

PD-PAU-387
ISN=47347
6250929

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The South-East Consortium for International Development

Technical Support to Mission
AFR-0510-I-00-4007-00
Work Order No. 4
Chad

Seed Multiplication Sub-Project for the
PVO Development Initiatives Umbrella Project in Chad
Project No. 625-0929-3-40001
Work Order #4
July, 1985

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The South-East Consortium for International Development

SEED MULTIPLICATION SUB-PROJECT
FOR THE FVO DEVELOPMENT INITIATIVES
UMBRELLA PROJECT IN CHAD

Service Rendered to
USAID/Chad and the GOC

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July 12, 1985

ACKNOWLEDGEMENTS

The author wishes to express his appreciation to Mr. Larry Harms and Dr. Haroun Kabadi for their support, ideas and hospitality during the period of consultation and without which this assignment would not have been completed.

Special thanks is extended to the Chadian agronomists whose input into the project design was vital and important. Particular reference is made to the Director General, Mr. Alladoumgue Nadingar, and the Director of the Gassi Seed Farm, Mr. Kouma.

Finally, no document is written without the necessary logistical support and mention is made of the efficient and cheerful help of Mrs. Debbie Dorcus and Ms. Carline Mamadou.

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July 12, 1985

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EXECUTIVE SUMMARY

TITLE: Seed Multiplication Sub-Project for the
PVO Development Initiatives Umbrella
Project in Chad

CONTRACT NO.: SECID AFR-0510-1-00-4007-00
Work Order No. 4

CONSULTANT: Dr. Gary A. Reusche, Seed Technologist
North Carolina State University

TDY PERIOD: June 25 - July 13, 1985

SUMMARY

1. Services were requested to prepare a PID-like document for the Chad Seed Multiplication Restoration Project. More specifically, the consultant was requested to study the feasibility of a seed production project that could be studied by an interested PVO operating in Chad and used as the basis for a proposed activity under the umbrella project "PVO Development Initiatives".
2. The PID-like document was prepared following consultations and field visits in the N'Djamena area. The details of the recommended seed multiplication activities, which included by necessity a varietal collection and evaluation component, were discussed with all interested parties and agreed upon in principle.
3. This report describes on-going seed distribution schemes and a general lack of information required for decision-making in any proposed seed production scheme. It proposes seed multiplication activities designed to be within the capacity of the GOC/PVO to implement, coordinated with other seed efforts in Chad, build the necessary varietal evaluation infrastructure, and finally produce seed on a semi-official program that capitalizes on the experienced gained in the private sector by the American PVO "Volunteers in Technical Assistance (VITA)".

1. PROJECT DESCRIPTION

A. PERCEIVED PROBLEM

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Seed stocks of the major food grain crops in Chad have been reduced to such a degree that most government and donor agencies operating in the Sahelian zone feel that many small farmers have nothing left to plant. This disastrous situation has been brought about by repeated drought and civil war. The AID project document "PVO Development Initiatives" (p. 1-8) presents an excellent summary of the actual situation.

The same processes that have caused the lack of seed at the small farmer level have also destroyed seed collections and varietal improvement programs within the Ministry of Agriculture and Rural Development, leaving this organization incapable of responding to the crisis in any meaningful way. Two on-going projects within the Ministry have been recently re-initiated to test varieties and produce foundation seed, but both of these efforts are based on varietal improvement programs outside of Chad and incomplete or non-existent testing of materials within the Chadian context. No varietal improvement programs are on-going, and none are even at the stage of serious project design.

The argument is heard that a varietal improvement program is outside the reach of Chad at the present time, yet "seed" (presumably local varieties) are to be distributed. Even if an emergency seed program could be built around a production scheme involving local varieties, the question of what local material should be produced remains to be answered. An indiscriminate selection of local varieties for production and distribution schemes is of questionable value. All villages and individual cultivators already have the capacity to indiscriminately collect and reproduce local varieties, and it is doubtful that any government program could significantly improve or accelerate this centuries-old procedure. In order to effect an improvement over the existing system, an added level of sophistication and degree of effectiveness must be present.

If local varieties in the Chadian context are considered the avenue of choice, the added sophistication would entail a collection of the local varieties and an evaluation of the relative merits of each local variety in the collection. Local varieties should not be conceptualized as an amorphous mass of genetically similar

material. They include a wide range of characteristics and diversity, and it is quite likely that one or more local varieties could be proven to be significantly superior to the others. Applying systematic seed production and quality control to local varieties that are identified as having superior characteristics can provide to the small farmer a service beyond his capacity to perform for himself. In addition, the collection can serve as the basis for varietal improvement programs that must certainly be initiated as soon as they become feasible.

The difficulty of producing local seed varieties in competition with the small farmer can be readily understood by an example. Sorghum and millet production in the Sahelian zone is normally in the area of 465,000 hectares (1970-77 average). The total seed requirement for this hectareage can be assumed to be somewhere around 3,000 metric tons (using an average seeding rate between sorghum and millet of 6.5 kg/ha). If seed could be provided to plant 1 out of 5 hectares in the Sahelian zone, perhaps representing farmers without seed to plant, the total need would be on the order of 600 MT. To produce 600 MT of seed for distribution in 1986, perhaps 1,000 hectares of irrigated culture would have to be produced during the dry season (1985-86) and distributed before the onset of the rains in 1986.¹ The 1,000 hectares of irrigated culture would require 6.5 tons of seed collected from the harvest of 1985. The collection of such quantities would be at best haphazard.

