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9. ABSTRACT

In 1975, a Development Assistance Plan was prepared for Chad. In that document, seed multiplication and distribution were identified as substantial contributions that could be made to the agricultural sector of Chad's economy. Technical assistance under an AID contract was requested for preparation of a Project Identification Document in seed multiplication for Chad. That document was prepared. This present report, by the consultant, Charles E. Vaughan, of the Seed Technology Lab, Mississippi State University, for the period June 11-July 3, 1976, includes six recommendations concerning the seed program in Chad: The Ministry of Agriculture should proceed to establish and organize a Seed Division within the Ministry; its sole purpose should be the multiplication and distribution of seed. A foundation seed project should be established in conjunction with the agricultural research station in Deli. Three seed multiplication centers should be organized and located at Dougui, Moussafoyo, and Boumo. A program of farmer-seed producers should be organized whereby farmers will produce seeds under contract and supervision of the seed multiplication centers. A revolving fund should be established for immediate purchase of seed from contract growers to encourage rapid development of this program. O.N.D.R., the national extension service, should be the agency through which seeds are distributed to the farmers.

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SEED MULTIPLICATION AND DISTRIBUTION IN CHAD

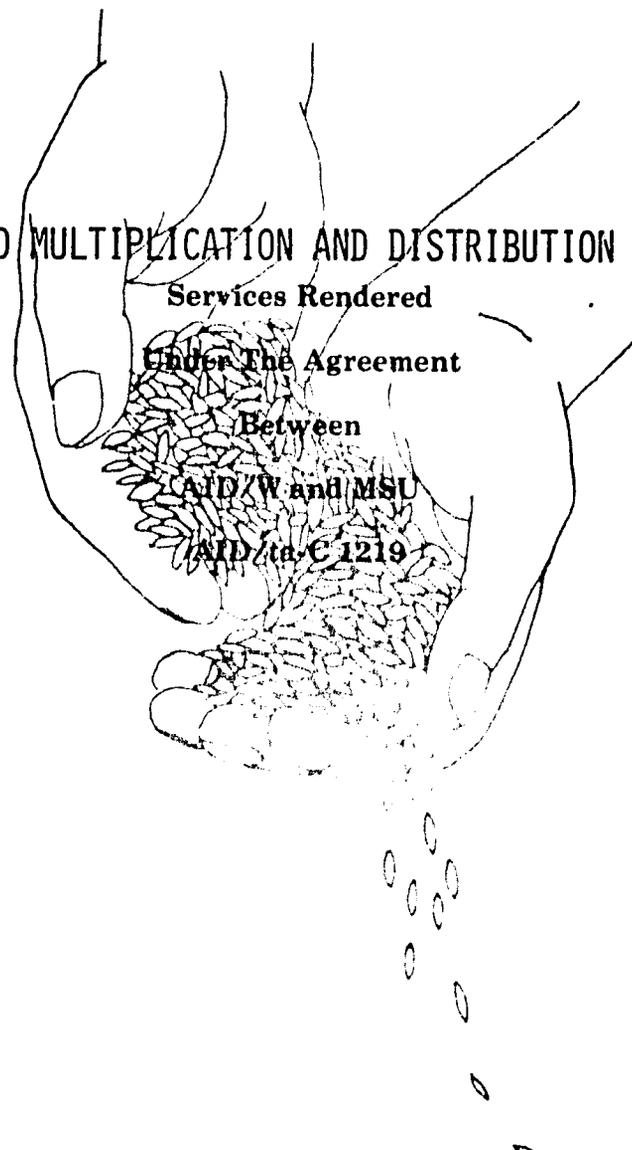
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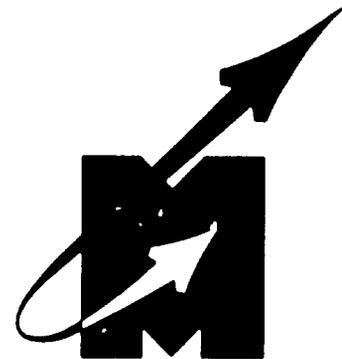
Between

AID/W and MSU

AID/ta-C 1219



SEED TECHNOLOGY LABORATORY  
MISSISSIPPI STATE UNIVERSITY  
MISSISSIPPI STATE, MISSISSIPPI



Report to USAID/Chad and AID/W  
ON  
Seed Multiplication and Distribution in Chad

Services Rendered  
Under the Contract  
between  
AID/W and MSU  
AID/ta-c-1219

Seed Technology Laboratory  
Mississippi State University  
Mississippi State, Mississippi

August 1976

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REPORT SUMMARY

TITLE: Report to USAID/Chad and AID/W on Seed Multiplication and Distribution in Chad.

