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AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A = Add, C = Change, D = Delete — Amendment Number

DOCUMENT CODE: 3

2. COUNTRY/ENTITY: TUNISIA

3. PROJECT NUMBER: 664-0327

4. BUREAU/OFFICE: NE — 03

5. PROJECT TITLE (maximum 40 characters): Agricultural Research

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM DD YY

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)

A. Initial FY 82 B. Quarter 4 C. Final FY 82

8. COSTS ($000 OR EQUIVALENT $1 = TD.588)

A. FUNDING SOURCE	FIRST FY B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	3500		3500	3500		3500
(Grant)	(3500)	( )	(3500)	(3500)	( )	(3500)
(Loan)	(-)	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country		214	214		3062	3062
Other Donor(s)						
TOTALS	3500	214	3714	3500	3062	6562

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) ESF	121	968		-	-	3500		3500	
(2)									
(3)									
(4)									
TOTALS				-	-	3500		3500	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 080 | 073 | 963

11. SECONDARY PURPOSE CODE: 111

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	BF	R/AG	TECH	XII			
B. Amount	1750	3500	3500	3500			

13. PROJECT PURPOSE (maximum 480 characters)

To implement a program that coordinates and carries out interdisciplinary interinstitutional research on mixed farm production systems and develops an effective system for coordination and management of research by objectives.

14. SCHEDULED EVALUATIONS: Interim MM 10 YY 84; Final MM 09 YY 86

15. SOURCE/ORIGIN OF GOODS AND SERVICES: [X] 000 [ ] 941 [ ] Local [ ] Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a ____ page PP Amendment.)

17. APPROVED BY

Signature: Gerald R. Wein

Title: Acting Director

Date Signed: MM 08 DD 20 YY 82

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM 08 DD 25 YY 82

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ACRONYMS

AID	-	U.S. Agency for International Development
AID/Tunis	-	USAID Mission in Tunis
ATT(P)	-	Agricultural Technology Transfer (Project)
CGIAR	-	Consultation Group for the International Agricultural Research
CIAT	-	Centro International de Agricultura Tropical
CIMMYT	-	Centro International de Mejoramiento de Maiz y Trigo
CNDA	-	Centre National de Documentation Agricole
CNEA	-	Centre National d'Etudes Agricoles
CRP	-	Coordinated Research Plan
CTRDA	-	Central Tunisian Rural Development Authority
CTRD(P)	-	Central Tunisian Rural Development (Project)
DERV	-	Research, Extension and Education Directorate (Direction des Etudes, de la Recherche et de la Vulgarisation)
ECAT	-	L'Ecole Coloniale d'Agricultures de Tunis (Colonial School of Agriculture)
ESAK	-	Ecole Superieure d'Agriculture du Kef (Advanced School of Agronomy at Le Kef)
FSI	-	Foreign Service Institute
FSR	-	Farming Systems Research
GOT	-	Government of Tunisia
HCC	-	Host Country Contract
IBRD	-	International Bank for Reconstruction and Development (World Bank)
ICARDA	-	International Center for Agricultural Research in Dryland Area
ICRISAT	-	International Crops Research Institute for the Semi-Arid Tropics
INAT	-	Institut National Agronomique de Tunis (National Agronomic Institute of Tunis)
INRAT	-	Institut National de la Recherche Agronomique de Tunisie (National Institute of Agronomics Research in Tunisia)
IRRI	-	International Rice Research Institute
MIAC	-	Mid-America International Agricultural Consortium
MOA	-	Ministry of Agriculture - Tunisia
MOU	-	Memorandum of Understanding
PI	-	Principal Investigator
PID	-	Project Identification Document
PP	-	Project Paper
PSR	-	Production Systems Research
RMT	-	Research Management Team
SBAT	-	Service Botanique et Agronomique de Tunis (Botanical and Agronomic Service of Tunisia)
TA	-	Technical Assistance
TPT	-	Technical Program Team of RMT

LIST OF ANNEXES

1. Logframe
2. Request for Assistance from the GOT
3. Draft Authorization
4. Draft Project Description for Annex A of the Grant Agreement
5. Statutory Checklist
6. Waivers and Other Justifications
7. Draft Scope of Work for the Technical Assistance Team
8. Response to Issues Raised in Review of the PID
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10. Organigram of Project Organizations
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I. SUMMARY AND RECOMMENDATION

A. Recommendation

It is recommended that a grant be authorized in the amount of $3.5 million to finance the life of project cost of a four-year project in Agricultural Research to begin in FY 1982. The grant will finance 53 percent of total project cost, including most of the foreign exchange requirement and approximately 20 percent of the local currency cost. The remaining $3.1 million necessary to finance the project will be provided in local currency and in-kind contributions by the Government of Tunisia.

It is further recommended that the following waivers be approved as part of the project authorization: a) a waiver of competitive procurement for technical assistance and certain other services to permit sole-source negotiation with the Mid-America International Agricultural Consortium of land grant universities, b) a waiver to permit third-country (code 941) procurement of part of the participant training to allow the project to utilize training programs at the international agricultural research centers (ICARDA, CIMMYT, etc.)

B. Summary

The project will establish an inter-institutional program of farmer-oriented interdisciplinary research directed toward improving the production systems of the semi-arid mixed farming zone. This program will address the need for agricultural technologies suited to the needs of farmers in this zone and will develop a mechanism for the coordination of research at the operational, researcher level with broad applicability to Tunisian research. In Tunisia today there exist neither such a program focussed on this priority area nor a mechanism to institute and control such research. The research will be planned and carried out cooperatively by a research team drawn from INAT, INRAT, and ESAK*. Project activities will reinforce graduate education as well as research by involving INAT graduate students in research, and by strengthening the staff and management systems of INAT, INRAT and ESAK. The project will fund a program of related research activities, commodities to support this research, and technical assistance and participant training in research management and applied methodologies.

* The Institut National Agronomique de Tunisie (the principal agricultural college), the Institut National de la Recherche Agronomique de Tunisie (the national agricultural research institute) and the Ecole Superieure d'Agriculture d'El Kef (an agricultural college serving the North and Central drylands areas).

II. BACKGROUND AND PROBLEM STATEMENT

Over the last 20 years, Tunisia's agricultural research system has been strengthened dramatically through the combined support of the GOT and the donor community. the recent Impact Evaluation of the Wheat Research Program documents, Tunisia has developed a strong national resource base of highly skilled researchers. Unfortunately these human resources are not being effectively utilized to address the country's agricultural development problems.

Two of the most serious problems impeding greater research effectiveness (other than the perennial shortage of operating funds) are the poor coordination among research activities and the lack of an applied, problem-oriented approach. These problems undermine the development of research results serving national agricultural priorities. The scarce resources available are not allocated or managed for maximum effectiveness. Moreover, the opportunities for complementarities across disciplines are underexploited or lost entirely, limiting the relevence of research results for the small and middle farmer clientele.

The research management problem is not limited to one institute or one part of the system. It is equally damaging to coordination within and between institutions, in teaching as well as research, in national institutions such as INRAT and INAT and in regional institutions such as ESAK. Although it affects research throughout the country, one area where it is particularly damaging to research usefulness is the mixed farming zone in northwestern Tunisia. In this area, the complexity of the land and water management problems facing the small and medium dryland farmers make it necessary to consider the production system as a whole (including crop-livestock interactions and the mix of grains grown) in developing applicable technologies. An increase in cereal, forage, livestock and other crop production over time requires an approach that is both better focussed on the farmers' problems and more comprehensive in its application of different disciplinary perspectives to understanding and solving these problems.

The management problem was manifested by the inability of the principal national agricultural institutes to provide the project design teams with a list of ongoing research projects. Resources (human and financial) are neither allocated nor recorded on a program basis. This leads to a fragmented approach with individual researchers continuously competing for scarce resources. There is no formal mechanism to insure that research efforts are focussed on priority problems and that researchers working on the same problem are aware of or cooperating with each other.

The current fragmented approach to research prevents the formulation and execution of coherent programs. Two previous attempts to deal with this problem -- formation of a national coordinating council and establishment of semi-autonomous "offices" -- have failed, the former dramatically.

Fragmentation of the research effort reduces the usefulness of research in two ways. First, it makes it more difficult for the researchers to select topics and conduct their research in the context or framework of commonly perceived national or regional needs. Second, the needs of the majority of farmers are not fully addressed because the research activities are developed without first clearly analyzing farmer needs and identifying research priorities.

Finally, agricultural research does not support the broader national need for a system of resource use that permits increasing agricultural production without undermining the continued productivity of the resource base. Agricultural technology must help to reconcile the farm family's needs for an assured food supply and higher income with the optimal use of national land and water resources in accordance with Tunisia's comparative advantage. This need is most pressing in the semi-arid zone where hard and soft wheat competes with barley, forage and livestock.

The specifics of the research management problem differ substantially from one institution to another. Each of the three institutions participating in this project has a different background and a somewhat different set of institutional and managerial constraints.

The two main institutes involved are the National Agronomic Institute of Tunisia (INAT) and the National Institute of Agricultural Research of Tunisia (INRAT). The parent institution for both INAT and INRAT was established in 1898 as a research and teaching institution serving only the French "colons". The two were not divided until 1963 with the creation of INRAT. As the main Tunisian institutions charged respectively with training of upper-level agricultural professionals and agricultural research, both INAT and INRAT are well-established organizations with a total of roughly 130 professionals, almost all Tunisians.

INAT's personnel base is much stronger at present than INRAT's, due to the greater flexibility accorded a teaching institution and, in particular, INAT's much higher salary scale, which has led to a continual hemorrhage of INRAT staff to INAT. INRAT on the other hand, has the principal mandate for research and controls the national network of research stations, whereas INAT has only very limited facilities for research. An additional problem at INAT is the need to incorporate graduate students' research into the research activities of INAT and INRAT. Involvement in applied research as part of the graduate training program is the most feasible means of producing upper-level agriculturists with an understanding of farmer needs and national research programs.

ESAK, by contrast, has just this year been upgraded to a four-year institution. Established in 1977, it has a much less developed institutional base, whether measured in terms of personnel, physical plant, or current programs. Nonetheless, as part of Tunisia's developing regional network of training and research institutions specialized in particular branches of agriculture, ESAK is expected to play a much larger role in the future. The need establish ties with the national centers of teaching and research is therefore critical to its development. (For example, ESAK serves as the regional research base for the CTRD Deylands Research subproject as further explained in Section III. F. a.)

All three of these institutions come under the Directorate for Education, Research and Extension of the Ministry of Agriculture. Coordination of activities among these institutes under DERV's control to date, however, has been almost totally lacking. Each institute has been identified as a separate entity with its individually defined role. Their management approach made more sense in the past when INAT resources were fully employed in undergraduate training and INAT had neither the need nor the ability to take on research activities. With this development of INAT's staff capabilities, the expansion of graduate training for which research is an integral part and the recognition of the need to develop a research program focussed on the semi-arid region where ESAK is located, it has become apparent to the director of DERV and others that it is essential to develop a more coordinated approach to research to effectively utilize the resources which the GOT has at its disposal.

III. PROJECT DESCRIPTION

A. Goal

This project supports achievement of the Tunisian VIth Plan (1982-1986) goals for increases in agricultural production and improvements in the quality of rural life for small and medium-scale farmers. The plan sets quantified goals for 5 percent annual growth in agricultural production overall, with specific annual growth targets for in project-area products of 1.6 percent for cereals and 6.5 percent for livestock products.

B. Purpose

1. Project Strategy

The structural problems inherent in the Tunisian research system make national-level coordination unworkable. Given the large number of activities and institutions and the absence of an effective coordination system, the national research leadership has been unable to reach a consensus on priorities with sufficient precision to make topdown coordination of research operations feasible. The setting of priorities is thus limited to the broad guidelines included in the inational plan, but the mechanism to operationalize these priorities into integrated programs is lacking.

The project strategy addresses this problem by moving past the upper managerial level to achieve coordination at the operational level of the researchers themselves, instituting a system of coordination on the basis of research program objectives. This system builds on the substantial informal cooperation already existing at this level and formalizes it by the creation of a "program team" of researchers who will define and implement a research program exercising control over the research budget designated for that program and formation of a "research management team" with researcher and management members to provide policy guidance and formal support to the program team from DERV and the Directors of theinstitutions participating in the program.

The key element of this strategy is the development of an integrated research program by the researchers themselves and implementation of the programs under researcher control after ratification by the management team. Because each research and his or her activities remain under the control of their respective parent institutions, this approach is fully consistent with the existing management system.

Since the strategy is intended to increase researcher control and decentralized program development, it is clearly not possible to institute such a system from the top down. To attempt to do so would immediately raise the very questions that have sabotaged previous attempts at coordination (which programs should be organized, for example, and who should control them). The project strategy developed with the full cooperation of researchers as well as management personnel of the Ministry of Agriculture is therefore to choose one program as a starting point, bringing together researchers from different disciplines and institutions in a common effort to plan and implement a research program.

The program selected must be of manageable size, but it must be of sufficient national importance and breadth to make coordination a non-trivial problem. The Production Systems Research program identified for possible AID funding by a group of Tunisian researchers from INAT, INRAT, and ESAK is virtually ideal for the project's purpose. The program proposes to address a major national problem identified as a high priority for research; management of the northern semi-arid mixed farming zone. The low yields of Tunisian farmers in this area (see Economic Analysis Annex 13) compared to farmers in similar environments elsewhere promise very high potential returns from research- The nature of the problem requires an interdisciplinary, applied, integrated approach. A core group of scientists have already identified themselves as interested in the work and have the support of their parent institutions. A group of social scientists has been working on related problems since 1975 and agronomic research has also begun in the area.

The management approach to be used can readily be extended beyond the proposed program by creating other programs (horticulture in the irrigated perimeters, for example) independent of any restructuring of the research system. The project sill assist the Tunisian government to move toward a matrix organization of agricultural research management that maintains the identify of the individual institutions with their staffs, facilities and line-item budgets (the "rows") but allows identification and management of coherent research programs (the "columns").

While the project focusses on research it does not totally ignore the Extension Service in Tunisia which has largely failed. One of the reasons for the weak extension service is the inadequacy of extendable information.

This project will not address the organization nor management of Extension but rather will focus on providing a knowledge base from which the extension agents can enhance their technical skills and develop educational programs for farmers. The agents themselves will participate with researchers in carrying out field trials, attend seminars organized to identify researchable problems and present research findings and will have access to published research results. (The organization and management of Extension are being addressed in other AID and donor projects.)

2. Purpose

The project will implement a program that coordinates and carries out interdisciplinary research on mixed farm production systems. The innovative organization of this program will provide a model for an effective system of coordination and management of research by objectives in Tunisia. The program will be defined and carried out cooperatively by the researchers of INAT, INRAT, and ESAK to strengthen these teaching and research institutions, direct their research to meeting farmer needs and provide a solid foundation for extension of the system. (See Annexes 16 & 17 for details on management systems.)

By the end of the project, the programmed reviews of research results will determine that research conducted is producing useful information to improve production in the target area. A continuing interdisciplinary "production systems" research program will be underway under the effective control of the researchers involved, supported by MOA's research managers, with the active involvement of researchers and students from the three institutions, and focussed on farmer problems. The research management system developed will be established as an effective method of research coordination in Tunisia, leading to its application to other research areas.

C. Outputs

The primary project output will be the development of a system for the management of interdisciplinary, cooperative research programs by the researchers of INRAT, INAT, and ESAK. The most important element of this system will be the project research management team described below, but the project will also strengthen other formal and informal linkages among these institutions and internal management within the three institutions.

A second equally important output will be an integrated program of applied, interdisciplinary research directed to farmer needs and VIth Plan agricultural goals to be carried out by the faculty and students of INAT, INRAT, and ESAK. The program will use the "systemes de production" model, a variant of the farming systems approach and will focus on the northern semi-arid mixed farming zone typified by Le Kef governorate. Approximately 30 research projects will be funded under the project, incorporating the research activities of senior staff at the three institutions and thesis research by at least 30 INAT M.S. candidates.

Other outputs projected are increased INAT/INRAT/ESAK staff capabilities in interdisciplinary research methodologies, including production systems research, and strengthened agricultural institutions producing agricultural professionals committed to meeting farmers' needs. Project training activities will upgrade the skills of at least 100 INRAT/INAT/ESAK staff members, with approximately 40 receving short-term training abroad and the rest participating in training seminars in Tunisia.

1. Establishment of a Research Management System

The primary project output is the establishment of a research management system through the application of management by objectives to a specific program of research.

The heart of the concept is formation of a Research Management Team (RMT) that draws together individuals from both the management and operational levels into a single group. This group oversees the development and implementation of an identified research program.

The RMT is chaired by the Director of Research, Extension, and Education Directorate (DERV) and includes the directors of the three participating institutions and a group of researchers who provide leadership to, and are themselves active in, the program of research.

The RMT has two elements: the management team as a whole and a smaller, working level group composed of the researcher members of the team, the Technical Program Team (TPT).

The RMT as a whole sets the overall directions of the program and monitors program progress. It acts on the recommendation of the TPT to approve projects for funding under the program. The presence of senior-level research management personnel in the RMT builds in the necessary ratification of TPT decisions and underlines the ultimate responsibility of the management level for program directions and accomplishments.

The key element of the system, however, and the main factor differentiating it from other "coordinating committees" is the Program Team. The TPT will enable the researchers to develop and implement a coherent program of their own. Once projects and their respective budgets are approved by the RMT, the TPT will have the authority to approve individual activities (such as includion of a particular Master's student's research, in an approved project for example), to make adjustments within approved budget levels, and in general to manage the execution of research projects.

A second major element of the system is the greater flexibility in fund disbursement achieved through instituting a "regie" or rolling cash fund under the control of the TPT. The regie system permits disbursements to be made against approved line items without prior approval of the agency director. Currently the Director of INRAT, for example, must personally approve in advance any disbursement over TD5.000 ($8.00).

The regie mechanism exists within the Tunisian administrative system and requires only administrative approval. This will be the first time, however, that it has been applied to the program of a line agency within the DERV. (The regie system is discussed in more detail in the Financial Plan.)

The establishment of the RMT is expected to provide a practical means of coordination, to build inter-institutional tie at the operational level, and to create a mechanism for developing interdisciplinary research programs clearly focussed on identifiable farmer needs and national goals.

As the program develops, it will lead to changes in research management beyond the establishment of the RMT system. The financial mechanism to be instituted through the project, for example, is the first attempt to give researchers effective control over part of their budget. Development of a budget for a specific research program is itself an innovation in the Tunisian system that will have a large impact on research management.

To reinforce these improvements in research management at the three institutions, the project will conduct training seminars* provide technical assistance, and undertake other activities designed to extend the project's management improvements to other research activities. It is not expected that the system developed by this project will be applied to all Tunisian research activities or even to all INAT/INRAT/ESAK activities by project completion. The direct involvement, however, by the directors of DERV, INAT, INRAT, and ESAK in the implementation of this project insures that the merits of the approach will be considered and where feasible will be applied to the rest of the Agricultural Research Program.

2. A Program of Production Systems Research in the Northern Drylands

The second major project output is an interdisciplinary program of research directed at increasing production in the northwestern semi-arid region typified by Le Kef governorate (See map, Annex 23). Cereals are the major crop often combined with some livestock enterprise (sheep and cattle) on mixed livestock/cereals farms. The zone includes three sub-zones. In the superior and intermediate semi-arid subzones cereals are grown in a 2-year, fallow/crop rotation usually with mechanization. In the high plateaus and hill subzone cultivation is more traditional and often practiced on slopes too steep for mechanization. The rainfall in this zone ranges from 350 to 500 mm per year with most of it falling between October and April.

This program extends and integrates two ongoing research programs: 1) a program os socio-economic research by an INAT/INRAT group to define the production systems of this region, and 2) a program of cereal breeding and other agronomic research conducted primarily by INAT staff using INRAT facilities.

By integrating the two programs, redefining the scope and priorities of the comibned program, and adding a stronger component of livestock and forage crop research, the scientists of the three institutions will build, in effect, a Farming Systems Research Program for Zone II. To emphasize that the approach used is a development of the Tunisian scientists themselves and to avoid confusion between this approach and other FSR approaches developed elsewhere, we will use the term Production Systems Research (PSR) in this paper (see Annex 15 for a more detailed consideration of this issue).

*For more detail on seminars see Annex 20.

The PSR program itself will proceed in three stages. First, the socio-economic survey work will be broadened to include agronomic and livestock components, leading to a definition of the major production systems used by farmers in the agroclimatic sub-zones of the region with particular emphasis on farm management problems and opportunities. Second, specific interventions fitting within the current system will be identified based on the work in stage 1 as likely to increase production and incomes and will be tested on farm in close cooperation with the farmers themselves. Third, the research group will develop and test more significant departures from the current system, based on their improved understanding of farmer goals, risk and production variation in the area, and the potential for more productive uses of the area s land and water resources.

These stages are conceptual rather than strictly chronological. The analytic work begun in stage one does not cease when technology trials begin in stage two, nor does the rethinking of current systems in stage three wait until all marginal changes to that system have been tested in stage two.

The research program to be developed by the TPT is anticipated to focus on the following three major areas:

1. Interactions between cereal crops and livestock production (including the use of crop residues for feed and the impact of livestock grazing in the crop rotation system).

2. Varietal improvement and alterations to the cultural practices and the mix of crops grown to reduce farmer risk and inter-season variability and to meet the farmer's cash income/home consumption goals.

3. Introduction of improved livestock nutrition, genetic improvement, and health practices.

Agronomic and socio-economic research will be equally important in each of these issue areas. Definition of the current relationship between cereal crops and sheep farming, for example, must be a joint task of sociologist, economist, cereal agronomists, and livestock specialists. Equally important, all of the disciplines will be actively involved at each stage of the research.

Many of the issues identified are obviously quite complex agronomically, economically, and socially. Answers to all of them cannot be obtained in the scope of a three-year research effort. The project's technical strategy is therefore twofold: 1) to focus immediately on the identification of specific technologies based on existing research for on-farm testing to produce farmer-relevant improvements within the project's limited time frame, and 2) to build a program structure with the capability to continue after U.S. assistance ends. Thus, although specific technologies will be an important project output, an output with greater long term value is the research program itself.

The need for a multi-year perspective isparticularly important in view of the complex nature of crop-livestock and soil-water-crop interactions in the project zone. It is precisely these complexities that have motivated the scientists to turn to an interdisciplinary, PSR approach.

3. Increased Capacity in Interdisciplinary Research Methodologies and Research Management

The program will strengthen and institutionalize the current system of informal cooperation by Tunisian researchers across disciplines and institutional boundaries. The RMT management system and the research program will have a significant positive impact on researcher capacity in both program management (including development implementation, and evaluation) and interdisciplinary research.

This capacity will be reinforced by the project's training activities, both in-country and overseas. Through the project, researchers will receive advanced training in specific methodologies needed to carry out a program of interdisciplinary, applied research on farm and in particular aspects of research management, such a development of project budgets and formulation of research proposals.

4. Strengthened Agricultural Training and Research Institutions

The project will reinforce the three institutions' participation in the research program. Incorporation of graduate student research by INAT Master's students will both strengthen the research program and make their training more relevant to the farmer's needs. The improved integration of teaching and research activities at INAT and ESAK through the active involvement of the students in the research program will build these institutions' capacity to produce agricultural professionals who are receptive to farmer perspectives and who have a field orientation to their work. Whether INAT graduates continue on as researchers, go on to careers in extension or other parts of the Ministry, or take up positions in Tunisia's growing agricultural private sector, a strong background in applied research will increase their effectiveness. INAT's M.S. graduates are in high demand from investment companies and other Tunisian institutions moving into agriculture that need management-level personnel with an understanding of agriculture. Graduates

of ESAK's and INAT's four-year programs generally move into positions of less responsibility, but the need for understanding of the farmer's situation is no less pressing at the field level where effective contact between farmers and functionaries must begin.

The project will also strengthen the research capacity of the three institutions by assisting them to develop a viable mechanism for working together by sharing their limited physical and human resources. By developing inter-institutional cooperation and strengthening the facilities of each institution, the project will have a lasting impact on agricultural research in Tunisia. The participation of extension personnel in the implementation of research projects and in the annual seminars to review research results and further define and direct the research program will be mutually beneficial to both the research and extension institutions.

D. Inputs

The principal project inputs will be the equipment, materials, and operating expenses needed to carry out the program of research managed by the Program Team. Commodities selected will upgrade the capacity of participating institutions to carry out applied field crop research as well as supporting particular research projects. Technical assistance and participant training will increase both research management skills and transfer specific methodologies needed for applied, on-farm research in field crops and livestock. One long-term and 26 months of short-term assistance will be funded, together with 150 months of U.S. and third-country short-term participant training.

The GOT will provide staff, facilities, equipment, and operating expenses Their share of research operating expenses will increase to 67% by the third year of research activities and 100% thereafter.

Total A.I.D. contribution to the four year project will be $3.5 million, in the form of a grant. The GOT contribution is estimated at TD 1.8 million ($3.1 million), bringing total project cost to $6.6 million.

1. Aid Inputs

a. Technical Assistance

The technical assistance funded will include one long-term advisor in agricultural research management for three years, supplemented by a substantial amount of short-term assistance in research management, PSR methodologies, physical science specialities, and social science research.

The long-term advisor will be responsible for assisting the management team to put together an integrated, well-designed research program on production systems in the semi-arid region and for advising the team on the management of the research program as well as the overall management of research at the three institutions. As the in-country representative of the contractor, the long-term advisor will also have overall responsibility for coordinating other contractor inputs, including off-shore procurement, short-term technical assistance, and participant training. The proposed scope of work for the long-term advisor is shown in Annex 7 .

Short-term technical assistance will provide specialized management advice, conduct the workshops planned in research management, and assist the Tunisian scientists in the implementation of the individual research projects. Although the core group of researchers is highly qualified, the majority of INAT/INRAT/ESAK staff are less well-prepared in terms of both academic training and experience with field research. The core group, moreover, does not at present include scientists from all of the disciplines likely to be required and it is unlikely that the current level of expertise can be duplicated for all the specialities needed. While inclusion of junior researchers in the program is highly desirable from the point of view of staff development and integration, relying upon them to develop their components of the research program without assistance is not advisable. Visits by experienced researchers from the contracting university group will provide the professional review and advice needed for these junior researchers to contribute effectively to the total program. Sixteen months of assistance are provided in the hard sciences, including data analysis and documentation.

Short-term assistance in project management will assist the management team to develop and implement the proposed program of research by providing training in specific skills needed and by reviewing with the program managers the progress of the program as a whole. Six months of assistance are budgeted for such research management assistance.

Short-term assistance in the social sciences will fill two roles. First, the advisors will play a role parallel to that of those in the hard sciences, advising individual researchers as their projects progress. Second, the short-term social scientists will supplement the INAT/INRAT/ESAK staff, participating directly in the multidisciplinary research at critical stages such as the elaboration and analysis of survey instruments. While the pool of agricultural economists is substantial, the participating institutions have only a very small group of specialists in sociology and none in anthropology. Eight months of assistance are provided in this category, with trips averaging two months.

Specific specialties are suggested in the Scope of Work (Annex 7), but the final determination will depend on the research proposals developed.

b. Participant Training

Given the large amount of long-term training financed under the ATT Project and the relatively short length of the current project, all participant training will be short-term. Both U.S. and third-country training will be provided to support the planned research program.

U.S. training will include observational travel and special courses for senior research managers involved in project implementation totalling twelve months. Experience in Tunisia indicates that this approach is highly effective in increasing awareness of management issues. In addition, 30 person-months of short-term courses will be funded to upgrade research skills in particular areas related to the research program and identified as needed for the research program. These may cover methodological, technical, or management skills. Maximum use will be made of USDA and other U.S. courses ffered in French.

The project will fund participation by 16 graduate students and junior researchers in 6-month courses in agricultural research methodologies and 6-months of additional short-term courses at the international CGIAR network research centers. As discussed below with regard to other donor programs, the intention is to rely on ICARDA for the training to tie in with other ICARDA programs and to support institutional linkages in the Near-East region. A waiver to permit third-country training is included in the draft authorization.

If possible, the project will also make use of the centrally-funded training program recently inaugurated in Farming Systems Research and Extension (see Relation to AID Program below).

c. Commodities

The basic research infrastructure base of the participating institutions, particularly INRAT, is presently insufficient to support the planned research program or the greater level of research planned under the VIth Plan. Much of the equipment dates from the pre-independence period and is beyond rehabilitation. Although most of the buildings themselves are adequate, there is a critical need for a modern greenhouse to support the plant breeding and agronomic program.

To meet the pressing need for research facilities, the project has budgeted a substantial commodity input. This will finance research equipment in support of project objectives, computer hardware and software for data analysis and documentation, books and reference materials, and vehicles, as well as a small amount for office equipment.

Only a small portion of the equipment budgeted will be field equipment. This allocation in a project where most of the research is to be conducted on field may on first examination seem counter-intuitive and requires explanation.

In any research project, a considerable amount of back-up work is required that cannot be performed on-farm. Determination of seed quality, for example, identification of plant pathogens, or analysis of trace nutrient deficiencies cannot be done practically in the field. In order for the researchers to function effectively in their on-farm work they must have access to the lab equipment necessary to answer technical questions. Field equipment, on the other hand, is less necessary for on-farm work, since the equipment used can and should be the farmer's own. In the specific case of the Le Kef region, moreover, most of the special field equipment likely to be needed has been supplied by other projects, including the CTRDP.

The equipment provided will, of course, have an impact extending beyond the project, both to other research activities currently ongoing and to those beginning after project start-up. It will both increase the effectiveness of Tunisia's current limited researcher pool and provide the facilities for more productive use of additional researchers trained under the ATT project. This training is needed primarily to increase research planning and management skills and acquaint researchers with interdisciplinary research methodologies that have been tried and proven successful in the U.S. and other developing countries. Special skills training will also be required for research support personnel in computer operations for data analysis and information storage and retrieval. These are operated and supported by INAT and INRAT scientists and laboratory facilities which are concentrated in Tunis. Most of the laboratory equipment procured will be to complement the existing equipment and will, therefore, also be located in Tunis. The procuring of additional field samples and data generated by the additional research activities in this project will require some additional equipment at ESAK.

The Ministry of Agriculture has already installed a Hewlett Packard Computer at its National Center for Agricultural Documentation capable of both data processing and information storage and retrieval. It is linked with international agriculture information systems through FAO. Under this project software and terminals will be provided to link the participating institution's libraries and researchers with CNDA for more effective research and more effective use of existing facilities.

d. Research Project Expenses

The project will fund the operating expenses associated with the PSR program. Since the activities will represent an increase over currently-budgeted research activities, AID will co-finance the operating expenses with the GOT. AID will provide 100 percent of the research operating costs in the first year (1983-84), 66 percent in the second year (1984-85) and 33 percent in the third and final year (1985-86). The amounts budgeted will cover research materials, (fertilizer, seed, etc.), enumerators and temporary labor, local transportation, data analysis and other such requirements. The fund will not be used to finance current GOT expenditures nor to finance researcher salaries, student stipends, or rental of GOT facilities.

