

PD- AAQ - 039



EXPERIENCE, INCORPORATED

1930 DAIN TOWER • MINNEAPOLIS, MINNESOTA 55402 U.S.A.

END-OF-TOUR REPORT

AID-0102-C-00-2003-00

GHANA MIDAS II SEED MULTIPLICATION

WILLIAM HALL

Seed Quality Control Specialist

February 1, 1982 to September 30, 1984

I. INTRODUCTION

A. MIDAS Project Background

The Managed Inputs and Delivery of Agricultural Services (MIDAS) I Project was authorized in 1976. It was designed to be the initial stage of a national program to develop and strengthen national and regional agricultural institutions to provide coordinated services and goods to small scale farmers.

The project consisted of six basic components:

1. Credit expansion
2. Fertilizer procurement
3. Seed multiplication, processing, and distribution
4. Small farm systems research
5. Extension-demonstrations
6. Marketing

As implementation of MIDAS I proceeded, it became apparent that the goals and objectives of the project were too complex for successful completion. The project was also initiated at a time of political unrest and economic decline in Ghana. There were four changes of government during the MIDAS I Project period.

The MIDAS I Project was amended 29th August, 1979, to instruct the contractor, among other things, to "collaborate with the staff of the Ministry of Agriculture and its Seed Multiplication Unit into the Ghana Seed Company (GSC), in:

1. expanding and improving the quality and quantity of foundation and certified seed;
 2. contracting with private growers to produce certified seeds;
- /

3. establishing a seed certification program;
4. processing and distributing seed; and
5. establishing a comprehensive seeds industry."

The MIDAS II Project was designed to concentrate efforts to a restricted area, the Brong-Ahafo region, except for the seed component, which would remain nationwide. It attempted to retain the six basic components. A fifth change of government occurred on December 31, 1981 just as the project was about to be-

Due to the continued decline of economic conditions, only seed component was able to obtain the necessary inputs to show any progress.

A change of objectives developed in 1982 to modify certain basic components and to emphasize the progress of the Ghana Seed Company. The revised project purpose was to improve and expand the institutional capacity of the Ghana Seed Company, resulting in a viable, independent, profitable company.

B. Ghana Seed Company Background

The need for good seeds for use in Ghana's agriculture has long been recognized. This is reflected in the establishment of research organizations such as the Crops Research Institute, the University of Science and Technology at Kumasi, and the University of Ghana at Legon, and the inclusion of the Seed Multiplication Unit in the Department of Agriculture in 1961. After several years of study in the early 1970s, the decision was made to convert the Seed Multiplication Unit to a parastatal organization capable of operating as a private, incorporated seed company. Thus the Ghana Seed Company was formed in 1979, to be assisted by the MIDAS Project.

The Ghana Seed Company inherited the land, buildings, and assets of the Seed Multiplication Unit's foundation seed farms and area offices. Many of the Seed Multiplication Unit Staff

were transferred to the Ghana Seed Company. At the start of MIDAS II, the Ghana Seed Company had its headquarters in Accra and area offices in Ho, Winneba, Kumasi, Tamale, and Bolgatanga. Each of the area offices had minimal seed quality control capabilities. Staff training and laboratory equipment and supplies were needed. The MIDAS II Project contained provisions for three technical advisers to serve with the Ghana Seed Company: a processing consultant, a production consultant and a quality control consultant. These were provided by Experience, Incorporated.

C. Assignment and Arrival of Quality Control Consultant

The Seed Testing and Certification Technologist joined the Experience Incorporated team on February 1, 1982 after a month's delay due to the change in Government of Ghana on December 31, 1981. He arrived in Ghana on February 9, 1982. The position is set forth in the MIDAS II Project paper signed June 16, 1980 under Technical Assistance Annex III-E.

The job description of the position calls for two functions:

1. Assisting the Officer-in-Charge of the Ghana Seed Inspection Service (GSIS) to:
 - a. establish a functional seed certification agency;
 - b. inspect fields and seed producing facilities;
 - c. test for quality and issue labels for seed meeting the seed laws and standards of Ghana.
2. Assisting the Quality Control Division of the Ghana Seed Company (GSC) in developing a system for monitoring quality of the seed product at each stage of production.

For a more detailed description of the assignment, the reader is referred to the plan of work prepared by the Seed Technology Consultant early in 1982 giving the then current status of the Ghana Seed Company and Ghana Seed Inspection Service with the goals, objectives, and steps to be taken to achieve those goals (See Appendix A).

