

# BEST AVAILABLE DOCUMENT

38

68-0204      2/15/77      TO      1/15/78      Niger      76-1

## Niger Cereals Project (NCP)

1. PROJECT DURATION: 76	2. DATE LATEST PROP: 5/14/75	3. DATE LATEST RFP	4. DATE PRIOR RFP: 2/28/77
5. Cumulative Obligation: 8,012	6. Current FY Estimated Budget: 4,165	7. Estimated Budget to completion After Current FY: 0	
8. KEY ACTION AGENTS (Contractor, Participating Agency or Volunteer Agency)			
a. NAME		b. CONTRACT, PASA OR VOL. AG. NO.	
Consortium for International Development (CID)		Contract	
Staff Assistants (Ex PCV's)		Contract	
Afro-American Purchasing Center (AAPC)		Contract	
9. NEW ACTIONS PROPOSED AND REQUESTED AS A RESULT OF THIS EVALUATION			

A. ACTION ID	B. LIST OF ACTIONS	C. PROPOSED ACTION COMPLETION DATE
X	X (1) Make an in-depth study of the GCN extension systems including those in the Productivity Projects.	May 1978
X	X (2) Develop system for more effective collection of evaluative data and information for purposes of economic and social impact appraisal.	Apr 1978
X	X (3) Appoint staff assistant to oversee aide-encadreur program and to follow-up with them in collecting evaluation data.	Mar 1978
X	X (4) Develop and approve work plans for aide-encadreurs including provision for supervision and material support.	Feb 1978
X	X (5) Give more attention in the breeding program to improvement within local millet varieties.	continuing
X	X (6) Design sub-station and out-field research program to measure technical and economic impact on separate elements of the package of technology.	continuing
X	X (7) Expand research in soil fertilization, rotations (especially involving legumes), use of phosphate rock and water management under dry farming conditions.	continuing
X	X (8) Amendment to Decree 003/NER of 10 February 1973 to broaden scope to cover all seed.	Apr 1978
X	X (9) Take initial steps to establish a central seed testing laboratory.	late 1978
X	X (10) Redesign of project for a possible Phase II should carefully study the relationships between NCP and National Productivity Projects. This is especially important with respect to the extension component and	Phase II

10. REPLANNING REQUIRES		E. DATE OF MISSION REVIEW	
REVISED OR NEW	<input checked="" type="checkbox"/> PROP <input type="checkbox"/> RFP <input checked="" type="checkbox"/> PRO AG <input type="checkbox"/> PRO/T <input type="checkbox"/> PRO/C <input type="checkbox"/> PRO/P	2/8/78	
PROJECT MANAGER: TYPE NAME, SIGNED INITIALS AND DATE		MISSION DIRECTOR: TYPE NAME, SIGNED INITIALS AND DATE	
Howard L. Garner      2/8/78		Jay P. Johnson      2/8/78	

Project No. 683-0201 PAR No. 78-1 Page 1a of 6

PAR -- Page 1a -- Continuation

<u>USAID</u>	<u>AID/W</u>	<u>HCST</u>	<u>List of Actions</u>	<u>Proposed Action Completion Date</u>
			should be done in relation to item number (1) above.	
X			(11) Redesign should focus on establishing a new log-frame with clearer input - output -- goal and realistic time frame.	Phase II



PAR - Page 2a - Continuation

A. Input or Action Agent

2. Staff assistants have played a very useful role in getting projects underway, working far above capacity of positions since the initial crop cycle and construction program was almost entirely manned by these. A role more complementary to more senior CID personnel should be established in the future.

5. Commodities

This is the result of a unilateral decision of the GON to limit the number of vehicles. The IH vehicles have not been entirely satisfactory to the GON. Part of this problem is related to wrong specifications (8 cylinder engines with 3 speed transmissions). In part the problem is poor preparation for operation and maintenance by GON personnel. The IH company conducted a training program on operation and maintenance in January 1971. More of such training is needed.

6. Cooperating Country

Management of infrastructure development program has improved, after a slow start. The completion of construction is in phase with anticipated equipment delivery schedules. With few exceptions the entirety of projected facilities will be in place and equipped by the end of project Phase I.

Three elements of other donor participation have been important in effective project implementation: (a) Administrative support in MDR in negotiation on various processes. Canadian and French advisors cooperated effectively in this; (b) French assistance for providing personnel in the research program. This has been effective except for failure to provide one planned researcher. Close cooperation with PAC was also important to the implementation of the UNCC activities of ECP in Dosso Department; (c) the Canadian support for pest control makes a key contribution to the achievement of production objectives.