The project will finance as well special equipment identified as needed for the research projects (such as a special seed drill to measure the impact of seeding depth on plant stand). Inclusion of a provision for meeting such special needs is designed in part to help limit the initial basic procurement to truly essential equipment without closing the door on special equipment if a need can be demonstrated.

For estimating purposes, it has been assumed that 6 projects will be funded in year 1, 12 projects in year 2, and 12 in year 3 (for a total of 30 projects under way by project end), with each project assumed to use one "scientist year" and budgeted at $10,000 per year. The number indicates the level of effort anticipated and should not be interpreted as a specific target. Each project should involve the active participation of several researchers and may include several identifiable "activities" with their own budget lines. MS. student research funded under the project, for example, will be budgeted as within these larger research "projects"

e. Other expenses

Other inputs to be funded by AID include in-country conferences and seminars to present research results, discuss progress of the program, and make more effective use of the short-term assistance. Participation of Tunisian researchers in international conferences will also be financed on a limited basis as justified by the needs of the research program. The design team has suggested that a conference on FSR in Francophone Africa would provide both a useful goal for researchers to work toward and fitting capstone to this project. AID/Tunis would therefore welcome designation of Tunisia as the site for one of the regional conferences to be carried out under the centrally funded FSR/E Project. Finally, AID will fund two external project evaluations, as discussed in the Evaluation Plan.

2. GOT Inputs

a. Personnel

The GOT will finance the researchers, students, and other professional and support staff necessary for project implementation. In addition to the management staff and researchers from INAT, INRAT, and ESAK active in the research program andor working with the management team, the GOT will finance a project administrator who will handle the administrative details of the project under the direction of the Project Director and additional drivers and support staff needed by the project.

b. Participant Training

The GOT will finance international transportation and staff salaries in support of the project's training program. All short-term participants, including students, will continue to receive their salaries (or student stipends, as appropriate) during training.

c. Commodities

To promote establishment of a regularized research investment budget, the GOT will be required to contribute a share of the commodities budget ranging from a low of around 20 percent in the case of basic research equipment and documentation (exclusive current facilities available to the project), to over 50 percent in the case of vehicles. The GOT will purchase research equipment using local currency and will provide mopeds and heavier vehicles to complement the AID-funded vehicles.

d. Research Project Expenses

The GOT share of research expenses, as described above, will increase from zero in the first year to 67 percent in the final year. It has been decided not to reduce the AID contribution to zero in the final year, since only three years of research will be funded.

e. Other expenses

The GOT will finance vehicle operations and 50 percent of the in-country expenses associated with operation of the project office, the management team, and in-country seminars and conferences.

They will fund the participation of GOT officials in the two external evaluations planned for the project as part of their contribution of GOT personnel.

E. Administrative Arrangements

The project administrative structure recognizes the dual responsibility of researcher and manager for the development of balanced research programs serving national needs. The structure developed has three main components: 1) the Research Management Team, as described above, including both management-level and researcher members; 2) the Technical Program Team, made up of the researcher members of the RMT, and 3) the day-to-day administration and management mechanism made up of a Project Director selected from among the RMT members, supported by the resident advisor and a professional administrator to handle logistical matters.

1. The Research Management Team

As described in detail in Annex 16, the RMT will set the overall guidelines and policies of the research program, upon recommendation from the TPT, and will approve research projects for funding under the project, after they have been reviewed and developed by the TPT. The RMT is expected to meet on a quarterly basis, although more frequent meetings may be necessary in the early stages of the project.

In selecting projects for funding, the RMT will follow an agreed-upon set of criteria, to be developed with the assistance of the technical assistance team working with the TPT and the Project Director. All proposals funded must demonstrate a clear connection to an identified farmer need and must be applied (leading directly to a farm-usable technology) rather than basic (although we recognize that this distinction is often more imagined than real). Proposals for interdisciplinary research conducted on-farm with the active involvement of students and researchers drawn from more than one of the participating institutions will receive preference over proposals not meeting these criteria.

2. The Technical Program Team

The researcher-members of the RMT will form the Technical Program Team, with primary responsibility for developing and implementing the research program funded. Working together, they will develop the program priorities and criteria for selection of activities, review specific research proposals, and monitor the progress of the research. Major programmatic decisions will require approval of the RMT as a whole. The RMT is not expected to become involved in the substantive development of the program, however, beyond reviewing and monitoring the work of the TPT.

One of the researchers will be selected as the Chairman of the TPT. If, as is expected, the Project Director is drawn from among the RMT's researcher members, then this individual will logically also serve as the TPT Chairman.

The TPT thus will have the primary responsibility for research project implementation. The role of the RMT is to provide the management-level ratification needed and to maintain oversight and review progress to as to ensure that the program proceeds according to the approved policies.

3. The Project Director

One of the members of the RMT will be selected to serve as Project Director upon appointment by the Minister. It is clearly preferable for the Director to be drawn from among the researcher-members of the RMT. Designation of a researcher as Project Director supports the principle of researcher management and ensures that the Project Director is both able and motivated to devote sufficient time to the project. The Director of the DERV and the Directors of INAT and INRAT strongly support selection of a researcher as Project Director, but the final decision will be made by the Minister.

The Project Director will be the counterpart of the long-term advisor as well as the individual responsible on a continuous basis for the management of the project. The Director will carry out the decisions of the RMT and the TPT, in accordance with the responsibility and authority delegated to him by the Chairman of the RMT, the Director of the DERV. If the Project Director is a researcher from INAT or INRAT, allowance will be made for the time requirements of the position by reducing that person's regular teaching and/or research load.

A project administrator will be hired or assigned to the project on a full-time basis. The duties of the administrator will be to assist the Project Director with the logistical, financial, and other administrative matters related to implementation of the project. The administrator will in particular be responsible for local procurement, for supervising operation of the "regie" to ensure rapid disbursement of research operating expenses and proper accounting, and for overseeing the scheduling of project-funded resources, particularly vehicles.

The administrator will also assist the Project Director and resident advisor in administrative matters relating to participant training, the holding of conferences and seminars, short-term technical assistance, etc.

The administrator will be assisted by a staff of secretaries, drivers, and other support staff assigned to the project office by the GOT.

The project will be located administratively within the DERV. This positioning accords fully with the coordinating responsibility of the DERV and with multi-institutional involvement in the project. Although INRAT is clearly the national lead institution for agricultural research, the MOA and AID design team members are in agreement that location of the project within one of the institutions would seriously weaken project effectiveness. The issue of project location is further discussed in the Administrative Analysis.

F. Programmatic Concerns

1. Project Relationship to GOT and AID Priorities

The project is fully in line with GOT priorities for agriculture as outlined in the draft VIth Plan and with AID's program priorities as elaborated in the most recent CDSS.

a. GOT Priorities

The VIth Plan places a heavy emphasis on the importance of better conserving and utilizing Tunisia's scarce soil and water resources. Agricultural research is cited in the text as one of the top three priorities for investment, with "particular attention accorded to the concrete needs of the farmer".

In line with this analysis, the investment planned in research has been tripled from the TD 14 million allocated in the Vth Plan to TD 41 million in the VIth Plan. It must be recognized, however, that the investment in research remains small relative to the amount programmed for other areas, such as irrigation, which consumes 40 percent of the total investment. As discussed in the economic analysis, the percentage invested in research has scarcely increased from the Vth Plan level. Various reasons have been cited for this, including the failure of the research institutions to use their previous allotments, the lack of convincing demonstrations of research progress in recent years, and the large World Bank assistance planned. In view of these developments, the GOT's decision to increase investment in research must be interpreted as a sign of renewed commitment to the research system.

The Plan, however, covers only the investment budget and, therefore, does not address the most critical financing gap in research, which is the serious underfunding of research operations. The recurrent expenditures problem is chronic throughout the Tunisian public sector (and indeed throughout the developing world), and no quick solution has or can be identified other than more effective use of available resources.

The specific research program to be undertaken is directed toward the priorities identified in the VIth Plan. The coordination of reserach is cited as a vital need. The Plan's analytic documents recognize the interactions among input supply, extension, and research in increasing production and the consequent need to maintain progress in all three.

The Plan emphasizes the requirement for increased cereal and livestock production to maintain Tunisia's food deficit constant in the face of increasing population and growing consumption of high-value foods. With regard to cereal production, the intermediate zones are to receive particular attention, and the research in meeting the needs of the middle-scale farmers in these areas is highlighted. In the field of livestock production, the Plan urges greater reliance on forage crops and programs a doubling of forage crop acreage. Much of this increase is to be obtained by replacing the fallow cycle in the rotation with forage legumes, a particular topic of research under this project.

b. AID Program and Relation to Current Projects

The most recent CDSS (prepared in 1980 for the current fiscal year) and the March 1981 Agriculture Sector Assessment cite research as a necessary complement to better input access in the effort to combat Tunisia's low agricultural productivity. This low productivity relative to other countries with similar agro-climatic conditions is identified as one of Tunisia's major problems and an important contributing factor to rural poverty.

The Agricultural Research Project supports the Mission's development strategy for assistance to the Tunisian agricultural sector. It continues the programmatic emphasis placed on developing and strengthening linkages with U.S. institutions and the transfer of technology in agriculture in previous or ongoing projects, including the ATTP, the CTRDP, and the recently completed Livestock Feed Production and Utilization Project.

The most important way in which institutional linkages will be strengthened will be through the participation of short term consultants from U.S. universities primarily MIAC in the development and carrying out of the research program. In many cases there will be the same professor under whom the Tunisian researchers did their graduate training under the ATT project further strengthening the relationships initiated there. The seminars, short term training and documentation will all support the linkages with U.S. universities and the CGIAR centers.

The project's strategy of building institutional capacity in research and teaching at the operational level is a direct continuation of the ATT project strategy. Like the ATTP, the present project supports development of Tunisia's major agricultural teaching and research institutions by making their human resources more effective. The ATTP focusses on the individuals themselves, providing training to increase their capacity for teaching and research, while this project seeks to establish a more productive environment in which the individuals trained can contribute effectively to agricultural research and education. An important element of the present project's strategy is the desire to create an operational framework into which the returning ATTP participants can fit productively and function more effectively than would be possible given the current lack of organized research programs.

The project complements the work of the CTRDP, although the project area lies north of the CTDA zone. The CTRDP Drylands Farming Systems Research subproject which is now going into its second year of full activities and other agricultural assistance has made active use of the ESAK facilities, strengthening both physical plan and programs in the process. The present project does not duplicate the Drylands subproject which focusses on the arid zone III, although the work done under the latter activity is expected to be of major assistance to the research planned. Despite the plans for a broad research effort incorporated in the PP for this activity, research has in fact been limited to work on cereal varieties and cultural practices. Neither the techical assistance provided nor the institutional capacity at ESAK have provided a meaningful component to-date in either economic or sociological research, nor with an examination of crop-livestock interactions. The work planned under this project will, therefore, complement the CTRDP and help ESAK to make fuller use of the facilities provided under that project.

The project also continues work begun under the Livestock Feed Production and Utilization Project. The FSR approach accords well with the earlier team's emphasis on considering the farm enterprise as a whole in order to identify farm management improvements consistent with the farmers' current systems. The specific recommendations on research needs detailed in the team's end of tour report have been incorporated into the planned research program (including for example the suggested research on medicago/wheat rotations and varietal work in vetch and oats).

The Supervised Agriculture Credit project, whose zone of activity partially overlaps with this project, focusses on making inputs available to farmers. A key element of the credit project is shared by this research project in that both focus on the farm enterprise. Under the credit project loans are approved on the basis of annual and five-year farm plans. This has been a difficult concept to introduce but has been recognized as an important element in making the Supervised Credit Project the most successful agriculture credit program in Tunisia. This activity is being expanded in the research project area by the GOT with their own and other donor funds. The development of the research program with a farmer focus will not only improve the research but will make it easier to extend the recommendations through credit and other extension activities that take a farmer as opposed to a crop focus.

Finally, the project conforms to AID's growing emphasis on Farming Systems Research and Extension. The mission welcomes assistance from the planned FSR/E centrally-funded project in training, technical assistance and evaluation. As discussed above, we believe that this project offers an excellent opportunity to use one of the regional conferences planned under FSR/E to reinforce and publicize the progress made under this project.

2. Other Donor Activities

Two activities planned with assistance from other donors have direct bearing on this project: a major World Bank-funded program to support restructuring of Tunisian research and extension and a smaller ICARDA project in farming systems research.

The proposed World Bank program in research and extension could be part of a larger program of assistance to Tunisia that, in effect, would be an institutional analog of the Bank's structural adjustment loans. If approved, the program would provide up to $250 million, part of which may be used to finance reorganization and strengthening of the research and extension system. The program is now in the early phases of development, with a technical assistance team scheduled to begin work late this year. Tunisian agreement to the restructuring has not been finalized nor has the design itself.

If the current concept is carried through, the restructuring would create a unified national research and extension structure, drawing together the programs and personnel currently dispersed across a multiplicity of organizations. All agricultural research activities would be folded into INRAT, while all extension programs would be combined into a single system controlled by a new Directorate. The research and extension systems would be unified at the local level through the creation of a network of "Support Stations". Each station would be staffed by researchers, extension subject matter specialists, and extension supervisors. On-farm research and extension activities alike would be conducted from the station.

Many details of this plan remain to be worked out before it can be accepted by the Tunisians and implemented. It is not clear, for example, how teaching institutions such as INAT that also conduct research would be affected.

The AID-assisted project, which is based on coordination at the operational, researcher level, has been developed with a view to selecting an approach that would remain valid whether or not the proposed reorganization is actually implemented. Interdisciplinary research management teams taking responsibility for defined programs of research would be equally compatible with the current system or the proposed unified structures. In either case the necessity for decentralized management and coordination as well as better program definition remains critical.

The ICARDA program is also in the planning stages at present. ICARDA proposes to undertake a limited farming systems research program focussed on why the farmers are unwilling to accept the currently available technology. The scale of operations will be on the order of $200,000 annually if IDRC funding is obtained, but considerably less if ICARDA must fund the project alone. While the specific geographical area reamins somewhat undefined, AID/Tunis expects that there will be numerous opportunities for cooperation and collaboration between the ICARDA activities and this project. Other ICARDA activities underway or contemplated that would complement the proposed project include research programs on wheat, legumes, and barley.

The project plans to make considerable use of ICARDA's training programs in research methodology and dryland cropping technologies. The six-month ICARDA program combining field and course work on dryland crops provides an excellent vehicle for upgrading the technical skills of Tunisian researchers and will also be utilized to help particularly promising master's students prepare for thesis research to be conducted under the project. If ICARDA training proves impractical, the project will make use of similar programs at the other international centers (CIMMYT, ICRISAT, etc.).

Collaboration with ICARDA in training and research offers several important advantages to the project. Project-funded cooperation will strengthen the institutional relations between Tunisian institutions and the major international research center in the area. ICARDA training is more directly relevant than U.S. coursework to Tunisia's research and technical environment, reducing the problem of "decompression" faced by participants returning from the U.S. The lower cost and reduced language problem also increase the accessibility of ICARDA training after project completion.

IV. PROJECT ANALYSES

The economic, administrative technical and social analyses completed during project design are summarized in this section. A more detailed consideration of the issues covered in each area is presented in the annexes, which provide additional background information and analysis in support of the points made in this section to meet the concerns raised during review of the PID.

A. Economic Analysis

In evaluating the economic return expected from the proposed project, the economic analysis presented in Annex 13 takes into consideration both the institution-building aspects of the project and the value of the research program as such. It therefore addresses three issues: 1) the expected impact on the project on the efficiency and effectiveness of resource use in Tunisian agricultural research; 2) the level of return anticipated from research in Tunisia and from the specific research program funded, and 3) the appropriateness of the research methodology selected from a standpoint of the efficiency of research fund allocation. Given the practical impossibility of deriving meaningful estimates of the value of either agricultural research or institution building ex ante, the overall approach taken is one of cost-effectiveness rather than cost-benefit analysis.

Methodologically rigorous attempts to measure ex post the return to expenditures on agricultural research have in general demonstrated impressively high rates of return but this general finding cannot be interpreted as implying that all research will have a high return, much less than agricultural research is necessarily the best use for limited development resources. The potential for high benefits relative to costs can only be realized if research is well targeted to relieving farmer constraints, technically sound, and backed up by the other agricultural institutions necessary for farmer adoption of productive technologies.

1. The Value of Increased Efficiency in Research Resource Use

The World Bank estimates that Tunisia's investment in agricultural research and extension is approximately half what it should be relative to other investments in the sector. The VIth Plan indicates an expansion of agricultural research investments in line with the planned tripling of total investments in the sector, but the share of research, extension and studies is to be increased only from 2.4 to 2.6 percent and the total amount -- TD 8 million per year -- remains low. As a rough approximation, it may be estimated that expenditures on research operations at the project's three institutions (including salaries and operating expenses but excluding investment) total on the order of TD 2 million (US$ 3.2 million) annually.

In this situation, allocation of research resources to their most productive use and careful management of those resources is clearly the only viable strategy for meeting Tunisia's need for better agricultural technology. Although a country of Tunisia's size should rely primarily on work done elsewhere for the basic technologies to be used, there remains a substantial need for adaptive, applied and verification research to adjust imported technologies to Tunisian conditions. The project will help to establish a system for such productivity-oriented research.

The need for effective resource use will not become less important if the major World Bank investment in research and extension is implemented. Productive use of very large amount of funds proposed will require that an operational system for formulating well-defined, problem-oriented research programs be in place, The specific approach directs project resources to the operational level and thus provides and excellent balance to the proposed Bank focus on national structure.

Return Expected to Project Research

The overall research topic to be addressed in this project -- the production systems for the northern drylands -- has been identified in the VIth Plan as a priority for agricultural research. The logic behind this emphasis is fundamentally sound and is based on the following reasoning. This semi-arid area is vitally important to national cereal production. Despite this importance it has received relatively little research attention compared to the higher rainfall areas to the north for historical reasons. At the same time, the semi-arid zone has a much greater production potential than the drier areas to the south (which have also been largely ignored by researchers until recently). In consequence, the marginal return to additional investments in technology for the semi-arid zone should be comparatively large. This theoretical argument is buttressed by several analyses of the technical potential of the area for increased production, which have concluded that dramatic yield increases on the order of 50-100 percent are feasible on the small farms. A forthcoming World Bank agricultural sector study argues that the production of cereals, livestock products, and forage could be doubled on the small farms of Northern Tunisia (including the project zone). The draft report cites the need to fit existing technological knowledge into the farmers' production systems as the basis for achieving these gains.

Such unusually high estimates of the potential yield increases are not unrealistic in the present circumstances. The Projet Ble Impact Evaluation cites the doubling of hard and soft wheat yields obtained over the project period. Yet Tunisian wheat yields for 1978/80 were still only 75 percent of the Moroccan average and 54 percent of the Indian average for the same period.

a. The Return to Research in Tunisian Agriculture

The lack of farm relevant research results is not the only factor holding back agricultural growth in Tunisia. In the short run, substantial gains could be made by improving input access and marketing channels with no additional research at all. Over the longer run, however, research is a critical part of the total system supporting technological progress and production growth as argued in AID's 1981 Agricultural Assessment.

The immediate need for improved farmer access to fertilizer will be addressed through the PL 480 multi-year program. That program will support the development of the private sector network for adequate distribution of input to the small and medium producers. The increasing attention to the role of the private sector encouraged by the PL 480 program is an extremely important development for Tunisia's agricultural sector.

Within the agricultural system, however, the "public good" nature of research makes it a logical target for U.S. assistance to the GOT, and one where government-to-government assistance has the least potential for discouraging private sector initiative.

The experience of Projet Ble (Accelerated Cereals Production Project) demonstrates the potential of a coordinated research program to support agricultural growth in Tunisia over a 10-15 year time horizon, as documented by the recently completed Impact Evaluation.

In the absence of a system to bring technologies to the farmer, research results can have little impact on production. The real progress made in average yields over the last ten years, however, demonstrates that the weakness of Tunisia's formal research=extension linkages have not prevented productive technologies from spreading. Clearly the farmers were able to apply the new technologies despite the weakness of the input supply and extension net workers. While one cannot simply assume away the problem of moving technologies from the researchers to the farmers, there is increasing evidence that public sector extension plays a less important role in the process than previously believed. Whatever the system used to transfer technologies to the farmers, the availability of production-increasing technologies suited to farmer conditions will be a pre-condition to its success.

b. Return to Research in the Project Area

Special problems exist in the semi-arid areas that make the need for research more pressing. The barley and forage crops potentially best suited to these regions have received almost no research in Tunisia. Equally important, management of semi-arid lands for continued productivity demands techniques of soil and water management that are quite different from those developed for the higher rainfall areas immediately to the north. Current practices, such as plowing down hills instead of across the contours, are already leading to serious erosion.

Newberg's* analysis supports the view that this is a high-return area for research. If sustainable technologies more attractive to farmers than current practices are not identified, a real danger exists that these lands will suffer serious degradation. The value assigned to sustaining the productivity of Tunisia's limited arable land base and preventing permanent loss of these lands to production is of course very large.

A final motivation for selection of the semi-arid region as a project focus is the possibility of obtaining valuable results within the project's extremely restricted time frame, based on the limited work already done in the area and the already strong commitment of some of Tunisia's leading researchers to this program.

*Tunisia's Agriculture Sector Assessment, March 1981

The cost effectiveness of electing a single area rather than addressing national needs should be self-evident. By focussing on a single related set of issues, the researchers can capitalize on the inter-relationship and complementarities that present themselves rather than idffusing their efforts across the conceptual landscape.

A further limitation of the research strategy by introducing a narrow commodity or discipline focus would, however, make the program less cost-effective. The amount budgeted is not trivial compared to Tunisia's annual expenditure of TD4-5 million for agricultural research. Focussing on too narrow a topic (such as barley or weed control) would be as great an error as choosing too broad a topic (e.g. field crops in Tunisia).

This general argument is reinforced by the specific demands of the project strategy and the geographical area chosen. The interactions between crops and livestock lie at the heart of the semi-arid agricultural system; the two cannot effectively be dealt with in isolation. Equally important, the preliminary work of the agronomists has convinced them that they need the active collaboration of social scientists to identify technologies of value to the farmers. The project's overall strategy of developing a mechanism to coordinate research demands a research topic for which coordination is neither a trivial problem nor an unmanageably large one. The research area identified meets these criteria and is therefore judged to be a cost-effective focus for project research.

3. Cost-Effectiveness of the Research Methodology Selected

The selection of a Production Systems Research (TSR) methodology for the project is based on much the same reasoning as the selection of the geographic region and follows naturally from this choice. The methodology focusses the research effort on technologies that fit within the farmer's current system and that meet his (or increasingly in Tunisia's case, her) needs. This procedure limits the search to potentially useful techniques from the beginning. It thus reduces the chance of costly errors, such as ignoring the value of the straw in developing cereal varieties for small farmer use, and permits researchers to capitalize on indigenous practices with potential for wider applicability.

The decision to use a multi-disciplinary methodology such as PSR is not costless. The specific problem area chosen must be one that justifies the increased "transaction costs" of interdisciplinary research, itself.

Such is the case in the project's area, where farmers already recognize the value of high-yielding varieties, fertilizer and other inputs, and have largely adopted them. In doing so, they have moved their systems away from traditional equilbria into technological "terra incognita" where inputs and outputs interact with more complexity than they are able to handle. In order to develop new, more productive and sustainable systems, their problems must be viewed holistically. The farmers themselves, being relatively new adoptors of improved practices, cannot undertake the integrating work themselves. It therefore falls to the researchers to consider existing interactions and new possibilities to help the farmers move to a new and more productive equilibrium.

The interdisciplinary and problem-solving orientation of the FSR approach enables researchers to fill this role and therefore well-suited to the problem of semi-arid mixed farm management in Tunisia. Moreover, by conducting the research on-farm in collaboration with the farmers the FSR approach shortens the route from initial research to farmer adoption.

B. Administrative Analysis

The Administrative Analysis completed during project design has focussed on three related issues: 1) analysis of the administrative and institutional problems impeding the effectiveness of agricultural research in Tunisia, 2) determination of the administrative capabilities of each institution and their capacity to implement a project such as that proposed, and 3) development of a project strategy that addresses the administrative problems and is consistent with the administrative structure and style of operation of the Tunisian Government.

1. Tunisian Problems of Research Administration

Research in Tunisia has been handicapped by a number of administrative and management constraints. Coordination of activities in pursuit of a well defined and commonly perceived goal is not apparent. As a result, research activities have been scattered, highly self-contained and developed in isolation from each other rather than within the context of coordinated goal-oriented programs. The lack of a clear sense of program deprives research managers of a usable standard for measuring program effectiveness.

The absence of well-defined programs further weakens institutions already forced to operate in a difficult administrative environment. The rigidity of the operating rules, particularly those surrounding management of funds, has greatly narrowed flexibility in management. Disparities between INRAT and INAT salary and perquisites have resulted in research scientists leaving research in favor of teaching. Restricted research operating budgets coupled with low investments in research have limited the scope of research acitvities as well.

A final problem is the proliferation of organizations with responsibilities in the area of agricultural research, encouraged in part by donor activities. Although IMRAT is the principal research organization, it has no formal means of coordinating its activities with those of the other institutions, whether within the Ministry of Agriculture or outside it. The scarcity of research means and the rapid movement of key personnel from one institution to another has created a situation where individual research activities are spread across several institutions, with personnel drawn from one organization using equipment from another on land belonging to a third.

The researchers and administrators have responded to the lack of a formal mechanism by relaying on informal, personal connections to assemble sufficient resources to permit research to be carried on. These ad hoc, personal arrangements provide what is in effect the only coordinating mechanism now in operation, but they have not proved sufficient to the task of developing coherent programs focussed on farmer needs.

2. Current Administrative Capabilities

The strength of Tunisia's agricultural research institutions differs widely, depending on how long they have been established, the administrative structure in which they operate, and the management skills of the administrative personnel. INAT and INRAT, both national institutions that have been in operation in one form or another for over 80 years, have well-established administrative structures fully capable of managing the research and teaching activities

underway according to established GOT procedures. INAT, as a teaching institution, has somewhat more flexibility than INRAT and has made more progress towards a program approach to management. This year, for example, they established departmental budgets specifying the funds available to each for research and other purposes. Neither institution has the degree of control over its internal management procedures that is enjoyed by the semi-autonomous organizations, such as the "offices".

ESAK, by contrast, is a relatively new organization with a limited staff and administrative capacity. It was upgraded from a secondary agricultural school to a 2-year agricultural college in 1977 and next year will admit its first group of students for the four-year "ingenieur agronome" degree. It is planned as one of Tunisia's new network of regional agricultural colleges and, as such, is expected to play a major role in both teaching and research in the zone it serves. At present, however, ESAK has very little experience in the management of research activities. Even after ESAK develops capacity of its own, its program should in any case remain closely tied to INAT and INRAT to ensure the necessary coordination and technical support from the national institutions.

The three institutions clearly have the administrative capacity to carry out the project as planned. The leadership of each institution, and of the DERV, has expressed a strong commitment to the proposed administrative approach. Backed up by the technical assistance to be provided in research management, the RMT should function effectively to develop and manage the planned research program.

3. The Proposed Administrative Strategy

a. The Strategy Selected

The project's strategy for improving research management and coordination in Tunisia capitalizes on the informal cooperation among researchers already in existence. The Technical Program Team is essentially a formalization of the informal researcher groupw now operating. But by assigning a specific research program to the TPT, providing regular management-level overview and monitoring through the joint researcher-manager RMT, and giving the researcher groupcontrol over a specific pool of research funds, the project's administrative structure goes far beyond the informal cooperation now practiced. It does so, moreover, without recentralizing program control at the management level and without giving the researchers more authority that is consistent with the Tunisian governmental and social system.

The approach to be applied thus differs fundamentally from the senior-level "coordinating committee" approach. Such committees have been tried before in Tunisia and have failed because of their inordinate size and unrealistic expectations regarding their ability to coordinate disparate programs nationwide. The principal difference between the RMT proposed and previous committees is that the approach to be used restricts the scope of expected coordination to a single research program (production systems in the Le Kef drylands region and places the program under research control.

The specific program management tools to be applied by the project follow the principals of "research management by objectives". This set of techniques further described in Annex 17, uses goal setting, program and project development and evaluation, project implementation, monitoring and fund management to manage research on a programmatic basis. In applying these management tools, the RMT will develop a Coordinated Research Plan (CRP), encourage broad participation in that plan, develop management protocols for the preparation, evaluation, approval, implementation, and monitoring or research activities (projects), publish an annual accomplishment report, and develop inter-institutional cooperation.

b. Alternatives to the Approach Selected

Three alternatives to the approach identified for the project were considered during project design. These were: 1) a broader attack on the problem of coordination among research, teaching, and extension, 2) selection of a single institutions as the focus, and 3) an emphasis on traditional "management training" rather than an action approach (using a specific program as a mechanism for developing the management system). A fourth alternative -- coordinating all national research in a selected program area such as cereals -- was rejected as infeasible by both the Tunisian and AID design team members.

The problem of research management is part of a broader problem that impedes the effectiveness of research, agricultural education, and extension and reduces the coordination among them. It was determined, however, that this problem is too large to tackle effectively with a project of this size, particularly at a time when the World Bank proposes a major effort to address research-extension linkages. Including extension in the project's focus would require expanding the group of institutions beyond those included and would inevitably dilute the emphasis on research program development. The project design team recognizes the need to involve extension agents in the research process and the project program relfects this need by 1) including a series of seminars and workshops to bring researchers and extension agents together to review the program and 2) carrying out research on-farm, where the active involvement of farmers and extension agents is a central part of the research strategy.

The second alternative, focussing on a single institution, was rejected as well because it would not permit the project to focus effectively on the problems of poor researcher coordination and the lack of clear research programs. These problems, both identified as critical constraints to research, can only be addressed in a multi-institutional context given current practice in Tunisia. As discussed previously, a large part of agricultural research is already carried out jointly, using personnel and facilities of more than one institution. This cooperation, however, has not been carried the necessary next step to achieve coordination and development of integrated programs. Considered singly, neither INAT nor INRAT (much less ESAK) has the resources necessary to put together an integrated program, suchas that proposed in production systems research. The research management at the three institutions recognizes this, and has, therefore, actively supported joint development of such a program by scientists from the three institutions. This programmatic approach to managementoffers a promising alternative to confronting the

problem on the basis of a single institution. It is also equally consistent with the planned restructuring of research and with the current system.