The Consultant has worked closely with Mr. J. R. Turkson, Officer-in-Charge, Ghana Seed Inspection Unit (GSIU), Department of Agriculture and Mr. A. A. Amihere, Quality Control Manager for the Ghana Seed Company, in an effort to achieve these objectives.

II. ACCOMPLISHMENTS

A. Program & Facility Development

1. Ghana Seed Company

When the Seed Technologist arrived, the Ghana Seed Company seed quality control laboratory was confined to a 9' x 15' cubbyhole. There was room for only one germinator and counter space only for a working table. Successful efforts accomplished the transfer of stored vegetable seeds from a large, 17' x 19' room, allowing the development of a more satisfactory laboratory. Two germinators were installed. Sample preparation and work tables were put in place. A table for moisture meters and microscope was available, as well as tables for an oven and torsion balance. A storage cabinet, 2' x 6' x 6', was constructed for sample storage. An adjacent room, slightly smaller, was developed as an air conditioned seed storage room for vegetable seed.

In accordance with the 1982 changes in the objectives of the MIDAS II Project and the Revised Implementation Plan, equipment and supplies procured for the Ghana Seed Inspection Service were transferred to the Ghana Seed Company. Following a three-week training course for Ghana Seed Company seed quality control personnel, the laboratory equipment and supplies were distributed for the seed laboratories at Ho, Winneba, Kumasi, Tamale, and Bolgatanga.

The training course from July 5-23, 1982 consisted of lectures and discussions on importance of seed to man and agriculture, development and maintenance of new varieties, and seed certification programs. Practical experience was gained in seed laboratory procedures with moisture determinations,

purity analysis, and germination tests. Both standards and chemical (tetrazolium) germination tests were practiced. Quality Control Officers from Bolgatanga, Tamale, Kumasi, Winneba, and Ho participated in the course. The Quality Control Manager for the Company was attending the Mississippi State Seed Technology short course at that time.

During the sales period of 1982 (February-April), problems in tagging and seed lot identification were experienced. Tags were lost from bags during trucking to sales points, and large bags of seed were being divided into 10 and 20 pound sales lots without tags or labels. The importance of the tag and the necessity of seed lot identification in case of customer complaints of seed quality were stressed to the seed processing and sales personnel. The motto "a tag in every bag" was finally accepted. Heavy-duty staplers were purchased to secure tags to the bags. "Make-your-own" rubber stamp kits were obtained to facilitate labelling the bags by eliminating the hand-written tag.

Prior to harvest in 1982, field inspection forms were developed (Figure II-1). Field trips were made to each of the areas, and field inspection training was given to quality control and seed production personnel. Methods of determining plant populations and percentage of diseased plants were explained and demonstrated. Field isolation by space and by time (plant maturity) was discussed and recorded on the report form. Field inspector training continued with supervision by the Consultant in the 1983 and 1984 growing seasons. Quality Control Personnel have been adequately trained to perform field inspection until the Ghana Seed Inspection Unit is established.

In the seed laboratories, technicians were instructed on how to determine screening losses, moisture content, seed purity, seed damage, 1000-kernel weight, and germination percentage of seed lots. A seed quality report form, as shown in Figure II-2, was developed with space for listing distribution. The total number of seed tests done in all laboratories increased from 1,582 in 1982 to 3,016 in 1983.

The required expendable supplies for all the laboratories for one year's operation were determined and submitted for purchase in March, 1983. Additional laboratory equipment to improve facilities and capabilities was also requisitioned.

Plans for a larger seed quality laboratory at the soon-to-be completed new Ghana Seed Company Headquarters building have been prepared. The design is for improved counter and drawer space for work areas and better storage for supplies.

2. Ghana Seed Inspection Unit

a. Development. In January, 1979, the Ghana Seed Company was formed by the removal of the Seed Multiplication Unit from the Department of Agriculture. As the Ghana Seed Inspection Service and National Seed Committee did not begin to function as a replacement for the Seed Multiplication Unit, a number of changes were required in Legislative Instrument (L.I.) 802 to meet this situation.