CONTRACT: Services under AID/ta-c-1219

CONSULTANT: Charles E. Vaughan  
Seed Technology Laboratory  
Mississippi State University

PERIOD OF REPORT: June 11-July 3, 1976

SUMMARY

1. In 1975 a Development Assistance Plan (DAP) was prepared for Chad. In that document, seed multiplication and distribution was identified as an area where a substantial contribution could be made to the agricultural sector of Chad's economy. Technical assistance under contract AID/ta-c-1219 was requested to help in the preparation of a Project Identification Document (PID) in seed multiplication for Chad.
2. A Project Identification Document (PID) was prepared in the area of seed multiplication and distribution along with an estimated budget.
3. Six specific recommendations were made for the seed program in Chad. They are:
  - a. The Ministry of Agriculture should proceed with the establishment and organization of a Seed Division within the Ministry whose sole purpose is multiplication and distribution of seed.
  - b. A foundation seed project should be established in conjunction with the agricultural research station in Deli.
  - c. Three seed multiplication centers should be organized and located at Dougui, Moussafoyo, and Boumo.
  - d. A program of farmer-seed producers should be organized whereby farmers will produce seeds under contract and supervision of the seed multiplication centers.
  - e. A revolving fund should be established for immediate purchase of seed from contract growers to encourage rapid development of this program.
  - f. O.N.D.R., the national extension service, should be the agency through which seed are distributed to the farmers.

#### ACKNOWLEDGEMENTS

I wish to acknowledge the exceptionally fine support of the USAID/Chad Mission during the period of my consultation. Although my consultation was an individual program, I often functioned as a part of the Integrated Rural Development Team that was developing Project Identification Documents for USAID/Chad. Therefore, superb secretarial services were provided in the person of Ms. Rosine Lampell, also a member of the team.

I appreciate the assistance of Jean-Marc Peysson and Mustapha Yehouessi in supplying the needed data.

Finally, I wish to acknowledge the invaluable assistance of Bob McAlister, Team Leader of the Integrated Rural Development Team, for his suggestions and ideas during the period of this report.

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Associate Agronomist  
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SEED MULTIPLICATION AND DISTRIBUTION  
IN  
CHAD

June 11-July 3, 1976

BACKGROUND

In the Development Assistance Program (DAP) prepared for Chad during 1975, seed multiplication was recognized as an avenue for improving the productivity of traditional crops in Chad. Also the Direction de L'Agriculture estimates that improved varieties and disinfection can increase millet and sorghum productivity by at least 20%.

As a result of these assessments USAID/Chad felt that seed multiplication would be a fruitful area in which assistance could be rendered to the Government of Chad.

TERMS OF REFERENCE

Mississippi State University (MSU), under terms of its technical assistance contract with TAB/AID (AID/ta-c-1219), was requested to provide assistance for the formulation of a Project Identification Document (PID) for the multiplication and distribution of improved seed and plant materials of selected crops.

Dr. C.E. Vaughan, Seed Technology Laboratory, Mississippi State University was assigned to provide the services requested. He departed MSU June 11 and returned to home station on July 3, 1976.

PROJECT IDENTIFICATION DOCUMENT

The primary responsibility of the consultant was to develop a Project Identification Document (PID) for USAID/Chad. A copy of that document follows:

## 2.

### PROJECT IDENTIFICATION DOCUMENT (PID) CHAD-SEED MULTIPLICATION AND DISTRIBUTION

#### I. The Problem and the Proposed Response

##### A. The Problem

It has been determined that there is very little activity in the area of seed multiplication and distribution in Chad. With the exception of the small quantities of imported seed during periods of drought, the seed used by farmers are characterized as follows:

- (a) The seed used for planting are generally "saved" by the farmer from his own grain production.
- (b) The seed are largely of unknown germination potential and purity and of uncertain varietal identity.
- (c) The better "grain" is sold by the farmer or consumed, thus leaving the poorer quality "grain" for use as planting seed.
- (d) Poor storage conditions and practices further reduces the quality of seed saved for planting by allowing it to get wet or be damaged by rodents and insects.
- (e) A significant number of farmers periodically buy or barter for their seed supplies in the local grain markets.

The combined effect of these practices reduce the quantity and quality of seed available for planting the next crop.

A seed multiplication and distribution program, which for all practical purposes does not exist in Chad, was identified in the Development Assistance Program (DAP) as being the main avenue available for improving the productivity of millet and sorghum, the nutritional base of the rural population. Also the Direction de L'Agriculture estimates that improved varieties and seed disinfection can increase millet and sorghum productivity by at least 20%. These

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goals or ideas cannot be accomplished without external assistance in the area of seed multiplication.