III. KEY OUTPUT INDICATORS AND TARGETS

A. QUANTITATIVE INDICATORS FOR MAJOR OUTPUTS		TARGETS (Participating/Rain/Amount)					END OF PROJECT
		CUMULATIVE PRIOR FY	CURRENT FY 77		FY 78	FY 79	
			TO DATE	TO END			
Distribution of improved seeds (tons annually)	PLANNED	40	76	-	120	120	356
	ACTUAL PERFORMANCE	70	76.6	-	-	-	-
	REPLANNED	-	-	-	120	120	486.6
Demonstration of improved practices in farmer's fields (animal level)	PLANNED	1,500	3,450	-	2,000	2,400	9,350
	ACTUAL PERFORMANCE	2,200	2,800	-	-	-	-
	REPLANNED	-	-	-	-	-	-
Participant training (number trained and/or in training)	PLANNED	11	19	-	8	2	42
	ACTUAL PERFORMANCE	13	28	-	-	-	-
	REPLANNED	-	-	-	12	7	49
In-service training (numbers total)	PLANNED	190	270	-	290	310	1,060
	ACTUAL PERFORMANCE	300	320	-	-	-	-
	REPLANNED	-	-	-	290	310	1,240
B. QUALITATIVE INDICATORS FOR MAJOR OUTPUTS	COMMENT:						
Agriculture inputs delivery system	The capacity of UNCC to respond to farmer's needs for agricultural inputs as well as that for the Agriculture Service to respond to seed requirements has been expanded by installation of facilities.						
Functional and effective extension system	The project has contributed to expansion of Agriculture Service's capacity for reaching an increasing number of farmers. The quality to these services, however, must be improved substantially.						
Upgraded and expanded capacity for in-country training	In-service training has become an established practice. Quality of such training is being gradually improved.						

Data through FY 77 only since evaluation being made at end first quarter FY 78.

1. ORG-25 (10-70) PROJECT NO. 683-0201  
 2. PLAN FOR PERIOD 2/15/77 to 1/15/78  
 3. TITLE Niger  
 4. REGION 7B-1  
 5. PROJECT PURPOSE

6. 1. Statement of purpose currently envisaged. 2. Status of PROPT  YES  NO

**Short-term** - Achieve a production and distribution capability providing sufficient cereals at reasonable prices to feed Niger's growing population even under adverse weather conditions, within five years.

**Long-term** - Provide sufficient food for a larger population with a smaller ratio of land to people in an ecologically sustainable production system, in order to free land and people for export production and non-agricultural activities.

3. 1. Conditions which will exist when above purpose is achieved.	2. Evidence to date of progress toward these conditions.
1. Cereal production increased by 200,000 tons over 12 year basis.	1. Measurable production from project inputs not yet obtainable.
2. Carry-over storage both on farm and in GON warehouses sufficient to feed population for two months in event of emergency.	2. In spite of essential self-sufficiency of production, supply of all sectors of the population is still deficient because of distribution problems and escape of grain to higher priced neighboring areas. Procurement by GON equals less than 1% of production since the official price is about 1/3 less than free market prices.
3. Diversion of 100,000 hectares of land formerly planted in millet to other crops while increasing total cereal production.	3. The potential for this diversion will depend upon the yield increase potential of a still untested package of technology. A second factor will be the measured incentive which the package will offer farmers as a function of input cost, labor inputs, grain prices and marketing opportunity.
4. Release of labor to work in other agriculture production.	4. Progress in this respect will not be measurable until a fully proven useful package of technology is adopted. Achieving this thru research and extension is a long-term effort.
5. Returns to the farmer per unit of input will increase.	5. The economic value of the technology package in the hands of the farmer is to be evaluated.

V. PROGRAMMING GOAL

A. Statement of Programming Goal  
 Strengthen the predominately agricultural society of Niger, ending its dependence upon donated external cereal supplies except in years of extraordinary drought and improve the economic condition and performance of the farm community to support a viable and ecologically secure way of life for the Sahelian population.

B. Will the achievement of the project purpose make a significant contribution to the programming goal, given the magnitude of the national problem? Cite evidence.

Increasing the country's capacity to produce cereals is a first step towards achievement of project goal. It is not a sufficient condition, however, to assure overall economic development nor a substantial improvement in the living standard of the rural population in the long run.