In October, 1982, in cooperation with Mr. Turkson, Officer-in-Charge, Ghana Seed Inspection Service, a proposed amendment to L.I. 802 was prepared. The original L.I. 802, entitled Seeds (Certification and Standards) Regulations 1973, legally established the National Seed Committee (N.S.C.), described its functions and set forth crop standards for corn, rice and groundnuts (peanuts). It took its authority from the Seeds De-

FIGURE II-2. GHANA SEED COMPANY LIMITED LABORATORY REPORT

Lot No: _____ Lab No: _____

Crop Kind: _____ Variety: _____

Date Received: _____ Amount of Seed in Lot: _____

Percent Moisture Content: _____

Screening Loss:	2nd Test	3rd Test
Over _____ : _____ % Size of Screen	_____ : _____ % Size of Screen	_____ : _____ % Size of Screen
Thru _____ : _____ % Size of Screen	_____ : _____ % Size of Screen	_____ : _____ % Size of Screen
Total Loss _____ %	_____ %	_____ %

Seed Analysis

- Inert Matter (grams) _____ %
- Other Crop & Weed Seed (grams) _____ %
- Other Variety (grams) _____ %
- Off Color-Other Type (grams) _____ %
- Off Color-Weather & Disease (grams) _____ %
- Damaged Kernel-Mechanical (grams) _____ %
- Damaged Kernel-Insect (grams) _____ %
- Pure Seed _____ %

1000 Kernel Weight _____ + _____ + _____ + _____ + _____ = _____ x4
(50 Kernels x5) = _____ grams

Germination Regular: _____ % Date of Test: _____

TZ.: _____ % Date of Test: _____

Area Seed Lab: _____

Quality Control Officer: _____

Reports given to: _____

cree 1972 (NRCD 100), which established the Ghana Seed Inspection Service as the official seed certifying agency.

The amended L.I. 802 with the reconstituted National Seed Committee was submitted for approval to the Attorney General's office in December, 1982. During discussions with the Attorney General and the Principal Secretary for Agriculture, it was decided to change the name from Ghana Seed Inspection Service to Ghana Seed Inspection Unit to conform with the Government of Ghana's structuring of agencies. In spite of continued efforts to get approval of L.I. 802 as amended 1983 from the Attorney General, it was not returned until September 1983. It was then forwarded to the Government of Ghana for the signature of the Chairman of the P.N.D.C. As of July 31, 1984, there had been no response to action on the Ghana Seed Inspection Unit.

b. National Seed Committee. Following the Fifth Maize and Cowpea Workshop in Kumasi on February 3, 1984, a group of maize, cowpea, rice and legume breeders as well as research administrators and representatives of the Ghana Seed Company met in recognition of the need for a national seed law. As they were aware of the existence, albeit non-functioning, of the N.S.C., they decided to identify themselves as the "ad hoc" National Seed Committee. They favorably accepted Mr. Turkson's report on the actions that had been taken to legalize the Ghana Seed Inspection Unit and urged further steps be taken. They expressed support of the plans and arranged for further meetings to discuss naming and release of new varieties; these actions were appropriate to the National Seed Committee.

A paper was prepared for meeting of the ad hoc National Seed Committee on May 28, 1984, setting forth requirements and procedures for the release of new varieties to the seed multiplication program of Ghana. This was used as a basis for discussions for release and naming of new varieties. Recognizing they had no legal authority at this time, they encouraged the

continued efforts to establish the Ghana Seed Inspection Unit and requested a paper showing the structure and function of the Ghana Seed Inspection Unit on which they would express support to the Ministry of Agriculture. This is being prepared by the Quality Control Consultant and Mr. Turkson for the next meeting.

In consultation with Mr. Turkson, the requirements of laboratory equipment and supplies for the Ghana Seed Inspection Unit are being prepared. The distribution of equipment previously ordered for the Ghana Seed Inspection Service to the Ghana Seed Company laboratories necessitates another order. The function and coordination of the Ghana Seed Company and the Ghana Seed Inspection Unit laboratories will have to be established in defining the structure of the Ghana Seed Inspection Unit.

A complete listing of all special reports and papers prepared by the Consultant can be found in Appendix B.

B. Training

1. Trainee Participants

During MIDAS I, 16 trainee participants received 100 person-months of training. Lack of foreign exchange for airline tickets prevented Ghana Seed Company personnel from attending the 1981 and 1983 Seed Technology short course at Mississippi State.