A program of traditional management training to improve research administration was also rejected as inappropriate to Tunisian conditions and likely to be less effective than the proposed approach. Theoretical lectures on the value of coordination, interdisciplinary cooperation, and program design, even accompanied by case studies or role playing, cannot be expected to have the same impact as actually developing and implementing a program using these principals. Moreover, by combining the development of a decentralized management system with a specific program of research, the project can achieve concrete progress in both the technical and administrative areas, rather than in only the latter.

C. Technical Feasibility

The research program to be funded by the project is technically sound, well-adapted to the needs of the project area, and within the capability of the three institutions. The technical analyses provided in Annexes 14 and 15 further describe the relationship between the production systems research program, the needs of the project area, and the farming system research approach as applied elsewhere.

This summary addresses four issues of particular concern:

1. the technical capability of the three institutions to carry out an interdisciplinary program in production systems research,

2. the potential for increased production in the area and the role of research in realizing that potential,

3. the major technical issues to be addressed by the research, and

4. the research approach to be used and its relation to the FSR methodology. This section will also address environmental concerns raised by the project.

1. Technical capability of INAT, INRAT, and ESAK

The strongest evidence of the technical capability of the three institutions is that this project is itself a response to a request for funding for a multi-disciplinary production systems research program, rather than an AID-generated initiative. Agronomic and social scientists at the three institutions have recognized that interdisciplinary cooperation is needed and developed a technical and institutional approach to achieving it.

INRAT is the major Agricultural research institution in Tunisia with a core staff of 50 professionals, it operates central facilities in Tunis and a network of 23 experimental farms. The primary focus of their research is in the areas of plant breeding, agronomy, and plant pathology all centered about the commodity focus of cereals. Recent interest in cereal-forage rotations has resulted in additional research in irrigation, forage production, and animal science. A primary objective has been the development of high yielding durum and bread-wheat varieties, with increased emphasis on barley planned.

INAT the major agricultural college, has increased staff involvement in research over the last five years. It has built a demonstrated capability in agricultural economics as well as in several agronomic areas including fertilizer responses, forage varieties and systems, tillage methods, weed control and plant breeding. The agricultural economics program has evolved from a limited farm management training activity emphasizing farm record-keeping into a research and teaching program within strong focus on production systems research as well as work in other areas.

Both of these institutions thus have some in-house capability to conduct research in each of the project's technical areas. Their capacity will be further strengthened by the return of ATTP participants. By 1986, INAT's current complement of around 20 PhD.'s and 60 MS's will be expanded by 9 PhD.'s and one MS trained under the ATT, while INRAT will receive an additional 7 PHD.'s and 8 MS's. Formal experience in interdisciplinary research, however, is limited.

ESAK's capability is much more restricted although it has been designated as the regional center that is to specialize in cereal and field crops and a program is underway to upgrade the institution. The construction of a new INRAT field facility at Le Kef adjacent to ESAK, coupled with the emerging research-development capability established there under the Central Tunisia Rural Development Project provides a basic level of competence in areas of cropping systems, cereal breeding, soil fertility and management and weed control. This will be further reinforced when personnel now being trained under the project ATT return to Tunisia. 5 Ph.D's and 8 M.S are scheduled to join ESAK's staff by 1985, more than doubling the current full-time teaching staff of seven.

2. The role of research in realizing the project area's production potential

The project-funded research program will focus on a limited geographical area that is both a major production region and one that has received relatively little attention from researchers. A just-completed World Bank agricultural sector assessment concludes that production increases of 50-100 percent can be obtained in hard and soft wheat, barley, forages, and livestock production, which are the main crops of the project's region. These unusual optimistic estimates are based on research results as well as comparison's between Tunisia's unusually low dry-land yields and those obtained elsewhere under comparable conditions.

Although substantial gains are possible from increased use of inputs and existing technology alone, there is considerable evidence that the current production systems of the intermediate regions need more than marginal adjustment if they are to realize their production potential, whether defined as meeting farmer income and consumption goals or as producing the maximum production value consistent with Tunisia's comparative advantage and national needs. A change in the cropping pattern to substitute a fodder crop for the current fallow season for example, is a major change that the farmers cannot be expected to adopt unless it has been proven by on-farm trials to be superior to the current practice. The role of research in the project area is therefore first to identify the specific adjustments yielding the highest short-term impact on production and, second and more important, to explore alternative crop and livestock patterns with greater long-term potential for the intermediate region.

3. Selection of major technical issues to be addressed

A. The Research Program

The project's research strategy, in keeping with the production systems methodology, is iterative rather than determinative: the research program will be redefined and redirected as the team's understanding develops regarding the current production system and the possibilities for improving it. The five major areas identified in the project description must therefore be regarded as a starting point rather than a blueprint for project research.

Research will focus initially on the current system, moving from a definition of major production sub-systems to testing of marginal alterations offering immediate benefit and finally formulation of modified systems offering a better mix of crop and livestock activities. Interdisciplinary research to analyze the farmer's needs and problems will be the conceptual starting point, focussing the initial

on-farm research around the basic elements of the current system. These determine the starting point for research, which will examine farmer-identified problems in crop-livestock interactions, tillage and cultural practices, livestock management, varietal adaptiveness, and crop mix. The research program will then extend into other areas mutually identified by the TPT as promising. These may include examination of the role of tree crops in the production system, for example, or the possibility of off-season irrigation of fodder crops.

4. The Production Systems Research Approach

The research methodology to be used by the project has its origins in the French "systemes de production" technique, an approach stressing socio-economic surveys to define the structure of production (typology of production systems) and microeconomic analysis of farm management. Working with a group of agronomic scientists at INAT and INRAT who perceived a need for economic inputs to their work, the production systems group is developing a uniquely Tunisian methodology that shares many of the characteristics of farming systems research. It goes well beyond the cropping systems approach through its emphasis on the crop-livestock interaction but, as presently formulated, focusses more narrowly on the production aspects of the farmer's system. Home consumption is included as it affects production planning, for example, but it will not receive the in-depth analysis theoretically called for by the FSR approach.

5. Environmental Concerns

An Initial Environmental Evaluation recommending a Negative Determination was submitted with the PID. Redesign of the project does not a-fect the conclusions of that evaluation.

Greater consideration of environmental problems, particularly soil erosion and long-term productivity of the project region, is a major focus of the proposed research effort. The overall impact of the project on the semi-arid zone is therefore expected to be positive. Research activities will make use of agricultural chemicals (fertilizer and pesticides), which are an accepted element of improved semi-arid land management and a necessary adjunct to non-chemical means of pest and weed control in cereal and other field crops. As discussed in the IEE (Annex 9), pesticide use will be restricted to EPA/FAO approved chemicals. All chemicals will be used with appropriate professional supervision and careful monitoring of residual levels in products for human or livestock consumption will be conducted as part of the research. Crops and livestock produced on research plots using unapproved chemicals will not be released for human or animal consumption. Since the areas involved in project research will be limited to small trials, there is virtually no risk of measurable environmental damage from project activities.

D. Social Analysis

Tunisia has made extraordinary strides in the past 20 years. Between 1969 and 1980, its GDP increased by a yearly 7.5%, with per capita yearly incomes reaching $1130 in 1980. Income and production growth in the agricultural sector, however, has far led to keep pace with other sectors, and agricultural labor has decreased by 41%. The agricultural indicators in the statistical table presented in the annex suggest the problems that plague the sector.

The inability of agricultural research to apply itself to farmer's needs is one of the biggest constraints to agricultural production in Tunisia. The project addresses this problem by supporting an interdisciplinary and inter-institutional group of researchers determined to direct their combined research effort to farmer's needs. The immediate aim of the project is to define a two-way, iterative methodology by which knowledge from the field is fed back into research, to establish a sound basis for linkage to teaching and through estension workers, to the farmer. The ultimate goal of the project is to improve and increase production through that integrated approach to research.

The sociological analysis summarized here differs from that of the typical PP because of the nature of this project, which centers around the institution building process. The analysis has focussed on three levels of agricultural research and training: 1) teaching - research interactions; 2) institutional development; and 3) farmer - extension research linkages. (For more detail see Annex 18)

1. Teaching-Research Interactions

Linkages between research and teaching are a recurrent theme in the agricultural sector of the VIth Plan. This is particularly significant because it points to the increasing acceptance of a need to change the research status quo. The redirection and readjustment of the eductional and research systems to meet rural needs is a condition for agricultural development in Tunisia. The proposed World Bank program reflects this new awareness.

The most immediate impact of the AID-funded project on the teaching research relationship will be the creation of institutionalized, and therefore more formal, linkages between researchers and teachers at the three institutions, a truly revolutionary approach in the Tunisian context. A principal aim in creating these linkages is to redirect research and teaching towards the understanding and analysis of rural needs through field-oriented, interdisciplinary research on systems of production. Several levels of linkages that affect the teaching-research relationship will be strengthened in the project: between researchers and teachers, between disciplines, between working professionals (both researchers and teachers) and students, and between academics, scientists and farmers.

The short term impacts on the integration of teaching and research are significant, commonly-pursued research goals will be achieved through self-determination and increased group decision-making capability the self-esteem of researchers, students, and teachers will increase the problem-solving orientation of research will focus teaching and students research on farmers' constraints; students will be involved in field work that will help to break down the barriers between agricultural professionals and the farmers.

The long-term impacts can be even more far reaching: greater interest in the approach will encourage new interdisciplinary research teams to be set up; research programs managed jointly by researchers and teachers will lead to better research-teaching outputs; listening to the farmer will allow for more meaningful data and research results; meaningful research results will lead to better research planning and to greater involvement in policy-making.

2. Institutional Development

Institutional linkages are presently based on personal contacts between individuals and not on an institutional support system, due to lack of budgetary support for such linkages and administrative problems. The full potential of researchers and teachers at the various institutions is therefore never completely put to use.

Internal and external factors at the institutions affect the quality and the output of research as well. The most important internal factors are a lack of sensitivity among professionals to farmers' needs because of social alienation, a lack of field orientation in teaching, and a lack of material support to both research and teaching. The primary external factors are unrealistic planning of needs by either public or private sectors and the high unemployment of trained agriculturalists, especially among lower-echelon cadres and laborers.

The creation of a Research Management Team with institutional linkages, supported by the leadership of each of the institutions concerned, will set a precedent for coordination and planning of interdisciplinary research and will strengthen international as well as national ties through its workshop-seminar activities. Most important, the farmer will be seen as a partner in research rather than an impediment to it - a novelty to both farmer and researchers. Moreover, the RMT will serve as an example to the administration: inter-institutional coordination, based at the operational level (that of the researchers and teachers in this case) is possible and is productive. This realization will support the valid researcher claims for greater attention to the status of research institutions and the need for equality between teaching and research institutions.

3. Farmer - Extension - Research Linkages

The Tunisian farmers are faced with many problems that heighten their exposure to risk. Increasing desertification, irregularities of rainfall. overgrazing of pasture land, rural exodus of labor and of active youth, the old age of male farmers (who average 55 years old), parcelling of land impeding efficient mechanization, indebtedness, etc. all contribute to raising the cost of failure.

The land ownership pattern in Tunisia in 1977 was:

Size of Farm (Ha.)	% of Farmers	% of Land
Less than 5	40.8	6.1
5 - 50	55.0	53.9
51 and more	4.0	29.0

The 4% of the farmers with large land holdings have been able to gain access to new crop specific technology and introduce it into their system with relatively less difficulty and risk. In the 5 to 50 hectare farm category, the introduction of new technology becomes more risky for the farmer because of impact it may have on other parts of his system. An increasing portion of farmers in this category today are women and have their own particular set of problems.

The extension program in Tunisia has been less effective in reaching this group for a number of reasons including: a) weaknesses in the extension system ifself, b) lack of technology developed and adapted particularly for this group where relationships within the farm system are more important, c) lack of effective linkages with the research system to jointly identify farmers' problems and new technologies that can be effectively adopted by the farmer within his system to meet his priorities and goals.

This project will address the last two of these constraints. It will focus on the development of new technologies that address problems of and fit within the small and medium size farmer system. It will also involve the extension agent in research activities and research seminars to strengthen linkages between the two groups. Involving professors and graduate students in this type of research activity will increase the sensitivity of future extension agents who are now being trained to the farmer's problems and the need to consider aagriculture development in the context of the farmer's system rather than the incremental amounts of crop and livestock products required to meet national consumption requirements. One of the most important changes created by this project is to focus greater research attention on female farmers: their needs, constraints and potentials.

4. Project Beneficiaries

"The farmer as client" should be the leitmotiv of the project. Such an approach will have far-reaching impacts on research and training: the farmers, by seeing their needs addressed, will cooperate actively in research conducted on their fields; extension workers participating in the program will realize the importance of listening to the farmer; students with field experience will become better cadres, researchers and teachers; research will address immediate production problems rather than develop technological packages of little relevance to the farmers.

The beneficiaries of this project will therefore by the institutions, benefitting from the better organization of research; the students, teachers and researchers, benefitting from cohesive research programs that integrate research into teaching and national goals; and the farmers, whose problems will be better perceived and addressed.

V. FINANCIAL ANALYSIS AND PROJECT PLAN

The financial plan for this project has been developed based on the budget submitted with the PID, but modified to reflect the revisions in the project concept. The modifications required have been somewhat less than might be expected because the current project concept represents in large part a return to an earlier concept veloped in cooperation with the GOT, for which the budget submitted with the .D was originally developed.

The main revisions in the budget, other than a reformatting along standard lines, are an increase in the amount allocated for the research activities that will make up the program funded and a substitution of more short-term training for the long-term training originally planned. The latter change is in line with the overall effort made to focus the project more tightly around the research program funded, since participants sent for long-term training could not return in time to participate effectively in the program funded through this project.

A. Overview of Project Funding

The AID contribution of $3.5 million will finance 53 percent of project costs, including 20 percent of local currency costs and all foreign exchange expenditures. The full amount will be obligated in the form of a grant in FY 1982. The GOT will contribute the equivalent of $3.1 million in local currency (TD 1.8 million), to finance 47 percent of total project costs of $6.6 million, including 80 percent of the local currency requirement.

The table below indicates the breakdown of total project cost by major category of expenditure and by source of funds. Tables V-2 through V-5 detail the schedule of AID and GOT expenditures by fiscal year, the local currency and foreign exchange components of the AID contribution, and the estimated allocation of AID inputs by project output categories (sources and uses of AID funds).

TABLE I

Summary Financial Plan
($000 or equivalent)

	AID				GOT		TOTAL AID Co		
	$	LC	T	%	LC	%	T	% as % of Total	
Technical Assistance	553	139	692	27	-	-	692	15	00
Participant training	230	-	230	9	115	5	345	7	67
Commodities	1060	40	1100	42	634	30	1734	37	63
Research Projects	42	323	365	14	296	14	661	14	55
General Ops. and Misc.	88	42	130	5	192	9	322	7	40
Evaluation	60	15	75	3	-	-	75	2	100
GOT Personnel	-	-	-		886	42	886	19	-
Sub Total	2033	559	2592	100	2123	100	4715	100	55
Inflation	478	178	656	25	727	34	1383	29	47
Contingency	198	54	252	10	212	10	464	10	54
Total	2709	791	3500	135	3062	144	6562	139	53

Table V-2 AID Budget by Fiscal Year ($000)

	FY 1983	FY 1984	FY 1985	FY 1986	TOTAL
Technical Assistance	104	198	210	180	692
Long-term	30	120	120	90	360
Short-term	74	78	90	90	332
Research Management	(30)	(10)	(10)	(10)	(60)
Social Scientists	(20)	(20)	(20)	(20)	(80)
Technical Specialists	(24)	(48)	(60)	(60)	(192)
Participant Training	37	67	69	57	230
US Observational	7	16	16	7	46
US Short-term	-	18	19	18	55
3rd country 6-mo. course	30	30	30	30	120
3rd country special course		3	4	2	9
Commodities	545	410	115	30	1100
Basic research equipment	450		70		520
Documentation	20	410	45	30	505
Hardware		(250)			(250)
Software		(60)			(60)
Books and reference	(20)	(100)	(45)	(30)	(195)
Vehicles	50				50
Office equipment	25				25
Research-projects		73	156	136	365
Operating expenses		60	120	100	280
Special equipment		13	36	36	85
General Operating Expenses and Miscellaneous	28	34	34	34	130
Conference, Workshops and Seminars	25	25	25	25	100
Project office operations and supplies	3	9	9	9	30
Evaluation		30		45	75
SUB TOTAL	714	812	584	482	2592
Inflation	71	170	193	222	656
Contingency	65	81	58	48	252
TOTAL	850	1063	835	752	3500

Table V-3

GOT BUDGET BY FISCAL YEAR ($000 - 1TD = $1.70)

	FY 1983	FY 1984	FY 1985	FY 1986	TOTAL
Training	19	37	33	26	115
Travel	8	16	15	12	51
Salary	9	17	14	11	51
English Language	2	4	4	3	13
Commodities	125	224	115	170	634
Equipment & Facilities	20	115	105	100	340
Documentation					
Hardware	100	50			150
Books & Periodicals		5	10	15	30
Office Equipment	5	5			10
Vehicles		49		55	104
Research Projects Funds			72	224	296
Operating Expenses			60	200	260
Special Equipment			12	24	36
General Operating Expenses	5	52	65	70	192
Conference Workshop & Seminar		5	10	10	25
Project Office	5	10	10	10	35
Vehicle Operations		35	40	45	120
Research Publication		2	5	5	12
GOT Personnel	29	136	278	443	886
Researcher	20	33	85	160	298
Research Tech.		30	90	150	270
Research Admin.	6	9	9	9	33
Computer Operator		18	18	18	54
Secretary	3	6	6	6	21
Drivers		25	25	25	75
Graduate Student		15	45	75	135
SUB-TOTAL	178	449	563	933	2123
CONTINGENCY	18	45	56	93	212
INFLATION	18	94	186	429	727
TOTAL	214	588	805	1455	3062

Table V-4

Breakdown of AID Contributions by Local Currency and Foreign Exchange Costs

($000)

	FY 83		FY 84		FY 85		FY 86		TOTAL	
	$	LC	$	LC	$	LC	$	LC	$	LC
Technical Assistance	83	21	158	40	168	42	144	36	553	139
Long-term	24	6	96	24	96	24	72	18	288	72
Short-term	59	15	62	16	72	18	72	18	265	67
Participant Training	37		67		69		57		230	
U.S.	7		34		35		25		101	
Third Country	30		33		34		32		129	
Commodities	509	36	410		111	4	30		1060	40
Basic Research eqpt.	427	23			66	4			493	27
Documentation	20		410		45		30		505	
Vehicles	50								50	
Office Equipment	12	13							12	13
Research Projects			6	67	18	138	18	118	42	323
Operations				60		120		100		280
Equipment			6	7	18	18	18	18	42	43
General Operations	22	6	22	12	22	12	22	12	88	42
Conferences - Seminars	22	3	22	3	22	3	22	3	88	12
Project Officer		3		9		9		9		30
Evaluation			24	6			36	9	60	15
SUB TOTAL	651	63	687	125	388	196	307	175	2033	559
INFLATION	65	6	144	26	128	65	141	81	478	178
CONTINGENCY	60	5	69	12	38	20	31	17	198	54
TOTAL	776	74	900	163	554	281	479	273	2709	791

Table V-5

Project Input/Output Matrix (AID Inputs)
($000)

Outputs/Inputs	Technical Assistance	Training	Commodities	Research Projects	Other Cost	TOTAL
1) System for Management of Cooperative Interdisciplinary Research	486	40	135		75	736
2) Program of Applied Production Systems Research	270		405	492		1167
3) Increased Staff Capability	97	270			170	537
4) Strengthened Agricultural Institutions	81		945		34	1060
TOTAL	934	310	1485	492	279	3500

Since the research program funded will represent an expansion of GOT activity in the area financed, AID will contribute a part of the research operation expenses. AID's share will be reduced progressively from 100 percent in the first year to 66 percent in the second year and 33 percent in the third and final year while the GOT will provide a proportionately increasing share, enabling them to establish the project's budget in the Ministry's regular operating budgets by the end of AID financing. Since the level of research activities will increase as the proportion financed by AID declines, AID will contribute approximately one half (55 percent) of total non-personnel research expenses for the life of the project.

AID's contribution to research operations is balanced by the relating large share of total cost financed by the GOT. In keeping with Tunisia's status as a middle-income developing country, the planned tripling of the research investment budget (in current terms), and the phaseout of the AID program, the GOT will provide a substantial share of project costs in the areas other then research operational generally financed by donor contributions in cooperative projects. The GOT will finance one-third of participant training costs and nearly 40 percent of the projec commodities, as well as all GOT personnel costs, bringing their contribution to nearly one-half of project cost.

As recommended in the PID review, the allowances for inflation and contingency have been increased. In preparing the budget an annual inflation rate of 10 percent has been assumed in all categories and a contingency fund is included equal to 10 percent of all costs, pre-inflation.

B. Project Disbursement Mechanism for Research Operation Expenses

Disbursement of project monies, both AID and GOT, will in general follow the accepted procedures followed in other AID-assisted projects. Disbursements for research operating expenses, however, will utilize a "regie," a mechanism selected because of the greater speed and flexibility with which funds can be disbursed. Although this mechanism has been applied to other MOA programs and is fully within the existing Tunisian financial regulations, its application to a research program in the Ministry's line agencies represents an important administrative innovation. The precedent established through this project, and the specific regie established through it in the DERV, has the potential to greatly reduce administrative bottlenecks in the expenditure of research operating funds.

1. The Disbursement Problem

The GOT's disbursement mechanisms, built on the French colonial model, are designed to ensure complete control over all expenditures in advance rather than to facilitate implementation of programs requiring flexibility, such as agricultural research. The resulting financial and administrative procedures at the ministry and agency levels reduce the effectiveness of the already extremely limited research operating expenses. In order to ensure the availability of a basic stock of chemicals, for example, the Director of INRAT must place a bulk order covering the year's needs as soon as the annual allotment is made by the Ministry of Finance. Needs identified later cannot be met, both because the budget for the year has already been spent and because the delay encountered between making a specific request and receiving the item in question is so long that few researchers make the attempt. Delays of six months are routine, with lapses of a year or even two by no means uncommon.

Since the allotment received is an unpredictable fraction of the amount originally requested, neither the research management nor the scientists themselves are able to program operating expenses according to agreed-upon research priorities. The administrative response has instead been to centralize control over whatever small flexibility remains in the annual allotment and to meet as many researcher requests as possible, issuing the supplies stockpiled on a first come first served basis.

Although this situtation is naturally viewed as unsatisfactory by both the researchers and the management-level officials, they have not been successful in finding a solution. The search to date has focussed on trying to change the statutory status of INAT, INRAT, and other institutes to make them semi-autonomous agencies with control over their own funds on the pattern of the "offices" (the Office des Cereales, etc.). To date this has not been successful, for a variety of political reasons.

Discussions with Ministry officials during project design identified the "regie" mechanism as an alternative that, while providing considerably less freedom than a change in status, would represent a significant improvement over the current situation.

2. The Regie Mechanism

A "regie" is simply a rolling cash account that permits expenditures to be made almost immediately against approved line items in the budget that are included in the regie. Establishment of a regie requires a request from the ministry involved and approval from the Ministry of Planning and Finance. An accountant or administrative officer is then assigned by the Finance Ministry to handle the account. This individual may be a Finance Ministry employee but, if the regie does not need a full-time manager, it may also be any qualified individual designated by the requesting ministry. The manager ("regisseur") may then make disbursements up to a fixed amount for the agreed-upon purposes, replenishing the account as it is drawn down to make purchases or reimburse expenditures.

The Ministry of Agriculture already has a limited number of regies. One exists, for example, under the control of the administrative section for the repair of Ministry equipment. The mechanism has in general been reserved for "special cases" where greater flexibility is needed; research has not previously been recognized as such a special case. Agreement to establish a regie for this project thus represents a modest but important breakthrough in streamlining research management procedures.

The regie mechanism is by no means a cure-all for the administrative problems plaguing research in Tunisia. Disbursements through the regie must follow the same regulations as other disbursements. Reimbursement of per diem expenses through the regie for example, does not circumvent the problem of unreasonably low per diem levels but it does open up the possibility of contracting for hotel space on a monthly basis or making other arrangements permitted within Tunisian regulations to facilitate operating in the field. Numerous other examples could be cited.

The regie approach is preferable to the principal alternative considered, contracting with a semi-autonomous agency in the MOA (such as one of the "offices")

to disburse research operating expenses. The latter approach would provide somewhat greater flexibility but it offers no long-term advantages for research administration. Moreover, it raises the danger that the"office" involved would assume more than an administrative role in the project. In no way does it strengthen the internal management mechanisms of the DERV system. The regie system is therefore preferable on several grounds. If, however, the regie cannot be implemented or if it proves inadequate to the project's needs, consideration will be given to using another mechanism such as a contract with one of the"offices". Although it is possible that INAT and INRAT will succeed eventually in gaining status as semi-autonomous agencies with the right to hold accounts of their own, thus permanently solving the problem, this eventuality cannot be relied on to occur in time to meet the needs of this project.

VI. IMPLEMENTATION PLAN

The primary responsibility for project implementation will rest with the Ministry of Agriculture. AID's role will be limited to regular project monitoring by the project officer and participation in project evaluations.

Day to day management of the project will be the responsibility of the Project Director, a member of the RMT and leader of the Program Team. This individual will be backed up technically and programmatically by the other members of the TPT and in addition will receive administrative support from the project-hired administrator.

Overall project policy, including the approval of research projects for funding under the project, will be determined by the RMT, which will ratify Program Team decisions and also provide the GOT with management level supervision and monitoring of project progress.

A. Implementation Schedule

The Implementation Schedule shown below indicates the timing of important project accomplishments The interrelationship of project activities is shown in the PERT chart (Annex 11). Project-funded assistance to research management at the three institutions (research management workshops, etc.) is indicative of the type of activities planned. These activities cannot be fully programming in advance of implementation, since efforts to improve research management will have to be largely explorative and adaptive, rather then directive or based on an imported bag of tricks associated with any single management model.

Implementation Schedule

Date	Accomplishment	Responsibility
September 1982	Project Agreement Signed	AID/GOT
October 1982	Proposals requested from potential contractor(s)	AID/GOT
	Researchers begin informally to develop Coordinated Research Program (CRP) guidelines	GOT
December 1982	Project Director formally named	GOT
	Proposals including draft contract submitted to USAID and GOT	HCC
January 1983	Vehicles ordered	AID/GOT
March 1983	Management team formally established	GOT
	Contract approved and signed	GOT/HCC
	Resident advisor identified; TDY arranged	HCC
	Short-term training at ICARDA	GOT/ICARDA
April - May 1983	Research planning workshop conducted	HCC/GOT
	Project research priorities and criteria for first year research proposals finalized and CRP submitted to AID	GOT
	TDY to finalize basic equipment specifications and plan first workshops	HCC/GOT

Implementation Schedule

Date	Accomplishment	Responsibility
June 1983	Commodity procurement begins	HCC/GOT
	Financial mechanism for disbursement of research expenses formally established and administrator assigned	GOT
July-September 1983	Resident advisor arrives	HCC/GOT
	Proposals approved by team	GOT
	Vehicles arrive	GOT/CHRYSLER
	Research management and proposals workshops to discuss and finalize initial research proposals	HCC/GOT
	Proposals approved by team	GOT
Oct./Dec. 1983	First 4-8 stage I research projects begin	GOT
	Development of plans for short-term training and consultants	HCC/GOT
	Computer procurement planned and procurement begins	HCC/GOT
	First set of equipment arrives	HCC
March-June 1984	Documentation and data analysis hardware received and installed	HCC/GOT
	First group of short-term participants to U.S.	HCC
	Second group of short-term participants to ICARDA	HCC
July-August 1984	Research progress, review and accomplishment reporting workshops following first year of research	HCC
August-October 1984	Preparation of Annual Report	GOT/HCC
	Submission and approval of second set of research proposals (10-15) (Stages I and II)	GOT
	Short-term training and consultants continue	HCC
	First external evaluation	GOT/AID/HCC

Implementation Schedule

Date	Accomplishment	Responsibility
October-August 1985	Second Year of research implementation PSR Stage I activities continue and Stage II activities begin	GOT
	Short-term training and consultants continue	HCC
	Procurement of specific research equipment continues	HCC
July-August 1985	Accomplishment and Progress	HCC
	Reporting workshops following second year of research	
August-October 1985	Preparation of Annual Report	HCC/GOT
	Approval of final set of research proposals (10-15)	GOT
October 1985	Final year of research implementation	GOT
August 1986	Final short-term participants and consultants	HCC
	Research/extension workshop	
August	Final Project Evaluation with	AID/GOT/HCC
September 1986	Recommendations to GOT on research management	
	Long-term advisor departs	

B. Procurement and Contracting Plan

The principal commodities and services to be procured under the project are technical assistance, participant training, research equipment and supplies, vehicles, and data analysis hardware. Of-shore procurement and arrangements for participant training will be the responsibility of the technical assistance contractor. The single exception planned is the procurement of AID-funded vehicles in accordance with the AID/MOA standardization plan at the beginning of the project through a host country contract. This is necessary to ensure arrival of the vehicles in time to begin research in the second year of the project and has proven effective under other AID projects in Tunisia. Local commodities (including imported equipment procured off the shelf) will be the responsibility of the participating Tunisian institutions, with the assistance of the project, administrator. Procurement will be in accordance with AID and GOT regulations.

Procurement of research equipment will take place in two phases. In the first phase, the contractor will procure basic equipment identified as necessary to upgrade the research capacity of the three institutions. A short-term team will be provided by the technical assistance contractor immediately upon contract

signature to prepare specifications for this equipment and initiate procurement. The initial listing of equipment needs is shown in Annex 21 .

The second phase will consist of procurement by the GOT and TA Contractor of specific equipment identified as necessary for the research projects funded. Equipment needs will be included in the research proposals submitted to the research committee and, if approved, will be included in the budget authorized. This practice both increases the scope of committee decision-making and eliminates the purchase of specialized equipment before a specific need has been identified.

The technical assistance services will be provided through a Host Country Contract with a U.S. land grant university or consortium. The MOA will function as the contracting institution, with the Project Director serving as the counterpart of the long-term advisor.