B. AID Response

It is projected that one foundation seed project and facility will be established in conjunction with the agricultural research station in Deli. The responsibility of the foundation seed project will be to increase the seed being developed or maintained by the research workers at the station. This facility will be modest in size and will concentrate on the food crops: rice, millet, sorghum, groundnuts and perhaps cowpeas.

Actual multiplication of seed to be distributed by O.N.D.R., the national extension service, will be accomplished at three proposed "seed multiplication centers". The most logical locations are at Dougui, Moussafoyo, and Boumo, located strategically throughout the country. Each center would not necessarily be engaged in the multiplication of all seeds, but only those important in that particular area. These centers should have warehouse storage for relatively large amounts of seed as they should be responsible for some "carry-over" until the next planting season. These centers should have land available for seed production, but they should also establish a program of "contract growers" to provide a market for high quality seed produced by farmers under contract. Seed collected from farms will be dried, cleaned, tested and treated to reduce diseases before storage and distribution occurs.

The initial provision of basic buildings, vehicles and equipment at these centers will be a necessary part of the program. It is also anticipated that a revolving fund will be established for the immediate purchase of seed from contract growers to encourage

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rapid development of this program.

Initial staffing of the foundation seed project and seed multiplication centers can be accomplished by use of existing personnel at these seed farms. As the program expands local personnel will be trained in the techniques of seed technology and how they differ from grain technology.

#### Program Outputs

The outputs of this program within the five-year period are seen as being:

1. There will be an increase in the amount of seed available to small farmers for planting.
2. Genetic quality will be improved because procedures will be followed whereby seed produced by the "Seed Multiplication Centers" can be traced to the plant breeder or research technician who maintains that variety. By the use of isolation techniques and roguing of seed fields, mixtures that are common in planting seed now will be eliminated.
3. Physical contamination resulting from admixtures will be reduced.
4. Germination potential of seed lots can be determined. Lots unsuitable for seed can be identified and diverted to other channels. Planting of seed that does not germinate or has a low germination can be eliminated.
5. Managers for the foundation seed project and the Seed Multiplication Centers will be trained in seed production, handling and distribution techniques.
6. Through local training, farmer-producers of seed will be trained in seed production and handling techniques.

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that differ from grain production.

7. Facilities necessary for handling and storage of increased quantities of improved seed will be established.
8. The infrastructure for a well organized seed program for Chad will be developed.

### Inputs

To carry out this program, the following inputs are required:

#### 1. Consultants

At critical stages in the development and implementation of the program, technical consultants in seed improvement methods will be needed for 4-6 weeks at a time.

Examples are as follows:

- (a) During design of facilities and specification of equipment .
- (b) During final installation of equipment and initial operation.
- (c) For training of personnel.

#### 2. Commodities

- (a) Buildings to house the foundation seed and seed multiplication centers. These will include both buildings for handling and storage of seed.
- (b) Basic equipment and supplies for the facilities.
- (c) Vehicles for staff's supervisory activities and for the transport of seed.

#### 3. Other Costs

- (a) Travel/subsistence allowance for trainees.

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(b) Recurrent operating expense for the facilities.

(c) Administrative costs

(d) Contingency fund.

It is anticipated that the greater part of the total capital expenditures for the five-year project will be called for in the third and fourth years of the project. During these years the seed multiplication centers will be established.

C. Major Assumptions Pertinent to Project Success

Basic assumptions for the extension of the project over its entire five year period are that:

1. The Government of Chad has made or will make a commitment to support an expanded program for seed multiplication.
2. The Ministry of Agriculture will proceed with the establishment and organization of a Seed Division within the Ministry whose sole purpose is the multiplication and distribution of seed.
3. The farmers want improved seed and are willing to purchase and plant such seed when it becomes available.
4. Other inputs into the agricultural program will be available at the time improved seeds are available so that maximum benefits can be obtained from the use of improved seed.
5. The cost of the program is justified in terms of increased agricultural production which can hopefully help to raise the standard of living for all Chadians.

D. Host Country and other Donor Activities

The basic structure for a viable seed multiplication program in Chad now exists. The agricultural research station at Deli, where the foundation seed project will be located, is pre-

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sently the location of varietal testing work. Selected locations for the seed multiplication centers are already designated as seed farms, so building on the present structure will be the approach taken.

UNDP has provided some buildings and small farming equipment for the seed farm at Dougui. Several large fields have also been cleared for use in seed multiplication of groundnuts. The farm is just getting started but should be functioning well by the time of increased seed activities under this project.

E. Alternatives.

Commercial dealers now supply much of the seed that farmers buy when their own saved supply runs low. This seed is usually taken from grain trade stocks and is of unknown variety, of uncertain germination, and may harbor disease organisms, weed seeds and trash. At this point in time better systems are known and are proposed here to be put into effect.