PROJECT APPRAISAL REPORT (PAR)

Project No. 683-0201

PAR No. 78-1

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Comments on Last PAR's Recommended Actions

Status of implementation of new action proposed in the last evaluation (2/15/77)

1.\* Very little has been accomplished in the way of designing an effective national extension system. A variety of extension efforts are being tried in the Department Productivity Projects and the GOV rejects the idea of a major redesign of the existing system at this time. There seems to be a lack of detailed knowledge of the existing systems not only on the part of USAID and the contract team but also on the part of the different entities of the GOV itself. A thorough understanding of the existing systems should be developed before recommendations are made for change. The detailed study of the existing systems and of GOV policies both implicit and explicit would make far better use of the CID contract inputs in extension than efforts to develop a national extension system.

2. A national seed policy as such has not been explicitly developed, nor has legislation been adopted to define such a policy. A general scheme does exist and is practiced by INRAE, the Service d'Agriculture and UNCC which systematically allocates the responsibility for different phases of seed production to the services. Moreover, it is proposed that the decree of 1973 which created the Committee for Coordination of Programs for Production and Distribution of Seeds of Grains be amended - specific modification of the text was proposed - which would charge the Commission with the responsibility for all seed rather than just grains. This as a first step in the formulation of a documented national seed policy would seem to satisfy the intent of the Project Agreement in this respect.

3. This has not been done. INRAE is structured into sections or divisions in terms of areas of research, e.g., Agronomy, Economics, etc. Moreover, the Tarna station where the NCP is centered is likewise divided. Each section carries out the research in its area of interest. Coordination of research is assured by the Director. The research requirements of NCP have been defined and are being carried out. Coordination of INRAE activities with other elements of NCP through existing coordination among agencies appears to be adequate to assure that the research requirements of NCP are met without the necessity of a special coordination structure in INRAE.

4. The extension adviser has had only limited impact on extension work in NCP. Aside from being only part-time assigned to the extension functions, there are numerous

\* Numbers refer to list of actions from page 1 of the evaluation of 15 February 1977 (PAR 77-1)

conceptual and philosophical differences which are beginning to surface. Effective intervention of the extension adviser depends upon an in-depth understanding of the GCH extension systems, their philosophy of extension and their overall strategy for agricultural development. With such an understanding it should be possible to introduce elements of improvement. The GCH will not accept suggestions or recommendations for massive overhaul of structure or strategies. The evaluation team has recommended that the last period of the extension adviser's tour be concentrated toward developing an in-depth understanding of the GCH system (see #1). Until this is done there is no point to attempt to influence extension by UECC.

5. The situation as far as Eigerian counterparts has remained virtually unchanged. A participant returning from training in 1978 will be assigned as counterpart agronomist. No counterpart has been identified for the agricultural engineer. IERAY proposes to nominate a participant for training in the U.S. for this post. The positions of Director of Extension and Chief of Seed Production in the GCH continue to be held by one person.

6. No action has been taken on this.

7. The problem of integrating CID personnel into GCH services and of coordination of CID team personnel in relation to the AID Project Manager, the NCP Coordinator and the several GCH services has continued unresolved. Lengthy discussion during the evaluation resulted in a formula which was acceptable to all parties and which should resolve the main issues.

8 and 9. These were seen as actions for the second phase, FY 79. Some planning by the GCH and the CID team has been made with respect to number 9. No action has been taken on point 8.

ANNEX B

B. NCP Financial Status

(1) Obligations

In the first year of project implementation, it became evident that the original \$9,636,000 approved would not be sufficient to implement the project as designed. This was reflected in the ADO/Niamey ABS submissions for both FY 1978 and FY 1979. It was recommended that the AID contribution be increased by \$2,541,000 to \$12,177,000 to meet the increased cost through the third year of the project. The extension of the project for an additional year will raise AID project cost by an additional \$2,500,000 for a total of \$14,677,000. The GON contribution has already been increased by approximately \$2,200,000 (27,000,000 FCFA), to meet part of the increased cost.