It is strongly recommended that the technical assistance contract be negotiated on a sole source basis with MIAC, the consortium of land-grant universities currently implementing the ATT project. While sole source procurement is not absolutely necessary for project success, it is highly desirable and serves the best interests of the United States government, for the following reasons:

a. The MidAmerica International Agricultural Consortium (a group of Midwestern land-grant universities) is one of two U.S. university groups currently carrying out an agricultural program in Tunisia. It has had substantial experience with the Tunisian institutions that will participate in the project -- DERV, INAT, INRAT and ESAK -- and is organizing the training programs of approximately 83 Tunisian PH.D and M.S. agriculture students, many of whom are scheduled to work at those institutions upon their return to Tunisia (1982-1986).

b. MIAC is the only consortium of U.S. university groups in operating in Tunisia and (the other is Oregon State University) and has sufficient breadth of appropriately trained and experienced personnel and the deep institutional capacity to handle the needs of the project. Two of its members (Kansas State and Missouri) are particularly strong among U.S. universities in farming systems research.

c. Continued participation by MIAC would strengthen existing ties between U.S. and Tunisian personnel, an important objective of the overall A.I.D. program as it phases out. It could also provide continuity in the collaboration between MIAC personnel and ATT participants.

d. The Tunisian Government has formally requested that contracting be limited to at most, the two university groups currently in Tunisia; they have stated their preference for this project's contractor to be MIAC. Their request is based on the reasons outlined above and their concern that efficiencies that would otherwise obtain through the continuation of contacts with an institution with current experience in Tunisia would be lost, and that scarce resources would be dissipated in orienting another group for a limited, three-year project.

These reasons are consistent with the waiver criteria in items 4 and 5 in HB 1 Supplement B Section 12C4a(2)(a) (predominant capability, avoid impairment of foreign assistance objectives).

VII. EVALUATION PLAN

Both internal and external evaluations will be conducted within the project.

A. Internal Evaluations

These evaluations will serve as a monitoring mechanism and will be periodic, taking place every 3 or 4 months to coincide with RMT meetings. They will be informal and will take the form of regular workshops and seminars designed within the project and organized by the institutions concerned to discuss project progress, air problems on a timely basis and identify actions needed at the management level.

The goal of these regular evaluations is three-fold:

(a) to help synthesize actions and results obtained, problems and constraints met during that period and, most importantly, to allow researchers to reconsider their approach and the extent of interdisciplinary interactions;

(b) to highlight particular problems within the themes to be discussed in the seminars or workshops (which will be determined by project timing);

(c) to present a critical summary report of activities and of the workshop or seminar to the presiding members of the RMT.

B. External Evaluations

These evaluations will be the joint responsibility of AID and the GOT. Two external evaluations are planned: one at the project midpoint and one at the end of the project, that is at the end of years 2 and 4. A two or three member team will be fielded for each. The goal of the team will be to measure the process of development of the project through discussion with the researchers and others. They will address the essential questions of whether interdisciplinary work has been effective and supportive of research,whether the research program is demonstrably directed to farmers and whether better results have been obtained through field-oriented research.

The end-of-project evaluation will be equally valuable for GOT research management, the researchers involved and AID since the research program will continue after the project. The span of four years should allow sufficient time to permit the evaluators to address the following questions:

(1) To what extent have research and teaching become more closely related to each other at INAT and ESAK?

(2) To what extent has an iterative process of communication been established between researchers, teachers, extension agents and farmers?

(3) To what extent has the project's approach created the necessary interest for similar actions to take place in different research and teaching departments?

The international seminar planned for the final year of the project will contribute to the project's evaluation and lesson-learning process. The seminar will group researchers, particularly from Africa, who have done similar interdisciplinary and action-oriented research in mixed systems of production. The goal of the international seminar's strategy of allowing researchers to share experiences of successes and difficulties will also offer a forum for the Tunisian hosts to present the outcome of their activities.

VIII. CONDITIONS, COVENANTS, AND NEGOTIATING STATUS

The GOT has cooperated actively in the preparation of the project design and has reviewed the final draft at both the technical and planning levels of the Ministry of Agriculture. No issues remain to be negotiated prior to signature of the Project Agreement, which can proceed immediately upon project authorization, in accordance with normal procedures.

Two covenants are proposed for inclusion in the grant agreement. The first covenant will reinforce the GOT commitment to make all project-funded commodities (including vehicles) available for the exclusive use of the project, except as may otherwise be agreed in writing. The second covenant will commit the GOT to continuing the research activities initiated under this project. Furthermore, they will be continued through the management structure established until such time as the National agricultural management structure is revised and the research activities of this project can effectively be absorbed under it.

A. Conditions Precedent to Initial Disbursement

Only the standard conditions will be required for initial disbursement, including naming of a Project Director and specimen signatures.

B. Conditions Precedent to Subsequent Disbursements

In addition to standard conditions, the following conditions precedent to subsequent disbursement will be included in substance in the grant agreement:

1. Prior to the first disbursement by AID of research operations funds the GOT will provide in form and substance satisfactory to AID:

(a) evidence of the establishment of a financial mechanism to permit prompt procurement of goods and services for approved research activities, including the name of the person responsible for controlling the funds for those goods and services,

(b) evidence of the establishment of the Research Management Team within DERV,

(c) a copy of the Coordinated Research Plan and the criteria for approving individual research proposals, as developed by the Research Management Team.

2. Prior to disbursements for the second and third years of research operations the GOT will provide evidence that GOT funds in the amounts of 1/3 and 2/3 of the expected project research operation cost for the second and third years, respectively, have been made available through the finanical mechanism described above.

ANNEX I

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 87 to FY 94
Total U.S. Funding $1.5 million
Date Prepared: 8/11/87

Project Title & Number: Agricultural Research 664-0327

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: Achievement of Tunisia's objectives for agricultural production and rural quality of life.	**Measures of Goal Achievement:** Agricultural production increases % annually, with growth of 1.0% annually in grains and 1.5% annually in livestock products.	National agricultural statistics	**Assumptions for achieving goal targets:** a. Research program produces farmer-relevant technologies that increase farm production. b. Prices, input system and other agric. institutions permit farmers to employ technologies. c. Private sector and public extension systems effective in connecting technologies to farmers. d. Research system able to adopt improved management system.
Project Purpose: To implement a program that coordinates and carries out interdisciplinary, interinstitutional research on Tunisian farm production systems and develops an effective system for coordination and management of research by objectives.	**End of Project Status:** a. The programmed reviews of research results determine that research conducted is producing useful information to improve production in the target area. b. Continuing interdisciplinary "production systems" research program underway with effective control by researchers involved, with the active involvement of researchers and students from INRAT, INAT and Le Kef, and focussed on farmer problems. c. Concept of management by research objectives has been applied to at least two other research programs.	Project final evaluation finds that: a. 50% of INRAT/INAT/ESAK research in cereals and other field crops carried out in interdisciplinary interinstitutional framework and clearly focussed on farmer problems/national priorities. b. 50% of graduate student research directly tied to identifiable research programs. c. 25% of researchers do at least part of research on farmers' fields or addressing problems identified by farmers.	**Assumptions for achieving purpose:** a. Researcher management produces observably better coordination and programatic results than previous system. b. Interdisciplinary onfarm approach applicable in Tunisian research system. c. Research committee able to obtain continued funding and institutional cooperation.
Outputs: a. Development and testing of a system for management of interdisciplinary, cooperative research programs. b. An integrated program of applied "production systems" research directed to farmer needs and 7th plan objectives. c. Increased INRAT/INAT/ ESAK staff capability in interdisciplinary research methodologies, including production systems research, and research management skills. d. Strengthened agricultural institutions producing agricultural professionals committed to meeting farmers needs.	**Magnitude of Outputs:** a. System established and able to continue after project end. b. 30 interdisciplinary, interinstitutional research projects undertaken, and 20 graduate student MS student thesis projects incorporated into program. c. 100 researchers receive advanced training in research methodology and management. d. Research and teaching programs integrated.	a. Project Reports b. External Evaluations	**Assumptions for achieving outputs:** a. Sufficient MS students/choose topics related to project. b. Researchers in specialties needed willing to cooperate with project. c. Farmers in target region agree to participate actively. d. Authorities delegate sufficient control over research programs to researchers. e. Researchers able to design and carry out research program cooperatively.
Inputs: a. TA (long and short term) Research equipment, supplies and other commodities Operating Expenses Participant Training (long and short term) GOT personnel GOT research facilities	**Implementation Target (Type and Quantity):** (see Project Budgets)	Project records	**Assumptions for providing inputs:** a. GOT retains commitment to agricultural research as planned. b. GOT able to generate sufficient investment resources to follow plan. c. Institutional cooperation continues d. US university can mobilize staff with needed skills. e. Project-funded resources reserved for project use.

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IKM (.II.)

REPUBLIQUE TUNISIENNE

MINISTERE DE L'AGRICULTURE

D.E.R.V

N 3401 DERV

Tunis, le - 3 MAI 1982 19

Received 5/4/82

N O T E

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L'Attention de Monsieur Fliginger

A.I.D. - Tunis -

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J'ai l'honneur de porter à votre connaissance que la Direction de l'Enseignement, de la Recherche et de la Vulgarisation serait intéressée de poursuivre le Projet relatif à l'Enseignement et la Recherche Agricole qui a été développé grâce à nos efforts conjoints. Je vous saurais gré du soutien continu de votre bureau en vue de mener à bien la conception finale du projet de manière à ce que nous puissions entamer son exécution aussi rapidement que possible.

Pour la suite du processus de la phase de conception, je souhaiterais que nous considérons l'exécution du projet de concert avec d'autres projets connexes en cours. Dans le souci d'une telle coordination et en vue de commencer rapidement l'exécution de ce projet, je voudrais également vous demander que nous considérions l'un ou l'autre ou les deux contractants qui sont déjà engagés dans la réalisation de projets de développement agricole en Tunisie.

Il reste entendu que la mise en oeuvre de ce projet reste tributaire de l'accord définitif et officiel des instances de décision du gouvernement Tunisien et notamment le Ministère de l'Agriculture et le Ministère du Plan et des Finances.

Le Directeur
de l'Enseignement, de la Recherche
et de la Vulgarisation.

Signé : H. HAFSIA

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ANNEX 3

PROJECT AUTHORIZATION (DRAFT)

Name of Country: Tunisia

Name of Project: Agricultural Research

Number of Project: 664-0327

1. Pursuant to Section 531 of the Foreign Assistance Act of 1961, as amended (the "FAA"), I hereby authorize the Agricultural Research Project for Tunisia involving planned obligations of Three Million Five Hundred Thousand Dollars ($,500,000) in grant funds, subject to the availability of funds in accordance with the A.I.D./OYB allotment process, to help in financing foreign exchange and local currency costs for the project.

2. The project consists of agricultural research activities, the provision of technical assistance and commodities related thereto and participant training in agricultural research subjects.

3. The Project Agreement(s) which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with A.I.D. regulations and delegations of authority shall be subject to the following essential terms, covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Goods and Services

Goods and services, except for ocean shipping and participant training, financed by A.I.D. shall have their source and origin in the United States or Tunisia, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States. Participant training financed by A.I.D. under the project, shall, except as A.I.D. may otherwise agree in writing, be conducted in the United States, Tunisia or countries in A.I.D. Geographic Code 941.

b. Conditions Precedent to Disbursement

Prior to the first disbursement, or to the issuance by A.I.D. of documentation pursuant to which disbursement may be made under the Project Agreement Tunisia shall furnish to A.I.D., in form and substance satisfactory to A.I.D. the name of the person appointed to serve as Project Director for the Project.

Prior to the disbursement of funds for research operations, or to the issuance by A.I.D. of documentation pursuant to which such disbursement may be made, Tunisia shall furnish to A.I.D., in form and substance satisfactory to A.I.D.: evidence that a financial accounting and disbursement system has been established (including the name of the project fiscal officer) to handle project research funds.

4. I hereby approve the following waiver:

a. Sole Source Procurement of Technical Assistance Contractor

I authorize the procurement of technical assistance, commodities and related services for the project in an amount up to $2.5 million from the Mid-America International Agricultural Consortium (MIAC), of which amount approximately $1.2 million is for commodity and participant training services which MIAC would procure on a competitive basis consistent with its normal procurement practices.

5. I hereby determine in accordance with Section 612(b) of the FAA that: (a) the expenditure of United States Dollars for the procurement of goods and services in Tunisia, as authorized above, is required to fulfill the purposes of this project; (b) the purpose of this project cannot be met effectively through the expenditure of United States local currencies for such procurement; and (c) the administrative official approving local cost vouchers may use this determination as the basis for his (her) certification as required by Section 612(b) of the FAA.

M. Peter McPherson
Administrator

ANNEX 4

Draft Annex A to the Project Agreement

Agricultural Research Project No. 664-0327

I. OBJECTIVES

This project supports achievement of the Tunisian VIth Plan (1982-1986) goals for increases in agricultural production and improvements in the quality of rural life for small and medium-scale farmers.

The project will do this through the implementation of a program that coordinates and carries out interdisciplinary research on mixed farm production systems. The innovative organization of this program will provide a model for an effective system of coordination and management of research by objectives in Tunisia. The program will be defined and carried out cooperatively by the researchers of INAT, INRAT, and ESAK to strengthen these teaching and research institutions, direct their research to meeting farmer needs and provide a solid foundation for extension of the system.

By the end of the project, a continuing interdisciplinary "production systems" research program will be underway under the effective control of the researchers involved, supported by MOA's research managers, with the active involvement of researchers and students from the three institutions, and focussed on farmer problems. The research management system developed will be established as an effective method of research coordination in Tunisia, leading to its application to other research areas.

II. PROJECT INTERVENTIONS

Establishment of a Research Management System

The primary project output is the establishment of a research management system through the application of management by objective to a specific program of research.

The heart of the concept is formation of a Research Management Team (RMT) that draws together individuals from both the management and operational levels into a single group. This group oversees the development and implementation of an identified research program.

The RMT is chaired by the Director of Research, Extension, and Education Directorate (DERV) and includes the directors of the three participating institutions and a group of researchers who provide leadership to, and are themselves active in, the program of research.

The RMT has two elements: the management team as a whole and a smaller working level group composed of the researcher members of the team, the Technical Program Team (TPT).

The RMT as a whole sets the overall directions of the program and monitors program progress. It acts on the recommendation of the TPT to approve projects for funding under the program.

The key element of the system, however, and the main factor differentiating it from other "coordinating committees" is the Program Team. The TPT will enable the researchers to develop and implement a coherent program of their own. Once projects and their respective budgets are approved by the RMT, the TPT will have the authority to approve individual activities, to make adjustments within approved budget levels, and in general to manage the execution of research projects.

A second major element of the system is the greater flexibility in fund disbursement achieved through instituting a "regie" or rolling cash fund under the control of the TPT. The regie system permits disbursements to be made against approved line items without prior approval of the agency director.

The establishment of the RMT is expected to provide a practical means of coordination, to build inter-institutional tie at the operational level, and to create a mechanism for developing interdisciplinary research programs clearly focussed on identifiable farmer needs and national goals.

To reinforce these improvements in research management at the three institutions, the project will conduct training seminars, provide technical assistance, and undertake other activities designed to extend the project's management improvements to other research activities.

2. A Program of Production Systems Research in the Northern Drylands

The second major project output is an interdisciplinary program of research directed at increasing production in the northwestern semi-arid region.

This program extends and integrates two ongoing research programs: 1) a program of socio-economic research by an INAT/INRAT group to define the production systems of this region, and 2) a program of cereal breeding and other agronomic research.

By integrating the two programs, redefining the scope and priorities of the combined program, and adding a stronger component of livestock and forage crop research, the scientists of the three institutions will build, in effect, a Production Systems Research Program (PSR) for Zone II.

The PSR program itself will proceed in three stages. First, the socio-economic survey work will be broadened to include agronomic and livestock components, leading to a definition of the major production systems used by farmers in the agroclimatic sub-zones of the region with particular emphasis on farm management problems and opportunities. Second, specific interventions fitting within the current system will be identified based on the work in stage 1 as likely to increase production and incomes and will be tested on farm in close cooperation with the farmers themselves. Third, the research group will develop and test more significant departures from the current system, based on their improved understanding of farmer goals, risk and production variation in the area, and the potential for more productive uses of the area's land and water resources.

These stages are conceptual rather than strictly chronological. The analytic work begun in stage one does not cease when technology trials begin in stage two, nor does the rethinking of current systems in stage three wait until all marginal changes to that system have been tested in stage two.

3. Increased Capacity in Interdisciplinary Research Methodologies and Research Management

The program will strengthen and institutionalize the current system of informal cooperation by Tunisian researchers across disciplines and institutional boundaries.

This capacity will be reinforced by the project's training activities, both in-country and overseas. Through the project, researchers will receive advanced training in specific methodologies needed to carry out a program of interdisciplinary, applied research on farms and in particular aspects of research management, such a development of project budgets and formulation of research proposals.

4. Strengthened Agricultural Training and Research Institutions

The project will reinforce the three institutions' participation in the research program. Incorporation of graduate student research by INAT ("3e cycle")students will both strengthen the research program and make their training more relevant to the farmer's needs. The improved integration of teaching and research activities at INAT and ESAK through the active involvement of the students in the research program will build these institutions' capacity to produce agricultural professionals who are receptive to farmer perspectives and who have a field orientation to their work. The participation of extension personnel in the implementation of research projects and in the annual seminars to review research results and further define and direct the research program will be mutually beneficial to both the research and extension institutions.

III. ADMINISTRATIVE ARRANGEMENTS

The project administrative structure recognizes the dual responsiblity of researcher and manager for the development of balanced research programs serving national needs. The structure developed has three main components: 1) the Research Management Team, including both management-level and researcher members; 2) the Technical Program Team, made up of the researcher members of the RMT, and 3) the day-to-day administration and management mechanism made up of a Project Director selected from among the RMT members, supported by the resident advisor and a professional administrator to handle logistical matters.

1. The Research Management Team

The RMT will set the overall guidelines and policies of the research program, upon recommendation from the TPT, and will approve research projects for funding under the project, after they have been reviewed and developed by the TPT. The RMT is expected to meet on a quarterly basis.

In selecting projects for funding, the RMT will follow an agreed-upon set of criteria, to be developed with the assistance of the technical assistance team working with the TPT and the Project Director. Proposals for interdisciplinary research conducted on-farm with the active involvement of students and researchers drawn from more than one of the participating institutions will receive preference over proposals not meeting these criteria.

2. The Technical Program Team

The researcher-members of the RMT will form the Technical Program Team, with primary responsibility for developing and implementing the research program funded. Working together, they will develop the program priorities and criteria for selection of activities, review specific research proposals, and monitor the progress of the research.

3. The Project Director

One of the members of the RMT will be selected to serve as Project Director upon appointment by the Minister.

The Project Director will be the counterpart of the long-term advisor as well as the individual responsible on a continuous basis for the management of the project. The Director will carry out the decisions of the RMT and the TPT, in accordance with the responsibility and authority delegated to him by the Chairman of the RMT, the Director of the DERV. If the Project Director is a researcher from INAT or INRAT, allowance will be made for the time requirements of the position by reducing that person's regular teaching and/or research load.

A project administrator will be hired and assigned to the project on a full-time basis. The duties of the administrator will be to assist the Project Director with the logistical, financial, and other administrative matters related to implementation of the project. The administrator will in particular be responsible for local procurement, for supervising operation of the "regie" to ensure rapid disbursement of research operating expenses and proper accounting, and for overseeing the scheduling of project-funded resources, particularly vehicles.

The administrator will also assist the Project Director and resident advisor in administrative matters relating to participant training, the holding of conferences and seminars, short-term technical assistance, etc.

The administrator will be assisted by a staff of secretaries, drivers, and other support staff assigned to the project office by the GOT.

4. Project Disbursement Mechanism for Research Operation Expenses

Disbursement of project monies, both AID and GOT, will in general follow the accepted procedures followed in other AID-assisted projects. Disbursements for research operating expenses, however, will utilize a financial mechanism selected to provide the speed and flexibility with which funds need to be disbursed to effectively carry out agricultural research activities.

A "regie" or rolling cash account that permits expenditures to be made almost immediately against approved line items in the budget that are included in the regie will be established.

An accountant or administrative officer will be assigned to handle the account. He, the "regisseur", may then make disbursements up to a fixed amount for the agreed-upon purposes, replenishing the account as it is drawn down to make purchases or reimburse expenditures.

IV. PROJECT FINANCING

1. A.I.D. Financing

Assistance in the form of A.I.D. grant funds are provided for the following:

	(000 U.S. Dollars)
Technical Assistance	692
Participant Training	230
Commodities	1,100
Research Projects Expenses	365
General Operating Expenses	130
Evaluation	75
Subtotal	2,592
Inflation	656
Contingency	252
TOTAL	3,500

The above budget items may be shifted up to ten percent without formal amendment of the project.

2. Government of Tunisia Financing

In kind and Tunisian Dinar Contributions are provided for the following:

	(000 U.S. Dollar equivalent) 1 TD = $1.7
Personnel	886
Training	115
Commodities	634

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Research Projects Funds	296
General Operating Expenses	192
Subtotal	2,123
Contingency	212
Inflation	727
TOTAL	3,062

3. Details of A.I.D. Financing

(1) Technical Assistance

The technical assistance financed by A.I.D. will be for one resident advisor for up to three years and short-term consultants for up to 30 person months. The Ministry of Agriculture will negotiate a contract acceptable to A.I.D. with a U.S. university or consortium of universities to provide these services. The contractor should have experience in procurement of commodities and services in accordance with A.I.D. regulations.

The long-term advisor will be responsible for assisting the RMT to put together an integrated, well designed research program on production systems in the semi-arid region and for advising the team on the management of the research program as well as the overall management of research under DERV, especially at INAT, INRAT, and ESAK. He will be supported in commodity procurement,placement of participants, and arranging for the services of short-term consultants by the university or consortium awarded the technical assistance contract.

Short-term technical assistance will provide: a) specialized management advice and conduct workshops in research management (approximately 8 person months), and b) assist the Tunisian scientists in the design and implementation of the individual research projects (approximately 22 person months).

(2) Training

The participant training financed by A.I.D. will iclude approximately 30 person months of U.S. short-term courses to upgrade researchers skills in particular area related to the coordinated research plan. It will also include training for approximately 16 junior researchers and research technicians in agricultural research methodologies and specific subject matter areas for 6 months each in the U.S. or at one of the International Agricultural Research Centers.

(3) Commodities

U.S. financed commodities will have their source and origin in the U.S. except for "shelf items" in Tunisia as allowed under standard A.I.D. regulations. They will include six automobiles (to be procured in accordance with the USAID/Tunisia project vehicle standardization plan), research laboratory and field equipment, computer terminals, and library reference and resource books and journals.

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(4) Research Project Expense

Since the research activities of this project will represent an increase over currently budgeted research activities, A.I.D. will co-finance the operating expenses with the GOT. A.I.D. will provide 100 percent of the operating expenses in the first year (1983-84) up to $90,000, 66 percent in the second year (1984-85) up to $225,000 and 33 percent in the third year (1985-86) up to $210,000.

(5) Other Expenses

Other inputs financed partially by A.I.D. will include in-country conferences and seminars, and participation of Tunisian researchers in international seminars related to this project.

4. GOT Inputs

a. Personnel

The GOT will finance the researchers, students, and other professional and support staff necessary for project implementation. In addition to the management staff and researchers from INAT, INRAT, and ESAK active in the research program and/or working with the management team, the GOT will finance a project administrator who will handle the administrative details of the project under the direction of the Project Director and additional drivers and support staff needed by the project.

b. Participant Training

The GOT will finance international transportation and staff salaries in support of the project's training program. All short-term participants, including students, will continue to receive their salaries (or student stipends, as appropriate) during training.

c. Commodities

To promote establishment of regularized research investment budget, the GOT will contribute a share of the commodities budget ranging from a low of around 20 percent in the case of basic research equipment and documentation (exclusive of current facilities available to the project), to over 50 percent in the case of vehicles. The GOT will purchase research equipment using local currency and will provide mopeds and heavier vehicles to supplement the AID-funded vehicles.

d. Research Project Expenses

The GOT share of research expenses, as described above, will increase from zero in the first year to 67 percent in the third year and 100 percent thereafter.

e. Other Expenses

The GOT will finance vehicle operations and the in-country expenses associated with operation of the project office, the management team, and in-country seminars and conferences.

They will fund the participation of GOT officials in the two external evaluations planned for the project as their contribution to the evaluations.

ANNEX 5

STATUTORY CHECKLIST

5C(2) PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only: B.1. applies to all projects funded with Development Assistance Funds, B.2. applies to projects funded with Development Assistance loans, and B.3. applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. FY 1982 Appropriation Act Sec. 523; FAA Sec. 634A; Sec. 653(b).

   (a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that amount)?

   Routine Congressional Notification. Yes.

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,00, will there be

(a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	Yes	Yes
3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?	None required.	
4. FAA Sec. 611(b); FY 1982 Appropriation Act Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973? (See AID Handbook 3 for new guidelines.)	N/A	
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?	N/A	

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6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.	No. Project is limited in its scope, but potential for later involvement or replication by other donors is possible.
7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	Project is directed in large part at improving technical efficiency of Tunisian agriculture.
8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	U.S. university will provide technical assistance. U.S. goods will be purchased.

9.	FAA Sec. 612(b), 636(h); FY 1982 Appropriation Act Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.	A 612(b) determination is requested to use dollars to buy some local currency.
10.	FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?	Tunisia is near excess currency country.
11.	FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?	A sole-source waiver is requested to maximize efficiencies in technical assistance contract. A proprietary procurement waiver is requested for vehicles for similar reasons.
12.	FY 1982 Appropriation Act Sec. 521. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?	N/A
13.	FAA 118(c) and (d) Does the project comply with the environmental procedures set forth in AID Regulation 16? Does	Yes.

the project or program take into consideration the problem of the destruction of tropical forests?

14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)? — N/A

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria — N/A, an ESF project.

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and

otherwise encourage democratic private and local governmental instituti (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) uti. ze and encourage regional cooperation by developing countries?

b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?

c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?

d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activitiy with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than $100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character

f. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage

institutional development; and supports civil education and training in skills required for effective participation in governmental processes esential to self-government.

2. Development Assistance Project Criteria (Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest. — N/A, an ESF project.

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

c. ISDCA of 1981, Sec. 724 (c) and (d). If for Nicaragua, does the loan agreement require that the funds be used to the maximum extent possible for the private sector? Does the project provide for monitoring under FAA Sec. 624(g)?

3. Economic Support Fund Project Criteria

a. FAA Sec. 531(a). Will this assistance promote economic or political — Yes, through improved agricultural production. Yes.

	stability? To the extent possible, does it reflect the policy directions of FAA Section 102?	
b.	FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities?	No.
c.	FAA Sec. 534. Will ESF funds be used to finance the construction of the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives?	No.
d.	FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	N/A

ANNEX 6

WAIVERS AND JUSTIFICATION

Justification for Code 941 Waiver for Participant Training -

The rationale for such a Code 941 waiver is as follows: (1) certain participant training courses provided by international research centers (e.g., CIMMYT, ICARDA, ICRISAT) are more relevant to the training of Tunisians in this project than training in the United States or Tunisia; (2) the participant training envisioned is largely of a short-term nature, for which English language training and special orientation would not be cost effective and would unduly delay project implementation; and (3) the cost of third-country training in code 941 countries (e.g., Syria) will be less than such training in the United States, particularly when per diem and air transportation costs are taken into account. This is consistent with items (2)(b), (f) and potentially (c) in the waiver criteria in HB 1 Supplement B, Section 5C4a (no suppliers in eligible countries, other circumstances critical to the success of project objectives and cost from eligible suppliers exceeds that from others by 50 percent).

It should be noted that non-U.S. and non-Tunisian training sites will be chosen only where appropriate for project purposes. The cost of such training would not exceed $165,000.

JUSTIFICATION FOR SECTION 612(b) DETERMINATION

Recommendation to Purchase Tunisian Dinars with U.S. Dollars

Over the life of the project approximately $900,000 will be used to support local currency expenditures that the Tunisian Government will make to support specific agricultural research projects in Tunisia and other related items in support of this project. Dollar funds will be used in association with GOT disbursement of Tunisian dinars for the costs of travel, per diem, shipment of household effects of the project resident advisor, related project support costs such as secretarial and interpreting services, special costs associated with training and related miscellaneous costs. The U.S. contractor will purchase dinars with U.S. dollars provided by the project in accordance with procedures prescribed by A.I.D. The contractor will be responsible for many of the expenditures which will be made in accordance with the agreements reached between A.I.D. and the Tunisian Government.

One reason for using dollar funds in conjunction with Tunisian dinar costs of the ESF project is that this represents an additional real resource to the Tunisian economy and supports efforts by the Tunisian Government to implement new initiatives. Although Tunisia is a near-excess foreign currency country, it is believed that it will not be so for much longer, and the amount of U.S.-owned local currency available to A.I.D. is restricted to that which is not allocated for other priority purposes. Accordingly, the availability of excess local currency at any point in time cannot be predicted.

The Tunisian contribution to this project of not less than $2.0 million equivalent in local currency is evidence of their support for and interest in this innovative activity.

Given the above considerations and the fact that the Agricultural Research Project is fully consistent with the mandate of the Foreign Assistance Act, we have concluded certain local currency project costs should be dollar funded.

JUSTIFICATION FOR SOLE SOURCE PROCUREMENT OF TECHNICAL ASSISTANCE CONTRACTOR

The technical assistance services will be provided through a Host Country Contract with a U.S. land grant university or consortium. The MOA will function as the contracting institution, with the Project Director serving as the counterpart of the long-term advisor.

It is strongly recommended that the technical assistance contract be negotiated on a sole source basis with MIAC, the consortium of land-grant universities currently implementing the ATT project. While sole source procurement is not absolutely necessary for project success, it is highly desirable and serves the best interests of the United States government, for the following reasons:

a. The MidAmerica International Agricultural Consortium (a group of Midwestern land-grant universities) is one of two U.S. university groups currently carrying out an agricultural program in Tunisia. It has had substantial experience with the Tunisian institutions that will participate in the project -- DERV, INAT, INRAT and ESAK -- and is organizing the training programs of approximately 83 Tunisian PH.D and M.S. agriculture students, many of whom are scheduled to work at those institutions upon their return to Tunisia (1982-1986).

b. MIAC is the only consortium of U.S. university groups in operating in Tunisia and (the other is Oregon State University) and has sufficient breadth of appropriately trained and experienced personnel and the deep institutional capacity to handle the needs of the project. Two of its members (Kansas State and Missouri) are particularly strong among U.S. universities in farming systems research.

c. Continued participation by MIAC would strengthen existing ties between U.S. and Tunisian personnel, an important objective of the overall A.I.D. program as it phases out. It could also provide continuity in the collaboration between MIAC personnel and ATT participants.

d. The Tunisian Government has formally requested that contracting be limited to at most, the two university groups currently in Tunisia; they have stated their preference for this project's contractor to be MIAC. Their request is based on the reasons outlined above and their concern that efficiencies that would otherwise obtain through the continuation of contacts with an institution with current experience in Tunisia would be lost, and that scarce resources would be dissipated in orienting another group for a limited, three-year project.