In 1982, the Ghana Seed Company purchased a ticket for Mr. Amihere to attend the short course. In 1984, a change in policy allowed USAID to provide transportation as well as funding for participants, and three Ghana Seed Company trainees were sent to Mississippi State. These were Mr. Hammond, processing manager; Mr. Zinge, quality control officer at Bolgatanga; and Mr. Ocloo, area manager at Ho.

2. In-Country Training

In July, 1982, a seed technology training session was conducted by the consultant at the Ghana Seed Company Headquarters seed laboratory for five Seed Quality Control Personnel of the Ghana Seed Company, representing all laboratories of the Company.

Discussions covered:

1. The importance of seed to man and agriculture;
2. Varietal development and maintenance;
3. The purpose of seed certification programs;
4. Field inspection techniques; and
5. Laboratory procedures.

Participants gained practical experience in seed lot analysis, tetrazolium and regular germination tests, and field inspection techniques.

In September, 1982, Mr. Turkson and his assistant Mr. Amarteifoi were given one month of seed technology training at the Ghana Seed Company Headquarters laboratory. The course followed much the same subjects as given earlier to the Ghana Seed Company Personnel, but discussions also included the updating and amendments for the Ghana Seed Decree of 1973.

A seed production and quality workshop was conducted by Officers of the Ghana Seed Company for Production and Quality Control Personnel in July 1983. The Production and Seed Technology Consultants assisted in this seven-day session in Navrongo. About 25 persons were in attendance.

Topics included:

1. Formation, development and maturation of seed;
2. Plant breeding and varietal development;
3. Certified seed production and management practices;
4. Seed sampling, germination tests, and record keeping in the seed laboratory;
5. The role of quality control in the seed business;
6. Laboratory procedures for moisture content determinations, seedling vigor and purity analysis; and
7. Seed processing and warehousing.

C. Quality Control Activities

1. Laboratory Exercises

The quality control program of the Ghana Seed Company has progressed very well. The laboratory personnel have learned quality control procedures and gained confidence in their testing ability. The number of laboratory tests increased from 1,500 tests in 1982 to 3,000 in 1983.

The Steinlite moisture meter did not have moisture content conversion charts for garden eggs (egg plant) or okra. These were constructed by correlating meter readings with moisture content determined by the air-oven method. This also served as a good training exercise for the laboratory technician and Quality Control Manager, as all electrical moisture meters should be tested and calibrated with the official air-oven method.

Close monitoring of imported vegetable seed sold by the Company is required. The policy of testing a can for germination of each variety every six months was established. Reports on inventory and status of seed lots are prepared on a semi-annual

basis. Seed lots which were found going out of condition were sometimes blended with other lots from another company of the same variety with higher germination to salvage the seed by having the required viability to permit sale. Quality control officers and sales personnel were notified to take this action and instructed in blending techniques. Poor quality seed was removed from the sales stores.

2. Research Papers

a. Seedling vigor. The shortage of seed in the spring of 1983 caused the Ghana Seed Company to salvage seed losses by re-processing seed lots with a smaller bottom screen, thus saving more small seed. This led to the question of germination and seedling vigor of small seed. An 80-pot experiment was designed and conducted to compare size of seeds with the ability of seedlings to emerge from different depths, time of emergence and top growth production. The quality and vigor of the smaller seed was found to be satisfactory. This experiment was written as a research paper and presented by Mr. Amihere at the Maize and Cowpea Workshop in Kumawasi in 1984.

b. Seed Storage. It was been the practice of the Ghana Seed Company to double-bag maize in solidpoly and a polymesh bag for insect and moisture content control. With improved insecticides, it was desired to know if double bagging was necessary or if a single burlap or polymesh bag was sufficient. A seed storage experiment was designed and conducted with Dr. Ocran, Ghana Seed Company Research Manager, to sample seed lots stored in jute, polymesh and solidpoly bags each month for a six-month period. The seed lots were also divided into chemically treated lots using Actellic and Fernasan 'D' with an untreated check. Moisture content, insect damage, and number of insects were determined at each sampling from two locations, Winneba and Accra. The Accra lots were stored in an air-conditioned room, the Winneba lots in a non-conditioned warehouse.

Moisture content was found to increase in jute and polymesh bags at both locations. Moisture content increased to over 13 percent in these bags and was associated with loss of germination. Seed in solidpoly bags maintained their original moisture content and did not suffer loss of viability. Fernasan 'D' and Actellic chemical treatments were effective against insect invasion and were necessary even in the solidpoly stored lots. A scientific paper of this experiment was prepared and presented at the Maize and Cowpea Workshop in Kumasi in 1984 by Dr. Ocran.