Funds obligated to date are:

AID Inputs:

\$5,912,000	1976 ProAg
2,100,000	1977 ProAg Amendment
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\$8,012,000	

GON Inputs:

\$ 231,200	1976 ProAg
1,200,000	1977 ProAg Amendment
<hr/>	
\$1,431,200	

(2) Project Expenditures and Pipeline Analysis

Of the \$8,012,000 obligated under the ProAg, the ADO/Niamey controller's U-203 report showed \$5,202,000 expended as of 31 March 1978 leaving a balance of \$2,860,000. Recently received information indicates that expenditures are actually higher than was estimated in that report. Expenditures that have been accrued for commodities, contract services and GON local expenditures have since been confirmed that were not definitely known at the time of the U-203 report, therefore were not included.

The status of the \$2,864,000 pipeline is:

PERSONNEL

\$165,000 will fund CID contract through April 1978;  
\$135,000 will fund staff assistants through December 1978  
\$ 38,000 will fund local support staff through December 1978

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\$338,000 Total Personnel

PARTICIPANTS

\$ 90,000 will fund long-term participants now in training through  
December 1978 and 1 short-term participants through  
August 1978

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\$ 90,000 Total Participants

COMMODITIES

\$169,000 will be expended by September 1978 for vehicles and  
tractors that have been ordered and are now in transit;  
341,000 will be expended by September 1978 for fertilizer that is  
now in transit and expected to arrive in Niger by  
May 31, 1978;  
47,000 will be expended for miscellaneous commodities that have  
been ordered and shipped or are soon to be shipped;  
133,000 represents the estimated remaining balance in previously  
issued PIO/C's and will be used to order project required  
commodities in June and July of 1978 with final expendi-  
ture by March 1979;

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\$690,000 Total Commodities

OTHER COSTS

\$881,000 will be used to finance construction contracts for 8 oper-  
ations buildings on each of 2 seed centers. Contracts are  
expected to be awarded by May 20, 1978 with final expendi-  
ture by March 1979;

\$733,000 will fund local expenses for support to GON cereals operations through July 1978. It is estimated that expenditures have been accrued by the GON services amounting to approximately \$500,000 through April 1978 for which reimbursement is now due. The additional \$233,000 is estimated to fund ongoing operations through July 1978;

132,000 is estimated to fund AID project office and CID logistic support through March 1979.

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\$1,746,000 Total Other Cost

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\$2,864,000 Total Project Pipeline

RELATIONSHIP OF NIGER CEREALS PROJECT TO  
OTHER FOOD PRODUCTION PROJECTS IN NIGER

The Niger Cereals project is both directly and indirectly related to and coordinated with a number of other National and Sahel regional projects. The bilateral projects most directly related to NCP are the department productivity projects of which four are in various stages of implementation (Niamey funded by AID, Dosso funded by FAC, Maradi funded by IBRD, and Zinder funded by FED). Three additional projects are in the planning stage for; Diffa department (CIDA), T.A. Houa department (FRG), and an expanded Dosso department project (IBRD). These integrated rural development projects, when fully operational, will have the primary responsibility for the Agricultural Extension efforts in their respective geographic areas. They will benefit from the research conducted under the cereals project and rely on the cereals project as a source of improved seed for dissemination to the farmers. They will benefit from increased manpower in UNCC and the Agriculture Service that have been trained under the Cereals Project.

The National Plant Protection project funded by Canada (CIDA) will also contribute to increase cereals production in Niger. The CIDA project is providing assistance to the Agriculture Services plant protection section to improve their surveillance for potential pest outbreaks and improve their pest control efforts. This project includes technical assistance in pest control, applied research for pest control in vegetable crops,

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commodities, and local training at various levels in plant protection and proper use of pesticides.

Regional projects that are related to and supportive of the Cereals project include; Africal Manpower Development (AMDP) Semi-Arid Food Grain Research and Development (SAFGRAD), and the Sahel Integrated Pest Management project. The AMDP project has provided training to GON personnel in millet and sorghum production. The SAFGRAD project will provide additional linkages between the National Cereals Research program supported by NCP and regional research in millet and sorghum production. Coordination of research trials and results through SAFGRAD expected to begin with the 1979 production cycle.

The Sahel Integrated Pest Management project (AID funded) will provide assistance to Niger for applied research in pest management. This research will strive to identify environmental sound integrated pest management systems that will contribute to increased cereals production and security from unnecessary crop losses.

The Entente Grain Stabilization project has and continues to provide assistance to the Government of Niger (OPUN) in Grain Marketing and storage. Support to OPUN through the Grain Stabilization project and UNCC through NCP are designed to assist the GON in developing their marketing system to insure a reasonable return to the farmers, and an adequate supply of grain at a reasonable price to the consumers.