These reasons are consistent with the waiver criteria in items 4 and 5 in HB 1 Supplement B Section 120a(2)(a) (predominant capability, avoid impairment of foreign assistance objectives).

Annex 7

Draft Scope of Work for Contract Technical Services

The Contractor will provide staffing adequate to meet the objective of the project. Present estimates of technical assistance needs are as follows:

	P.M.
1) Long term	
Research Management Specialist	36
2) Short term	
Agricultural Research Program/Project Planning	4
Agricultural Research Project Management	2
Agricultural Research Evaluation	2
Data Analysis and Documentation	1
Agricultural specialties in Support of Research Program	16
Social Science Specialties in Support of Research Program	8

1. Scope of Work for the Resident Advisor

The Research Management Specialist will adivse the Team and provide technical and managerial assistance as needed to support development of the project's program in production systems research. Specifically, the advisor will:

a) As Chief of Party, be responsible for planning, coordinating, and implementing activities with Tunisian colleagues.

b) and schedule the work program of the short term advisors.

c) plan, schedule and conduct, with the assistance of short term advisors, workshops and/or seminars in program planning, research management, project preparation, project evaluation, project/program reporting, and others as necessary for the success of the project.

d) provide guidance and assistance to the management team and participate with them in the functions and activities of the team and its committees.

e) assist in the planning of short term participant training, arrange suitable training programs and participate in the selection of trainees.

f) assist in the procurement of dollar funded commodities and in particular to take overall responsibility for off-shore procurement.

g) serve as the counterpart of the Tunisian Project Director.

h) assist in the development of a research management information system.

i) participate in external and internal evaluations

k) provide quarterly reports to AID and the GOT on project activities and accomplishments.

The incumbent must have previous experience, a minimum of 3 years, in the management of agricultural research. Included in this experience must be a demonstrated ability to plan and manage research programs as well as to plan, prepare, evaluate, conduct and monitor and administer research projects. Academically he or she must have a PhD and have held previous positions including responsibilities equivalent to those of a university department head, experiment station director, national program staff, or program leader.

The individual must speak and read French to at least the FSI 2+ level, with a strong preference for FSI 3 or higher. Experience in research management in developing countries is preferred. Research experience should include involvement with an FSR program or at a minimum, demonstrated experience with interdisciplinary approaches and on-farm research.

Short-term technical assistance

Short-term advisors will be required in three areas: research programming and management in agronomic and livestock sciences, and social sciences. The experts provided in the first category will supplement the long-term advisor in the preparation and conduct of seminars, workshops, and other activities to

improve the management of the research program.

The technical specialists in(both agricultural and social sciences) will provide technical advise to the individual researchers to improve the design and implementation of their research activities. They will advise on methodological and technical, issues as needed. Since the precise nature of the research to be funded cannot be specified at this time, it is not possible to predict the specific requirements, but it is anticipated that specialists will be required in the full range of disciplines relevant to the farming systems of a mixed dryland field crops/livestock area. These may include cereal, forage, and legume breeding and agronomy, pest control, grain quality, soil science (including tillage practices), livestock management, and other agricultural specialties. Social science disciplines likely to be required include agricultural economics (particularly farm management and household economics), sociology, anthropology, and statistics. Short-term assistance will also be needed in data management, library science, and data analysis.

ANNEX 8

Response to Issues raised in the PID Review

In reviewing the PID, the NEAC and Project Committee raised several issues. These have been addressed in preparing the project paper and are reflected in the PP text. The responses are summarized here for ease of reference.

1. Lack of Required Analyses (Para. 7A in the NEAC Response Cable)

The PP includes complete technical, social, economic, and administrative analyses, as required. The implementation plan showing the project schedule and detailing the procurement and contracting plans has also been provided.

2. Specification of Research Priorities (Para. 7B)

The project research focus has been identified as concentrating on the semi-arid northern mixed farming zone. The research will follow a "production systems methodology" that uses interdisciplinary survey analysis and on-farm trials to analyze the major production systems of the area, identify and test marginal improvements, and explore major modifications to the system. The farms of the project area are primarily mixed cereal-livestock enterprises, which dictates a project focus on dryland cereals, forage, and livestock management. As appropriate, the research program may be broadened out from this focus to address the needs of the area. Initial topics identified for research include tillage and cultural practices, weed control and fertilizer application, varietal adaptation for reliability and yield, livestock management (particularly sheep, but also including cattle), and the mix of crops grown.

The program focusses on the region immediately north of the CTRD region and will therefore complement the research underway through that project on cereal varieties and cultural practices.

3. GOT Commitment to Coordination (Para. 7C)

The GOT's recently completed VI'h Plan stresses the importance of improving research coordination and directing it toward farmers' needs. Their commitment is evidenced not only by their active support of the project design, but also by their recent agreement to undertake an in-depth review of the research and extension structure as part of a World Bank "institutional structural adjustment loan" analysis and by the tripling of the resource allocation to research in the VIth Plan.

4. Feasibility of Addressing institutional Problems (Para. 7C)

The project strategy is based on the conviction of design team members and GOT officials alike that the most effective means of addressing the institutional problems of research is through development of a mechanism for coordination of specific research programs that decentralizes control of these programs to the researchers themselves. The multi-institutional approach dictated by this strategy in effect goes around the severe structural disarray at the upper level to focus on improvements at the operational level. While this approach does not provide a cure-all for such nearly intractable institutional problems as low public-sector salaries, it offers the best promise of any course of action available to a project of this scope and should provide the GOT with a mechanism

that they can apply whatever the institutional structure adopted.

5. The Project's Administrative Structure (Para. 7C)

The project's administrative structure, which establishes a researcher program team with a management-level oversight committee, has been designed to provide a simple coordination mechanism that will be effective in the Tunisian administrative environment. By itself, it will not coordinate all research, nor even attempt to coordinate all activities of the three institutions. It will instead create a system for developing and implementing a specific program of research that can be applied within the existing structure. Establishment of other programs can be accomplished using the structure in place with this projectby simply identifying other researcher groups and assigning them the responsibility to design and implement programs in other priority areas (irrigation management, for example), and identifying a portion of the cooperating institution's research budgets to finance their activities. Progressive adoption of this approach would result, in effect, in a system of inter-institutional, coordinated program budgets under decentralized management.

6. Linkage to the International Centers (Para. 7C)

The project has been designed to dovetail with planned ICARDA activities and to reinforce ICARDA's in-country linkages. (This is discussed fully in the section on Other Donor Activities).

7. Project Budget

The project budget's have been reformulated following standard agency practice. Adequate allowance has been made for inflation, contingencies, and project evaluation. The cost factors used for technical assistance, participant training, and commodities include sufficient margin for contractor overhead.

ACTION: AID-8
INFO: AMB DCM
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ATO

DEPARTMENT OF STATE

TELEGRAM

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TAGS:
SUBJECT: AGRICULTURAL RESEARCHV ECT - 664-0327 - PRC
REVIEW OF INTERIM DESIGN REPORT

REF: (A) STATE 177724; (B) PRC ISSUES PAPER, 9/14/82;
(C) TUNIS 5768; (D) TUNIS 5771; (E) TELCON J.
PHIPPARD/R. JOHNSON/AUCHTER, 8/9/82

1. PROJECT REVIEW COMMITTEE (PRC) MET ON AUGUST 4 AND REVIEWED THE INTERIM DESIGN REPORT (SECTIONS I AND II). WHILE REF (A) STATED AID/W WOULD NEAC THE INTERIM REPORT BEFORE ADVISING ON DEVELOPMENT OF PP, EVENTS AND TIME HAVE OVERRIDEN THIS APPROACH, SO THE FOLLOWING COMMENTS ARE FOR YOUR GUIDANCE IN SUBMITTING THE PP OR SUPPORTING DOCUMENTATION TO THE PP.

2. NEAC/PRC ISSUES ADDRESSED IN REPORT:

(A) THE INTERIM REPORT CONTAINED SUFFICIENT INFORMATION TO SATISFY THE SUBSTANTIVE ISSUES AND CONCERNS OUTLINED IN REFTEL (A) AND REF (B) REGARDING:

(1) ADMINISTRATIVE ANALYSIS AND PROJECT OPERATIONS.

(2) SOCIAL AND BENEFICIARY ANALYSIS.

(3) IMPLEMENTATION PLAN.

3. NEAC/PRC ISSUES NOT ADDRESSED IN INTERIM REPORT (I.E. MAJOR ISSUES WHICH CAUSED LACK OF PID APPROVAL IN FIRST INSTANCE):

(A) THE DISPERSION OF EFFORT ISSUE STRESSED IN REFTEL (A) PARA (7.B.) THERE IS NOT A CLEAR STATEMENT OF THE PROBLEM THE PROJECT WILL SOLVE. APROPOS TO THIS, THE INTERIM REPORT STILL TENDS TO CONVEY THE IMPRESSION THAT THE RELATIVELY SMALL AID FINANCIAL INPUT TARGETED FOR THIS PROJECT WOULD POSSIBLY BE DIVIDED AMONG SEVERAL RECIPIENT INSTITUTIONS OR IMPLEMENTING ORGANIZATIONS AND, THEREFORE, NOT HAVE THE IMPACT NEEDED TO PRODUCE SIGNIFICANT RESEARCH BENEFITS OR INSTITUTIONAL IMPACT ON A GIVEN AGENCY OR ON THE RESEARCH SYSTEM IN GENERAL. THIS WAS IDENTIFIED IN REF (B) AS QUOTE POSSIBLE DISSIPATION OF RESOURCES AMONG TOO MANY INSTITUTIONS UNQUOTE AND NEEDS TO BE ADEQUATELY

Best Available Document

(B) A SECOND MAJOR CONCERN THAT ALSO NEEDS TO BE ADDRESSED IN THE ANALYSIS SECTION OF THE PP IS THE AREA OF FOCUS OR SPECIFICITY (OR NONSPECIFICITY) OF RESEARCH TOPICS TO BE RESEARCHED AND THE RATIONALIZATION FOR THAT CHOICE. THIS WAS LISTED IN REF (B) UNDER QUOTE NUMBER OF SUBJECT MATTER AREAS WITHIN AGRICULTURE TO BE ADDRESSED BY PROJECT SUPPORTED RESEARCH UNQUOTE. REF (B) ALSO RECOMMENDED QUOTE THAT THE NUMBER OF SUBJECT MATTER AREAS (CROPS AND TYPES) TO BE FINANCED BY THIS PROJECT BE LIMITED TO OPTIMIZE OPPORTUNITIES FOR TANGIBLE END OF PROJECT PRODUCTION OUTPUTS AS OPPOSED TO A COMPENDIUM OF DISCRETE AGRICULTURAL FINDINGS. UNQUOTE.

(C) THE INTERIM REPORT LACKED REFERENCE TO THE ECONOMIC ANALYSIS CALLED FOR IN REFTEL (A). THE POSSIBLE INEFFICIENCIES INHERENT IN THE CONCERNS EXPRESSED IN (A) AND (B) ABOVE AFFECT THE ECONOMICS OF THE AID INVESTMENT PER SE. THERE IS, OF COURSE, AN ADDITIONAL NEED TO JUSTIFY IN ECONOMIC TERMS THE TYPE OF RESEARCH THAT IS TO BE CARRIED OUT

(D) IN CONJUNCTION WITH (A) AND (B) ABOVE, PRC APPRECIATES

NEED FOR USAID S CABLE BREVITY IN INTERIM REPORT. HOWEVER PRC RECOMMENDS THAT ALTHOUGH EX CIRCA PP SUPPORTING DOCUMENTS REFERENCED IN PP MAY BE AVAILABLE TO PP READERS, PP SHOULD BE SELF-CONTAINED, SPELLING OUT MAIN CONCLUSIONS FROM SUPPORTING DOCUMENTS IN ORDER TO PROVIDE A LOGICAL JUSTIFICATION FOR THE PROJECT.

3. NEAC/PRC ISSUES/CONCERNS PARTIALLY OR INADEQUATELY ADDRESSED IN INTERIM REPORT:

(A) PARA 29, REFTEL (C) OFFERS USAID/GOT RATIONALE FOR CONTINUED COOPERATION WITH MIAC IN IMPLEMENTATION OF THE SUBJECT PROJECT A MORE APPROPRIATE RATIONALE FOR A CONTINUATION OF THIS CONTRACTING ARRANGEMENT WOULD BE PRIOR CONTRACTOR INVOLVEMENT AND PERFORMANCE RATHER THAN PREDOMINANT CAPABILITY PER SE.

(B) REF (B) CONCERNS REGARDING PID BUDGET ESTIMATES WERE PARTIALLY ADDRESSED IN REFTEL (C). INASMUCH AS USAID COGNIZANT OF PRC RECOMMENDATION THIS ISSUE, IT IS REITERATED AND PRESUMED THAT DESIGN TEAM HAS ADJUSTED BUDGET TO ADEQUATELY REFLECT PROJECT INFLATION AND CONTINGENCY REQUIREMENTS AND HAS PROVIDED A SPECIFIC LINE ITEM FOR EVALUATION.

4. AID/W CONCURRENCE TO PROCEED WITH PP DEVELOPMENT IS GIVEN CONDITIONED UPON USAID ACTION TO FULLY AND ADEQUATELY ADDRESS ALL NEAC AND PRC ISSUES AND CONCERNS CONVEYED IN REFTEL (A) AND REF (B AND REITERATED ABOVE IN THIS CABLE.

5. PROJECT DESIGN: INTERIM REPORT SUGGESTS PROJECT DESIGN NOW FOCUSED ON DEMONSTRATING THE DESIRABILITY OF AN INTERDISCIPLINARY RESEARCH APPROACH TO SMALL FARM MIXED PRODUCTION PROBLEMS. INDIVIDUAL RESEARCH ACTIVITIES TO BE CONDUCTED WOULD BE MEANS OF DEMONSTRATING THAT THIS QUOTE PROCESS UNQUOTE IS MORE EFFECTIVE THAN CURRENT, BASICALLY UNCOORDINATED APPROACHES. THUS, PROPOSED PROJECT MAY BE SEEN AS A PILOT OR DEMONSTRATION OF A PREFERRED RESEARCH PROCESS WHICHWAXST IS ASSUMED, MISSION EXPECTS/HOPES WILL BE ACCEPTED AND INTEGRATED INTO THE TUNISIAN AGRICULTURAL RESEARCH SYSTEM AS THE STANDARD FOR ALL SMALL FARM RESEARCH. JUSTIFICATION FOR SUCH A PROPOSAL MUST BE FIRMLY BA;ED ON THE STRONG LIKELIHOOD/PROBABILITY THAT THIS SYSTEM AND ITS DEMONSTRATION IS OF PRIORITY INTEREST TO THE TUNISIANS AND WILL BE INTEGRATED INTO OR INFLUENCE THE ENTIRE AGRICULTURAL RESEARCH SYSTEM AS SOON AS POSSIBLE, POSSIBLY WITHIN THE WORLD BANK'S PROGRAM OF PROPOSED ASSISTANCE TO RESTRUCTURE AGRICULTURAL RESEARCH. WITHOUT SUCH EXPECTED LINKAGE, RELEVANCE OF PROPOSAL SUFFERS AS SUSTAINABILITY OF PRINCIPAL INVESTMENT OUTPUT--THE PROCESS--IS IN DOUBT.

6. PLEASE ADVISE WHEN USAID PLANS SUBMIT SIGNED PP TO AID/W. SHULTZ
BT
5261

ANNEX 9

INITIAL ENVIRONMENTAL EXAMINATION

1. PROJECT COUNTRY: Tunisia

2. PROJECT TITLE: Agricultural Research

3. U.S. FUNDING: FY 1982; $3,500,000

4. LIFE OF PROJECT: Four years - 1982 to 1986

5. IEE PREPARED BY: Robert I. Jackson C.W. Collier, AID/W, S&T/AGR/AP

6. ACTION RECOMMENDED: Mission recommends a negative determination

7. CONCURRENCE: C. John Fliginger, Agric. Development Officer
Richard S. Stevenson, S&T/Environmental Officer
Gerald R. Wein, Acting Director, USAID/Tunis

DATE: August 1982

8. DISCUSSION:

This is a multidisciplinary agricultural research project. The project will support research in semi-arid farming systems to form a sound base for continued research relevant to farmers' needs.

The project will have minor impacts on land and water resources within the context of adaptive farming systems research. To the extent that the activities will succeed in identifying improved practices that will enable Tunisian farmers to increase production, t[illegible]vironmental impact will be positive. Better methods of improving and maintaining soil fertility and increased production per unit area will enable Tunisia to strive for self-sufficiency in food production with less pressure on marginal lands. This will result in less soil erosion than would result if increasing population pressure forces more marginal lands into use.

This IEE authorizes the experimental use of 16 differen[illegible] herbicides for weed control in agricultural research - aimed at increasing wheat, barley and oat production. Eight of these herbicides have not been cleared for use by the U.S. EPA nor do they have acceptable daily intakes established by the FAO/WHO. For these eight herbicides the special provisions of A.I.D. Regulation 16, Section 216.3(B) (C)III will be applicable.

Experimentation with the 16 herbicides will emphasize a complete testing of comparativ[illegible] efficacy and every effort will be made to select effective pesticides from those eight chemicals which have been approved by the U.S. EPA or have FAO/WHO clearances. In the event that this is not possible no herbicide will be recommended from the project for extension to farmers without the prior submission to GOT/MOA and GOT/MOH of a report on the pesticide(s) detailing the current status of the pesticide and the potential environmental and health implications surrounding its use.

As the general nature of this project will not produce environmental effects, and for the reasons described above and in this IEE, the Mission recommends action as indicated in Item 6. above, Negative Determination.

9. PURPOSE:

The purpose of this IEE/Risk-Benefit is to allow for the experimental use of 16 different herbicides to establish comparative efficacy data and a scientific basis for pesticide recommendations to the small farmer.

10. ALTERNATIVES, INCLUDING THE PROPOSED ACTION:

Weed control is an essential element in the production of wheat, oats and barley. Search for safe and effective pesticide is necessary if increased production is part of the overall agricultural plan. No economically viable alternative exists to the proposed plan short of only testing "approved" pesticides. Based on the current data base, however, it is impossible to predict if a complete list of herbicides could be selected from the eight "approved" chemicals. Every effort, however, will be made to select, as a final listing for recommendation to small farmers, only those herbicides which have existing EPA and/or FAO/WHO clearances for the same or similar crop uses.

11. THE U.S. EPA REGISTRATION STATUS AND/OR EXISTANCE OF AN FAO/WHO ACCEPTABLE DAILY INTAKE:

The following pesticides are registered by the U.S. EPA, without restriction for the same use as intended in Tunisia:

Triallate (Avadex B)
2,4-D Ester
MCPA
Dicamba (Banvel)
Diclofop-Methyl (Illoxan)
Difenzoquat
Dinoseb
Barban (Carbyne)

The following pesticides have not been registered by the U.S. EPA for food uses and have not yet received acceptable daily intakes from FAO/WHO:

Pesticide	Acute LDSO MG/KG	Manufacturers
Metoxuron (Dosanex)	3600	Sandoz
Chlorotoluron (Dicuran)	2000	Ciba-Geigy
Isoproturon (Ipuron)	1826	Ciba-Geigy
Benzoylprop-Ethyl (Suffix)	1555	Shell
Mecoprop (Compitox plus)	930	May and Baker (UK)
Methabenzthiazuron (Tribunil)	2500	Bayer AG
Ioxynil (Actril)	110	May and Baker (UK)
Bentazon (Basagran)	2063	BASF

Most of these pesticides, if not all, are commercially available herbicides used in various parts of the world. All are made by large, reputable pesticide manufacturing companies. However, their exact state of acceptance in major developed countries having highly developed pesticide regulatory infrastructures is not known at this time.

12. BASIS FOR SELECTION OF THE HERBICIDES:

Certain of the herbicides were selected based on their expected efficacy and ready availability in Tunisia. Additional candidates for testing were selected on the basis of their U.S. EPA registration status and their known efficacy against similar weed species in the U.S. Both local tunisian agricultural researchers at INAT and herbicide experts from Oregon State University participated in the final selection of herbicides to be evaluated.

EXTENT TO WHICH THE PROPOSED PESTICIDE USES ARE PART OF AN INTEGRATED PEST MANAGEMENT PROGRAM:

No integrated pest management program is proposed in the current project effort.

14. THE PROPOSED METHOD AS METHODS OR APPLICATION INCLUDING AVAILABILITY OF APPROPRIATE APPLICATION EQUIPMENT:

None of the herbicides with the exception of Ioxynil are highly toxic nor would any qualify for a restricted status in the U.S. based on hazard to humans. All label instructions, as supplied by the manufacturer, will be rigorously followed and only the ordinarily used equipment for experimental application of herbicides will be utilized. Rubber gloves and impermeable aprons will always be used when transferring liquid concentrates to smaller containers or to spray rigs. Granules will never be handled with the bare hands. Application of liquids will only be made with equipment resulting in coarse sprays not subject to drift.

15. ACUTE OR LONG-TERM TOXICOLOGICAL HAZARDS AND MEASURES AVAILABLE TO MINIMIZE SUCH HAZARDS:

There are no known acute or long-term hazards associated with any of the above herbicides. Pesticides which do not have a U.S. EPA tolerance for the crops under testing or which do not possess maximum residue limits (tolerances) as established by FAO/WHO will be subject to the special provisions of A.I.D. Regulation 16, Section 216.3(B)(C)III. Therefore, the manufacturers of the pesticide must provide the A.I.D. Project Manager with toxicological and environmental data necessary to safeguard the health of research personnel and treated crops cannot be used for human or animal consumption.

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16. EFFECTIVENESS OF THE REQUESTED PESTICIDES FOR THE PROPOSED USES:

All of the pesticides are either currently being used to control weeds in the same or similar crops in other parts of the world or are known to control weed species of types similar to those encountered in Tunisia.

17. COMPATABILITY OF THE PROPOSED INSECTICIDES WITH TARGET AND NON-TARGET ECOSYSTEMS:

The pesticides are known to be beneficial to the target ecosystem. Effects on non-target terrestrial ecosystems are expected to be minimal since all of the herbicides except one have low mammalian toxicity. Naturally, drift of spray to non-target plants can cause phytotoxic effects but careful use of good quality application equipment should obviate this impact. Typically, herbicides are not especially toxic to aquatic organisms so the impact on this environment should be minimal.

18. THE CONDITIONS UNDER WHICH THE PESTICIDE IS TO BE USED:

The pesticide will be used under carefully controlled research conditions and will always be applied under the supervision of experimental research personnel.

19. THE REQUESTING COUNTRY'S ABILITY TO REGULATE OR CONTROL THE DISTRIBUTION, STORAGE, USE AND DISPOSAL OF PESTICIDES:

Pesticide regulation is a function of Defence des Cultures and the Service du Controle Phytosanitaire et des Pesticides. The National Institute of Nutrition has laboratory facilities adequate for pesticide residue analysis.

Since 1961, government regulations require that pesticides for sale in Tunisia be registered with the Ministry of Agriculture. The products registered through 1977, totaling 830, were reexamined in 1978 by a technical committee (Commission Technique d'Etude des Produits Pesticides a Usage Agricole). This committee consisted of representatives of the Ministry of Agriculture, Public Health, Agricultural Production, Plant Production, and INRAT. Of the 830 materials, 313 pesticides (and formulations) have been approved (homologué), 417 have been disapproved, 15 were given provisional registration, and 85 were still under examination. The Index Phytosanitaire which was published in 1978 contains for each pesticide, the trade name, manufacturer, packaging, target pests, rate of application, and local representative.

The registration of every new product is subject to approval (homologation) based on 1 to 3 years of field tests carried out by the Defense des Cultures. Pesticide needs are planned and estimated annually and after review authorization to import is given.

20. PROVISIONS MADE FOR TRAINING USERS AND APPLICATORS AND MONITORING EFFECTIVENESS:

Under this project the users and applicators of pesticide will be under the guidance and supervision of the agriculture research staff. In Tunisia, in general, there are basically two classes of users-applicators. For control of major pests such as those affecting citrus and olive producing regions pesticides are applied by SONAPROV which is a special division under the "Sous-Direction de la Defense des Cultures" (Crop protection) of the Ministry of Agriculture. Training is provided to farmers by agents of Defense des Cultures which are located in each governorate.

The monitoring of effectiveness is jointly shared by the Defense des Cultures section of the MOA and the Plant Protection Division of INRAT.

IMPACT IDENTIFICATION AND EVALUATION FORM

Impact Areas and Sub-areas 1/	Impact Identification and Evaluation 2/
A. LAND USE	
1. Changing the character of the land through:	
a. Increasing the population	N
b. Extracting natural resources	N
c. Land clearing	N
d. Changing soil character	N
2. Altering natural defenses	N
3. Foreclosing important uses	N
4. Jeopardizing man or his works	N
5. Other factors	
B. WATER QUALITY	
1. Physical state of water	N
2. Chemical and biological states	N
3. Ecological balance	N
4. Other factors	N

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

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IMPACT IDENTIFICATION AND EVALUATION FORM

C. ATMOSPHERIC

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

_____ N _____

_____ _____

D. NATURAL RESOURCES

1. Diversion, altered use of water..... N _____
2. Irreversible, ineficient commitments..... N _____
3. Other factors

_____ N _____

_____ _____

E. CULTURAL

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

_____ N _____

_____ _____

F. SOCIOECONOMIC

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

_____ _____

_____ _____

IMPACT IDENTIFICATION AND EVALUATION FORM

G. HEALTH

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

H. GENERAL

1. International impacts..... N
2. Controversial impacts..... N
3. Larger program impacts..... N
4. Other factors

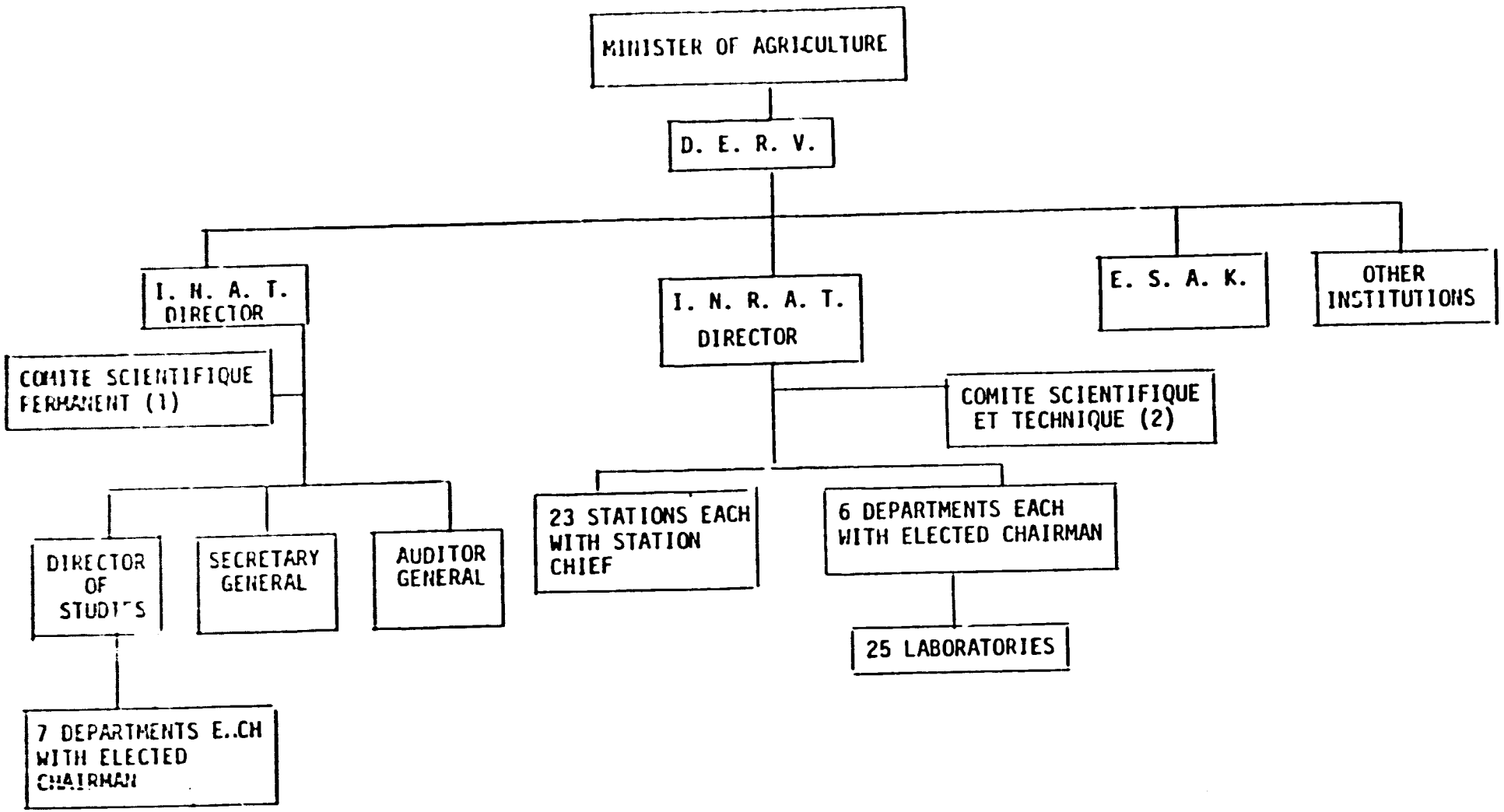
I. OTHER POSSIBLE IMPACTS (not listed above)

N

See attached Discussion of Impacts:

ANNEX 10

ORGANIGRAM OF PROJECT INSTITUTIONS



(1) Members: INAT Director, Director of Studies and Heads of 7 departments. Committee takes budgetary decisions.

(2) Members: INRAT Director and 6 Department Chiefs

ANNEX 11

AGRICULTURAL RESEARCH PROJECT DESIGN TEAM

1. DESIGN TEAM

J. Bremer, Development Economist, DAI
J. Naegele, Research Administrator, USDA
B. Lockhart, Agronomist, DAI
M. Fikry, Sociologist, AFR/DR/ARD/RSSA
A. Daaloul, Agronomist, INAT
M. Hedri, Agriculture Economist, INRAT
A. Ben Zaid, Chairman, Agric. Econ. Department, INAT

2. ADVISORY GROUP

H. Hafsia, Director, DERV
M. Lasram, Director, INRAT
A. Jerraya, Director, INAT
M. Boujebel, Director, MOA Planning & Statistics Division
C. John Fliginger, ADO, USAID/Tunis
H. L. Dickherber, Agric. Economist, USAID/Tunis
S. Mahjoub, Agric. Program Specialist, USAID/Tunis
S. E. Carlson, Regional Legal Advisor, USAID/Tunis
E. L. Auchter, Program Officer

ANNEX 12

Brief Background on Project Institutions

The three teaching and research institutions to be involved in the project -- INAT, INRAT, and ESAK -- are all attached to the Ministry of Agriculture as line agencies under the overall direction of the DERV. The DERV itself plays a coordinating and administrative role. The emphasis is currently on the latter, given the extremely limited number of professional staff assigned to the DERV.