All of the above effort, requiring resources not known to be available, would be rendered useless if rains permit an average crop in 1985. The farmer would produce sufficient quantities of seed for his needs in 1986 without outside assistance.

If irrigated seed production could not be achieved in 1985-86, then it would be June of 1987 before significant quantities of seed could be produced and distributed. This would allow the possibility of improved rainfall cancelling the utility of the program during either 1985 or 1986.

¹Low yields are anticipated because of severe bird damage when the cereal grains are grown out-of-season. This was observed at Gassi in spite of an extensive system of manned deterrence.

In spite of the pessimistic analysis that has been presented in the above paragraphs, the seed situation in Chad critically requires attention and a program designed to assist the GOC and donor agencies in their development efforts. Extension activities whether by the ONDR or voluntary agencies regularly distribute "seed" referred to as "semences tout venant (seed coming from all over)", most frequently originating from commercial grain stores both in and out of Chad. In addition to the fact that these "semences tout venant" are of unknown and mixed condition, they appear to be distributed without even the benefit of a standard germination test taken from a representative sample of the loads being distributed. These "semences tout venant", it is often mentioned, are likely to be collected from the South and distributed in the Sahelian zone, thereby introducing genotypes that thrive on greater amounts of rain than is normally received in the North. The inherent danger of such "seed" distributions is obvious. The fact that it is being done at all is an indication of the severity of the problem, and the need for assistance.

B. SUB-PROJECT GOAL AND PURPOSE

The sub-project's goal is to increase food production throughout the Sahelian Zone in Chad by providing seeds of superior local varieties and adapted improved varieties from international sources to the small farmer. The purpose of the sub-project will be to initiate a rational and controlled procedure used to select varieties meeting minimum requirements of germination and purity that are distributed to small farmers. More precisely, seeds will be multiplied in the N'Djamena area under irrigated and supervised culture, and then distributed to production projects by various PVO/GOC activities for subsequent extension activities and/or multiplication.

C. EXPECTED ACHIEVEMENTS/ACCOMPLISHMENTS

A collection of local varieties of sorghum, millet, corn, and cowpeas will be evaluated for agronomic characteristics and yield potential, and maintained in conditioned storage facilities. A National Seeds Committee will be established under the direction of the Ministry of Agriculture and Rural Development charged with the duty of selecting varieties to be produced and determining distribution and pricing policy.

Selected varieties will be produced in conjunction with the GOC/FAO seed farm at Gassi and on privately operated

irrigated perimeters in the N'Djamena area, destined to be distributed to PVC/GOC project areas. The multiplied varieties will have superior and desirable agronomic characteristics, will stabilize seed distribution schemes and modestly increase yields at the small farmer level.

D. PROJECT OUTLINE

1. Collection and Evaluation of Local Varieties, And Varieties Developed in North Cameroon²

Local varieties will be collected during seed maturation by a team composed of two plant breeders and an anthropologist in cooperation with the Division de Recherche Agronomique (DRA). The objective will be, to the extent possible, the collection of local varieties considered by the breeders, in consultation with the local farmers and extension workers, to have desirable agronomic traits. At each collection site, a short questionnaire will be completed providing a description of the variety being collected, the village, name of the farmer/extension worker, and a number of general questions designed to characterize the desires and needs of the farmer for improved varieties (i.e., shorter season, tall, short, resistance to disease/drought, etc.) as well as the traditional means he employs to acquire local varieties not directly maintained within his control (i.e., neighboring villages, markets, extension worker, etc.). In short, to characterize the small farmers conception of a "variety" (as distinct from other varieties, grain, etc.) and assess his interest in acquiring varieties from his neighbors and/or a government program. One result of this questionnaire should be the design of future marketing strategies.

The experience of the breeders should be utilized to assure a collection of local varieties representing those commonly grown throughout the Sahelian Zone, while attempting to keep the collection at a reasonable number of entries. A sufficient quantity of seed will be collected to permit multi-locational testing over a period of years plus a sufficient quantity for long-term storage

²Varieties developed in Senegal, Mali, Gambia, Mauritania, Burkina Fasso and Niger are currently being evaluated in the CILSS regional trials. Three locations were planted in the Sahelian Zone in 1984: Ba-Illi, Bokoro and Dougui/Gassi.

in a conditioned seed storage facility. At the departure of the breeders, the collections will be categorized, characterized and ready for evaluation. Finally, a report will be prepared summarizing the questionnaire, providing guidance for the evaluation of the varieties and recommendations for future varietal improvement programs.

2. Linkage With North Cameroon Varietal Improvement and Seed Multiplication Projects

North Cameroon has been involved in varietal development and seed production for a number of years. It is geographically and climatically similar to many areas of Sahelian Chad, and is therefore possible that the Cameroonian programs have a direct relevance to the situation in Chad. Little or no exchange of germplasm or information has occurred since 1979, and a number of important projects have been initiated in North Cameroon that can assist Chad. For example, 88 different on-farm tests of sorghum varieties were undertaken in North Cameroon in 1984, showing the variety S35 to be significantly superior to local varieties in each of the five testing regions with an average superiority of 614 kg/ha.