F. Beneficiaries.

This project will meet a strongly felt need of the country. Seed improvement is of central importance to agricultural growth in Chad. This fact is recognized by Ministry of Agriculture personnel, as well as team members preparing the DAP for Chad. While improved, high yielding varieties of seed are received from International Agricultural Research Centers, the multiplication and distribution functions are severely limited. The research station at Deli does adaptive testing, but only small quantities of improved seed are available for general use. Creation of a seed multiplication organization will assist in getting improved technical results into the hands of farmer producers. Use of good seed of improved varieties is a major fac-

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tor for increasing the yield levels of Chadian agriculture which are lower than some neighboring African countries.

Major beneficiaries will vary with time. Initially the benefits will accrue to the more adventurous individuals who will try new methods. In successive planting seasons the project design will assure availability of improved seeds and increased income to smaller farmers. Special efforts will assure improved seed distribution to poorer farmers in increasing proportions. This will be given special attention in the development of the PP. Several types of benefits will result from the creation of a seed industry. Both commercial and subsistence producers will gain by higher yields and lower per unit costs of using improved seeds.

Concurrently an entirely new spectrum will be opened for the selected farmers who will raise the multiplication seed. A bonus is paid for this seed as compared to market prices. This is to compensate growers for the extra care and attention needed for acceptable seed production.

### G. Spread Effect.

The Direction de L'Agruculture estimates that improved varieties and seed disinfection can increase millet and sorghum productivity by at least 20%. This will have a multiplier effect over subsequent years. Also the inclusion of additional crops into the seed program will require less time to work out the technology of multiplication and distribution, simply because the technology of a crop like millet will apply to a crop like sorghum. Techniques of seed production learned by the more progressive farmers will also be readily communicated to other farmers.

## II. Financial Requirements and Plans

Although a detailed financial statement will be prepared as part of the PRP, it is projected that the project costs over five years will fall into four areas as follows:

Technical Assistance	\$ 130,000
Commodities	2,294,600
Participant Training	100,000
Other Costs	1,598,600
	<hr/>
TOTAL for Five Years	\$4,123,200

## III. Project Development

Before the project can be developed, it will be necessary to complete a more detailed study of the needs of the program. In addition it will be necessary to clarify the Government's position with reference to establishing a Division of Seed Multiplication within the Ministry of Agriculture whose sole responsibility will be the multiplication and distribution of seed. Some Ministry of Agriculture personnel see this as a significant step toward creating the right kind of atmosphere in which a viable seed program can develop. Also the level of commitment to the seed program will need to be determined.

The PRP can be prepared by November 1976 on the basis of information already collected. It will be necessary, however, to collect additional information in the month of January 1977 in order to complete the PP by March 1977.

## IV. Issues

In the development of a seed multiplication program for Chad, there is one over-riding issue. All assistance will have to be in the form of grant funds. At the present time there can be no counterpart money from the Government of Chad. Most Government money goes to pay salaries and wages. Even now, less than

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10% of Government money goes for operations. This would provide no money in the foreseeable future for capital investments.

SEED MULTIPLICATION

Five-Year Budget Estimate (FY 78 - FY82; in US \$)

Category	Per Year					Five-Year Total
	Year 1 (Fy 78)	Year 2 (Fy 79)	Year 3 (Fy 80)	Year 4 (Fy 81)	Year 5 (Fy 82)	
<u>Technical Assistance</u>	20,000	30,000	40,000	20,000	20,000	130,000
<u>Commodities (Vehicles, Buildings, Equipment &amp; Supplies)</u>	341,900	601,800	646,800	601,800	102,300	2,294,600
<u>Participant Training</u>	20,000	35,000	15,000	15,000	15,000	100,000
<u>Other Costs</u> Local Training Recurrent Operating Expense	4,000	121,900	317,500	485,900	669,300	1,598,600
<b>TOTAL</b>	<b>385,900</b>	<b>788,700</b>	<b>1,019,300</b>	<b>1,122,700</b>	<b>806,600</b>	<b>4,123,200</b>

## CURRENT SITUATION AND BASIS FOR RECOMMENDED PROGRAM

Chad is one of the poorest countries in Africa with an estimated annual per capita income of \$93. Chad's major potential for economic growth lies in its agricultural sector. In years of normal rainfall Chad has the potential to be self-sufficient in the production of basic food crops and to export limited quantities of rice and wheat. Although often described as a Sahelian country, more Chadian land is located in the Sudanian and Guinean zones (30%) than in the Sahelian zone (20%).