3. Promotional Activities

Sales Inauguration Days were held annually in a different area each year. Grower meetings in different areas were also held prior to harvest. The seed consultant was requested to talk at these meetings on seed quality, its importance, and the maintenance of quality in seed production. Farm visits and field inspections also afforded the opportunity to increase farmer awareness of seed quality.

As a result of the severe food and seed shortage in 1983, many relief agencies sent or imported food grains to Ghana for 1984; some of this grain was used for seed. This cut sharply into Ghana Seed Company seed sales, as high seed prices caused farmers to purchase seed from the market. The poor stands in fields from this and other imported seeds caused concern in the Ministry of Agriculture for the quality of seed that was being distributed. This was used to emphasize the need for the Ghana Seed Inspection Unit, as Mr. Turkson and the consultant sought out imported seed lots for quality testing.

III. CONSTRAINTS

The biggest disappointment was the failure to legalize and implement the Ghana Seed Inspection Unit. It must, however, be viewed in the context of the political unrest and economic decline that the nation was experiencing. Many other matters occupied those responsible for organizing the Government. None of them were assured of their position for any length of time. The Secretary for Agriculture, Professor Bortei-Doku, was transferred in April, 1983, just as he became aware of the efforts to revive the National Seed Committee. A series of secretaries pro-tem occurred until March, 1984, when the current secretary, Mr. John Ndebugre, was appointed. The Director of the Department of Agriculture, Mr. Ako-Nai, was removed, and the Department is still under the Deputy Director, Mr. Pappafoi.

The failure to establish the Ghana Seed Inspection Unit prevented the development of seed and field regulations and a seed certification manual which would have required the concurrence and approval of the National Seed Committee. This also was a disappointment; however, drafts and preliminary papers have been prepared.

Only four of thirteen proposed trainee participants have been or are being given the training courses provided for in the Project Amendment No. 1. These have all been from the Ghana Seed Company with no training provided for future Ghana Seed Inspection Unit technicians. This will handicap the implementation of the seed certifying agency.

The lack of response by the Government of Ghana to the proposed establishment of the Ghana Seed Inspection Unit has already been discussed. It is regrettable that there was no additional staff provided nor laboratory facilities located. Lack of Government of Ghana support deprived the project of

necessary inputs of transportation, local supplies, and equipment. The MIDAS executive committee refused to maintain the project vehicle or provide fuel when the Ghana Seed Inspection Unit was not made functional. The economic decline further reduced the opportunities to establish the Unit.

The economic condition and lack of foreign exchange with which to purchase airline tickets prevented the sending of participant trainees in 1981 and 1983. Political difficulties were also encountered as project funds were temporarily halted by USAID in April 1983. The decision of USAID to assist in the training program by allowing purchase of airline tickets from PL480 funds was negated by the withholding of funds in 1983, so no trainees were sent to the Mississippi State Seed Technology short course. The "freeze" also prevented the procurement of needed laboratory supplies and additional laboratory equipment. The seed laboratories are operating with insufficient supplies, as purchase orders prepared in March, 1983 have not yet been received. Emergency purchases, allowed following the last Project Evaluation, has permitted continued functioning of the laboratories.

Communications between the Ghana Seed Company Headquarters in Accra and the Area Offices were very difficult. Messages were usually transmitted by Company truck drivers or personnel travelling to the area. Reports were often delayed one or two months. The planned radio network was not established.

IV. RECOMMENDATIONS

Continued training of laboratory technicians for the Ghana Seed Company is essential. Many of those previously trained in seed technology are now in administrative positions and not being used in the laboratories. The training should be at two or three levels: in-service training sessions, short course appreciation conferences, and long-term technical training programs. The Ghana Seed Company Quality Control Manager has attended the Mississippi State Seed Technology short course and should be encouraged to have training sessions for his quality control personnel.

Previously trained personnel should be utilized in the in-service training, as was done at Navrongo in 1983. Persons showing interest and initiative in the seed quality program should be selected for attendance in short course appreciation courses sponsored by FAO and other organizations on a geographical regional basis. Continued development of the seed quality program will require additional technically trained leadership. There should be at least two seed analysts at each of the Company laboratories. These should also be used as field inspectors during the growing season and monitors of the contract growers' harvesting procedures. Adequate personnel should be available to allow leaves of absence for training and short course purposes. Plans should call for both graduate level trainees and three to six month technical short course trainees.