It is recommended that a program be immediately initiated to test the Cameroonian elite lines and released varieties in Chad, and that arrangements be made for the procurement of breeder seed in the case that one or more of the Cameroonian varieties are selected for production in Chad. It may even be possible to contract foundation seed production with the North Cameroon Seed Project based in Garoua. The formal linkages that can be developed with North Cameroonian efforts can be of great benefit to Chad, in terms of the exchange of materials, information and the association with Cameroonian agricultural technicians.

3. Sahelian Varietal Testing Program

The decision to produce seed must be based on factual information, information that is generated through comparative varietal testing. This is true whether one is considering the production of a local variety, or an improved variety.

If seed production is destined for the Sahelian zone, this implies a range of climatic conditions, soil types, and rainfall ranging from 800-900 mm in the south to 350 mm or less in the north. For this reason more than one test location is required, and different varieties may be recommended for different areas within the Sahelian zone.

Therefore, it is recommended that the local varieties collected, as well as the improved germplasm from North Cameroon, be evaluated in replicated trials in at least three different areas representing the range of conditions in the Sahelian zone. These trials will complement the on-going CILSS regional trials and provide a sound basis for seed policy in Chad.

Expatriate technical assistance will be recruited to work with the agronomists at the DRA to execute these trials. The requirements for the position would be a M.S. in Agronomy (Crop Science option) with experience in field plot technique and the statistical analysis of data. Data will be reported along with adequate statistical information to establish whether or not observed differences are significantly different or the result of chance. The level of expertise required is well suited to a recently graduated student, perhaps with Peace Corps experience in Francophone Africa. This same agronomist will serve as a field inspector and technical advisor for the seed production component of the project.

4. National Seed Policy Committee

One of the first steps in development of a seed multiplication scheme is the establishment of an orderly mechanism for the "release" of a new variety and its entry into the seed multiplication and production chain. The decision to release a variety should be made by the Directeur de l'Agriculture on the basis of a recommendation made to him by a National Seed Policy Committee. The National Seed Policy Committee will review the information generated by the Varietal Testing Program and the experience of extension organizations utilizing the distributed seed to formulate its recommendations. The National Seed Policy Committee should meet at least twice a year (September and April) and be composed of representatives from the Agronomic Research Division, CNDR, private seedsmen/farmers, international organizations involved with seed production such as UNDP/FAO, USAID and PVO organizations involved in seed distribution and production activities.

At least 10 working days before the April meeting, the Varietal Testing Program will distribute to members of the Seed Policy Committee a dossier containing all relevant information that would influence the choice of a particular variety for multiplication; and a verbal summary of the document will be given by the researcher responsible for the trials at the meeting of the committee.

In addition to selecting the varieties for multiplication and the desired quantities of each variety according to the expected demand and resources available, the National Seed Policy Committee will review the premium paid to contract seed producers, to insure that sufficient incentive is present, and decide on seed distributions and pricing. Finally, the committee will receive a report by the seed testing laboratory, showing the results of standard germination and purity tests for each lot of seed. Based on this information, the committee will establish minimum quality requirements for the seed to be distributed. This approach is recommended until sufficient experience is gained and the production scheme has stabilized to the point that official standards can be set.

5. Foundation Seed Production

A GOC/FAO seed production project is located at Gassi, approximately 16 km from N'Djamena along the bank of the Chari River. This station presently has the capacity to irrigate 10 hectares of seed production and expects to have the means to irrigate 40 hectares by travelling gun sprinkler systems by the end of 1985. The project is financed for a total irrigated area of 60 hectares

The desire of the GOC is to continue the development of Gassi up to 200 hectares by 1987; however, it has not located the funds to accomplish this. Two thousand hectares of land has been set aside for the farm by the government. It is recommended that government seed production be limited to the 60 hectares already financed by FAO, but permit the desired 200 hectares of irrigated production by a system of private contract growers in the N'Djamena area. The USAID PVO Initiatives Project will finance loans and technical assistance for 10-20 hectares irrigated perimeters along the Chari and Logone Rivers within 30 km of N'Djamena.

Seed production by contract growers throughout the Sahel has had limited success. The infrastructure and personnel requirements to control dozens of small farmers scattered over large areas is expensive and oftentimes ineffective. This project is different because a limited number of medium-sized commercially oriented operations will be producing the seed. The contract grower will have been screened by the loan agency to determine his technical and managerial capacity and therefore whether or not he is a good risk. Those farmers receiving loans will, therefore,

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be of above average capacity. This will increase the likelihood that they will be able to follow the technical guidance and produce a high quality crop in conjunction with the Gassi Seed Farm personnel.

Volunteers in Technical Assistance (VITA) is presently financing a number of irrigated perimeters within 30 km. of N'Djamena. These perimeters are devoted largely to small-scale truck farming, and range in size from 2-20 hectares. To date, they are successfully installing pumps, clearing and leveling land, and engaging in profitable production. The loans are being repaid on-time. VITA has indicated that there is already sufficient interest in the production of cereal crops to undertake a number of perimeters and arrive at the proposed 140 hectares of contract seed production.

Building on VITA's experience, it is recommended that 8-14 loans be negotiated to equip a like number of contract seed producers. The minimum size contract seed farm should be no less than 10 hectares.