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

FROM: <sup>JW Koehring</sup> John W. Koehring, AFR/DR

SUBJECT: Environmental Threshold Decision

Environmental Threshold Decision Recommendation: "Negative Determination"

Problem: Your approval is required on an Environmental Threshold Decision before the obligation of FY 1979 funds that will finance the continuation of the Niger Cereals Production Project (683-0201), including the purchase and use of pesticides.

Discussion: The purpose of this project continues to be to improve the institutional capacity in Niger to (1) develop improved cereal production technology; (2) communicate production knowledge to small farmers; and (3) strengthen the framework for supplying agricultural inputs to encourage farmer adoption of higher-yielding cereal production technology. To achieve this purpose the project is funding four interrelated components: (1) adaptive research on improved cereal varieties and production practices; (2) seed multiplication and distribution activities; (3) agricultural cooperative structure expansion; and (4) agricultural extension service improvement and expansion.

The original Niger Cereals Production Project was approved in June, 1975, before an IEE was required by Agency regulations. When the project was amended on June 26, 1978, increasing total funding by \$4,964,000 and extending the life of the project one year, funding authorization for FY 1979 was granted contingent upon the fulfillment of environmental regulations regarding pesticide use.

Regulation 16, as amended in May, 1978, provides that for any project including assistance for the procurement or use (or both) of pesticides, the IEE must contain a special analysis of the risks and benefits likely to result from the use of the pesticides in question. Therefore, AID/W, in June 1978, sent a contractor to Niger to prepare the required analysis. The contractor's study, which has the concurrence of AID/W's staff responsible for the implementation of environmental procedures, concludes that the Niger Cereals Production Project is not a major Federal action likely to have a significant effect on the human environment, and that the

proposed pesticides will involve no risks and will probably result in increased yields. In accordance with the contractor's recommendations, the GON has consented to use Diazinon, which the USEPA has registered for general use without restriction, in place of the restricted pesticides BHC and Lindane. The contractor's study further indicates that neither an Environmental Assessment nor an Environmental Impact Statement will be required in connection with the continuation of the Niger Cereals Production Project, and that the recommended environmental action is a Negative Determination.

Recommendation: That you approve a "Negative Determination" on the Initial Environmental Examination, thereby permitting the obligation of FY 1979 funds.

Initial Environmental Examination

Project Location: Niger  
Project Title: Niger Cereals Production  
Funding for FY 1979: \$2,423,000  
Life of Project: 1 year remaining of 4-year project.  
IEE Prepared by: George A. Shaefers  
NYS Agricultural Experiment Station,  
Geneva, New York.  
Benjamin A. Stoner, Sahel and Francophone  
West African Projects Division

Benjamin A. Stoner

Environmental Action  
Recommended:

Negative Determination Concurrence

Jim Kelly 11/8/78

Jim Kelly Director, Office of Sahel  
and Francophone West African Affairs

Assistant Administrator's  
Decision

Approved: [Signature]

Disapproved: \_\_\_\_\_

Date: 11/27/79

Clearances:

AFR/DR: J. Nixon [Signature]  
AFR/SFWA: G. MacArthur [Signature]  
DAA/AFR: WHNorth  
GC/AFR: P. Scott [Signature]

IMPACT IDENTIFICATION AND EVALUATION FORM

Impact Identification and Evaluation 2/

Impact Areas and Sub-areas 1/

A. LAND USE

1. Changing the character of the land through:

- a. Increasing the population ----- N
- b. Extracting natural resources ----- L
- c. Land clearing ----- L
- d. Changing soil character ----- L

2. Altering natural defenses ----- L

3. Foreclosing important uses ----- L

4. Jeopardizing man or his works ----- N

5. Other factors  
-----  
-----

B. WATER QUALITY

1. Physical state of water ----- N

2. Chemical and biological states ----- L

3. Ecological balance ----- L

4. Other factors  
-----  
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1/ See Explanatory Notes for this form.

2/ Use the following symbols: N - No environmental impact  
L - Little environmental impact  
M - Moderate environmental impact  
H - High environmental impact  
U - Unknown environmental impact

C. ATMOSPHERIC

- 1. Air additives ----- N
- 2. Air pollution ----- L
- 3. Noise pollution ----- N
- 4. Other factors
- .....
- 
- .....
- 

D. NATURAL RESOURCES

- 1. Diversion, altered use of water ----- N
- 2. Irreversible, inefficient commitments ----- N
- 3. Other factors
- .....
- 
- .....
- 