Agricultural research in Tunisia started at the turn of the century when L"Ecole Coloniale d'Agriculture (ECAT), the forerunner of both INAT and INRAT,was created in Tunis in 1898. Research first centered on field crops and in particular cereals, the only important export crop of the "colons". By 1930, extensive degradation of soils led to research on fertilizer usage. Diversification into field crops followed and research in non-traditional vegetable and cereal crops developed. In the early years of independence, research expanded into livestock production. Research activities became progressively more important and the seventies were the most productive years of agricultural research to date in Tunisia, with major work on cereals as well as other areas.

INAT

In 1898, advanced agricultural teaching in Tunisia was established through the creation of ECAT, the first agricultural school in North Africa. Its main objective was to train colonial technicians, managing land and workers, to work under Mediterranean conditions. The realization that imported techniques were creating production failures led to recognition of the need for more regionally centered research.

ECAT was a copy of French agricultural schools, modified for colonial needs and Mediterranean conditions. Research concerns were centered around cereals, viticulture, production and conservation of forages, animal production, agricultural hydology and pomology.

From its inception, research and teaching were linked in ECAT's curriculum and activities. In 1963, a leading ECAT researcher established the Service Botanique et Agronomique de Tunisie (SBAT), which became INRAT.

ECAT was a two-year school until 1947, after which time it was extended to three years with the three objectives of a) increasing practical training, allowing students to pursue individual projects; b) better preparation of students for their future position of technicians; and c) providing more opportunities for specialization to the students.

By 1955, the last pre-independence class of 1,548 students graduated from ECAT. Only 107 were Tunisians. In 1955, ECAT was officially named l'Ecole Nationale Superieure d'Agriculture de Tunisie (ENSAT), known as INAT since 1971. It is interesting to note that in 1970, an attempt was made by the Minister of Agriculture to reunify INRAT and INAT, but the experiment was cancelled for political reasons after three months.

In 1969, the "third cycle" (M.S. equivalency) was instituted in the school, and in 1981, INAT formed seven departments: Agronomy, Basic Sciences, Rural Economics, Fisheries, Crop Production, Zoology, and Rural Engineering. This is a major development, since it moves INAT toward a stronger programmatic focus and adds a valuable management tool. Each department head is elected by his colleague

Acceptance to INAT, for both the B.S. and M.S. levels, is upon examinations which eliminate roughly half the candidates. In 1982, 130 students graduated with a B.S. and 80 are presently enrolled in the 2-year M.S. program, which now offers six specializations in-country.

Since 1981, cooperation between INAT and INRAT has increased with two researchers of INRAT teaching in the M.S. program. Similarly, personal contacts between INAT and INRAT researchers have enabled the former to use the labs and other facilities at INRAT.

INAT's research means are very limited, tending to make its teaching curriculum overly theoretical and academic. Each researcher at INAT has a maximum 250 dinars for research per student per year. Students in Rural Economy may easily spend several times that in computer expenses alone.

This year, for the first time, INAT established departmental budgets. About 20% of the total non-salary operating budget was allocated by department. The breakdown of the yearly budget per department gives a clear idea of the constraints each face. The budget includes research expenses as well as the operational funds for office needs even down to cleaning supplies and typewriter ribbon:

Agronomy	16.800 dinars
Basic Sciences	14.400 dinars
Rural Economy	4.300 dinars
Rural Engineering	15.800 dinars
Fisheries	7.400 dinars
Crop Production	11.040 dinars
Zoology	3.260 dinars

The teaching and research capacity of INAT will increase with the return of 10 (9 Ph.D and 1 M.S.) graduates from the U.S. under the ATT project. They will join the current faculty of 80, of whom approximately 25 have doctorates (including 6 from U.S. universities).

INRAT

While INAT increased in importance and status, INRAT, the national institution responsible for agricultural research, has developed more slowly. The total number of researchers has dropped in the past ten years, from 64 to 40, as foreign researchers departed more rapidly than the Tunisian staff grew. The policy of "Tunisizing" research has been a mixed blessing for INRAT. Because of the lower status of research vis-a-vis teaching or positions in the various ministerial "offices" or directorates, such as Office des Cereales, many of INRAT's best staff have left for positions elsewhere.

INRAT has today twenty-five laboratories and six departments, agronomy, cereals and industrial production, horticulture, crop protection, zoology and forestry, and economics, with a total professional research staff of 50 outside the Tunis campus it shares with INAT, it has a total of 4.000 hectares divided among its 23 experimental stations. Except for the station at Sfax, where 3 researchers are permanently stationed, none of the other stations has in-house researchers, the research staff being centralized in Tunis.

The loss of experienced staff in INRAT has been a great investment lost to the institution. It has also forced researchers to work on a variety of topics rather than on their specific area of expertise. The lack of coordination and incentives has had an impact on research in the past ten years, part of the underlying problem is the higher administration's reluctance to make the administrative changes necessary to meet the needs of the researchers. The change of status of the research institutions as a group needs to be a national priority for development.

INRAT's operating budget in 1982 was approximately 1,820.000 dinars, of which 82% was used for salaries. Of the remaining 18% for operational expenses, 40% went to research per se and 60% for general operations, utilities, water, car expenses, stations, labs, etc.)

Despite these many problems, INRAT's major research activities in the past ten years have led to tangible and important results:

1) Cereals research has included improvement and selection of several new varieties in durum wheat (Badri, Amal 72, Magrebi 72) and in breadwheat (Dougga, Carthage 74), which have been widely adopted by farmers.

2) Varieties of barley, maize and oats have been developed and released to the farmers. Triticale research remains promising;

3) Research on peach and almond trees has made possible the improvement of varieties and the better definition of the best plant environment; Hybridization of trees has also developed new varieties of apricots (Ouardi, Amal, Sayeb, Ezzine).

4) In the area of viticulture; an important selection has been made at Soukra to serve as a reference for the study of grape families (amphilopsis) and viticultural cadasters in Tunisia.

5) In horticulture, research has been conducted in the selection of various species, in particular solaneceae and cucurbitaceae. New hybrids of pimento and tomatoes have been developed, in addition to which several varieties of melons, fakous and local red pepper have been improved, multiplied and distributed.

6) A study of the potentials of irrigated perimeters in the Upper Valley of the Medjerda has been completed. Important research has defined rotations allowing maximum intensity of land use with optimal use of water.

7) In the field of crop protection, several publications have been made on the inventory of crptogramic diseases and viruses.

8) In livestock, genetic improvement of local cattle has helped increase animal production. Research, since 1973, on the reproduction of sheep has accelerated their reporduction rate. An exhaustive study on animal nutrition has established a table of nutritional value of animal food. The division of rural economy in INRAT has also published a monograph on the livestock-forage systems in Northern Tunisia.

INAT researchers have participated with INRAT on research in cereal genetics, phytopathology of cereals, bioclimatology, water resources and management.

Fifteen graduates from the U.S. (7 Ph.D's and 8 M.S) have been assigned to INRAT under the ATT project.

ESAK

L'Ecole Superieure Agronomique du Kef (Advanced School of Agriculture at Le Kef) is attached to the DERV at the Ministry of Agriculture, as are the other two institutes. In 1975, the school was established, offering a 2-year course (after high school). Beginning next year, it will also offer a 4-year B.S. program. The school has at present 7 full time professors (4 Tunisians and 3 foreigners) and 12 "vacataires" part-time professors from other schools (in particular from INAT) who teach various courses.

The school had a total of 29 graduates in 1981, who have obtained jobs at INRAT, Office des Cereales, Offices des Terres Domaniales and at various national cooperatives. Two have gone to France to pursue their studies and a few entered INAT to complete their B.S.

Until now, the school had been limited to students who only had the option of pursuing a 2-year course, having been eliminated from the 4-year entrance examination at INAT. The possibility of extending the school to a 4-year program will increase its status and capabilities extended as well (through the return of 14 students from the U.S. sent on the ATT Project - 6 Ph.D's and 8 M.S.). It will as well lessen the demand for INAT to expand its class size, which has reached its maximum capacity already.

In 1980, INRAT was given 50 hectares of land from ESAK grounds and a research station is now under development. The proximity of the two institutions has already enabled greater contact and several ESAK students have been involved in INRAT field experiment at Le Kef.

ESAK's goal is to develop a research expertise and cadres in field crops and particularly cereals, for the high plateau area of North-Central Tunisia. It has about 1,500 hectares of land and this year it acquired a soils lab provided by the CTRD project. The lab is to be used for the students of ESAK and INAT-INRAT researchers as well as CTRDP needs.

ANNEX 13

ECONOMIC ANALYSIS

In evaluating the economic return expected from the proposed project, it is necessary to take into consideration both the institution-building aspects of the project and the value of the research program as such. The economic analysis therefore addresses three issues: 1) the expected impact of the project on the efficiency and effectiveness of resource use in Tunisian agricultural research; 2) the level of return anticipated from research in Tunisia and from the specific research program funded, and 3) the appropriateness of the research methodology selected from a standpoint of the efficiency of research fund allocation. Given the practical impossibility of deriving meaningful estimates of the value of either agricultural research or institution building ex ante, the overall approach taken in this analysis is one of cost-effectiveness rather than cost-benefit analysis.

Methodologically rigorous attempts to measure ex post the return to expenditures on agricultural research have in general demonstrated impressively high rates of return. Beginning with Zvi Griliches' landmark study of hybrid maize in the United States, analyses by noted agricultural economists (Robert Evenson, Vernon Ruttan, and others) have consistently found internal rates of return to society's investment in research on the order of 30 per cent or even higher.

This general finding cannot be interpreted as implying that all research will have a high return, much less that agricultural research is necessarily the best use for limited development resources. The potential for high benefits relative to costs can only be realized if research is well targeted to relieving farmer constraints, technically sound, and backed up by the other agricultural institutions necessary for farmer adoption of productive technologies.

This analysis will not attempt to quantify the returns expected from project-funded research or institution building. Ex post evaluation of the return to research is feasible, if difficult (as shown by the questionable results obtained in the recent evaluation of Projet Ble, discussed below), but ex ante estimates are notoriously meaningless.

1. The Value of Increased Efficiency in Research Resource Use

The World Bank estimates that Tunisia's investment in agricultural research and extension is approximately half what it should be relative to other investments in the sector. They attribute this situation in part to the relatively poor showing of research in recent years due to the fragmentation of research efforts, isolation of research from farmer problems, and other problems discussed in this paper.

The VIth Plan indicates an expansion of agricultural research investments in line with the planned tripling of total investments in the sector, but the share of research, extension and studies is to be increased only from 2.4 to 2.6 percent. The total amount -- TD 8 million per year -- remains low, less than 2 percent of agricultural value added in 1980 (even though investment is projected at 56 percent of annual value added, a level that is certainly ambitious). Investment for the DERV as a whole in the Vth Plan was TD1.6 million yearly.

Total expenditures on agricultural research are not available nor are data on the proportion of INAT's or ESAK's budgets attributable to research. As a rough approximation, it may be estimated that research operations at the three institutions (including salaries and operating expenses) total on the order of TD 2 million (US$ 3.2 million) annually.

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In this situation, allocation of research resources to their most productive use and careful management of those resources is clearly the only viable strategy for meeting Tunisia's need for better agricultural technology. Although a country of Tunisia's size should rely primarily on work done elsewhere for the basic technologies to be used, there remains a substantial need for adaptive, applied and verification research to adjust imported technologies to Tunisian conditions. The project will help to establish a system for such productivity-oriented research.

The need for effective resource use will not become less important if the major World Bank investment in research and extension is implemented. Productive use of the very large amount of funds proposed will require that an operational system for formulating well-defined, problem-oriented research programs be in place, both to make maximum use of resources that will be available only for a limited period and to maintain forward progress in the research programs while major institutional changes are underway.

The economic rationale for improving resource efficiency in agricultural research is thus equally strong whether or not the proposed Bank investment is made. The specific approach to improving management to be used in this project, moreover, directs project resources to the operational or research staff level and thus provides an excellent balance to the proposed Bank focus on national structure.

Equally important, the project's use of a simple coordinating mechanism is more appropriate to the level of resources involved. It is more likely to have a positive impact in the current environment than a traditional "management training" approach carried out in isolation from any specific research program.

2. Return Expected to Project Research

The overall research topic to be addressed in this project -- the production systems of the northern drylands -- has been identified in the VIth Plan as a priority for agricultural research. The logic behind this emphasis is fundamentally sound and is based on the following reasoning: The semi-arid area is vitally important to national cereal production. Despite this importance it has received relatively little research attention compared to the higher rainfall areas to the north for historical reasons. At the same time, the semi-arid zone has a much greater production potential than the drier areas to the south (which have also been largely ignored by researchers until recently). In consequence, the marginal return to additional investments in technology for the semi-arid zone should be comparatively large. This theoretical argument is buttressed by several analyses of the technical potential of the area for increased production, which have concluded that dramatic yield increases on the order of 50-100 percent are feasible on the small farms. A forthcoming World Bank agricultural sector study argues that the production of cereals, livestock products, and forage could be doubled on the small farms of Northern Tunisia (including the project zone). The draft report cites the need to fit existing technological knowledge into the farmers' production systems as the basis for achieving these gains.

a. The Return to Research in Tunisian Agriculture

The lack of farm-relevant research results is not the only factor holding back agricultural growth in Tunisia. In the short run, substantial gains could be made by improving input access and marketing channels with no additional research at all. Over the longer run, however, research is a critical part of the total system supporting technological progress and production growth. This is the logic underlying the identification of research as an "action priority" in AID's Agricultural Assessment (prepared by Richard Newberg in February 1981),

even though the report recognizes that current technologies could increase production if made fully available to the farmer (both knowledge and inputs).

Experience in Tunisia and elsewhere, however, demonstrates that the private sector should play a le . role in input distribution and marketing. After years of experimentation with public sector intervention in this area, the GOT is now moving toward greater reliance on the private sector in these areas.

Research, on the other hand, is an area in which private sector under-investment can restrain development. The "public good" nature of agricultural technology makes a larger government role appropriate and indeed necessary. This is amply demonstrated by the experience in the United States and elsewhere.

Research is, therefore, a logical target for U.S. assistance to the GOT in the agricultural sector. It is an area where the U.S. has a comparative advantage and one where government-to-government assistance has the least potential for discouraging private sector initiative.

The experience of Projet Ble (Accelerated Cereals Production Project) demonstrates the potential of research in Tunisia to support agricultural growth over a 10-15 year time horizon. The recently completed Impact Evaluation found that the project "has had an important impact on Tunisia's agriculture after 16 years from the initial activities and 14 years after the grant agreement . The evaluation cites the progress made in the 1970's and during the last two years based on earlier project work. Yields of both durum and bread wheat have increased 50-100% since the 1960's although total soft wheat production has fallen due to declining acreage. 43% and 68% of the hard and soft wheat areas, respectively, were planted to high-yielding varieties in 1981, with a single durum variety - INRAT 69 - accounting for 50 percent of the certified durum seed.

The evaluators attempted to quantify the impact by comparing the value of the grain produced to project costs. Unfortunately, the data available to them did not permit them to adjust the grain value for either increased input use (and its associated cost) or other factors (e.g. price increases). Since both of the latter must surely account for part of the increased production, their inclusion would reduce the benefit in value-added terms the specific figures cited, therefore, overestimate project benefit.

The need to move forward rapidly in improving input supply, extension and marketing channels does not imply that research should be ignored. On the contrary, while other programs (such as the PL 480 fertilizer program) are concentrating on these aspects of the agricultural system, it is imperative that the gains made in research be consolidated so that the newly strengthened channels have something to transmit five years from now.

b. Return to Research in the Project Area

Special problems exist in the semi-arid areas that make the need for research more pressing. The barley and forage crops potentially best suited to these regions have received almost no research in Tunisia. Equally important, management of semi-arid lands for continued productivity demands techniques of soil and water management that are quite different from those developed for the higher rainfall areas immediately to the north. Current practices, such as plowing down hills instead of across the contours, are already leading to serious erosion.

Newberg's analysis supports the view that this is a high-return area for research. Citing the need to emphasize research, he concludes that "particular attention is needed on tillage practices to improve stands and conserve moisture; forage crops particularly legumes in crop rotation; fertilizer response on different soils and crops and widespread availability of reliable soil testing services to all farmers, big and small" He also recommends that "factors motivating or constraining farmers, particularly those on small-size units in successful adoption of production and income-increasing technology" should receive a high priority for future study.

In evaluating the likely returns to research on dryland management, therefore the base point is not necessarily the current production level. If sustainable technologies more attractive to farmers than current practices are not identified, a real danger exists that these lands will suffer serious degradation. The value assigned to sustaining the productivity of Tunisia's limited arable land base and preventing permanent loss of these lands to production is of course very large.

A final motivation for selection of the semi-arid region as a project focus is the possibility of obtaining valuable results within the project's extremely restricted time frame. The limited program of research underway has attracted some of Tunisia's best cereals researchers and social scientists. The cereals team leader has had previous experience in the area as the Director of ESAK. Cereals research is arguably Tunisia's area of greatest technical strength, based on past programs. It is therefore an appropriate choice for a project seeking quick results and focussing as much on research organization as on the research itself. Management and coordination can be expected to have a higher pay-off in an area of technical strength-- and consequently greater potential than in one where coordination is not the principal constraint.

The cost effectiveness of selecting a single area rather than addressing national focus should be self-evident. Given the limited time and resources available, an attempt to undertake research of a national scope would be extremely inadvisable. By focussing on a single related set of issues, the researchers can capitalize on the inter-relationships and complementarities that present themselves rather than diffusing their efforts across the conceptual landscape.

A further limitation of the research strategy by introducing a narrow commodity or discipline focus would, however, make the program less cost-effective. The amount budgeted is not trivial compared to Tunisia's annual expenditure of TD 4-5 million for agricultural research. Focussing on too narrow a topic (such

as barley or weed control) would be as great an error as choosing too broad a topic (e.g. field crops in Tunisia).

This general argument is reinforced by the specific demands of the project strategy and the geographical area chosen. The interactions between crops and livestock lie at the heart of the semi-arid agricultural system; the two cannot effectively be dealt with in isolation. Equally important, the preliminary work of the agronomists has convinced them that they need the active collaboration of social scientists to identify technologies of value to the farmers. The project's overall strategy of developing a mechanism to coordinate research demands a research topic for which coordination is neither a trivial problem nor an unmanageably large one. The research area identified meets these criteria and is therefore judged to be a cost-effective focus for project research.

3. Cost-Effectiveness of the Research Methodology Selected

The selection of a Production Systems Research (PSR) methodology for the project is based on much the same reasoning as the selection of the geographic region and follows naturally from this choice. The methodology focusses the research effort on technologies that fit within the farmers current system and that meet his (or increasingly in Tunisia's case, her) needs. This procedure limits the search to potentially useful techniques from the beginning. It thus reduces the chance of costly errors, such as ignoring the value of the straw in developing cereal varieties for small farmer use, and permits researchers to capitalize on indigenous practices with potential for wider applicability.

Tieing the socio-economic research to the agronomic work also increases the pay-off to the former. It directs the social science research toward problem-solving analysis in support of technological change and away from academically interesting but often unproductive descriptions of isolated aspects of the current situation.

The decision to use a multi-disciplinary methodology such as PSR is not costless. The specific problem area chosen must be one that justifies the increased "transaction costs" of the research itself. If particular problems can be identified and solved without frequent reference to other aspects of the farmer's situation, the value of PSR (or FSR) is probably not sufficient to merit incurring the extra cost in terms of time, analysis, and interdisciplinary friction. Such is arguably the case in the United States, where the volume of existing research results and the greater sophistication of both farmer and researcher make the extra effort of the FSR approach unnecessary. Farmers operating large mono-crop farms are able to integrate the researchers' results themselves. It is perhaps revealing that FSR has not been taken up in the United States and that, moreover, the "farm management approach" (which takes a similarly broad view of the farmer's goals and interrelated activities) was most widely applied at a time and place in American agricultural development where the conditions were not unlike those in the developing world today (small and medium-sized mixed farms in Missouri and Arkansas in the 1930's and 1940's, for example).

The FSR approach was developed initially to combat the failure of single-commodity research strategies to meet small farmer needs. It has been applied to analyze complex traditional systems, such as those of West Africa, Central America and the Philippines, in order to modify "Green Revolution" technologies to fit their needs.

The case in Tunisia is somewhat different. Farmers here recognize the value of high-yielding varieties, fertilizer andother inputs, and have largely adopted them. In doing so, they have moved their systems away from traditional equilibria into technological "terra incognita" where inputs and outputs interact with more complexity than they are able to handle. In order to develop new, more productive and sustainable systems, their problems must be viewed holistically. The farmers themselves, being relatively new adopters of improved

practices, cannot undertake the integrating work themselves. It therefore falls to the researchers to consider existing interactions and new possibilities to help the farmers move to a new and more productive equilibrium.

The interdisciplinary and problem-solving orientation of the FSR approach enables researchers to fill this role. It is therefore well-suited to the problem of semi-arid mixed farm management in Tunisia and should be more cost-effective than an equally large research effort focussed more narrowly on a subset of production enterprises, problem areas, or disciplines. Moreover, by conducting the research on-farm in collaboration with the farmers the FSR approach shortens the route from initial research to farmer adoption. It builds on-farm verification trials and the first stages of extension into the research itself. Involvement of extension agents in the research has been found to be extremely useful elsewhere (see for example the CATIE Impact Evaluation), and tends to strengthen the extension impact of the program as well as the research itself.

Annex 14

Technical Analysis

The most cost-effective agricultural research is conducted along narrowly-defined disciplinary lines in order to provide answers to on specific agricultural, economic, social, or managerial questions. This approach can be employed when data on the existing physical, decision-making and operational aspects of the farming system are sufficiently complete to permit raising specific questions for solution. This then permits the application of research-derived answers at critical points in the management cycle. In Tunisia, the social, economic and agricultural data that thoroughly define the farm production system have not been gathered, so the effectiveness of adopting either (a) existing technologies, or (b) site specific research results in order to increase productivity, profitability, or social satisfaction is greatly limited.

This project is predicated on the notion that by developing a thorough understanding of the agricultural (cropping practices, crop plant varieties, soil properties and soil management, water management, livestock management, etc), economic (risk-taking, marketing, credit, etc.) and sociological (land terms, non-farm activities, goal structure, family structure, family labour, etc.) components of the farm production system, it will become possible to introduce more effectively currently available or research-derived techniques and management practices in order to achieve farmer perceived goals. The implementation of the project will proceed in three sequential phases:

I. An initial phase of agro-economic, social, and technical research to define the production system and its environment by collection and analysis of a broadly-based set of data covering all aspects of crop and livestock production systems, economic factors, and management practices for a representative cross-section of farm holdings in the project area's three zones.

II. In the second phase, already available technology will be introduced into the farm production system, (i.e. on the farms themselves) at those critical points where, based on the analysis of the data collected in the initial phase, introduction of such technology is likely to produce desired results.

III. In the third phase, the feedback generated from the second phase will be analysed, and the conclusions drawn from these analyses will be used as the basis for design and implementation of research which can further achieve farmer and research perceived goals.

The principal components of design and implementation of the project will be the responsibility of Tunisian researchers from INAT, INRAT and ESAK. They will be complemented by a resident U.S. technical advisor, visiting U.S.researchers, and Tunisian M.S. students doing thesis research on topics that form an integral part of the overall research pattern.

For a more detailed treatment of the technical aspect of this project, the following themes will be addressed:

1. Pertinence of the research project to the national objectives as outlined in the VIth Plan.

2. Expectations regarding the value of research in this technical and geographical area.

3. Appropriateness of the research approach.

4. Capacity of the research as conceived to provide effective answers to the problems limiting goal achievement in the target area.

5. Adequacy of Tunisian and U.S. project research personnel to cover the scope of the project.

6. Sufficiency of material resources (laboratories, equipment, documentation, etc.) to meet the needs of the researchers.

7. Possible constraints to achievement of the project's research objectives.

8. Potential long-term benefits and carry-over effects.

1. Among the national objectives listed in the VIth Plan are:

   - Increase in cereal, livestock and forage production especially on small and medium size farmers.

   - Increase in the number of agricultural researchers and in the effectiveness of their research.

This research project is germane to the first objective because it seeks to enable a given agricultural zone to attain its full productive potential in terms of cereals, livestock and forages, by means of an examination of the factors limiting productivity when such factors are considered within the total context of the farm production system and not simply within more narrow disciplinary lines. Based on comparison with areas of similar geographic climatic and edaphic characteristics elsewhere in the world, this area is far from attaining its potential for production of cereals and livestock.

The project is pertinent to this second objective, that of researcher numbers and effectiveness, first, because an integral element of the project will be the M.S. thesis research carried out by INAT students working under the direction of senior researchers. This will support not only an increase in the number of agricultural researchers, but equally important, the training of researchers with an understanding of the farm production system as a whole. Second, the project will help to remove two of the principal constraints to effective agricultural research in Tunisia (as cited in "Preparation du VIem Plan, Rapport du Sous Comite de la Recherche et de la Formation des Cadres"), namely

- lack of coordination between researchers, disciplines and institutions.
- centralization of research facilities and research program in Tunis.

The essential feature of this project is cooperative, coordinated, inter-institutional research that cuts across disciplinary lines to involve social sceintists, economists, agronomists, and livestock management specialists. The centering of the field research activity around Le Kef promotes both inter-institutional activity and decentralization of research facilities.

2. Expectations regarding the value of research in this technical and geographical area.

Several reviews of technological opportunities in this area provide support for the expectation that yields can be increased with changes in the management of the system.

(1) A CIMMYT study showed that at Keff which lies within the project agro-climatic zone, application of 22, 45 and 67 kg/ha of nitrogen resulted in increases of 420, 650, 1070 kg/ha, respectively, of wheat, when compared to no N application. Rate of N application in cereals averages 5-6 kg/ha nationally.

(2) A 1982 World Bank report on the Tunisian agricultural sector suggested that yield increases of the following scales are possible:

50-100% increase in durum wheat production on small farms.

100% yield increase in barley in northern areas of Tunisia that receive adequate rainfall. (Applies to portions of the project area)

100% increase in fodder production

50% increase in the numbers of livestock by better integration of livestock into the farming system, and consequent improvement in the fodder available to the animals.

A 1982 Agricultural Assessment of Tunisia (AID/SOD/PDC-C-0218, W.O.H.9) suggests that 63% of the cattle and 56% of the sheep in the country are produced on small holdings of less 10 ha. The potential for increasing livestock production by better livestock-crop integration on small farms is therefore quite substantial.

Similarly a major problem in low levels of production of grains and forage and an increase in imports appears to be due to inadequate research, especially on:

- fertiliser response
- forage varieties and systems
- tillage methods
- weed control
- lack of soil testing

These are precisely the areas that the agronomist research side of the project ill deal with. The GOT is in the process of setting up 5 regional soil testing service labs, including one at ESAK and another at INRAT/Tunis. These labs are designed to do routine soil analysis for farmers. These soil analyses will be used as the basif for fertilizer application. On-farm project research that involves soil testing will help to familiarize the farmer with the benefits of this service and the procedure for doing so. INRAT would like

to see the farmers get to the point of regarding soil testing as a necessary and routine farming practice.

Pertinence of the research project to national objectives

The research project will be conducted by faculty, staff and graduate students of INAT, INRAT and ESAK. The field research will be limited to an agro-climatic zone centered around Le Kef roughly equivalent to the "C" zone defined by CIMMYT or the western half of Tunisia's Zone II. This is a semi-arid area of rain-fed agriculture where the principal farming activities are based on mixed cereal-livestock production. The research area contains a range of farm holdings of sizes and types. It includes three sub-zones which vary in terms of suitability for cereal production, from potentially highly productive to marginal, primarily on the basis of rainfall and topograph. Certain basic agronomic questions such as varietal adaptation have been answered for this area but it has not approached its potential level of cereal and livestock production because many other questions about technical and managerial inputs remain unanswered. Specific subjects already identified by research staff include:

- Tillage practices in relation to soil management and soil moisture conservation.
- Efficiency of fertilizer application.
- Adaptability of forage legumes for livestock production.
- Selection of crop components rotation systems most appropriate to the farm production system.
- Interaction of sheep grazing and grain production.

Research in these specific areas would be conducted, at all times, against the background and within the context of the socio-economic data base established as an initial target of the overall research program, with technologies being tested against both socio-economic and technical criteria.

3. Appropriateness of the research approach

The cereal-livestock farming system in the project area is a long-established one, and, as stated above, research work has already begun on certain factors such as choice of crops and varietal adaptation. The use of improved seed, fertilizers and herbicides are accepted practices among farmers. In undertaking this research therefore, the necessity lies not in producing a package of new technology for an existing system, but in modifying the existing production system after determining exactly where technological or managerial changes would be most effective. Viewed in this context, the research project is appropriate to the needs of the farm production system within the geographic research zone. An added virtue of the research project is that it proposes to examine and define the production system in farms of different sizes and types. This is an important distinction from the "technology package" approach because fixed packages of technology may not be equally applicable to farms of different sizes or managerial levels.

4. Capacity of the research as conceived to provide effective answers to the problems limiting goal achievement in the target area.

Some of the research problems that will be dealt with will be of a specific nature (e.g. determining the drought tolerance of a fodder legume), while others will be broader in scope (e.g. devising a rotation sequence that is agrocnomically sound and adaptable to the livestock management pattern of the farming operation). These two levels of research activity are equally important in contributing to the overall goal of increasing farm productivity, but demand different types of involvement and coordination. The more narrowly-focussed research topics can be handled by students as M.S. thesis projects. Those research problems that can be best tackled by researchers with greater experience, that require a greater degree of coordination, or that cannot be conveniently or adequately treated in the time allotted for M.S. thesis research, can be undertaken or directed by teams of more senior or experienced researchers.

5. Adequacy of Tunisian and U.S. project research personnel to cover the scope of the project.

The three cooperating institutions, INAT, INRAT and ESAK, currently (August 1982) have a combined total of roughly 35 Ph.D-level staff out of a total of 200 profession level staff members. This staff of trained professionals is the source for a nucleus of researchers, particularly in the areas of agricultural economics, rural sociology, plant breeding and agronomy, that is fully capable of undertaking immediately the initial phase of research operation, i.e. collection of agronomic, edaphic, economic, sociological and livestock data whose analysis will define the characteristics, details and range of variability within the farm production systems of the region under study. An additional 21 Ph.D's and 17 M.S. are expected to be operative by 1986 (ATT).