A particularly appealing aspect to this scheme is the fact that little vegetable farming occurs during the rainy season (vegetables are not adapted to the hot conditions). Also, cereals are grown during the dry season only with great difficulty due to a concentration of birds voraciously feeding on the only grain crop around. Income can be produced year round, and crop rotations can be initiated; thus rendering the enterprise more likely to succeed.

It is recommended that the loan agreement include an agreement in principle that the GOC represented by the MALP will purchase seeds grown under the supervision of the personnel at the Gassi Farm for eventual conditioning and bagging at the Gassi Farm. The agreement should indicate that the actual crops, varieties and pricing structure will be developed annually by the National Seed Policy Committee, that will include 2 members from the rank of the contract growers.

A seed conditioning facility, as well as a bagged seed storage warehouse is under construction at Gassi. The capacity of the conditioning facility will be 0.5 MT/hour. This works out to 25 tons a week if the facility is operated on the average of 50 hours/week. Assuming a conditioning period from November to May, or 24 weeks, 600 MT could be cleaned and bagged. This exceeds the quantities that would be anticipated on the 200 hectares (60 at Gassi plus 140 under contract) grown in the area.

The only reservation that can be made is the supply of electricity at Gassi. The present plan calls for the installation of a generating facility for the farm. It is recommended that the electricity from the town be brought to the farm if at all possible. The spectre of projects that have died due to inoperable electric generating facilities in countries like Chad is ominous. USAID would provide the difference in cost between the generating facility and the cost of running an electric line. The GOC's cooperation will be assured by a condition precedent to the sub-project agreement.

E. SEMI-OFFICIAL SEED PRODUCTION

1. Autonomous Units

The semi-official seed production program that is recommended involves less direct government participation. In general, the contract seed production with selected, qualified farmers, who operate as autonomous units and are financed with reduced, government-sponsored credits, is more commercial in nature and more efficient in operation. The selection of the loan recipients is a critical element, and technical assistance should be provided to increase the likelihood of success.

This technical assistance will be in the form of an expatriate agronomist working within the offices of the loaning agency. He should have experience with small-scale irrigation projects and the extension of improved agricultural practices. He should be able to operate rudimentary surveying equipment, to assist in the design of the irrigation canals. Finally, a competent irrigation engineer will backstop this agronomist when the problems surpass his competence.

In addition to providing general agronomic advice, the agronomist will be a field inspector and quality control agent, insuring that the production on the irrigated farms is according to internationally recognized seed certification standards. Immediately before harvest he will make a final inspection and authorize the harvest. The harvesting procedure will be regulated and overseen by the inspector along with Gassi personnel. A portable thresher will be present (belonging either to the Gassi Farm or an enterprising custom thresher operator) at harvesting and after threshing, the seed will be bagged, weighed, loaded on to a truck, and transported directly to the Gassi conditioning facility.

In addition to his duties involving the 140 hectares of seed production, the field agronomist will be expected to draw representative samples for germination tests, work with the seed laboratory personnel as the analyses are being performed, and provide technical assistance to other efforts involving further multiplications of the seed at the small farmer level.

2. Pricing of Seed Produced by Contract Growers

The central issue of this plan is the price paid to the contract growers for their production. It must provide sufficient incentive for them to stay in business, repay the loan and make a profit.

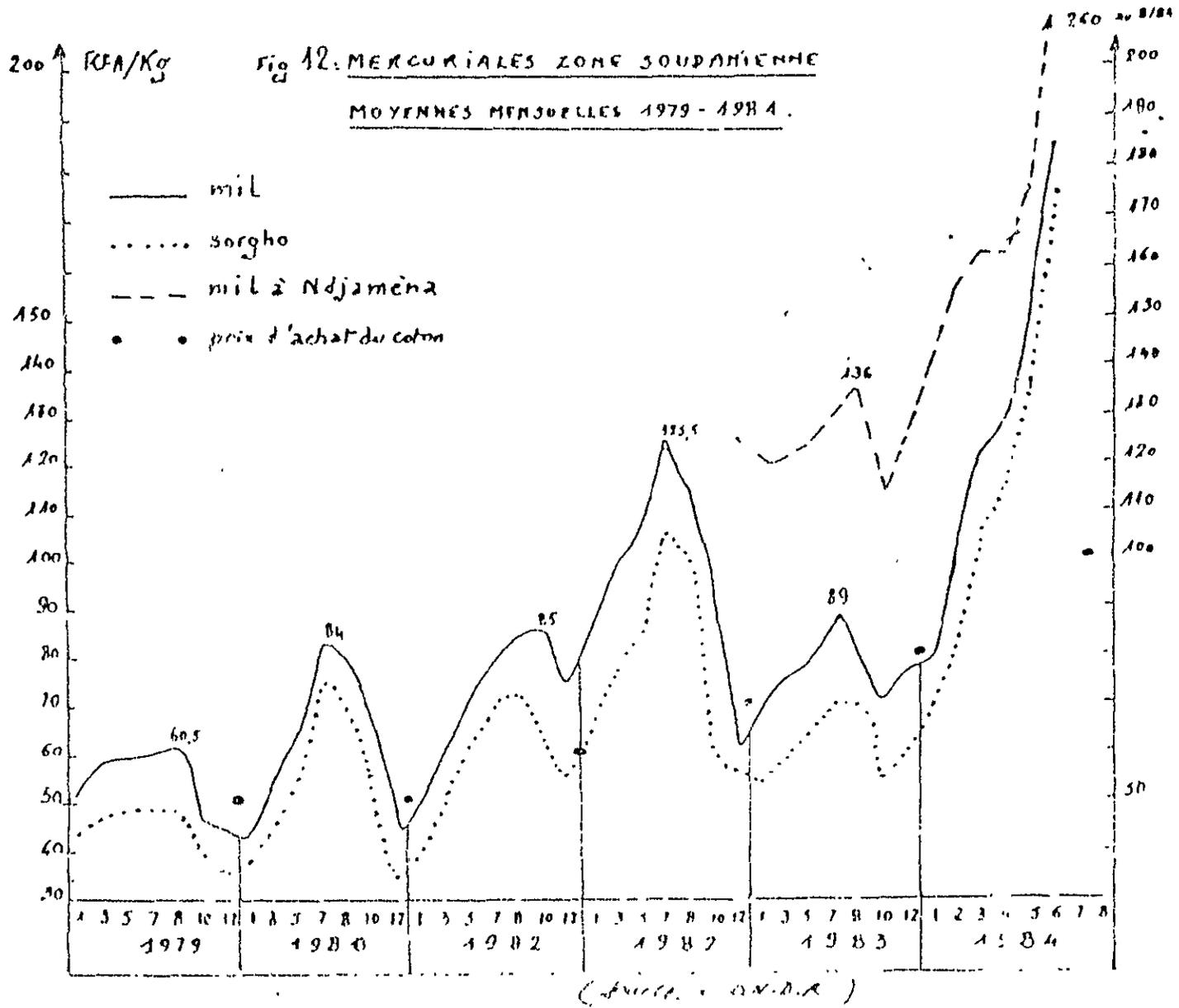
Figure 1 shows the seasonal fluctuation of grain prices over the period 1979-1984. Two points are made. First, the grain price always bottoms out in November-December and climbs steadily through the growing season. Second, yearly trends tied to the supply of grain are apparent. The 1984 prices reflecting the severity of the drought are an extraordinary example of the year factor.