As the Ghana Seed Inspection Unit is developed, plans must be made for the training and rotation (replacement) of personnel during training periods. Some training may have to be on-the-job (due to shortage of personnel), using a consultant to guide the program during the formation period. Initially, there should be three seed analysts at the Central Seed Laboratory in addition to the Officer-in-Charge and his assistant. They will also be used as field inspectors during the growing

season. Additional staff will be required if Area Offices are established at Ho, Kumasi, and Tamale. The need for as many as fifteen trained seed technologists should be anticipated in a three year period.

The Project Evaluation team report in 1984 states: "The Ghana Seed Inspection Service, as originally envisioned, never developed. The need continues to exist, however, for the establishment of the Ghana Seed Inspection Service. Renewed efforts by Government of Ghana (meeting in Kumasi a/) indicate that interest in forming the Ghana Seed Inspection Service may be revived. If this does in fact occur, the USAID could resume support for this agency". If the Ghana Seed Inspection Unit is activated, this will require development and publication of Rules and Standards for seed certification. These should be made to conform with rules of other seed certification agencies and the O.E.C.D. to facilitate international seed trade.

a/ This refers to the first meeting of the ad hoc National Seed Committee.

V. ACKNOWLEDGEMENTS

The cooperation received from the Ghana Seed Company Personnel during this tour of duty is gratefully acknowledged. The officers were:

Mr. J. Wobil	Managing Director
Mr. E. Blay	General Manager
Mr. P. M. T. Kitcher	Ag. Administrative Manager
Mr. P. K. Poku	Production Manager
Mr. F. Hammond	Processing Manager
Dr. V. K. Ocran	Research Manager
Mr. A. Amihere	Quality Control Manager
Mr. O. Gyamera-Amoako	Sales & Distribution Manager
Mr. J. Erzuah-Nyenzah	Chief Accountant

Area managers and quality control officers in the areas have been cooperative and pleasant to work with. Miss Becky Adotey, who served as secretary as well as performing laboratory technical duties, deserves special recognition.

The cooperation and assistance of Mr. Turkson and Mr. Amartei-foi in the Department of Agriculture are recognized and greatly appreciated. Mr. Ako-Nai and Mr. Pappafoi have served as Director and Deputy Director of the Department during this time.

Association with the USAID personnel of the project has been enjoyable, and their support and encouragement have been most useful. There have been three Mission Directors: Mr. Zarr, Mr. Saiers and Mr. Wagner. Program Officers have been: Mr. Mertens, Mr. Szadek, Mr. Flynn and Mr. Luche. Executive Officers Mr. Dietz and Mr. Parsons have provided very suitable living conditions which aided in maintaining morale.

The team members of Experience, Incorporated on the project have worked together in a most amiable fashion. Team leader Mr. Shulstad provided leadership and coordination with Experience, Incorporated headquarters. The cooperation and encouragement of Production Consultant Mr. Sandager throughout the tour and now the efforts of Agro-Mechanic Mr. Johnson to keep vehicles in shape have been most welcome.

The backup and administrative help of the Experience, Incorporated headquarters staff is also recognized and appreciated. Project visits by Mr. Eriksmoen and Mr. Holt provided encouragement and morale benefits to the team. Procurement Officer Mr. Locke has been very helpful.

7073A

Appendix A

EXTRACT OF
"PLAN OF WORK FOR QUALITY CONTROL TECHNICIAN"
W.E. HALL, MARCH, 1982

Extract of "Plan of Work for Quality Control Technician"

W. E. Hall, March 1982

I. GOALS AND OBJECTIVES OF THE QUALITY CONTROL TECHNOLOGIST

- o Development of quality control facilities and staff to assure production and distribution of high quality seed of superior varieties to Ghanaian farmers, thus contributing to increase of agricultural production.

- o To coordinate the efforts of the Ghana Seed Inspection Service and the Ghana Seed Company in the development of a viable seed program/industry containing the elements of varietal developments, seed multiplication and processing, quality control, seed marketing and distribution, and increased agricultural production through improved seed and cultural practices.

II. ACTIONS NECESSARY TO ACHIEVE THESE GOALS

1. Determine requirements for equipment and staff in area offices for the Ghana Seed Inspection Service and the Ghana Seed Company

The Ghana Seed Company presently has limited seed testing capability at its four area offices and headquarters facilities. Laboratory space at headquarters and Winneba is inadequate. Plans are underway to correct this deficiency.