Development of Chad's significant agricultural potential is hampered by the country's landlocked geographic location far from major ports, by inadequate transport and communications infrastructure, and by uncertain rainfall. The effectiveness of government agricultural services is limited by the poor communication and transportation links, the small number of qualified government personnel and major budgetary constraints. Security problems in the north, east and central regions of the country severely limit public access to government services and have led to increased allocation of scarce financial resources to the military and police.

As indicated above, agriculture is the major economic activity in Chad. Sorghum and millet are the major food crops. Total production has averaged about 600,000 MT except in drought years, such as 1973 when production fell to 380,000 MT. Approximately 60,000 MT of cereals are marketed in normal years and around 13,000 MT are imported largely from Cameroon and Nigeria. Chad could quickly become fully self-sufficient in millet and sorghum through programs designed to increase productivity and improve cereals marketing.

Peanuts are grown extensively in both the sudanian and Sahelian zones, mainly as a food crop. Peanut production suffered a severe setback in Chad between 1964, when the country had to import an equivalent amount, plus 1080 MT of edible oil. In 1971 domestic production declined to approximately

75,000 MT and has remained at that level through 1974/75.

Rice production reached a peak in 1971/72 at 60,000 MT but the 39,000 MT produced in 1970/71 is closer to the ten years average. Highly dependent upon rainfall and the flooding of the Logone river, rice output declined sharply during the 1972-74 drought years but appears to have recovered somewhat to 35,000 MT in the 74/75 season. Although Chad imports some high quality rice from France and the United States, Chad exports greater quantities of rice, especially to Cameroun, and in years of normal rainfall, is close to self-sufficiency in rice production.

Wheat production has gradually increased from 1,600 MT in 1961 to 7,700 MT in 1969/70 but has declined in recent years. Imports in 1973 amounted to 10,740 MT of wheat and flour at a foreign exchange cost of \$2.8 million. This quantity could be grown domestically in the Lake Chad polders or in small irrigated perimeters along the Chari River.

Although the Government has several designated seed farms, total production of seed when compared to the seed needs is very low.

With the exception of the small quantities of imported seed during periods of drought, the seed used by farmers to plant these crops are characterized as follows:

- a) The seed used for planting are generally "saved" by the farmer from his own grain production.
- b) The seed are largely of unknown germination potential and purity and of uncertain varietal identity.
- c) The better "grain" is sold by the farmer or consumed, thus leaving the poorer quality "grain" for use as planting seed.
- d) Poor storage conditions and practices further reduces the quality of seed saved for planting by allowing it to get wet or be damaged by rodents and insects.

- e) A significant number of farmers periodically buy or barter for their seed supplies in the local grain markets.

For a look at seed production and supply in Chad see the following table:

SEED PRODUCTION IN CHAD (Production in Tons)

Crop Location	Sorghum			Millet			Peanut			Corn		
	74-75	75-76	76-77	74-75	75-76	76-77	74-75	75-76	76-77	74-75	75-76	76-77
Deli	8.3	4.5	9.1	-	1.4	4.7	15.9	10.9	15.5	-	-	9.7
Moussafoyo	1.7	1.7	1.0	4.0	4.0	1.7	9.6	9.5	10.4	-	-	-
Bekao	9.7	9.6	7.4	-	-	-	14.0	13.9	2.5	-	-	-
Poudoue	2.8	2.6	2.5	-	-	0.2	5.4	5.1	4.9	-	-	-
Karoual	4.0	4.1	-	-	-	-	14.1	14.0	-	-	-	-
Tikem	3.1	3.0	-	-	-	-	-	-	-	-	-	-
Ba Illi	-	0.5	-	0.9	0.9	-	0.5	0.5	-	0.6	-	-
TOTAL	29.6	26.0	20.0	4.9	6.3	6.6	59.5	53.9	33.3	0.6	-	9.7

## SCOPE OF THE SEED MULTIPLICATION PROGRAM

Politicians, planners, technicians and farmers can and do justify "seed programs" rather easily in food deficit countries. The critical decision, however, is not whether a seed program is needed, but the establishment of the program's initial scope in the context of needs, capabilities and available resources. Experience suggests that beginning with a modest, soundly planned, and well supported program of limited scope more frequently evolves into the type seed program needed for sustained development than a broad scale, complex, high volume operation. The managerial and technical skills and experience required for a high volume seed operation are simply not available, at present.

Until the capability for producing and marketing 100 or 200 tons of high quality seed is developed and demonstrated in a routine manner, 1,000 tons should not be attempted. The quality and appearance of the seed distributed by a "public" program must be significantly better than seeds saved by the farmer before the seed will be accepted and purchased by Chadian farmers.