The payment for the production of seed, because of the extra work and technical expertise involved, should always exceed grain prices. Also involved is the sizeable incentive for the commercial grain producer to store his crop thereby increasing its value. The price paid by the government to contract seed producers must not be less than the farmer could receive if he speculated in a "sure" market. For these reasons, one of the two following pricing schemes is recommended. Negotiations with the GOC will determine which of the schemes is the most acceptable.

The objective of a pricing scheme is to insure that a seed premium is paid, over and above the amount that the farmer could obtain if he were to sell on the open market in N'Djamena. If this goal is obtained, there would be no incentive for the grower to divert his seed production into the grain marketing channels, and therefore such a loss should be minimal. It would also encourage the grower to continue producing seed for the government.

On the other hand, the grower should be allowed all the options available to him if he were speculating on the grain market, so that he is not forced to accept a "seed" price that is less favorable than selling his product on the open market. This would be an unfortunate situation, one that involves the livelihood and viability of a

FIGURE 1



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Chadian farmer. In essence, he must be paid the true value of his product without bureaucratic delays. The method and timing of payment must be agreed to by the GOC as a condition precedent to this project. A revolving fund used to purchase seed grown on the 140 hectares will be established for this purpose.

The GOC should fully understand that the production of seed by private farmers with a seed premium paid will be considerably less expensive than seed produced on a state-run seed farm. This should be borne out when the costs of producing seed at Gassi are compared with that paid to the contract producers. The privately grown seed will cut the cost to the GOC of running a seed program. Seed programs in the Sahel require considerable support from the government, support that is justified on the basis of increased yields from the seed distributed to the small farmers and not on the financial viability of the seed farm.

In the first pricing scheme, the contract grower receives a fixed incentive above the market grain price for his seed production (perhaps 10% of the market price). The actual incentive will be the subject of yearly decisions by the Director of Agriculture based on the recommendations of the Seed Policy Committee. The contract grower delivers the seed at harvest to the Gassi Farm where clean, well maintained warehousing can be assured. The grower can then request payment for the seed anytime between harvest and April 1 for all or part of his crop. The market price will be determined on the date of sale, a seed premium added, and immediate payment made. The cut-off date of April 1 is set so that the cost of seed will be available to the Seed Policy Committee when it is setting prices for the upcoming agricultural season.

The first scheme does not allow the farmer the full range of marketing options available to the grain dealer, but he accepts this because he is receiving seeds and technical assistance for the production on his farm while he is growing the seed. If the contract farmer needs cash, he will sell early. Otherwise he will certainly wait until April. Or he may choose to sell part at harvest, and the remainder on April 1.

The second pricing scheme requires the contract seed grower to sell at least 1/4 of his production to the Gassi Farm at the price fixed by the National Seed Policy Committee. He accepts to do this because he is receiving seeds and technical assistance from the Gassi Farm. The

grower then has the option to sell the remaining 3/4 of his production either to the Gassi Farm, or speculate on the grain market. Ideally, the GOC will set a reasonable price for the seed and therefore the grower will choose to sell all of his production to Gassi.

In the second scheme, the seed not sold to Gassi must not be lost to grain channels. The grower can be encouraged to pay a custom cleaning and bagging fee for this production, and sell it through commercial channels. The bags would be sealed, labelled and stamped with the Gassi approval if it meets minimum standards.