This core group of Tunisian researchers, already defined informally and enlisted for the project consists of competent, well-qualified individuals who have had a good deal of in-country research experience and are quite familiar with the terrain. Adequate implementation of subsequent stages of the farm production systems research project will require the intervention of a wider range of expertise. These additional inputs can be supplied, as necessary, by Tunisian researchers drawn from other disciplines, by U.S. scientists on short-term assignments, and by consultant researchers from CIMMYT, ICRISAT and ICARDA including ICARDA's in-country staff of three researchers. Short-term visits by Tunisian researchers to U.S. institutions or international research centers can also help to strengthen the research capacity of the cooperating institutions. Tunisian Ph.D and M.S. graduates trained under the ATT Project can also be drawn into the farm production system research project.

6. Sufficiency of material resources to meet the needs of the researchers.

Inadequacy of material resources has constituted a major factor limiting both the scope and effectiveness of research at INAT and INRAT. During the past five to six years there has been some improvement in this situation due in part to GOT financed purchases and in part to materials supplied under French, West German and Belgian technical assistance agreements. Visits to INAT, INRAT and ESAK, and discussions with Tunisian personnel at these institutions led to the conclusion that material resources remain substantially inadequate, both for the implementation of the current project as well as for post-project research and training activities, especially in the areas of:

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- Vehicles for transportation
- Equipment for key laboratories
- Data processing and analysis equipment
- Information and documentation services

In selecting equipment for financing, the project design team made a conscious choice to provide a few critical requirements rather than to fill a "wish list" of specialized equipment. For this reason, it has been decided to finance a research greenhouse under the project. A greenhouse providing reliable control over temperature and humidity is an absolute requirement for a wide range of agronomic research operations, including, for example, the crossing of wheat varieties from different latitudes, which requires them to be made to flower at the same time. It can also be used to simulate two crop years in a single year, halving the time needed for the same results. Despite the importance of this facility INRAT does not have a useable (or repairable) greenhouse nor is it likely to get approval for such a major expenditure of foreign exchange. The energy-efficient fiberglass panels or double glazing with air-tight seals necessary for a research greenhouse is not available in-country.

Regardless of the research strategy, good research requires ready access to previous work in the area under study and adequate data analysis facilities. Tunisia has established a National Center for Agricultural Documentation (CNDA) with donor assistance. Under this project, terminals will be provided linking INAT and INRAT to the documentation data base at the CNDA as well as software to make more effective use of the computing capacity in CNDA's current equipment. The facilities will support project research and will also be used by other faculty, staff, and students at INAT and INRAT. Linkage of ESAK with this facility is planned when the poor phone connections to the area are improved and make it practical. In any case, ESAK will be provided with a separate computing facility through the CTRDP. Technical assistance will help the DERV institutions to identify other applications for the equipment (such as electronic mail) that will increase coordination and efficiency of resource use.

A final basic requirement for field research to be provided through the project is better transportation. Public transportation is not available to transport students and researchers from Tunis to ESAK, much less to remote field sites. Some INAT/INRAT staff currently use their own cars (at their own expense), but without better transportation field work is effectively impossible for most researchers and students. To meet this need, AID will fund 6 small sedans (Didge Omnis in accordance with the Mission's standardized procurement plan), including one for the technical assistance team during the life of the project. The GOT will supplement these vehicles with mopeds and larger vehicles (vans and pickups) to be used for field work and transportation of larger groups.

Provision of these material resources, from both GOT and AID project sources, becomes therefore a sine qua non for successful project implementation, starting with the initial phase (where transportation and data analysis are particularly important) and continuing into subsequent phases (where laboratory and field experimentation assume a larger role).

7. Possible constraints to achievement of project's research objectives

Factors likely to hinder achievement of the project's goals are those related to:

- delays in delivery of commodities,
- failure to find, or to involve, adequately qualified research personnel.

Administrative steps can be taken to obviate or reduce the eventuality of tardy delivery of commodities, equipment for laboratories and fieldwork, and acquisition of data processing and documentation facilities.

The potential problem posed by inadequate resources o research personnel can be neither predicted nor sensibly described here. Consultations between the project's director, co-ordinating committee and U.S. technical advisor can help in locating personnel, training personnel, or devising research concepts that will best match the human resources available. However, it is expected that additional resources made available through this project will obviate some of the experienced constraints and will entrain the interests of newly trained personnel.

8. Potential long-term benefits and carry-over effects

The project is expected to leave in place a management methodology whereby complex problems, requiring solutions drawn from the research perceptions and contributions of several disciplines or institutions, can be addressed and successfully solved by mutual perception and cooperation. The interdisciplinary research program began under the project will be firmly established both technically and financially by project end and will continue to produce technological improvements suited to the needs of farmers in the Northwest semi-arid zone.

The project will also leave in place several well-equipped laboratories and a modern data-processing system, and will contribute to the establishment of a sizeable information and documentation service as well as leaves a body of data defining the farm production system in the project zone. It will also leave a cadre of Tunisian research and extension workers who have had the opportunity to undertake their dissertation research within the framework of a project that emphasizes an integrated, interdisciplinary on-farm approach to agricultural research. Rather than trying to transmit to farmers packages of technology developed by others or imported from elsewhere, they will be extending technological or managerial techniques in whose development they were actually involved. Finally, the project will act as a catalyst and an abiding example of in the integration of the three cooperating institutions and thereby greatly increase the effectiveness with which their human and material resourses are applied to the real problems of the farming sector in the future.

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ANNEX 15

The Project Research Strategy: An Adaptation of Farming Systems Research

The research program developed by the project will utilize the "systemes de production" (or production systems research PSR) approach, a research methodology based on an approach long used by French rural economists but modified to incorporate several critical concepts associated with Farming Systems Research (FSR).

a. Basic Elements of the FSR Approach

FSR has only recently received wide recognition as a distinct research approach or methodology, although it has been under development for approximately fifteen years. It has its origins in the realization by research scientists that the Green Revolution had spawned a "second generation of problems" that were impeding acceptance of the new technologies by smaller farmers. The search for a new approach was motivated as well by their discontent with the "technical package" approach due to the difficulty of developing packages with relevance to highly diverse small farmer groups. The parental honors for FSR are hotly contested, but it seems fair to say that it developed nearly simultaneously in several of the international research centers (notably IRRI, CIMMYT, and CIAT), with the active participation of scientists from American land-grant universities (among them Cornell, Kansas State, Michigan State, and Florida State).

As is not unusual for a new methodology, unanimity is lacking with regard to precisely which elements of the approach are central and which represent local modifications. In general, however, it is possible to say that farming systems research has three basic elements: it is interdisciplinary, involving at a minimum close collaboration of social and physical scientists in a single research effort; it considers the farmer's system as a whole, rather than concentrating on a single commodity such as wheat; and it relocates a large part of the research to the farmers' fields, and away from the experiment stations. These changes to

the traditional research approach are intended to reorient research in line with the farmers perspective, so that the research results respond to problems farmers perceive with technologies that they can apply in the context of their current systems.

None of the elements of farming systems research is new. The farm management approach developed for American farmers forty years ago, for example stresses the importance of taking into consideration the entire farm enterprise and a range of economic and non-economic goals in adivising farmers on ways to improve their operations. The French "systemes de production" methodology uses social and economic tools --primarily survey research-- to analyze the farm system as a whole. If anything is new (and some would argue this is not the case), it is the combination of these three elements into a research strategy directed specifically at the small farmers of the developing world.

The enthusiasm among donors and researchers that has greeted the farming systems approach has generated the inevitable flurry of controversy as to what is or is not included in the basic concept:

-- It is agreed that it is interdisciplinary, but the role of extension agents in the research phase is regarded as critical by some and superfluous by others. In some cases, interdisciplinary teams are fielded to work in close collaboration in a single village; in others the cooperation is much looser.

-- In theory, all aspects of the farm household system are studied, including off-farm employment, household consumption, and livestock, but in practice cash crops have received most of the attention (giving rise to a "cropping systems" variant espoused by IRRI).

-- There is an initial period of study, but it may be informal or formal, a few weeks or several years in duration, based on surveys, agronomic study, or mathematical modelling. Some FSR projects have been critized for failing to move beyond the survey stage.

-- After the initial analysis, technologies are identified for testing (or alternatively, specific problems are selected for research). The selection may be made with or without the active participation of the farmers, it may respresent a major or minor variation to the current system, or it may be directed toward developing a new system altogether (changing from rainfed to irrigated, for example).

-- These technologies or problems are defined for testing on-farm. Testing may or may not include preliminary or back-up testing on-station and it may or may not have the active involvement of the farmers. ICARDA, which has heavily influenced the Tunisian perceptions of FSR, recommends a three-stage approach, with researcher-managed trials giving way to trials carried out by the farmer under close supervision and finally farmer-managed trials.

-- Some FSR approaches provide explicitly for a final "extension" phase (David Norman, a principal supporter of FSR, argues this is critical). Many, however, stop with the development of zone- or farm system- specific technologies for use by the extension system.

-- Some FSR approaches include an examination of the institutions beyond the farm (credit, markets, etc) that are part of the total system and attempt to test modifications to these systems as well as to the farm enterprise itself. Most FSR projects, however, limit the area of study to the farm and regard the institutions as part of the environment.

b. Production Systems Research - a Tunisian Approach to FSR

As the foregoing implies, the development of the FSR approach has given rise to a considerable (and arguably growing) amount of confusion, disagreement and terminological fanaticism. To avoid this morass, the designers of the present project have preferred to use the term "production systems research". By doing so, we wish to emphasize that the approach to be used in this project while clearly lying within the range of activity identifiable as FSR, is an approach developed by Tunisian researchers to respond to a need they perceive. It is not an attempt to follow an international research "fashion" and in fact owes more conceptuall

to the French "systemes de production" approach than to FSR per se. A core group of Tunisian scientists at INAT, INRAT and Le Kef propose to modify the agricultural economic research program they have been developing for several years by incorporating agronomic research directly into it. The agronomic scientists recruited informally into this group are motivated by a recognition that their research would be more effective if the farmers' needs and problems were taken as the starting point for their investigations. They cite, for example, the farmer's unwillingness to accept high yielding dwarf varieties developed for them because of the preference for larger amounts of straw to serve as animal feed.

The approach proposed has three basic steps:

1. Research leading team understanding of the production systems of the area studies. Socio-economic and agronomic surveys as well as other research methods will be used to analyze and identify the major production systems of the target area. Socio-economic work has already begun, but the research will now be broadened to include explicitly the agronomic and livestock management components.

2. On-farm testing of marginal improvements. as the research team develops an understanding of the farmer's system, they will identify specific technological improvements based on currently-available information that initially judged to meet the dual criteria of increasing production economically and fitting into the current system. These will be tested on the farmers' fields in close cooperation with the farmers themselves and local extension agents.

3. Development of improved systems. As the team increases its understanding of the overall economic and agronomic environment in the target area, they will gradually expand the scope of system modifications tested. By the end of the project. the team will begin testing technologies that diverge more dramatically from the current system and therefore offer both an opportunity for more dramatic gains and a higher risk of failure. Whereas in the second phase, for example

researchers might test a medium-stature wheat variety to meet both grain and feed requirements, in the third phase they might introduce a drought-telerant fodder legume to replace the fallow cycle in the farmer's two year rotation, reducing the need for straw as a feed.

These three phases are not mutually exclusive. Both agro-economic survey research aimed at understanding farmer needs and adaptive research directed to identifying simple improvements will continue into the third phase of the research.

To provide a focus -or the research e-fort and to build on the work already completed, the researchers propose to concentrate their research on a single geographic area typified by Le Kef governorate. The region is a semi-arid transitional area between the relatively high rainfall wheat lands of the north and the arid drylands of the center. As such it forms part of the major cereal production zone, but research on the wetter areas to the north has not proven transferable to this region. Moreover, livestock plays a larger role in the systems of the Le Kef area and year-to-year variations in rainfall increase farmer risk, both factors that make a broad understanding of the farmer's system important in trying to increase production in any one crop (such as hard wheat) or through any one intervention (such as introduction of improved varieties).

The region chosen is not entirely homogeneous. As one moves from north to south, rainfall declines from roughly 600 mm annually to 350 mm annually. Thus there are three identifiable sub-regions, each with a distinctly different type of farming system developed to meet the needs of the area. Livestock is relatively more important in the southern third of the area, for example, as the grain crop is less reliable. The variation within the area makes it a good case for applying the FSR methodology, since the opportunity to contrast different systems with different technical problems and environmental conditions will strengthen the analysis of each.

The needs of the area also direct the research toward questions of overall resource allocation with significant national implications. There is evidence that much of the area is more suited to fodder, livestock or tree crop cultivation than to the current cereal-fallow systems, but farmers appear to prefer grain cultivation to meet family food requirements. The project will therefore examine such resource use questions as the mix of grains grown, livestock-crop interactions and the long-term impact of alternative land use patterns.

The approach to be used thus goes beyond a "cropping systems" methodology, because of the heavy emphasis to be placed on the livestock component of the total production program. It falls somewhat short of the complete "farming systems" methodology, however, in that research attention will be focussed on the agricultural production system, with relatively less emphasis on home production, off-farm employment, kitchen gardens, etc. As such, the "production systems research" methodology clearly belongs to the FSR "family", but it is a Tunisian hybrid, developed to meet the specific needs perceived by scientists here, not to copy an internationally fashionable research approach.

ANNEX 16

ANALYSIS OF ADMINISTRATIVE FEASIBILITY AND PROJECT STRUCTURE

Research in Tunisia has been handicapped by a number of administrative and management constraints. Coordination of activities in pursuit of a well defined and commonly perceived goal is not apparent. As a result, small, discrete and scattered, individually developed and highly self-contained research activities have been the rule rather than coordinated goal-oriented programs.

The lack of well-defined programs further weakens institutions already forced to operate in a difficult administrative environment. The rigidity of the operating rules, particularly those surrounding the management of funds, has greatly narrowed flexibility in management. Disparities between INRAT and INAT salary and perquisites have resulted in research scientists leaving research in favor of teaching. Restricted research operating budgets coupled with low investments in research have limited the scope of the program.

The administrative structure to be instituted in this project is designed to address these problems. The most significant administrative tool to be instituted is a research policy, planning and management team. This team must be viewed as a different concept than a senior-level committee. Such committees have been tried before in Tunsiia and have failed because of their inordinate size and unrealistic expectations of their ability to coordinate disparate programs nationwide. The significant difference between the team and previous committees is that the approach selected restricts the scope of expected coordination to a single research focus (production systems in the Le Kef drylands region). By limiting the team to about 10-12 members, most directly involved in the research, and equipping them with management skills, meaningful and achievable goals can be met. In order to achieve these goals, techniques of program goals setting, program and project development and evaluation, project implementation, monitoring and fund management will be applied.

The Creation of a Research Management Team (RMT) is the key element of the project's administrative approach. The team will be established within the Directorate of Education, Research and Extension (DERV) by appointment of the Minister of Agriculture. The team will be composed of:

a. Director of DERV, Chairman
b. Director of INAT
c. Director of INRAT
d. Director of ESAK
e. Up to three research scientists from each participating institution (INAT, INRAT, and ESAK); appointed because of accomplishment and competence in disciplines appropriate to the disciplinary focus of the project and expected involvement in the research program.

Non-voting members will include:

a. USAID-financed technical advisor on research administration (university contractor provided)

b. The "certified accountant" assigned to DERV to participate in the project.

c. Representatives from MOA's Planning Directorate.

The research scientist members of the team will const tute the Technical Program Team (TPT). The TPT will elect a Chairman, who is expected to be the Project Director.

The Chairman acts on behalf of the team between team meetings and facilitates such administrative details as may be necessary to prepare for team meetings, call team meetings, and implement team decisions.

The TPT is the operational and tecnnical arm of the RMT formulating policies and project proposals for RMT ratification.

The RMT will decide on the occasion of its organizing meeting the process whereby decisions shall be taken. It is expected the group will generally operate by consensus. For the formal decisons, a voting procedure will be selected viz., simple majority vote, 2/3 majority vote, real consensus, etc.

The RMT will have the following responsibilities:

a. The Development of a Coordinated Research Plan (CRP)

The CRP will serve as a planning guide for the identificatior and implementation of the research program and will include such information as:

(1) The research themes most likely to be successful in improving total productivity, or efficiency, or goal achievement of the farmers.

(2) The status of the current research effort in relationship to these themes.

(3) The research themes in which it is desirable to have expanded or additional research effort.

(4) A list of suggested research objectives in each of the priority themes.

b. The Development of Broad Interest and Participation in the CRP

The team will be responsible to disseminate information on the program to all active and potential research scientists in Tunisia and solicit their interest and participation in the research themes identified. Workshops, seminars or participation in INAT courses on research methodology may be appropriate. The development of broad interest in the program may be most appropriate after the second year of operation when administrative procedures are operating smoothly.

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c. The Development of Management Protocols for the Preparation, Evaluation, Approval, Implementation, and Monitoring of Research Activities

Research management encourages the directed application of intellectual and tangible resources in the pursuit of identified objectives. It also encourages this pursuit in an organized and responsible manner. To do this, research managers may employ protocols or other formal means of agreement to insure that information appropriate to the achievement of stated objectives as well as the accountability of resources is obtained and provided. A typical set of procedures would include:

1. The Project Proposal

The most important protocol is generally the Project Proposal. This document indicates what the investigator proposes to do, how he proposes to do it, and what resources are required to achieve his objectives. The essentials of such a proposal are detailed descriptions of the objectives, methodology; budget; and performance milestones, together with discussions of previous work done, the activity's justification, and duration planned.

2. The Project Evaluation and Approval Forms

This protocol provides for an orderly evaluation of the proposal and encourages objective evaluation. It generally consists of a series of gradable questions, such as shown in Form 1. A sample of an approval form is shown as Form 2. these forms are meant to be indicative rather than specific formulae to be followed by the RMT.

3. The Project Approval Form

The Project Approval Form is a formal (and legal) indication of approval of the proposed project. A sample of such a form is attached as Form 3. It affirms the fact that the researchers and their institutions, other cooperating institutions, and the RMT have mutually agreed to pursue the project objectives in the manner described in the Project Proposal.

The Project Approval Form also indicates the approved budget for the first year, and authorizes the Principal Investigator to obligate funds in accordance with the approved budget. It also establishes a time-based implementation plan and report schedule based upon the "Milestones" indicated in the Project Proposal.

4. The Progress Report

The Project Approval Form or a similar system establishes a reporting schedule consisting of frequent informal reports via conversations, letters, workshops, and seminars designed to insure frequent dialogue between the P.I. and the TPT to correct or ameliorate constraints in achieving the objectives. These activity reports represent milestones of progress.

An annual progress report may also be required. This is not an activity report, but an accomplishment report; it does not indicate what the investigator did in terms of activities,but what he accomplished in achieving his objectives. Progress is reported in reference to each objective of the project.

Progress can also be reported at an annual planning conference where each investigator reports his accomplishments (and problems) and this information is used to modify the CRP and prepare the team's satisfactory progress results in approval of further funding.

d. The Publication of an Annual Report of Progress in Research

This report is a completion of the achievement reports of the P.I. s and is presented to the Minister of Agriculture and the Director of USAID.

e. The Development of Inter-Institutional Cooperation

In order for investigators to cooperate freely, institutional barriers to cooperation have to be removed. The management team must insure this cooperation.

One method to insure this cooperation is for INAT, INRAT and ESAK to sign a Memorandum of Understanding pledging this cooperation. In addition, as other institutional components seek to participate they, too, may be required to sign a MOU or other formal agreement as a prerequisite to participation.

Draft Memoranda of Understanding illustrating this approach are shown as Forms 4 and 5.

f. The Development of Fund Management and Accountability Systems for Insuring Effective Implementation of Research Projects and Responsible Accountability

Research funds can be effectively managed by an obligation system of fund management.

In this system the TPT, which has the responsibility for the funds, delegates to a P.I. the authority to use funds in accordance with an approved budget. The P.I. can then make expenditures through an agreed-upon and properly documented system (P.O., Travel Requests, Travel Reimbursements, etc.). These documents obligate the project to disburse funds or reimburse expenses against invoices received when the goods and services are delivered.

The Project Director will have the overall responsibility for disbursing, accounting and supplying the P.I. with appropriate accounting information. It is expected that the Project Director will delegate authority for this activity to a registered accountant. This accountant will be expected to disburse funds against obligations and maintain a record of accounts on behalf of the TPT-RMT. The responsibility for declaring the programmatic necessity of the intended goods and services lies with the investigator who is responsible for carrying out the proposed objectives on behalf of the TPT. The accountants responsibilities are limited to insuring proper documentation and conformity to the approved budget.

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FORM 1

PROJECT EVALUATION FORM

TITLE_____

(1 = no, negative; 10 = yes, positive)

1. Are the objectives clearly stated?	1	2	3	4	5	6	7	8	9	10
2. Are the objectives realistic and attainable within the time frame?	1	2	3	4	5	6	7	8	9	10
3. Do the objectives support the program?	1	2	3	4	5	6	7	8	9	10
4. Does the methodology support the objectives?	1	2	3	4	5	6	7	8	9	10
5. Is the methodology scientifically sound?	1	2	3	4	5	6	7	8	9	10
5. Does the P.I. have the skills necessary to perform the methodology?	1	2	3	4	5	6	7	8	9	10
7. Does the budget contain all the items at appropriate levels necessary to support the methodology?	1	2	3	4	5	6	7	8	9	10
8. Does the budget contain items not needed or at excess levels needed to support the methodology?	1	2	3	4	5	6	7	8	9	10
9. Is the project farm-oriented?	1	2	3	4	5	6	7	8	9	10
10. Is the project multi-disciplinary?	1	2	3	4	5	6	7	8	9	10
11. Is the project inter-institutional?	1	2	3	4	5	6	7	8	9	10

Total Score _____

FORM 2

SAMPLE - DRAFT Project Approval Form

To: (P.I.) (cc. Inst. head, accountant)

The Research Policy, Planning and Management Team is pleased to inform you that the project proposal titled:_____(_____). has been approved for funding under the USAID/GOT Agricultural Research Project.

As Principal Investigator you will be expected to conduct the research in pursuit of the objectives identified in the project proposal and in accordance with the rules and regulations established for these projects funded under this granting authority. These rules and regulations are contained in the brochure "Rules and Regulations for the Conduct of Research under the Agricultural Research Project.

The budget approved for this project is attached as Annex I along with the reporting guidelines.

Approved: Chairman of Research, Policy & Planning Team

Date: _____

ATTACHMENT: Project Proposal

Approved Budget

Reporting Guidelines

Rules and Regulations.....

Form 3

Sample APPROVAL FORM

Title:_____

Project Number:_____

Principle Investigator:_____

Duration:_____ to _____

Milestones:

1. Activity report:
2. Activity report:
3. Activity report:
4. Annual Accomplishment Report:

Budget:

Object Class	Amount
001	
002	
003	
004	
etc.	

Form 4

Draft - MEMORANDUM OF UNDERSTANDING

Whereas, INAT, INRAT, and ESAK have agreed that mutual planning, implementation and evaluation of cereal research will provide Tunisia with a more effective research program that will more significantly contribute to the goals in the VIth National Plan, and,

Whereas, INAT, INRAT, and ESAK have mutually perceived that cooperation is in the best interest of all institutions and the nation,

We, therefore, Pledge, full and open cooperation in mutually achieving the aims of the Coordinated Research Plan (CRP) and the research projects supported by the Research Policy, Planning and Management Team, and,

We, therefore, Pledge, full access to such land, laboratories, equipment, vehicles, and personnel as may be necessary to insure our mutual success.

INAT_____

INRAT_____

ESAK_____

Form 5

DRAFT - MEMORANDUM OF UNDERSTANDING (for joining institution)

Whereas, _____, together with INAT, INRAT, (and) ESAK,

and _____, have agreed that mutual planning, implementation, and evaluation of research will provide Tunisia with a more effective research program that will more significantly contribute to the goals of the 6th National Plan, and

Whereas, _____, together with INAT, INRAT, (and) ESAK,

and _____, have mutually perceived that cooperation is in the best interest of all institutions, and the nation,

We, therefore, Pledge, full and open cooperation in mutually achieving the aims of the Coordinated Research Plan (CRP) and the research projects supported by the Research Policy, Planning and Management Team, and

We, therefore, Pledge, full access to such land, laboratories, equipment, vehicles, and personnel as may be necessary to insure our mutual success.

_____ _____
(INAT)

_____ _____
(INRAT)

_____ _____
ESAK

RESEARCH MANAGEMENT BY OBJECTIVES

A conceptual base for Research Management in Tunisia

Research Management by Objectives is the conceptual base upon which the research management procedures in this project will be based. It is a special application of an effective management scheme used widely in industry and known as Management by Objectives (MBO) and also used widely in the conduct of research in the agricultural experiment stations in the United States.

The concepts essential to effectiveness in this approach are:

1. CLEAR AND ACHIEVABLE OBJECTIVES: In order for research objectives to be useful in planning and management they must be understandable and they must be achievable. Global objectives, or indefinite objectives are generally ignored by scientist and manager alike.

2. TIME FRAMED OBJECTIVES: A key to making objectives effective and operational is to define them in terms of a particular period of time. Time framed objectives provide a schedule for blending the activities and operations of every research manager and scientist to achieve the short range and long range goals of the project.

3. MANAGING THE RESEARCH MANAGERS: Research Management by Objectives is really a system and philosophy for directing the efforts of the entire management and scientific team through a set of procedures for focussing, directing and controlling the scientific and research management resources of the project.

4. TRANSLATING OBJECTIVES INTO COMMITMENT: In order to make Research Management by Objectives work the critical step of translating a set of objectives into a statement of commitment must be accomplished. This involves all participants in a procedure to validate the objectives so that the objectives become a motivational system for focussing effort and achieving desired results.

5. REINFORCING THE COMMITMENT: In order to continually reinforce the commitment to achieving the objectives the maintenance of dialogue about progress, and the removal of constraints to progress are continually monitored.

RESEARCH MANAGEMENT BY OBJECTIVES DEFINED

The greatest challenge to the leadership in the DERV is the necessity to reconcile, integrate and direct human effort, resources and facilities toward achieving the common goals of the national agricultural need without discord, and disaster. In its simplist form this is achieved by establishing for each level of research management specific objectives that motivate accomplishment of results in the time period specified.

There are four basic elements in this concept: objectives, time strategy, total management, and individual motivation.

Objectives: These are events or accomplishments planned or expected to happen. These are research results, problem solutions or organizational results to be arrived at.

Examples:
- To identify the personal and family goals of the farmers of Le Kef.
- To determine the farming systems employed by farmers in and around Le Kef to satisfy their personal and family goals.
- To functionally analyze the parameters of the farming systems of the farmers of Le Kef.

Time Strategy: This concept refers to the schedule for blending the activities and operations of each manager and scientist to achieve long and short range results. It is a coordination of resources with the calendar, signaling each participant to act and accomplish at designated periods of time.

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Examples:
- To identify the personal and family goals of the farmers of Le Kef by September 1983.
- To determine the farming systems employed by farmers in and around Le Kef to satisfy their personal and family goals by March 1984.
- To functionally analyze the parameters of the farming systems of the farmers of Le Kef by March 1986.

Total Management: This is a formalized effort to involve and coordinate the contributions of individuals and facilities to the achievement of the objectives.

Examples:
- The Projects approved to determine the goals of the farmers identifies the work relationships of economists and sociologists and field assistants, and other cooperating scientists in INRAT, INAT, and ESAK.
- In order to achieve a description of the farming systems projects are prepared using the services of INAT and ESAK. The problem is divided into logical parts and sub-objectives (objectives of each project) are identified, methodology identified and resources personnel and a time table established.

Individual Motivation: Personal involvement in the setting of objectives at every level of activity is absolutely essential in order to develop motivational commit ment. The research scientist that is to be held responsible for the success of a project must be the chief architect of the objectives of that project. Team objectives must be framed by a participatory process that permits those who are expected to be committed to the achievement of the objectives to contribute to the formulation of those objectives.

These four elements form the basis of the four fundamental principles of

Research Management by Objectives.

1. Unity of scientific and management action is more likely to occur when there is pursuit of a common objective(s).

2. The greater the focus and concentration upon the results one wants to achieve on a time scale, the greater the likelyhood of achieving them.

3. The greater the participation in setting meaningful work with an accountability for results, the greater the motivation for achieving it.

4. Progress can only be measured in terms of what one is trying to make progress toward.

Research Management by Objectives in the Team is a five stage process:

1. Isolating the objectives
2. Setting the objectives
3. Validating the objectives
4. Implementing the objectives
5. Controlling and reporting the status of the objectives

Phase I - Isolating the objectives

A clear analysis of the problem is a necessary part of isolating the objectives. Take the problem, "How can we improve the quality of life of the farmer of Le Kef?" Analysing this problem leads to a number of questions, such as;

> "What is the quality of life of the Lef Kef farmer? What are his goals? How did he set them? What constrains his goal achievement? What resources contribute to his life quality? How does he employ these resources? Would a different "system" of using these resources change his life quality? How could he change the use of his resources? etc....."

Further analysis leads to expressing these questions as research objectives

such as;

a) To determine the personal value system of the Le Kef farmer.

b) To determine the goal setting apparatus of the Le Kef farmer.

c) To determine the constraints to goal achievement of the Le Kef farmer.

d) To determine the quality and quantity of resources available to the Le Kef farmer.

e) To determine the impact of resource quality and quantity and goal achievement.

f) To determine the pattern of resource use of the Le Kef farmer.

g) To determine and predict outcomes from direct changes in the pattern of resource use.

h) To determine soil fertility levels.

i) To determine wheat varieties.

j) Etc.....

This list could be interminable, and indeed does continue to grow since the more one analyses the problem and works on solutions, the more questions and potential research objectives are identified.

Analysing the problem will also identify objectives that are not amenable to research inquiry or are beyond the scope of the skills or resources available. These will be eliminated in Phase II.

Phase II - Setting the Objectives

Phase II is the logical consequence of phase I. During phase II the many objectives that have emerged from phase I are critically examined with certain criteria in mind.

For example:

1) Objectives that require resources, equipment and skills that are not now available are deferred;

2) Objectives that are clearly dependent on other objectives

are made a part of or related to their antecedents;

3) Duplicative or repetitive objectives are combined;

4) The most important or key, objectives are identified; and

5) time goals are added to all objectives.

The result of this excercise is a priority list of objectives that are time phased and which constitute a working research plan. This then is a coordinated research plan in which a multitude of disciplines and institutions can participate.

Phase III - Validating the Objectives

The objectives set in phase II are now subject to validation by packaging them into an action plan called a research project. The procedure begins when a potential Principal Investigator (P.I.) prepares a proposed project by taking one or more of the objectives from the coordinated research plan developed in phase II and develops an action plan indicating how he intends to achieve the objectives. This proposed research plan (the "project) is described by Title, Justification, Present and Previous Work, Methodology, Budget, Cooperators, Personnel, Institutions involved and any other information that may be required by the team.