Studies of serviceable seed programs in countries around the world have revealed five common characteristics:

1. Skilled, knowledgeable manpower is basic. The initial efforts in the seed program were scaled to developing manpower resources. Conversely, manpower resource development must be accorded high priority in the time-frame of over-all development. Since skilled, knowledgeable seed specialists are not available in Chad, initial implementation must be limited.
2. Early development efforts were concentrated. Diffusion of effort, fragmentation of resources, and dispersion of operations are not the means for building a good program. Initial efforts and avail-

able resources must be concentrated, centrally managed and closely coordinated until the program becomes self-sustaining. After this stage the program can be broadened rapidly in an orderly, efficient, and successful manner.

3. The quality of inputs into the program is more important than the quantity. Seed programs implemented with makeshift, piecemeal, and haphazard inputs are unlikely to have a higher quality output. The utilization of large-scale inputs of new varieties or broad-scale, short-term, Ministry-wide approaches have not succeeded in developing sustained seed programs, although, they have often been tried. Successful seed programs have evolved from the utilization of good workers, good equipment, good organization and good support. If the resources are insufficient to support more than a very modest but effective program--so be it.
4. The time-frame was realistic. A seed program is a horizontally integrated program, highly interdependent upon other related programs such as research, extension, credit and grain marketing and distribution. Therefore, time must be allocated not only for development of the technical capabilities within the seed program but those of the related services as well. Tons of seed have only grain value if the farmers cannot obtain them or will not plant them.
5. Planning, implementation and evaluation are continuous processes. One plan, a single implementation effort and one evaluation will not create a seed program. They only start the program. The "plan" must be revised, expanded, contracted or redirected on the basis of accurate, periodic assessments of progress.

Considering these five characteristics and the limited resources and experience available, the proposed program is limited in scope; although, a broad based comprehensive program is needed and must be the final goal for Chad.

#### RECOMMENDED SEED MULTIPLICATION PROGRAM

1. Objectives and goals of the seed multiplication component. The principle goals and responsibilities of the Seed Multiplication Program for Chad are foreseen as follows:

- a) To increase the quantity of good seed of superior varieties of millet, sorghum, rice, groundnuts and cowpeas in a manner that will assure those farmers receiving the seed that they will have performance characteristics equivalent to the variety released by the research workers.
- b) To train a corp of Chadian technicians and farmer-seed producers in the techniques required for the production, processing, distribution and marketing of high quality seed and to assure attainment of a level of technological and educational skills capable of providing a base from which a self-sustaining Chadian seed program can arise.
- c) To the degree possible, but within the technical, financial supervisor constraints present, produce seed by utilizing a "package", a package of production practices within the economic and technical capability of the average Chadian farmer.

The above goals largely restrict the role of the Seed Multiplication

component to that of technical production and first level distribution of seed as a production input. The role of demonstrator for the entire "package program" to large numbers of farmers is judged to be clearly outside the present technical and management capabilities of the available personnel.

## 2. Organizational Infrastructure

### a) Seed Division

It is suggested that a Seed Division or Division of Seed Multiplication be established within the Ministry of Agriculture in keeping with the established system for planning, coordination and control in the Government of Chad. The Chadian director would be responsible for the planning and implementation of all government seed activities. This office would have primary responsibility for over-all management and coordination of activities, records maintenance, purchase of supplies and equipment, and selecting professional personnel.

### b) Foundation Seed Project

A Foundation Seed Project (FSP) is well suited to serve as the vehicle for launching the technical operations of the seed program. In most respects this one project should be a nearly complete, though not comprehensive, seed program. Operationally, it starts with breeder's seed, engages in seed production, harvest, drying, processing, storage, marketing and distribution. Thus, it is well suited for in-service training of personnel in the context of their future responsibilities in expansion of the program.

The FSP should produce and supply some seed for use by farmers at least initially. However, its orientation should be maintained as an elite organization whose primary functions are to make the initial multiplications of breeder's seed for subsequent seed production; catalyze interest in production of commercial quantities of seed; to serve as a center of expertise, training and information for the developing seed program, and maintain a reserve of high quality seed of each variety, in current use, as a safeguard against national disaster.

Only those seed which meet established technical standards and receive approval of the breeder responsible for the species in question should be distributed as foundation seed. Because of this need for continuous interchange between the breeders and FSP personnel it is of utmost importance that the Research and FSP operations be in close physical proximity. In Chad, Deli has been identified as the logical location for the Foundation Seed Project.

The FSP should be established as the first operational unit of the Seed Multiplication component. In addition to the permanent operational staff, the Manager and Assistant Manager of the seed multiplication centers should be assigned here for the first crop season to participate in development of FSP facilities as part of their in-service training.

c) Seed Multiplication Centers

Initially, three seed multiplication centers (SMC) will be utilized both to increase the volume of seed as the se-

cond stage of the multiplication process and to facilitate distribution of the seed. Tentative sites for these SMC's are at Dougui, Moussafoyo and Boumo.