3. Quantities of Seed Produced by the Sub-Project

Table 1 details the potential seed production from the proposed sub-project. Approximately 200 tons of seed could be distributed annually, sufficient seed to plant approximately 15,860 hectares. If the Gassi production is included the seed produced rises to 284 tons which would be sufficient to plant 22,350 hectares. These figures may turn out to be too conservative for the proposed irrigated production and are considered gross estimates based on little factual data.

This sub-project does not intend to engage in a second multiplication, even though this is theoretically feasible if one assumes that international standards of seed certification apply in Chad. It is recommended that only a small percentage of the seed be multiplied again under the direct supervision of government services and that no official status be given to this second multiplication. This should not be misunderstood to mean that the seed will not be multiplied again and again by the small farmer. The 285 tons of seed available for distribution are reproducible by the small farmer, and if he is happy with the varieties being distributed, a spread effect will most certainly occur. Government intervention for further multiplications, characterized by a lack of trained personnel and financial resources, is unlikely to be effective at this time.

This means that the recommended project is a concentrated effort; a desirable design criteria for a seed project. Diffusion of effort, fragmentation of resources and dispersion of operations are not ways to build a seed program. Seed produced and distributed in the proposed semi-official scheme must develop a reputation for quality so that a demand can be created. This objective is unlikely to be realized if the program becomes over-ambitious.

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CONTRACT SEED PRODUCTION¹

<u>CROP</u>	<u>AREA</u> (Ha) ²	<u>EST YIELD</u> (Kg/Ha)	<u>TOTAL SEED YIELD</u> (Kg/Ha) ³	<u>PLANTING RATE</u> (Kg/Ha)	<u>AREA TO BE PLANTED</u>
SORGHUM	50 (70)	1,750	74,375 (104,125)	12	6,198 (8,677)
MILLET	50 (70)	1,200	51,000 (71,400)	7	7,286 (10,200)
COWPEA	25 (35)	2,000	42,500 (59,500)	30	1,417 (1,983)
MAIZE	10 (15)	2,500	21,250 (31,875)	25	850 (1,275)
PEANUT	5 (10)	2,000	8,500 (17,000)	80	106 (213)
TOTAL	140 (200)		197,625 (283,900)		15,857 (22,348)

¹Figures in parentheses include production at the state run Gassi seed farm.

²The actual hectareage planted to each crop will vary from season to season.

³Assumes 15% clean-out during screening and bagging process.

F. TRAINING

The success of the seed program will be determined in large measure by the efficiency and expertise of the producers, managers, field inspectors, analysts and workers who produce, harvest, dry, condition, test, distribute and market the seed. Many of the skills required to operate a seed program are not part of the usual background of agronomists, or other plant specialists, agricultural engineers and economists.

It is recommended that 2 Chadian students, perhaps having already completed 1-2 years study at the university, be selected for professional training in seed technology. This implies a 2-4 year course of study in the US leading

to a either a ES cr MS degree. Mississippi State University has an excellent program, regularly training seed professionals from all over the world, and can provide this training. Assurances should be received from the GOC that the students will be assigned to work in the seed program for at least a period of time equal to their studies in the US after their return to Chad.

In addition to the degree curriculum, Mississippi State has a 2-month specialized course in seed technology that has been filled to capacity for more than a decade. It is recommended that a Chadian agronomist or technician be sent annually to this seed school. Arrangements for this seed school must be made well in advance.

Other opportunities for specialized training that have a relevance to the seed program should be researched. Training opportunities in Africa are not readily available. However, seed programs do exist in varying stages of development, often under USAID financing, and the opportunity exists to cooperate with other projects to hold regional seed seminars. Also, seed program personnel working in Chad would benefit from visits to other seed production projects in the region to observe and learn from the experience gained. It is understood that IITA is in the design process for a seed unit, and this could fill a large need for training Africa.

G. EDUCATION AND PROMOTION

After the seed is produced, bagged and tested it needs to be promoted. Extension materials describing the seed program should be prepared and widely distributed. Government and international organizations including extension and credit agents, agricultural teachers, workers in other input supply programs, administrators and supervisors need to be informed about the objectives of the seed program so that they will develop an "appreciation" of the importance of improved seed.

Field demonstrations of the seed produced should be planted side-by-side with the traditional varieties used by the small farmer to promote and develop a demand for the improved seed.

II. NOTES ON COST/BENEFIT ANALYSES

Concerning the assessment of the economic benefits to be derived from the proposed seed program, the following considerations should be taken into account. The seed

program per se is probably not the proper focus for strict cost benefit ratio analysis. Rather, such analysis should be applied to the total crop improvement program of which the seed program is an essential extension. For example, there is an increase in total yield that results from the introduction and distribution of superior varieties into the Sahelian zone. In the case of S35 in Northern Cameroon, this translates into 614 kg/ha increased production over the local varieties. Or, seed of higher physiological quality will result in better crop stands and actual yield increases when compared with low quality seed of the same variety in equivalent populations.

Not the least in importance, a very real benefit is the elimination of the distribution schemes involving the unselected and mixed "semences tout venant" which are based on prayers and the lack of any alternatives.

The following sections are quoted from the publication "Improved Seed Production" (FAO Plant Production and Protection Series, No. 15).