E. CULTURAL

- 1. Altering physical symbols ----- N
- 2. Dilution of cultural traditions ----- N
- 3. Other factors
- 
- 

F. SOCIOECONOMIC

- 1. Changes in economic/employment patterns ----- L
- 2. Changes in population ----- L
- 3. Changes in cultural patterns ----- N
- 4. Other factors
- 
- 
-

G. HEALTH

- 1. Changing a natural environment ----- L
- 2. Eliminating an ecosystem element ----- L
- 3. Other factors .  
 .....  
 -----  
 .....  
 -----

H. GENERAL

- 1. International impacts ----- N
- 2. Controversial impacts ----- N
- 3. Larger program impacts ----- N
- 4. Other factors  
 .....  
 -----  
 .....  
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I. OTHER POSSIBLE IMPACTS (not listed above)

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See attached Discussion of Impacts.

DISCUSSION OF  
IMPACT OF PESTICIDE USAGE IN THE NIGER CEREALS  
PRODUCTION PROJECT

By

George A. Schaefers, Ph.D.  
NYS Agricultural Experiment Station, Geneva, NY 14456

Consultant to University of California AID Pest  
Management Project

I. Project Background and Description

The Niger Cereals Production Project (683-0201) originated as a result of special needs arising from the Sahel drought. Food shortages resulting from the drought caused an increased awareness on the part of the GON and the donor community of the need for significant action to increase food production. This project was designed to achieve increased production and availability of cereals by improving the institutional capacity in Niger to identify improved technology, communicate this knowledge to small farmers, and strengthen the framework for the provision of necessary agricultural inputs. The project was originally approved for a three year period extending from FY 76 through FY 78. The present project ammendment recommends a one year extension through FY 79.

The project consists of four interrelated components: applied research, seed multiplication, cooperatives, and agricultural extension. Crop protection aspects are involved in the seed multiplication component for which USAID is a significant donor, although all pesticides, recommendations, applicator training, and application equipment responsibilities are assumed by the GON, National Crop

Protection Project which is sponsored by CIDA. Negligible amounts of pesticide are used for research and demonstration in the applied research and agricultural extension components.

Seed multiplication involves 5 centers (farms) located at Doukoudoukou, Gaecheme, Magaria, Karangousuo, and Hamdallay, and a foundation seed farm at Lossa. All are situated in departments (states) along the southern border of Niger. Each center occupies about 40 ha of cultivated land with about 30 ha in Millet, and about 5 ha each of Sorghum and Cowpeas. The Seed Multiplication Component (SMC) was designed to increase the quantity of seed of superior quality and to train a corps of Nigerian technicians and farmer seed producers in the techniques required for the production, processing and distribution of improved seed. Among other reasons, delays in construction and attainment of full operational capacity of the seed centers has necessitated a recommendation for a 1 year extension of the project.

The research component is the responsibility of INRAN (l'Institut National de Recherche Agronomique du Niger). Pesticides are used in limited quantity at the research station in Mæredi. These are used in small scale field evaluations and demonstrations under trained supervision.

#### Project Setting

The Republic of Niger is located in north-central Africa between 12° and 24° north latitude. The country occupies about 1.25 million Km<sup>2</sup>, 80% of which is arid desert with the remainder being savannah suitable mainly for livestock and limited agriculture. Ninety percent of the 4.5 million population in Niger is concentrated in the narrow

band along the southern border which is suitable for cultivation. Water supply is restricted to a narrow band along the Niger River in the southeast, wells, and rainfall. Rainfall in the southern region, suitable for the cultivation of cereals consists of about 5-600 mm/year. The region has a marked dry season and rainfall occurs between the months of May to October. Temperatures range from a maximum of 45°C in April and May to a minimum of about 10°C in December and January.

The seed multiplication centers are located in 5 states in southern Niger and are isolated from any population centers by at least 5 kms. The total acreage potentially under cultivation will not exceed 300 ha. Total area under cultivation in Niger for the crops of concern here are ca. 3.5 million ha of millet, 0.6 million ha of sorghum and 0.8 million ha of cowpeas.

The southern region is characterized by long open 0-3% slopes and is subject to high wind erodibility. The soils, which have not been well characterized, are generally acid (PH5), and are recently developed from windblown siliceous sandstone sediments which overlay older Sahelian formations. Seed multiplication centers are selected in part for their constitution of loamy sand "Dune" soils. Vegetation throughout the region is characterized as being associated with moderately good to good agricultural land in Niger and consists of grasses, shrubs, and few trees.