Each SMC will function both as an active seed production unit and as a contractor for seed to be produced by farmers in areas adjacent to the SMC's farm operation (the third step of multiplication). The SMC will accumulate, process, store, test the quality, and distribute to O.N.D.R., the national extension service, all seed produced under its auspices. O.N.D.R. will make final distribution to farmers.

The dual responsibility of the SMC as a seed producer and contractor is important not only from the viewpoint of increasing total seed supplies but also for maintaining strict technical control on the relatively large quantity of seeds to be produced at this stage. The fact that all contract producers should be required to follow an advanced "package" of production practices should be based upon good seed production techniques, not as demonstration fields; although they will serve the latter purpose. Two to five years are required to properly train farmer-seed growers to produce high quality seed, therefore, an annual rotation of seed producers is believed unsound.

Operationally, the minimum size field acceptable for contract production of cross pollinated species is three to five ha. Since few Chadian farmers will or can allocate this much land to a "cash" crop, farmer groups will probably be required. Even in such comparatively large production fields, supervision of production will require

60 contractors (farmer groups) per year for each SMC, by the fifth year of the program. During the developmental stages of each SMC, proper training and supervision for only 10 or 15 new contractors each year will be a worthy goal.

Producing high quality seed through contracts with traditional farmers requires a very high level of educational and supervisory input. The supervisory time spent for the production of one or two hectares is only slightly less than that required for ten hectares.

It is of vital importance that those persons responsible for the seed program remember that seed production contracts are not the proper place to "reward" large numbers of farmers. Seed production requires specialized techniques not readily replicated each year. The greatest number of Chadian farmers will benefit most when they can obtain high quality seed of superior varieties.

On the other hand, the training and continued utilization of farmers who satisfactorily perform the seed production function is; (1) an excellent means of reducing costs to the government (when land, labor and input costs are borne by the farmer); (2) a means of increasing the income of a few farmers (a premium of 10 to 20 CFA per kilo, based on current prices, should be paid to producers who perform satisfactorily); (3) also a way to demonstrate the "package" approach.

After the seeds are produced, harvested, dried and threshed by the contract growers they will be returned to

the SMC for cleaning, testing, and storage until they are distributed. It is suggested that the seed be "over-cleaned" (i.e., 99% physical purity and removal of the smaller 15-20% of the seed), packed in new bags not exceeding 25 kg. in weight. Affixing a tag to identify the kind and variety of seed, its physical purity and germination percentage is recommended. These processes will encourage farmers to make a distinction between good seed and the grain they are used to planting.

Distribution of the seed should be through O.N.D.R. (the national extension service). The SMC manager should be responsible for developing and coordinating the distribution of seed to the O.N.D.R., since he will be responsible for receiving payment for the seed. A revolving fund should be established for immediate purchase of seed from contract growers to encourage rapid development of this program.

#### RECOMMENDATIONS

With reference to the seed program in Chad six major recommendations are made. They have been discussed in the report but are listed below.

1. The Ministry of Agriculture should proceed with the establishment and organization of a Seed Division within the Ministry whose sole purpose is multiplication and distribution of seed.
2. A foundation seed project should be established in conjunction with the agricultural research station in Deli.
3. The seed multiplication centers should be organized and located at Dougui, Moussafoyo, and Boumo
4. A program of farmer-seed producers should be organized where-  
by farmers will produce seeds under contract and supervision

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of the seed multiplication centers.

5. A revolving fund should be established for immediate purchase of seed from contract growers to encourage rapid development of this program.
6. O.N.D.R., the national extension service, should be the agency through which seed are distributed to the farmers.

#### CONCLUSION

Seed multiplication has been identified as the major avenue through which increased agricultural productivity can be achieved in Chad. A project identification document (PID) has been prepared and submitted. If this project is selected for further development and the final Project Paper submitted and approved, Mississippi State University can provide consultant services in the area of design of facilities, specification of equipment and training of personnel.

