to be acute during this stage. One of the farmers interviewed, whose efforts to acquire insecticide in the country proved futile was compelled to buy, in a neighbouring country, D.D.T. a banned and poisonous chemical, for the purposes of combating the weevil.

The duration of storage is variable and depends on a number of factors. However, farmers expressed the preference of holding maize stocks to holding cash as a reason why storage duration may last for 5 to 9 months.

The next stage along the grain pipeline is that of processing and packaging. Processing is done by private artisan mills scattered over the area like in other parts of the country. In-efficiency of such mills it was mentioned could lead to grain loss, at least to the mill operator. The use of old and worn-out jute sacks for bagging also contribute to grain losses. Indeed the need for jute sacks was ranked second to the need for agro-chemicals.

The final stage of the postharvest maize system is marketing. Unlike East and Southern Africa where maize meal and flour are produced on an industrial scale, maize is commonly traded in Ghana in the form of dry grain. The survey area is no exception. Techiman is the main wholesale maize market not only of the survey area but of the entire country. Indeed it is referred to as an International Market in local parlance. Its location in the maize Zone and on the trunk roads linking the north and the south accounts for its importance. Friday is the traditional market day. But market activity begins as early as Wednesday and gradually builds up into very brisk activity on Fridays. Interview with transport agents and traders indicate that stocks to the market come from Ejura, Nkoranza, Sekedumasi and all the surrounding villages. The grain is then moved to the large consuming centres in Kumasi, Accra and Sekondi-Takoradi. The market stall storage only last until transport arrangements are completed. At this stage much grain is spilled and contaminated, particularly during loading and unloading.

The connecting links to the grain pipeline as already mentioned are produce from small scale farmers, operating under 5 acres, those from intermediate farmers operating between 5 to 20 acres, with an average of 10 acres and those from large scale farmers cultivating land of over 20 acres. The largest maize enterprise in the country is the 3,500 acre Ejura Farms Ltd. which falls within the survey area. Operations are highly mechanized by the use of tractors, combine harvestors aerial spraying, bridge scales, large metal silos and driers. The major consumer of the high quality maize produced is the Food Specialities which uses corn for the processing of "Cerelac" an infant formula. Other clients are the Secondary schools, Food Distribution Corporation and the feed grade-maize for poultry farmers. It was noted that the enterprise incurs little postharvest losses. The only possible source of loss which is incomplete harvesting is remedied by the 123 casual labourers employed during harvesting. Field problems were acute at the time of survey. The lack of weedicide had telling effect of the crops, which were stunted and overgrown by weeds. Also, portions of the field had yellowish leaves which could possibly be due to nitrogen deficient soils or streak, a virus disease.

The only improved storage structures encountered were on intermediate scale farms or more precisely Zero-tillage maize farms, built of bamboo, with wooden frames. The platform was 75cm above ground level with an area of 75cm x 24 cm. The height of the container was 180cm and the walls were bamboo spits sewn into a network to allow for aeration. The roofing was also of bamboo. The capacity was 20-22 bags of shelled maxi bags of maize where an average of 650 cobs is equivalent to a bag. The maize is stored on the cob, without the husk after spraying crib and dipping the cob wholly in actellic 25.

It was observed that the stock stored well for a period of over 12 months. Removal of cob was done on the principle of first in first out through the base by sliding two or three of the bamboo cuttings used in the construction of the platform. The current cost for construction was about ₵1,000.00. Possible defects of this method could be the breakdown of the chemical under atmospheric conditions and of rodent damage as no rat guards were used. Nevertheless, the farmers interviewed insisted that there were no rodent damage. Another possible defect could be the residual toxic effect of chemical on humans as cobs are dipped without the husk, into the chemical.

#### EFFECT OF INSTITUTIONS AND GOVERNMENT POLICY

The postharvest system as described is influenced by government policy and a number of institutions. These include the Crops Research Institute, Grains Development Board, Ghana Seed Company, the Ministry of Agriculture, and the Food Distribution Corporation. The Crops Research Institute, among other things conducts breeding tests to develop high yielding, high protein and insect resistant varieties. Also, research are in progress to develop suitable varieties for the two seasons and for the three main ecological zones. The major postharvest problem with the current improved varieties in use: La posta, composite 4, composite W and Golden cristal is the poor husk cover which renders varieties susceptible to weevil attack in the field. This problem was said to be under investigation. The Crops Research Institute's station at Pokoase was mentioned to be focused on storage problems. The Grains Development Board on its part is a service organisation. It develops maize seeds, rice seeds, sorghum seeds and others for sale to farmers and to the Ghana Seed Company. This development is carried out on its seed farms scattered in all the regions with the exception of the Greater Accra and Western Regions.