#### Governmental Control of Pesticide Use in Niger

In Niger, importation, manufacture, sale and use of pesticides are under control of the Ministry of Agriculture. Materials are purchased by the government and application for pest control in outbreak

areas is accomplished by the government with trained personnel and application equipment. Crop protection in the seed multiplication component of the Niger Cereals Project is the responsibility of the National Crop Protection Project which receives CIDA support. Training of applicators, recommendations, and materials are provided through the crop protection project but application is made by farm workers. CIDA has provided one entomologist in advisory capacity to the National Crop Protection project, are bringing to Niger (Maradi) 2 additional entomologists for research, are currently training 5 Nigerians in Canada to the M.S. level, and anticipate a total of 20 scholarships.

Crop protection specialists spend one week annually in each department (state) for the purpose of training new applicators, and introducing previous trainees to new technology and materials. In this manner, it is estimated that about 250 people a year are trained in the use of pesticides.

While no means of residue monitoring is functioning in Niger, means of selection and recommendation of pesticides is attained through Niger's participation in CIP (Conseil Phytosanitaire Interafricaine) as well as an "Insecticide Commission" within Niger which is composed of representatives of different groups, i.e. INRAN, Agricultural Services, Ministry of Health, etc.

#### Integrated Pest Management

The pest control program as currently used and as proposed for the one year extension of the cereals project does not encompass an integrated pest management approach. However, CIDA supported entomologists, working under the National Crop Protection program

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will become involved in research and development of such an approach. In addition, 20 scholarships are being supported by CIDA for training of Nigerians to the M.S. level in entomology in Canada and should provide expertise for development of IPM programs.

Further, Niger, as a member of C.I.L.S.S., is a participant under the F.A.O. program for crop protection in the Sahel. Within this program Niger has responded positively towards the USAID-supported program proposed for research and development of integrated pest management against enemies of major crop pests in the Sahel. Thus, while IPM is not actively practiced in Niger at this time, the vehicles are available for development of IPM programs. Of particular interest to the present project is the possible affect of the proposed pesticides on the natural enemies of the pests involved.

## II. Requested Pesticides

Pesticides are used for the protection of seed at the seed multiplication centers. Such treatment is reportedly essential for protection against seed rotting organisms and against insects (primarily termites) which destroy or carry off the seed. The requested pesticide is Thioral<sup>R</sup> which consists of undetermined proportions of the fungicide Thiram and the insecticide heptachlor. The dye-marked pesticides are pre-packaged in 25 gram quantities which are then hand-mixed with about 10 kg of seed (Millet, Sorghum, or Cowpea).

Treatment of the standing seed crop is periodically required for protection against a complex of grasshopper species early in crop growth. It has been the practice to use 25% BHC (HCH) dust at a rate estimated at 1-10 kg/ha. Application methods vary from simply throwing a handful on each plant (1 kg/ha) to dusting through

a coarse mesh cloth, and more recently through the use of gasoline-powered, back-pack dusters (10 kg/ha).

Lindane 20 EC (Gamma BHC) is apparently less commonly used on the standing crop, but is preferred over BHC against certain insect pests which occur on the maturing crops. Of primary concern are a complex of stem borers including Busseola sp., Sesamia sp. and Coniesta sp. It is estimated that about 300 grams of active ingredient per ha are applied with powered backpack sprayers.

The above pesticides are recommended and provided by the Nigerian Government through the Direction Du Service De L'Agriculture Section De La Protection Des Vegetaux. While no efficacy or yield data is available for the above materials in Niger, their selection has been based on several years of experience by the National Crop Protection project.

#### USEPA Registration Status and Toxicological Hazards

Thiram - Registered for use on sorghum and millet. On the basis of teratogenicity, this material has been accepted as a candidate for intensive scientific review under the rebuttable presumption against registration or continued registration (RPAR) program. The acute oral toxicity of this material to mammals is in the 385-865 mg/kg range, placing it in a moderate to low classification of acute toxicity.

Heptachlor - Registered for use as seed treatment on sorghum (same or similar use as millet). Registration on sorghum will be effectively cancelled or denied on July 1, 1983. Notice of intent to cancel is based on oncogenicity and reduction in non-target and endangered species.