## APPENDIX

ITINERARY FOR CHARLES E. VAUGHAN IN CHAD

- Friday (June 11) Traveled to Washington, D.C. Met with the following AID personnel:
- John Pielermeier  
Stan Peak  
Lloyd Clyburn
- Departed for Paris.
- Saturday (June 12) Arrived in Paris. Stayed overnight in Paris.
- Sunday (June 13) Departed Paris for N'Djamena. Arrived in N'Djamena at 6:10 p.m.
- Monday (June 14) Met the various members of the Integrated Rural Development Team led by Bob McAlister. Met with S.H. Krashevski of USAID. Met with Jean-Marc Peysson, Ministry of Agriculture, Officer responsible for seed multiplication in Chad.
- Tuesday (June 15) Traveled to Douguia in the Lake Chad Basin area. Visited with farmers, village chiefs and viewed the agriculture of the area.
- Wednesday (June 16) Visited with FDAR and inspected the grain storage warehouses of the government.
- Thursday (June 17) Had meeting with Jean-Marc Peysson of the Ministry of Agriculture to get needed data on seed production and anticipated seed needs. Also met with Mr. Mustapha Yehouessi, leader of the Research Division of the Ministry of Agriculture.
- Friday (June 18) In N'Djamena. Worked on Project Identification Document and Estimated Budget.
- Saturday (June 19) Visited the Seed Multiplication Farm at Dougui. Traveled with Mr. Bob McAlister, team leader, and Mr. Beadou from the Ministry of Agriculture.
- Sunday (June 20) Traveled to Moundou to visit the Deli Research Station. Traveled in a small plane belonging to the Aero Club of Chad. Could not land because of a storm in Moundou. Returned to N'Djamena.
- Monday (June 21) In N'Djamena. Worked on Project Identification Document and Estimated Budget.
- Tuesday (June 22) Visited with Mr. Blatin of the Office of National Development Rural (O.N.D.R.)-the

national extension service of Chad.

- Wednesday (June 23) Met with Mr. Oloa, Chief of Division, of the Lake Chad Basin Commission (LCBC) about seed production and multiplication activities within the commission.
- Thursday (June 24) Traveled to Koundoul with Mr. Oloa of the Lake Chad Basin Commission. The LCBC had some seed production here, but for internal use only. None entered the market or was planted by farmers.
- Friday (June 25) In N'Djamena. Worked on the report.
- Saturday (June 26) In N'Djamena. Worked on revision of Project Identification Document.
- Sunday (June 27) In N'Djamena.
- Monday (June 28) Had meeting with Dr. Ray Olsen of the Kansas State University. Had discussion on the Semi-Arid Food Grain Research and Development Project (SAFGRAD) for Africa.
- Tuesday (June 29) In N'Djamena. Worked on the report.
- Wednesday (June 30) In N'Djamena preparing final draft of Project Identification Document,
- Thursday (July 1) Departed N'Djamena.
- Friday (July 2) Traveled to U.S.
- Saturday (July 3) Returned to Mississippi State University.

## Weather Data for N'DJamena (Fort Lamy) in Chad

Latitude	12° 7'N
Longitude	15° 0'E
Elevation	885 ft.
<u>Temperature (mean)</u>	
January	76.8°F
April	90.7°F
July	84.3°F
October	85.0°F
Maximum	118°F
Minimum	46°F
<u>Average Precipitation in inches</u>	
January	.00
February	.00
March	.09
April	.34
May	3.15
June	2.96
July	6.33
August	7.89
September	2.92
October	.86
November	.00
December	.00
Year	<hr/> 24.54

Budget Breakdown is based on the following information:

1. Technical Assistance:

Year 1	20,000	2MM Consultants
Year 2	30,000	3MM
Year 3	40,000	4MM
Year 4	20,000	2MM
Year 5	20,000	2MM
	<u>130,000</u>	<u>13MM</u>

2. Commodities (Vehicles, Buildings, Equipment, Supplies):

	<u>Yr. 1</u>	<u>Yr. 2</u>	<u>Yr. 3</u>	<u>Yr. 4</u>	<u>Yr. 5</u>
Pick-up (Land Rover)	15,000	15,000	30,000	15,000	15,000
14Ton Truck	30,000	30,000	60,000	30,000	
Foun. Seed Facility	296,900				
Seed Mult. Center		556,800	556,800	556,800	
Seed Test. Lab.					87,300
	<u>341,900</u>	<u>601,800</u>	<u>646,800</u>	<u>601,800</u>	<u>102,300</u>

3. Participant Training:

U.S. (one part.)	20,000	20,000			
Another African Country (4 part.)		15,000	15,000	15,000	15,000
	<u>20,000</u>	<u>35,000</u>	<u>15,000</u>	<u>15,000</u>	<u>15,000</u>

## 4. Other Costs:

	<u>Yr. 1</u>	<u>Yr. 2</u>	<u>Yr. 3</u>	<u>Yr. 4</u>	<u>Yr. 5</u>
Local Training (20 man mo. per yr.)	4,000	4,000	4,000	4,000	4,000

Recurrent Operating Expense:

Found. Seed Fac.		46,000	46,000	46,000	46,000
Seed Mult. Cent.			146,000	292,000	438,000
Admin. Labor		65,400	110,500	130,800	164,800
Contingency (10% of Admin.)		6,500	11,000	13,100	16,500
	<u>4,000</u>	<u>121,900</u>	<u>317,500</u>	<u>485,900</u>	<u>669,300</u>