The Board also carries out extension work to farmers which include the supply of inputs, demonstration farming and the teaching of improved cultural practices. Because of the Board's concern of seed purity and seed germination energy, seeds are shelled, dried, cleaned, treated and stored in air-conditioned rooms or cold stores. The stored seeds are periodically fumigated and sprayed.

The Grains Development Board together with the Ghana Seed Company supplies about 20% of the nation's seed requirement. The latter, also multiplies improved seeds and sells to farmers. Both establishments are concerned basically with the expansion of production. Their influence on the postharvest system is marginal in the short term but could be highly significant in the long run if weevil resistant varieties and high yielding varieties with good husk cover are developed.

In the short, run, the Ministry of Agriculture could have a tremendous impact on the system, with the existence of its extension service network, but for the poor input, delivery system, large number of farmers to field agent ratio, and lack of means of transport to facilitate frequent farm visits. Pertaining to the postharvest system, various methods have been advocated: envelope fumigation, in bag fumigation, use of chemical as actellic, Adrox 40, phostoxin and the construction of FAO recommended cribs.

Impact on target farmers have not been significant. Farmers together with field agents agree that the necessary inputs delivery system is poor. Another postharvest institution, the Ghana Food Distribution Corporation is a marketing organisation which handles about 5 to 10% of the maize output. It buys shelled maize off the hands of farmers usually in August when moisture content of the crops is about 20-25%.

The produce is then bagged and sent to drying centres where it is dried to about 12% moisture level. The dried maize is rebagged, stored in warehouses and distributed to consuming centres as the need arises. The Food Distribution Corporation's heavy duty driers are located at Sunyani, Abofour, Kintampo and Sekedumasi, all within the survey area. The drier at Sunyani was broken down, however, at the time of survey. The Corporation's depots are scattered all over the area with Nkrankwanta, Dormaa Ahenkro, Wenchi, Techniman, Mkwabeng and Nkoranza as the most important. These are basically buying or collecting depots in contrast to Centres Accra, Tema, Sekondi-Takoradi which are selling depots.

As previously indicated the depots of the Food Distribution Corporation constitute important reservoirs along the maize pipeline but less important in comparison to farmer storage.

The Food Distribution Corporation encounter problems not very different from the small scale farmers.

These include weevil infestation, mould growth and discolouration of stocks, lack of jute bags and inadequate transport facilities for quick evaluation due to the unavailability of spare parts. Other problems peculiar to FDC's scale of operations are inadequate storage facilities due to the fact that installed butyl silos lack the necessary auxiliary equipments to make them functional. Also, there is the problem of the high cost of acquisition and installation and maintenance of driers with its attendant fuel problems. Additionally, the low scale of existing manual shellers are unsuitable for their scale of operations.

One of the means where government policy affects the post-harvest maize system is the institution of controlled prices. The FDC for instance is obliged to purchase at government controlled price from the farmers. At the time of survey it

was ₦500 per 100kg whereas the open market price ranged between ₦900 to ₦1,200 per 100kg,. They are therefore able to procure sufficient supplies only with the reciprocal sales of such items as soap, textiles, sugar, matches and sometimes cutlasses at the stipulated controlled prices. In the Iechiman and Nkoranza areas, however, operations of the FDC have been curtailed to a minimum not only because of the price offered but also because the middlemen hire labour for shelling farmer's maize and render such quantities unavailable to the FDC.

Other responses by farmers are the gradual shift to the production of crops whose prices cannot be easily controlled ie. cocoyam, cassava etc. and the sales of the crop when green. Investigations showed that price per cob ranged 50p to ₦2.00. And considering the fact that 650-900 cobs fill a bag, then the return on marketing the produce when green is economically attractive. This phenomenon however, is subject to the Laws of demand and supply.

#### Suggested Solutions

The variety of measures suggested by the farmers, field agents and the experts interviewed could be presented in the form of a package for the prevention or reduction of leaks and waste along the pipeline.