Lack of electrical power at Tamale and Bolgatanga has caused problems in making germination tests of vegetable seeds. Alternating temperatures, required for most vegetable seed testing, have not been available.

The present quality control staff consists of the Quality

Control Manager at the headquarter offices in Accra, and one or two persons in each office. At Winneba, the quality control officer also has salesmanship responsibilities and banking duties to perform. Efforts will be made through instruction seminars to improve the knowledge of the quality control staff.

In 1981, the Quality Control Manager made visits to all area offices to train personnel in laboratory techniques. The Seed Processing Consultant had assisted in outlining procedures and quality standards to be used. Instructions for sampling and seed testing practices were posted in each laboratory. The Consultant will continue visiting and monitoring the actions in area laboratories.

Much equipment for the laboratories is lacking. Purity analysis and germination tests can be conducted, but weed and other crop seed identity samples, hand screens, laboratory cleaners, magnifying glasses, and counting boards have not been obtained.

As stated earlier, only three persons have been assigned to the Ghana Seed Inspection Service. The legalization of the service through a Parliamentary Enactment Act was interrupted by the change in government organization. It is expected to be completed in the near future.

With the completion of the legalization process, the procurement of an office and central laboratory building should be possible. The organization of the Service will then proceed.

Present proposals call for the establishment of the central laboratory in Accra and branch laboratories in Kumasi, Tamale, and Ho, for a total of four laboratories. Equipment and supplies for these laboratories were ordered and have been received by the Seed Processing Consultant.

2. Develop the required amendments to the Seed Regulations of the Ghana Seeds Decree of 1972 for quality standards for field and seed inspections of certified seed

Basic work in this area has been done by the Seed Processing Consultant during the latter years of MIDAS I. Seed certification was provided for legally by the Ghana Seeds Decree, 1972, with Seed Certification and Standards Regulations enacted in January, 1973.

With the formation of the Ghana Seed Company in 1979, it was expected amendments to these Regulations would be made, changing the functions of seed certification to the Ghana Seed Inspection Service.

Certain amendments are also necessary to bring the seed program into conformity with programs of other nations. It is essential to use similar terms and standards so as to be able to enter international trade with a minimum of effort. The minimum standards and definitions used by the International Seed Testing Association (ISTA) should be incorporated in the Ghana Seed Program. The purpose of ISTA is to provide uniformity in techniques and procedures which will give accurate, replicable data indicating the quality of the seed. Seed moving within the country or in international trade may be tested by different laboratories. It is important, therefore, that all laboratories use standard methods designed to give universally the same results within an acceptable range. Training seminars will be held to assure that all seed technologists are using approved testing methods.

Varietal purity is an important aspect to a successful seed program. Regression in yield by contamination of high yielding varieties by inferior and common varieties can occur. Field inspections for variety purity can be made only if the inspectors know the varietal characteristics of the desired

variety. The plant breeder or originating institution of the variety must provide a varietal description of all varieties entered in the seed program. Coordination between the Crop Research Institute and the Ghana Seed Inspection Service will be effected to provide this information. Field inspectors and seed analysts must also be able to recognize disease and weed contaminates. Collections will be made of disease symptom seeds. A herbarium of weed plants and seeds will be made.

3. Training of Ghana Seed Inspection Service and Ghana Seed Company Staffs in Seed Technology

The personnel of the Ghana Seed Inspection Service and the Ghana Seed Company quality control section must be trained in procedures and interpretation of data to assure the multiplication and maintenance of high quality seed. Preliminary training in field and laboratory procedures should be only the first step. Individuals showing interest and aptitude will be selected for additional training. General familiarity with seed production, processing, certification, storage, and marketing can suffice for broad operations of the seed program, but continued improvement and upgrading of the program require technicians who have complete understanding of the principles and technology involved.

Close collaboration between the consultant and his counterpart in the Ghana Seed Inspection Service and Ghana Seed Company will be aimed at providing capable leadership in the organizations upon completion of the consultant's contract. Program development and administrative decisions must be accomplished in consultation with the local personnel. Their involvement in these matters will provide them with experiences and background information to allow a continuation of the program.