"Feasibility analyses of seed projects in several fairly representative developing countries indicate that the annual IRR over a 15-year period ranges from 6 to 12 percent for operations involving easy-to-save seed (e.g., wheat, rice, beans, sorghum) and a seed price structure of about 160 to 180 percent of the equivalent grain price. This relatively low IRR probably accounts in part, at least, for the relatively low investment of the non-government sector in seed "businesses" in the developing countries. It is also an important factor that needs to be considered in determining the government's responsibilities in seed production and supply."

"A low ORR does not mean that a seed project is not feasible, because it basically takes into account only the "profitability" of the purely commercial activities, and not the value of the increased production derived from use of the seed by farmers, which is of little interest to a private seed firm, except as it is reflected in customer satisfaction and higher seed prices. The increased production, however, is of great importance to a government trying to improve economic conditions in a country. When the benefits derived from the use of improved

seed (i.e., the value of the increased production less "extra" costs) are entered into the feasibility analysis, an associated rate of return (ARR) can be established. The ARR is essentially a measure of the impact of activities on the total economy of the country or specific areas therein. ARR's determined for seed programs in representative developing countries range from 30 to 100 percent or more, depending on the yield advantage of the improved seed marketed. An ARR of this magnitude suggests that a public investment is sound."

111. ROUGH OUTLINE OF PROJECT INPUTS

BEST
AVAILABLE

A. TECHNICAL ASSISTANCE

1) Short-term

Sorghum/Millet breeder	4 mm
Cowpea/Peanut breeder	2 mm
Anthropologist	3 mm
Ag. Engineer (Irrigation)	2 mm
Seed specialist	3 mm

2) Long-term

Agronomist for variety testing program	48 mm
Vehicle and support budget	

Extension agronomist and field inspector, good background in irrigation technology	36 mm
Vehicle and support budget	

B. LOAN FUNDS FOR VITA

- 1) To equip 8-14 farmers for irrigated production on 10-20 hectare seed farms
- 2) To assist other custom operations, such as plowing, threshing, trucking, etc.
- 3) Overhead for loan processing/maintenance

C. GASSI SEED FARM SUPPORT

- 1) Revolving fund to purchase contract production
- 2) Installation of electricity from N'Djamena
- 3) Additional warehouse for seed storage (if needed)
- 4) Additional conditioning equipment (if needed)
- 5) Other

D. COLD STORAGE FACILITY

Enlarge facility presently under construction by the GOC/FAO seed project (if required).

E. VARIETAL TESTING PROGRAM

Equipment for small plot work (scales, moisture testers, small plot threshers, small secure storage facilities, processing rooms, etc.). Vehicle for GOC

BEST
AVAILABLE

agronomist working as counterpart to expatriate
agronomist, also to be used in collection of local
varieties. Travel budget for frequent contact with
North Cameroon research and seed efforts.

IV. ROUGH SUMMARY OF PROJECT OUTPUTS.

- A. A collection of local varieties of sorghum, millet, cowpeas, corn and peanuts. This collection will be maintained for varietal improvement activities.
- B. The local varieties will be tested. Those showing promise may form the basis for initial seed multiplication efforts. Introduced varieties will be compared against local standards to assess their suitability and value to Chad.
- C. Strong linkages will be developed with researchers and seed personnel working in North Cameroon. The activity in Cameroon will have a larger geographical impact than simply North Cameroon. Areas of cooperation will be established.
- D. An effective and comprehensive varietal testing program will be operational in the Sahelian zone.
- E. Personnel trained and experienced through short and long term programs, and on-the-job experiences.
- F. A rational scheme for varietal release, contract seed production, seed distribution and seed pricing will be operational.
- G. A pilot program in Sahelian Africa to involve 10-14 medium-sized, commercially-oriented contract seed producers within a relatively small geographic zone, thereby involving private interests at the beginning of a nascent seed program.
- H. At least 200 tons of high quality, professionally grown seed of varieties showing superior and desired characteristics will be produced and distributed annually.
- I. The development of a reliable seed (i.e. irrigated) production system that can act as a sort of disaster insurance in cases of prolonged drought, etc. This system will serve as a mechanism for the rapid rehabilitation of agriculture in the wake of natural disasters, a factor that cannot be overlooked when computing the economic justification for such activity.

APPENDIX I

LIST OF OFFICIALS CONTACTED

Mr. Larry Harms, Agricultural Development Officer,
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Dr. Haroun Kababi, USAID/Chad