- This include (1) early harvest to avoid field infestation  
ie. extension of knowledge.
- 2) quick evacuation from farms to avoid second rains (trucks)
  - 3) use of appropriate dryers - owned privately or communally to reduce moisture level and service cost.
  - 4) use of appropriate shellers to avoid broken grains.
  - 5) Construction of narrow cribs for drying over an average period of 3-4 months and
  - 6) practice of good storage sanitation

- 7) availability of agro-chemicals at the storage stage (ie. actellic, aldrex 40)
  - 8) use of jute bags, where possible furnished with polythene lining for fumigation and packaging purposes.
  - 9) use of efficient artisan mills
- and above all
- 10) use of grading and weights in the marketing system to give farmers the necessary incentive for maintaining good quality produce (ie. need of scales)

The survey indicated that the farmer's most important felt needs within the postharvest system are agro-chemicals, jute bags and shellers in that order. They give storage hygiene and improved structures low marks, in reducing their postharvest losses. The impression of the survey team however, was that the prospects of obtaining loans for such structures could induce the adoption of improved cribs, which they consider to be of too low a capacity and would involve the construction of more than a single crib. Selection of cobs for storage was indifferently done with little or no arrangement on cribs.

Government policy it is believed would assist in minimizing loss. One area is giving equal weight to strategic food crops as to the traditional cash crops and therefore ensuring the availability of the necessary inputs such as insecticides and jute bags etc. Another policy need is that of sound incentive management.

#### Dapit Project Site Options and Mechanism for Follow up Work

The Ashanti and Brong Ahafo regions are the leading maize producing regions in Ghana. They contribute about 41% of the national yearly maize output, with the survey area embodying the most important producing centres.

These are Nkoranza, Techiman, Sunyani and Wenchi agricultural districts in Brong Ahafo, and Mampong, Sekedumasi and Ejura agricultural districts in the Ashanti Region.

These areas share the tradition of commercial maize production, and have adequate rail and road network for input-output delivery, and are all close to the population centre in the Middle belt. The use of improved seeds is popular particularly near Ejura where the Ghana Seed Company has its sub-station. Storage facilities of various description are scattered in all these areas. The National Maize Plan submitted by the Crops Research Institute and the Grains Development Board to government (October 1982) makes mention of all these districts as target areas for the increase of maize.

Nkoranza could be a unique place for the DAPIT project. The area is relatively remote, needs the rehabilitation of the Techiman-Nkoranza road which is of high operational importance as far as the maize industry is concerned and enjoys only the physical presence of the Ministry of Agriculture and only partially the FDC which is in the process of constructing a depot in the area. Worthy of note is the resourceful and hardworking farmers of the area. Selection of area would include working in Akonsa Dumasi, Sikaa, Nkoranza village, etc.

Another option for the location of the DAPIT project is Techiman which is the most important wholesale maize market not only of the area but of the country.

Turning to the Ashanti Region, Sekedumasi district with the presence of the FDC, GDB and Ministry of Agric. is considered by the survey team to be ideal. The team believes, however, that Nkoranza should receive top priority.

Having agreed on project site together with the Technical team, the survey team proposes the formation of a Postharvest Loss Reduction Committee in the area, comprising of:-

1. Ag. Director of Food Research Institute - Chairman
2. A representative of the Office of the Regional Secretary
3. Regional Agricultural Co-ordinator
4. Two farmers representative
5. Representative of a Financial Inst. (eg. Rural Bank)
6. Representatives of FDC
7. Representatives of GDB
8. District Agric. Officer
9. Representative of Ghana Private Road Transport Union
10. Representative of Survey Team - 2 (FRI/PCV)
11. 2 representatives of Technical team
12. DAPIT Project Manager.

This body among other things could aid in the establishment of rapport with target group and aid in the implementation and monitoring of envisaged project. The team further proposes the adoption of 2 or 3 villages within the selected district, followed by an intensive survey to rank felt needs of the target farmers and aim at development by the felt needs approach, with emphasis on the postharvest system. Such a strategy it is believed would ensure participation of the target groups.

#### Conclusion

The DAPIT goal of extending appropriate technology to the rural sector for adoption can only be achieved when the environment, circumstances and felt needs of the rural sector are fully considered in the process. No single solution would solve the postharvest problem. Solutions should be presented in a package if favourable impact on the target population is to be achieved.