BHC (Technical Grade) - Has received voluntary cancellation of re-registration on all crops based on oncogenicity, fetotoxicity, and reproductive effects in mice and rats. Acute oral toxicity is dependent on amounts of various isomers present. Most are with low acute toxicity but some with high chronic toxicity.

Lindane - Although registered for use on sorghum (same or similar use as millet), RPAR, or a rebuttable presumption against re-registration has been issued against Lindane. Criteria involved include oncogenicity, fetotoxicity and reproductive effects in mice and rats, as well as acute toxicity in aquatic and avian species. The acute oral toxicity of Lindane to rats is about 90 mg/kg, placing it in a moderately toxic classification.

### III. Evaluation and Recommendation

The Thiram-Heptachlor treatment for seed treatment is used in extremely low dosages, i.e. 25 grams formulated material/hectare of seed with a maximum treatment area of 300 ha within the seed multiplication project. They are used on a product not immediately intended for consumption. Their use comes under the regulation of the CIDA supported National Crop Protection Project and their application is under trained supervision. Their use to date indicates no significant environmental impact and no significant effects are anticipated against non-target or endangered species within the area of concern. Thus it is apparent that the only potential risk occurs to the pesticide applicators and other immediate farm workers. Some risk of exposure occurs during seed treatment and hand planting of treated seeds. However, this risk will be mitigated upon the arrival of mechanical seed treatment equipment, and the use of gloves

or mechanical devices during the planting operation. RECOMMENDATION: In view of the registration status of these materials, i.e. registered for same or similar uses by USEPA without restriction it is recommended that their use in the seed multiplication component continue, at least through the one year extension of the NCP project. However, with respect to the pre-RPAR status of Thiram and the effective cancellation of Heptachlor in 1983, it is recommended that research be encouraged to find alternative treatments not possessing the risk criteria associated with these materials in order that more acceptable crop protection may be afforded the ongoing project in Niger.

BHC and Lindane for grasshopper and stem borer control on standing crops of millet, sorghum and cowpea are used at relatively low rates, 1-10 kg of 25% BHC and 1.5 l of 20% lindane EC/ha on less than 300 ha of crops within the seed multiplication project. BHC has been used extensively in Africa for many years and is a pesticide with which many agriculturalists are intimately familiar. Within the NCP both materials are used on products not immediately intended for consumption and are applied under supervision with adequate protective clothing. In view of the difficulties in assessing the chronic toxicity of technical grade BHC, and the risk criteria associated with Lindane, the greatest risk in its use will be to the applicators and to other immediate farm workers. RECOMMENDATION: In view of the USEPA regulatory status of BHC and Lindane it is recommended that alternative materials be used. Of a number of possible alternatives, Diazinon, registered for use on sorghum without restriction, is effective against grasshoppers,

moderately effective against stem borers, is readily available in Niger, and is only moderately toxic in terms of acute oral and dermal toxicity. Alternative materials suggested for investigation against stem borers include methomyl and endosulfan. Improved timing of applications of diazinon to coincide with periods of stem borer egg hatch, as well as destruction of stubble following harvest will markedly reduce the ravages of these pests. It is further recommended that some consideration should be given to the selection and development of stem borer resistant varieties of millet.

#### IV. Final Recommendation

Data substantiating the direct benefits (i.e. yield increases) gained from the use of pesticides in the seed multiplication component of the Niger Cereal Project are not available. The use of seed treatments over many years has led to the ready acceptance of this practice thus indicating that at least some benefits must be in evidence. An estimate of 25% reduction in standing crop has been attributed to insect attack. While these figures may not be supportable it is evident that any losses caused by insects and diseases are critical in the production of this valuable source of improved seed. Losses due to direct feeding damage as well as yield reductions resulting from delays in replanting can affect the quantity of seed produced.

There is some evidence that the use of improved quality seed, along with other improved cultural inputs can increase the yield of millet from the present level of 400 kg/ha to over 700 kg/ha. Such increases are vital to the nutritional well-being of the 4.5

million people in Niger, particularly in marginal drought situations. The use of Thiram and Heptachlor for seed treatment and the recommended use of Diazinon for protection of the standing crop undoubtedly play a contributory role in these yield increases. These materials are registered for general use without restriction by the USEPA. Based on the present examination, no significant adverse environmental impacts are reasonably anticipated from their use as prescribed in the Niger Cereal Project and as such a negative determination under AID Regulation 16 is, therefore, recommended for the project.

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