Mr. Saleh Djiguir, Secetaire d'Etat d'Agriculture

Mr. Alladoumgue Nadingar, Directeur General d'Agriculture

Mr. Boukar, Directeur de l'Agriculture

Mr. John Woods, AID Representative, USAID/Chad

Mr. Nekouan Ndomian, Division de la Recherche Agronomique

Mr. Dabi Nabissoumi, Chef de DRA

Mr. Nekacu Laoumaye, Chef de la Division Prod. Agricole

Mr. Sakacua Abba Mei, Agro-pedologue

Mr. Tentchev Tenio, FAO Seed Expert

Mr. Kouma Tahitangarti, Chef Gassi Farm

Mr. Abdel Majit, Sous-Directeur de la Zone Sahelienne, ONDR

Mr. Thomas, Conseiller Technique, ONDR

Mr. Richard Slacum, Project Director, VITA

Mr. Allan Turnbull, Director, CARE/Chad

Mr. Mark Henderson, Hydrologist, CARE/Chad

Mr. Tyrone Gaston, Country Representative, AFRICARE

Mr. William Stringfellow, AFRICARE

Mr. Lawrence Williams, Deputy Director, VITA

Mr. Leroy Jackson, Project Development Officer, USAID/Chad

Mr. Phillipe Mengin, FAO Representative

APPENDIX II

RESUME DU SOUS-PROJET DE MULTIPLICATION
DES SEMENCES DANS LA ZONE SAHELIENNE

BEST
AVAILABLE

prepare par Dr. Haroun Katsdi, USAID/Chad

Dans le cadre de la politique d'autosuffisance alimentaire prônée par le Gouvernement du Tchad et compte-tenu des derniers événements (guerre civile et secheresse) qui ont détruit la capacité productive de l'agriculture, il est impératif d'apporter une aide d'urgence au Ministère d'Etat à l'Agriculture et au Développement Rural pour mettre à la disposition des paysans des semences de mil, sorgho, maïs, arachide et niébe.

L'objectif du sous-projet est d'accroître la production alimentaire dans la zone sahélienne en alimentant les paysans avec des semences des variétés locales ayant des performances supérieures à celle dénommée "Semence tout venant". Le but du sous-projet est d'initier une procédure rationnelle et contrôlée pour sélectionner les meilleurs écotypes avec un pourcentage de germination et de pureté acceptable aux paysans.

L'exécution du sous-projet se fera principalement à Gassi et aux environs de la ville de N'Djamena pour permettre un meilleur suivi des activités d'essai à Gassi et de production des semences dans les périmètres irrigués tenus par les fermiers contractuels. La supervision du projet se fera conjointement par le Gouvernement du Tchad représenté par le Ministère d'Etat à l'Agriculture et au Développement Rural et les organisations non-gouvernementales (ONG).

Afin d'améliorer la capacité en matière de recherche de la Division de Recherche Agronomique, il est prévu d'y ajouter au présent programme à Gassi un degré de sophistication qui englobera les points suivants:

1. La mise en place d'un programme de collection des écotypes locaux et ceux du Nord Cameroun et leur évaluation.
2. L'établissement d'un programme d'essais multilocaux.
3. La création d'une structure semencière.
4. La création d'un Comité National de Politique Semencière.
5. Le développement des liens de coopération avec les projets d'amélioration variétale et

de multiplication des semences avec le Nord Cameroun afin de bénéficier de leur effort dans le domaine de la collection du germplasm. Le programme d'essais multilocaux devra couvrir la zone sahélienne dont au moins trois localités ayant des conditions écologiques variées et représentatives. Ces essais devront compléter les tests régionaux de CILSS.

BEST
AVAILABLE

Le Comité National de Politique Semencière aura pour rôle de déterminer:

- Un mécanisme de sélection de variété à multiplier
- La politique du prix payé aux agriculteurs contractuels
- L'examen des tests de laboratoire pour déterminer la pureté et la qualité des semences.

Le comité sera composé des représentants de la Direction de l'Agriculture (Directeur, Chef de la Division de Recherche Agronomique et autres chercheurs), de l'ONDR, des fermiers producteurs de semences, des organisations internationales, USAID, PNUD/FAO et des organisations non-gouvernementales (ONG), responsables du financement et de l'exécution du projet. Le comité en déterminant la politique du prix à suivre devra s'assurer que le stimulant monétaire sera suffisant au fermier afin qu'il paie ses dettes et en même-temps faire un profit.

La première recommandation consistera à payer les semences au dessus du prix du marché (c'est-à-dire augmenter le prix du marché de 10%) pour inciter le producteur à vendre au Gouvernement. La deuxième recommandation consistera à vendre 1/4 de la production à la ferme de Gassi au prix fixé par le comité et les 3/4 de la production sur le marché ou à la ferme de Gassi. La production des pieds de coupe à Gassi pourra se faire sur une superficie de 60 Ha déjà financés par la FAO alors que la production irriguée se fera sur une superficie esperée de 200 Ha dont 140 Ha appartiennent aux fermiers contractuels.

L'USAID financera le projet à travers les "PVO Development Initiatives Project" en ce qui concerne les prêts et l'assistance technique pour une superficie de 10 à 20 Ha par périmètre irrigué. Il a été recommandé l'emploi de deux experts expatriés dont un agronome pour les tests variétaux et un spécialiste en vulgarisation qui sera également l'inspecteur des champs des cultures.

La réussite du programme dépendra du volet formation du personnel. Il a été prévu une formation à long terme d'une durée de 2 à 4 ans pour deux (2) étudiants tchadiens au niveau d'ingénieur agronome, spécialisé en technologie de semences aux USA. Une formation à court terme d'une durée de 2 mois a été prévue pour les techniciens tchadiens spécialisés en technologie de semences à l'Université d'Etat de Mississippi et également dans d'autres pays Africains capables de dispenser des cours et des séminaires.

Un volet promotion et conscientisation du public, du Gouvernement, des organisations internationales, le service de vulgarisation doit être développé afin d'informer les fermiers sur la qualité des semences produites et leur importance dans le système de production. Des champs de démonstration des variétés améliorées et traditionnelles devront être mis en place pour permettre une meilleure appréciation de leur valeurs agronomiques.