REFERENCES

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2. Kenton L. Horris & Carl Lindbad - Postharvest Grain Loss
3. National Academy of Science of USA and SCIR, Ghana - Report of the Workshop on Research Management for Development Planning, Accra. March 24-26, 1980.
4. Nyanteng V.K. - The storage of foodstuffs in Ghana (1972) ISSER Technical Series.
5. DAPIT Project Paper.

SURVEY ITINERARY

- Tuesday, Nov. 16, 1982 - Accra - Kumasi
- Wednesday, Nov. 17 " - Visit to Technology Consultancy Centre (UST)
- Visit to ITTU/TCC at Suame
- Visit to Crops Research Institute (to fix appointment)
- Visit Kwadaso Agricultural College
- Visit Zero Tillage Farm and interview farmer.
- Thursday, Nov. 18, 1982 - Consult with Dr. J. Powell
- Visit Crops Research Institute
- Friday, Nov. 19, " - Kumasi - Sunyani
- Visit Ghana Food Distribution Corp.
- Calls on Regional Administration
- Mr. P.K. Baah, Administrative Off. arranges for accommodation.
- Saturday, Nov. 20 " - At Sunyani
- Sunday, Nov. 21 " - " "
- Monday, Nov. 22 " - Meeting with Regional Agric. Officer and District Agric. Officer.
- Sunyani to Wenchi
- Calls on District Chief Executive (who arranges for accommodation)
- Tuesday, Nov. 23, " - Meeting with District Agric. Off. (Wenchi)
- Visit Village, farm, and interview farmers
- Wenchi-Atebubu (lodges with USAID, Atebubu)



- Wednesday, Nov. 24, 1982
- To Sekedumasi
  - Visit Grain Drying Centre of GFDC
  - Interview with Grain Development Board (GDB) agent - Mr. Barima.
  - To Mampong
  - Brief interview with District Off.
  - Back to Atebubu
- Thursday, Nov. 25, "
- To Nkoranza
  - Meet with Field Agent (Agric.)
  - Interview Farmers
  - To Ejura Farms
  - Meet with Mr. Owusu Asante
- Friday, Nov. 26, "
- Atebubu - Techiman
  - Visit market, interview Maize traders and transport operators.
  - Night at Techiman (Holy Family Hospital with a Peace Corp Volu.)
- Saturday, Nov. 27, "
- Sunday, Nov. 28, "
- At Techiman
  - Techiman-Kumasi through Akumadan (Lodges at Crops Res. Inst. Rest House)
  - Visit Mr. Poku Debrah (Zero Tillage Farm)
- Monday, Nov. 29, "
- Visit Ministry of Agric., Kumasi
  - Visit Market
  - Visit Grains Development Board
- Tuesday, Nov. 30, "
- Kumasi - Accra
  - Trek Ends.

LIST OF PERSONS AND ORGANISATIONS CONSULTED

Ministry of Agriculture

Mr. J.E. Aka Nai	-	Ag. Director of Agriculture
Mr. Owusu	-	Co-ordinator of Agric. (Sunyani)
Mr. Tawiah	-	Regional Agric. Officer "
Mr. M.K. Ansah	-	District Agric. " "
Mr. Y. Asare Baffour	-	" " " (Wenchi)
Mr. Baah	-	" " " (Nanpong)

Food Distribution Corporation

Dr. P.A. Kuranchie	-	Deputy Managing Director
Mr. Kumordjie	-	Principal Research Officer
Mr. Barnini	-	
Mr. Akotia	-	Area Manager (Sunyani)

Grains and Legumes Dev. Board

Mr. Nonoo	-	Admin.
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Technology Consultancy Centre (TCC)

Dr. J.W. Powell	-	Director TCC
Mr. Ralph Mosphage	-	Technical Consultant
Mrs. Morlene Mosphage	-	" "

Crops Research Institute

Dr. G.K.A. Buahin	-	Entomologist
Mr. Gyampoh	-	Research Worker
Mr. Zaa	-	" "
Mr. Lotsu	-	Farm Manager
Mr. Annang	-	" "
Mr. Anthony Ofosu	-	Entomologist

Ghana Seed Company

Mr. E. Blay	-	General Manager
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