All personnel need training at some time. The responsibilities of the job and personal characteristics of each person will determine the most appropriate kind of training. Training should be considered broadly in two categories, academic and non-academic training. Long-time programs should consider academic training for a few specialists and leaders. Not all phases of a seed industry require such specially academic training. Short courses, seed appreciation courses, seminars, and travel studies of successful operations in other countries can be used to develop skills of staff members and upgrade performances.

Table 1 shows the training program and number of trainees proposed for the quality control programs of Ghana Seed Inspection Service and Ghana Seed Company. The Ghana Seed Company is fortunate to have several trainees who have returned from participant training programs.

Table 1. PARTICIPANT TRAINEES REQUIRED FOR THE QUALITY CONTROL PROGRAMS OF GHANA SEED INSPECTION SERVICE AND GHANA SEED COMPANY DURING MIDAS II PROJECT

	Ghana Seed Inspection Service			Ghana Seed Company			TOTAL
	1982	1983	1984	1982	1983	1984	
Academic Long Term Training		1	1			1	3
Non-Academic Short Courses <u>a/</u>	2	2	2	1	2	2	11
Appreciation Courses <u>b/</u>		3	3		2	2	10
Travel Studies <u>c/</u>		2	2		3	3	10
Incountry Training	2	3	3	5	10	10	33

a/ Mississippi State University conducts a 3-month short course on Seed Technology annually.

b/ Seed Technology short courses for 3- to 6-week periods are available through F.A.O. or M.S.U. programs in nearby countries.

c/ Organized tours to successful seed programs in other developing countries.

27

4. Supervise Seed Certification Procedures

Supervision, training and counseling in seed field inspections, laboratory analysis, and record-keeping bring together the requisites for a complete program. The Seed Processing Consultant has drafted manuals for Field Inspection, Seed Inspection, and Seed Certification. With the assistance of the Ghana Seed Inspection Service and Ghana Seed Company personnel, these manuals will be completed and published.

Quality control has no beginning or end. The foundation seed purchased for multiplication must have had quality control measures applied to it the previous year, from time of planting through harvest and processing, just as it must now be subjected to field inspections and seed analysis to qualify for certified seed. Each person in the progressive steps of seed production must be aware of the quality requirements of his operation and be knowledgeable of the entire certification procedure. Training sessions for field inspectors, together with growers and production advisers, will be held to stress the need for varietal purity isolation and care of handling seed at harvest time.

Processing personnel will be trained with laboratory technicians on quality measures required in the conditioning and processing of seed. Certification procedures and philosophies of superior seed will be covered at grower's meetings to assist growers in certified seed production and present means of enhancing the sale of their product.

A record-keeping system will be established to assure adequate seed lot identification from harvest through processing, storage, and marketing to subsequent seeding in the field. If quality problems arise, the seed and its progression through the certification process must be traced to identify the source and cause of the problem.

FINAL DRAFT - 9/12/84 - 7083A

The tag printing process for labelling the seed, identification, and recording quality will be improved. The increased volume of seed and number of growers precludes the continued practice of hand writing the tags.

7083A

Appendix B

SPECIAL REPORTS AND PAPERS PREPARED

SPECIAL REPORTS & PAPERS PREPARED

The following papers were prepared by the consultant during his tour of duty in Ghana:

1. Plan of Work (1982)
2. Proposed Amendments to Legislative Instrument 802 Seeds (Certification and Standards) Regulations, 1973 (1982)
3. Lecture Series for Seed Technology Training Session (1982)
 - a. Importance of seed to man and agriculture
 - b. Varietal development and improvement
 - c. Purpose of seed certification programs
 - d. Field inspection techniques
 - e. Seed laboratory procedures
4. First Annual Technical Reports, MIDAS II Project Quality Control Section (1982)
5. Lecture Series for In-Service-Training Workshop for Ghana Seed Company, Production, Processing, and Quality Control Personnel (1983)
 - a. The role of quality control in the seed business
 - b. Purity analysis procedures
 - c. Seedling vigor and moisture content determinations
6. Second Annual Technical Report, MIDAS II Project Quality Control Section (1983)
7. Co-authored, The Effect of Seed Size upon Maize Seedling Vigor (1984)

8. Co-authored, Seed Storage of Maize (1984)
9. Terms of Reference for Eligibility Requirements for Release of New Varieties (1984)
10. Proposed Organization and Function of the Ghana Seed Inspection Unit (1984)
11. End of Tour Report (1984)