The proposed project is then subjected to a review and evaluation procedure which establishes the scientific value of the project and the individual and institutional capability to successfully perform on the project and achieve the objectives. In this review process the institutional and personal commitment to the project and its objectives are confirmed. Since the project proposal carries the signature of the PI and his superior, the validation is completed when the authorizing authority signs the approval and an allocation of funds to the project takes place.

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Phase IV - Implementing the objectives.

Once a validated statement of commitment has been made as a result of Phase 3, a motivational system is initiated. The planned personnel commitments are established, equipment ordered, supplies committed, space committed. Detailed work plans are developed and a schedule for implementation strategy is launched. Each subsequent year of the project's life a new work plan or implementation strategy accompanies the budget request. The implementation of the project sets the stage for the next phase of controlling and reporting.

Phase V - Controlling and Reporting status of the objectives.

Since progress can only be measured in terms of what one is trying to make progress toward this phase concentrates on measuring, and reporting progress toward the achievement of objectives.

Therefore the fundamental aim of controlling and reporting the status of objectives is to maximize the probability of successful completion of the project's objectives. Research management thus focuses upon the objectives of the project as the principal management unit. It is the project that identifies the objectives as well as the justification, methodology, timeframe and resources required to accomplish the intended research objectives. Thus the evaluation of accomplishment and accountability for achieving objectives and resource use can be determined readily by tracking progress and expenditures at the project level. All administrative and support functions are justified in terms of their direct or indirect contribution to the success of the project. Administrative activity, personnel management, financial management, general support services and even physical facilities are not ends in themselves but are significant only as they contribute to the success of a project's objective.

The Project:

Since research management is essentially the management of project objectives, it is well to have a clear idea of the content of a Project. It is a clearly defined problem, a phase of a very big problem, or a few closely related

elements of research that constitute a logical and manageable package at a single location. The significant dimension is that a project must be a clear and manageable statement of objectives and means and resources to be employed in achieving those objectives.

This suggests the following criteria:

1. That the objectives of the project be clearly stated, free of ambiguity, achievable within the designated time frame, and progress in their achievement capable of being measured.

2. That the methodology to be employed in achieving the objectives should clearly justify the resources required and logically lead to the expected achievement of the objectives.

3. That projects should not combine so many diverse elements (or objectives) that significant information on achievement or evaluation is obscured. Normally projects that employ 1 to 2 SYs (scientist years) in support of a relatively homogeneous set of objectives will be effective. In order to insure sharp reporting of accomplishment and the clear identification of responsibility, the lower number of SYs are preferred (viz. 1).

That each project has a principal investigator who bears the responsibility for the conduct of research and the achievement of the objectives of the project. He also serves as project fund manager and as such bears the [illegible] responsibility for obligating funds for supplies and services in support of and consistent with the achievement of the objectives of the project.

5. Reports of accomplishment and expenditures against the project are recorded annually.

6. That the project serves as the unit of review and approval, but also the unit that measures accomplishment, progress, and expenditures.

Projects are the recipients of allocations, and the basic unit in the financial management system.

7. That the length of time a project is active is governed by:

   a. the time required to reach the stated objectives;

   b. the period of time definite plans can be laid.

This generally means no less than 1 and no more than 5 years.

8. That projects can be amended, terminated, or transferred.

9. That projects are documented at the management level by keeping a file on each project containing the proposal, annual reports and budget expenditures. Annually, a progress report and a financial report are added to the file.

Allocation of funds

With the execution of the project, allocation of funds to the project takes place and the designation of the Principal Investigator as project fund manager is accomplished. As fund manager he is authorized to obligate funds against the project consistent with the purposes outlined in the project. No delegation of spending authority is necessary since appointment as project fund manager establishes his authority to obligate funds within the indicated allocation subject to the procedures established. The alllocating document establishes his authority to obligate funds within the indicated allocation. The allocating document establishes the financial year plan and the total amount of money allocated as well as its suggested distribution between object classes.

Generally the budgetary indication in the allocating document should be adhered to, but the project fund manager as the principal person responsible for the conduct and performance of the project has the authority to obligate in excess of the amount in any object class, but cannot obligate in excess of the total allocation.

Accomplishment reporting

The minimum reporting required for a project is an annual accomplishment report and an annual expenditure report. Accomplishments are reported against each objective in the project. In accomplishment reporting only accomplishments toward the achievement of the objectives are reportable - activities are not reportable.

Financial Management

The management and accounting for finances at the management level should be accomplished through an obligation system of control. The essentials of an obligating system are:

a. obligation control
b. expenditure control
c. obligation and expenditure accounting
d. centralized purchasing
e. centralized accounting and disbursement

Financial reports

In order to aid in administration and status reporting, monthly reports of status of funds are prepared for each project. These reports reportobligation, expenditures, allocations and unobligated balances against object code class.

Accomplishment evaluation

Annually, the annual report of accomplishment and the annual expenditure report are evaluated against expected accomplishments and expenditures to determine progress against objectives. Appropriate action for each project is initiated following this review.

ANNEX 18

SOCIAL ANALYSIS

INTRODUCTION

Tunisia has made extraordinary strides in the past twenty years. The statistical profile shown below, comparing 1959 with 1975/80, highlights the socio-economic changes that took place, particularly in the health and educational sectors. Between 1959 and 1980, Tunisia's GDP has increased by a yearly 7.6 percent with per capita yearly incomes reaching an average of $1130 in 1980. Yet, the agricultural employment has steadily declined since 1969, with agricultural labor decreasing by 41 percent. Though Tunisian researchers have increased in number in the past decade, the overall number of researchers declined 30 percent because of the great number of French researchers who have left since 1969 and the inability of Tunisia to staff all vacancies rapidly enough to compensate. The agricultural indicators in the statistical table below indicate the great problems which plague that sector.

One of the biggest constraints to agricultural production throughout the developing world is the lack of applicability of research to farmers' needs and constraints. Indeed, the research often leads to a "package technology" which is so narrowly defined that it adds to the farmers' constraints. Tunisia is no exception and the Accelerated Cereals Production Project of 1966-1976 is a case in point. The high yield variety of Mexican bread wheat was indiscriminately distributed without an initial understanding of agro-climatic, institutional, social economic constraints on both the national and the farmer level. It is out of that experience that Tunisian researchers have developed, since 1971, high-yield varieties of durum wheat better adapted to agro-climatic conditions and to palatibility and risk considerations essential to the Tunisian farmer.

In essence, the present project aims at supporting an interdisciplinary and interinstitutional group formed of Tunisian researchers whose concerns are centered on farmers' needs and whose goal is to better understand the local systems of production. Their desire is to define a two-way iterative methodology by which that knowledge is fed back into research and consequently into teaching and extension and back to the farmer. The ultimate long term goal is to improve and, thus, increase production in the area defined.

This sociological analysis will focus on three levels of agricultural research and training:

I. The Teaching-Research Component

II. The Institutional Component

III. The Farmer-Extension-Research Linkages

This approach has been used, rather than the commonly known components of the social soundness analysis in PPs, because of the nature of the present project which is essentially an institutional one.

I. TEACHING-RESEARCH COMPONENT

A. Objectives of the VIth Plan

A recurrent theme in the agricultural sector of the VIth Plan is the importance of establishing functional linkages between teaching and research. Indeed, four conditions are cited for the improvement of the outputs of the agricultural eductional system:

1. An agricultural educational system more directed to rural needs as well as capable of meeting needs for better qualified cadres;

2. A higher quality of teachers;

3. Linkages established between teaching, research and extension (with regional agricultural schools, such as the one at Le Kef - ESAK - playing the

role of an agricultural station and serving as a link between research and extension in view of answering regional agricultural needs);

4. Greater understanding of management of farms.

The overall perspectives on agricultural development in the VIth Plan have defined five goals around which specific research activities have been planned:

1. Self-sufficiency in wheat, barley, meat and fruit;

2. Reduction of deficits in milk and sugar;

3. Efforts to increase exports in certain off-season produce (vegetables and oil) and to reduce imports to reach a commercial balance of agricultural products;

4. Develop regional potentials through better research and production.

5. Diminish imbalances between rural and urban standards of living through increased production, i.e. more equitable income distribution.

The realization that the present research and educational systems have had little impact on production, let alone extension work, has reached all levels of the agricultural administrative sector. It is acute among researchers and teachers in agriculture who have found themselves more and more alienated from field realities. This is particularly prominent among American-educated researchers and teachers as well as those who went on study tours to the U.S.

B. Constraints of Teaching and Research

The constraints and difficulties of research are admitted by all and are succinctly enunciated in the VIth Plan:

1. Overwhelming problems of research coordination (duplication of research, lack of continuity, lack of incentives)(1);

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(1) During the IVth Plan, in 1976, a National Council for Agronomic Research was formed in the MOA. It met only once, in 1977, and failed entirely in its essential goal, coordination, because of lack of funds as well as all the above cited problems.

2. Insufficient number of researchers;

3. Limited financial means and cumbersome administrative structure[1];

4. Inequity between status of researchers and teachers forcing many of former to attempt to leave research institutions[2].

All of the above listed goals in research and education are set with the assumption that attempts will be made to vercome some of the most obvious constraints. But realism predominates among the agricultural research, education and extension cadres who prepared the various working documents of the VIth Plan. We are informed that in the realm of human resources, there is today 1 researcher per 40,000 hectares and per 8,000 farmers while there should be one per 10,000 hectares. Yet, the objectives of 1991 will have to be satisfied with one researcher per 20,000 hectares and per 4,000 farmers[3].

Though the cumulative agricultural research, education and extension budget is tripled in size from the Vth to the new VIth Plan, the budget still remains, in real terms, far bèlow its satisfactory level for all three sectors (9% versus 5.5%).

A final constraint should be added to complete this bird's eye view of the VIth Plan objectives, goals and constraints in agricultural research and training. Because of the lack of satisfactory working conditions of researchers and cadres in the agricultural sector, a beginning of an "exodus" of trained upper-level researchers and cadres is taking place from the public to the private sector where monetary as well as professional incentives are higher. Yet, agricultural

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(1) In 1977 and 1979, neither INAT nor INRAT had an investment made in their annual research budgets.

(2) A request is made in a special report on agricultural research and cadres for the VIth Plan that the status of research institutions be reconsidered and rectified and that research institutions be given flexibility in decision making.

(3) Preparation du VIe Plan - Rapport du Sous-Comite de la Recherche et de la Formation des Cadres, Ministry of Agriculture, GOT, March, 1981, P. 20.

research and production will not be helped by haphazard and uncoordinated private efforts where only individual needs are satisfied. It is the clear intent of the VIth Plan to reinforce the capacity of INAT, for the training of upper level cadres and researchers, and of INRAT, for the better use of its researchers as well as of ESAK for the training of middle level cadres.

This brief presentation of constraints and desired goals in agricultural research and training allows us to better comprehend the critical need, voiced by researchers and professors alike, to redirect their research approach. A list of unanimously-voiced problems could summarize their common frustrations supporting the above description:

1. Lack of freedom in decision-making regarding operational and funding facilities of researchers;

2. Lack of means (financial as well as essential materials for research such as documentation, transportation, laboratory support, etc.) to carry out field-oriented research;

3. Lack of coordination because of all of the above;

4. Lack of integration of individual research because of lack of research planning and lack of concertation of researchers;

5. Lack of integration of research and teaching because of inadequate means to go to the field, to coordinate research efforts, to take time to synthesize research and, consequently, insufficient experience of researchers.

C. Impact of Redirection of Research

The present institutional and intellectual situation of agricultural research and teaching has a profound psychological impact on the technical and professional personnel of that sector: demoralization. This is an unmeasurable impact in real economic terms. Yet, it is professionally-and socially -- a very negative factor which impinges on the individual's and on the group's outputs, in this case research. The outputs of research and their linkages to teaching

may be a given in the U.S. but it could well be considered a revolutionary approach in the Tunisian context.

The present project aims at redirecting research and teaching towards the understanding and analyses of rural needs by designing field-oriented and interdisciplinary research. This will be done by creating several levels of linkages:

1. Between researchers and teachers;
2. Between disciplines;
3. Between teachers/researchers and students;
4. Between researchers/teachers and farmers, and
5. Between students and farmers (1)

The approach is said to be revolutionary only because it would indeed be institutionalized. Until now, such linkages were based on personal and individual initiatives.

The impacts of the project approach will be multiple and of far-reaching implications to research-teaching linkages. If viewed in the short term, the immediate impacts would be the following:

1. Create research goals between a group of researchers and teachers whose common interest would be intensified, pursued and continued because of assurances of self-determination of research activities and operation by the group.

2. Because of the above impact, increased self-assurance of researchers will lead to better use of their potentials, if not also create greater self-esteem;

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(1) In Section III, the linkages informally involving and impacting on extension workers will be discussed.

3. Field-oriented research will focus greater attention to the farmer's capabilities and constraints (social, economic and agronomic) and will lead to a problem-solving orientation of research;

4. Established research linkages to teaching will impact on teacher-student relationships as upper-degree students will also be more involved in field-oriented research and, thus, acquire greater understanding of problems of production.

The long term impacts of the project approach will be the most far-reaching:

1. Most important will be the creation of an interdisciplinary program-oriented research which, if successful, will be imitated by other researchers and teachers in the attempt to coordinate common goals and common research;

2. The experience of a self-managed program by researchers and teachers will allow for a better definition of projects and of teaching activities;

3. The enrichment of research-teaching linkages will provide more meaningful curriculae to students and institutions alike, and heighten the quality of teaching;

4. Listening to the farmer may be the most difficult lesson to learn from this approach, yet it may also be the most fruitful in terms of impact on research on agricultural production;

5. The interdisciplinary approach will look at the production system as a whole, with all its complexities of mixed farming and mixed croppings. The understanding of such systems will, undeniably, have a significant impact on research priorities and, ultimately, on planning priorities.

II. INSTITUTIONAL COMPONENT

A. Present Situation

Meaningful linkages between research and teaching depend entirely on the institution's approach to both activities. At present, neither the research institution, INRAT, nor the teaching institution, INAT, is able to provide enough support to its professional staff to pursue such linkages. The limited research portion of INRAT's budget (80 percent for salaries and maintenance; 20 percent for research needs) does not allow it to open its doors for researchers, let alone students, from INAT, to use its laboratories and materials difficult to replenish. Cooperation is only pursued intermittently and on a personal level, as noted above. Personal relationships, however, do not have an impact on decision-making, especially if these linkages do not fit within the administrative hierarchies. Social and administrative hierarchies are important in the Tunisian context, as elsewhere, and they can often impede innovative individual or group initiatives.

The VIth Plan sets, as a priority, the establishment of institutional linkages between agricultural research and teaching. Such linkages cannot be truly functional unless structural changes are implemented on the level of the institutions themselves. The World Bank has a proposal for the extensive restructuring of agricultural research in Tunisia. This is presently under discussion with the Ministry of Agriculture . Such a proposal, even if partially accepted, can have an enormous and most positive impact on agricultural research and especially on the status of researchers in INRAT. The valorisation of human resources is one of the factors of agricultural growth. Though these cannot be quantified, they stimulate agricultural development for, in this case, the farmer benefits by more meaningful research outputs.

The fact that the full potential of researchers is not put into use hinders institutional planning capabilities but it is also due to institutional budgetary and planning constraints. A preliminary report of the agricultural VIth Plan[1] highlights the problem from the outset by asking the question: Will the planned training of technicians, plus the existing number of active technicians, satisfy the needs of the agricultural sector for the coming five years, or will it create a labor market with a plethora of potential cadres whose insertion will pose social and economic problems? The question is left unanswered because the public sector is still unable to absorb more than 15 percent of agricultural school graduates, especially in the middle level cadres positions[2].

The gap between filled needs and projected supply, nationwide, is much greater for the senior staff levels than it is for the lower echelons, as shown below[3]:

39% of projected needs of ingenieurs agronomes B.S. and above are satisfied

97% of projected needs of ingenieurs adjoints (2-year post-secondary satisfied

61% of projected needs of adjoints techniques (vocational school) are satisfied

94% of projected needs of specialized workers (primary school) are satisfied

The institutional constraints affecting the quality of outputs - research, teaching and graduates in this case - are caused by internal and external factors:

(1) Rapport du Sous-Comite de la Recherche et de la Formation des Cadres Groupe de Travail, Preparation du VIe Plan, MOA, GOT, March, 1981, p.i.

(2) Ibid, p.5

(3) Ibid, p.4

1. Internal Factors

a. The teaching staff has not been field-oriented, mainly because of a predominantly theoretic training. As a result, graduates - become cadres - have not been operational nor sensitive to problems of agricultural production and producers.

b. Infrastructure and Management of institutions have been cumbersome, slowing or hindering projects of research.

c. Equipment has been unsatisfactory to teaching and research needs.

2. External Factors

a. Definition of needs has not been realistically planned - if planned at all by either the private or public sector, making it impossible for institutions to meaningfully plan ahead.

b. A high percentage of unemployment in the lower echelon of personnel in the agricultural sector, particularly among lower-level cadres and laborers, impacts on the very reputation of the profession and the institutions concerned. Though the entrance examinations to the B.S. program are extremely difficult and eliminate 50 percent of the candidates, the students, extension workers and cadres graduating out of these programs generally persist in maintaining their social distances from field realities. Their social alienation from the farmer's needs is reinforced by an institutionalized white-collar attitude expressed through researchers, teachers and cadres of all levels.

B. Impact of Project on Institutions

1. The most immediate and most tangible impact of the project on the institutions concerned will be the field-oriented and multi-institutional approach to research. This is already accepted and desired by the leadership of each of these institutions. Indeed, it is the first step toward the success of the implementation of the approach, institutionalized through the creation of an interdisciplinary and interinstitutional committee.

2. The most essential constraint to the successful maintenance of the approach, beyond the life of the project, would be removed were the status of the research institutions legally rectified, rendering them autonomous and financially viable. This project has no legal power to enable such changes to take place. But it will add sustenance, support and innovative research results to the institutions' claim to rightful change.

3. The approach is not only a field-oriented and multi-institutional agricultural research. The added significance of the project impact is that it emphasizes looking at the farmer's needs from a holistic perspective. The traditionalistic view of agronomic research and teaching, characteristic of Tunisian institutions, is that of viewing production as a purely agronomic and technologic problem. This approach will not change overnight. Two factors will have a long-term impact on the attitude of the institutions towards agricultural change:

a. The established iterative mechanism of research-teaching, centered around applied and adapted research, will involve the farmer. The institutions will, for the first time, consider the farmer a partner in research rather than an impediment to its process.

b. The institutions concerned are presently involved in the planning of agricultural research and training. Because of the overall limited impact of their research, policy-makers have not always effectively involved them in agricultural production planning. More productive and more problem-solving research institutions can undeniably have a long-term impact on policy-makers.

4. An important component of this project is to establish international exchanges between the institutions concerned and other international institutions involved in similar research, such as ICARDA and various U.S. universities. Such linkages will be developed through the setting up of topical seminars and/or workshops with the participation of international researchers. Overseas short-term training of Tunisian researchers and professors in specialized areas is also planned. Valid research is not only regionally meaningful. For greater refinement and acceptability of that research, such exchanges are to be encouraged. Indeed they will enhance the reputation of the institutions through the international recognition of their researchers.

III. FARMER - EXTENSION - RESEARCH LINKAGES

A. Present Situation

The following two tables on the landownership structure in Tunisia as a whole and in Northern Tunisia in particular (which includes the project zone) reflect the conditions in which agricultural production is pursued and allow us to understand the problems facing the majority of farmers, that is, the small farmers:

Land Ownership Structure in Tunisia in 1977

Size of Farm in Hectares	Percentage of Farmers	Percentage of Land	Average Size in Ha. of Land per Farmer
1 - 5	40.8	6.1	2.3
5 - 10	22.4	10.2	7.0
10 - 20	19.72	17.7	13.8
20 - 50	12.9	26.0	31.0
50 - 100	2.6	11.2	67.7
100 - 200	0.9 - 4.0	8.5 - 29.02	142.3 - 123.33
200 and more	0.5	9.32	312.0

Source: Based on data by Food and Agriculture Division, USAID/Tunis, 1977

Land Ownership Structure in Northern Tunisia in 1977

Size of Farm in Hectares	Percentage of Farmers	Percentage of Land	Average Size in Ha. of Land per Farmer
0 - 10	66	13	3.88
10 - 50	28	32	21.80
over 50	6	55	195.62

Source: Based on CNEA, Projet de Credit Agricole, 1977, p. 1

It is not difficult to comprehend, upon a glance of these tables, the difficulties of spreading the adoption of modern agricultural technology in such an unbalanced pattern of ownership. This situation is rendered even more acute by one of the major constraints in Tunisian agriculture: Parcelling of land. It affects small as well as large-sized farms with the major difference that the parcelled portions in the latter are larger and therefore more easily productive than in the former. The expenses of modern technology, such as mechanization, becomes far more onerous to the small farmer than to the big farmer whose greater surface allows for more efficient and less expensive use of machinery.

Many more constraints face Tunisian agriculture-- desertification, climatic variation and irregularities of rains, overgrazing of pasture land, lack of institutional support, lack of labor, rural exodus, the old age of male farmers and all would have to be addressed by the research component of this project. The cumulation of all these constraints, and at the heart of the problem of research and teaching, is the needed awareness that the farmer is more concerned about his losses than the gains from an unknown and unproven technology. Risk aversion is a universal characteristic of the farmers of the world, but it is particularly true of those on small and medium-sized farms whose survival is rendered precarious because of bad weather, expensive inputs, and uninternalized and uncontrolled knowledge of technology.

Risk aversion can be a great impediment to agricultural growth if the technology available is known to be beneficial to the majority of farmers but does not reach them or is reluctantly espoused by them. The diminution of this aversion is only possible through an efficient system of extension work. Such is not the case in Tunisia for not only is the number and level of extension workers low but there is practically no relationship between research and extension. Indeed, even where communication is possible, it is not made possible

because of the lack of coordination and management in both sectors.

The problem of extension cannot be solved merely by better management or more frequent trips to the fields. The very credibility of extension workers depends on their knowledge and on the projection of that knowledge. Neither research nor teaching have been very supportive of extension. One can even safely add that research, extension and teaching seemed to have reached a mutually supported agreement, that of consistently ignoring each other! The state of agricultural production in Tunisia can no longer allow such an unproductive system to be pursued.

The functional role which research and teaching can take vis-a-vis extension work would not only be beneficial to extension workers. By impacting on their attitudes, it becomes immensely important for them to realize who their target population is: the farmer will no more be only the male farmer but also the female farmer.

The statistical profile shown above indicates that the average age of the male farmer is 55 years old (with national life expectancy being 58 years old). On the other hand, female farmers were 1.89% of the agricultural labor force in 1966 and had increased to 13.6% in 1975. It is much higher today. The role of women has become more intense in all agricultural activities and is certainly more important than that expressed in the census. It should be pointed that not only does the old age of the male farmer diminish the extent of his participation but because more males than females own land in Tunisia's society, the statistical number tends to belie the field reality.

The lack of agricultural labor raises an economic problem to the farmer and a technological problem to production.

The farmer, even the small farmer[1], is forced to use machinery often diminishing his real income by creating burdens of indebtness. The latter directs research towards greater tendencies of pushing mechanization and inputs as a means to diminishing the reliance on labor while increasing production. A critical national problem in Tunisia, however, is unemployment which has effectively reached 30%. The problem is exacerbated by the closing of possibilities for migrant workers in Europe, particularly France and Libya. The increasing return of migrant laborers in a country with little industrial resources poses a serious dilemma to Tunisia.

B. Needed Impact of the Project

"The farmer as client" should be the leitmotiv of the project. Such a perspective will have an impact on the researcher, the teacher, the student, the extension worker and the farmer himself. The importance of understanding rural needs is voiced throughout the Agricultural VIth Plan. Putting the intention into action is more difficult. The project is centered around this challenge and its approach can only be viewed as positive.

(1) MOA/GOT report of 1981 indicates that little information exists on the use of mechanization in Tunisia but overall estimations can be made:

40% of cereal area mechanized
44% of arboriculture area mechanized
28% of oleiculture area mechanized

The use of machinery diminishes as one goes from the North to the South. 81% of the area is mechanized in the NE and 36% is in the South. A 1980 agricultural survey indicated that 50% of farms or less than 20 hectares used tractors while 70% of farms of 20 to 50 has., 90% of farms of 50 to 100 has. and 100% of farms over 100 has. used tractors. (GOT, Structures des Exploitations Agricoles a travers les Enquetes Agricoles de Bases 1977-1980, MOA, Dec. 1981, pp. 29-30)

The Project Committee is to participate and oversee an overall program of study of the systems of production from all their facets - agronomic, social and economic. This will be centered in little studied Zone C (according to CIMMYT mapping) of the Northern region. A drylands agricultural region, it has a mixed rotation of cereals with mixed croppings of vegetables and livestock. Mixed farming is an important traditional practice, encouraged in the VIth Plan, and a component of the planned research.

The "farmer as client" approach of the project is significant for research and training will be centered <u>on</u> and <u>in</u> the farm. The impacts may be far reaching:

1. The farmers will realize that their problems will be taken seriously, their participation, their collaboration and their willingness to listen will be greater. No social problems are foreseen in the closer participation of the farmers in field experiments. Quite to the contrary. From this author's past experience and contacts with farmers, extension workers and researchers, farmers in Tunisia are very open to new ideas and to greater involvement in the process of change on condition that they be informed and convinced of the value of that involvement.

2. Young agriculturalists, seing researcher, teacher and student in field, may well reconsider the worth of the family's farm.

3. The extension worker, who will observe, if not even participate in the field training and research, may not only realize the need of talking with the farmer but his own attitude towards his work may change.

4. The student will become a better teacher, researcher or cadre.

5. The approach of the research itself will direct its questions to the farmer's needs and consequently to production:

a) the relationship between the quality and quantity of a production and its palatability/acceptability will need direct contact with the farmer;

b) the practices of cultivation will have to include the new role of

women in production and their extent of technological know how as well as the understanding of changes in the family structure;

c) the introduction of new inputs will have to be preceded by an understanding of the farmer's capacity-knowhow and financial - to adopt such inputs.

In conclusion, it can easily be said that this project will have a positive impact on its beneficiaries: (1) the institutions concerned, for it will be a first attempt at organizing research on an institutional and interdisciplinary level; it will benefit all institutions by training better researchers, teachers and cadres; (2) the researchers, teachers and students involved, for it will allow them to have greater interest and incentives in their work through better coordination and collaboration; (3) the farmers who will benefit from all of the above for their problems will be better perceived and addressed.

SOCIAL ANALYSIS

Statistical Profile of Tunisia[1]

POPULATION INDICATORS	1959	1975	(1980)[2]
Total population	3,783,169	5,588,209	(6,363,000)
Population growth/yr	2.6%	2.3%	(2.1%)
Urban population	29%	49.83%	(62%)
Rural population	71%	50.17%	(38%)
Population under 20 yrs old	50.7%		
INCOME DISTRIBUTION			
Lowest 20% income group	4% of incomes	5% of incomes	
Top 20% income group	64% of incomes	50% of incomes	
Top 5% income group	18% (1966) of incomes	22% of incomes	
Population in absolute poverty			
Urban	22%	20%	
Rural	45%	15%	
Total	45%	17%	
Population at Poverty Level	75%	37%	
AGRICULTURAL INDICATORS			
Agricultural labor in total labor force	c. 73%	38%	(35%)
Agricultural Percentage in total GDP	c. 24%	-	(16%)
Women in Ag. labor	1.89% (8%=1966)	26%	
Average age of males in Ag. labor	c. 35 yrs old	c. 50.8 yrs old	(c.55 yrs old
Land Distribution in 3 groupings v. percentage of total land area:			
0 - 4.9 has.	41% of farmers(1966)	40.9% of farmers	
	6.7% of land	5.6% of land	
50 - 99 has.	2.5% of farmers(1966)	2.7% of farmers	
	12% of land	12.04% of land	
500 and more has.	0.1% of farmers(1966)	0.4% of farmers	
	6% of land	16.5% of land	
Total unemployment	c. 15%	c. 15.7%	
Effective unemployment	-	c. 30%	
HEALTH INDICATORS			
Life expectancy	40.7 yrs.	57 yrs.	(58 yrs.)
Crude death rate per 1000	20.0	12	(11)
Crude birth rate per 1000	46.0	35.4	(31.0)
Caloric intake per cap/day			
Urban	2340 (1966)	2543	
Rural	2600 (1966)	2416	
	2250 (1966)	2542	

	1959	1975	(1980)(2)

EDUCATIONAL INDICATORS

Adult literacy (15 yrs and over)	16%	55%
Primary: Total	66%	100%
Male	88%	118%(3)
Female	43%	81%
Secondary: Total	12%	22%
Male	19%	28%
Female	5%	15%

AGRICULTURAL RESEARCHERS BY INSTITUTION

	1971			1981		
	Tunisian	Foreign	Total	Tunisian	Foreign	Total
INRAT	28	36	64	40	-	40
INAT	21	21	42	44	18	62
TOTAL	49	57	106	84	18	102

(1) Combined from tables in draft of VIth Plan, GOT; World Bank Development Report, 1981; and M. Fikry, "Sociological Analysis of Projet Ble", in Impact Evaluation of Projet Ble, USAID, Tunis, April 1982

(2) Census of 1980 is not yet published. Figures are taken mainly from draft documents.

(3) Over 100% figure includes ages above and below 6-11 years old.

ANNEX 19

Participant Training Schedule

(trainee-months)

	83	84	85	86	Total	Mo/trainee
U.S.	2	14	14	12	42	
Observational	2	4	4	2	12	1
Short-term		10	10	10	30	2
Third-country	16	18	19	17	70	
6-month course	16	16	16	16	64	6
Short courses		2	3	1	6	1

Annex 20

Desired Learning Outcomes of Research Workshops

A. Research Program Planning Workshop

Participants should be able to

1. analyze a complex problem and identify the significant social, economic, and technical issues.
2. to translate the significant issues into statements of clear, concise, and achievable research objections.
3. to employ criteria to assess the relationships between objectives and create from them an array of Program Objectives with a realistic time frame.

B. Research Management Workshop

Participants should be able to understand the principle of Program Management including priority setting, budget building, allocation, information feedback systems, coordinating mechanisms, personnel management, group dynamics, communication, and the management of service functions.

C. Accomplishment ReportingWorkshop

The participants should be able to

1. distinguish between activity reporting and accomplishment reporting.
2. prepare the text of an accomplishment report.
3. prepare a paper for a scientific audience and a non-scientific audience based upon the accomplishment report.

D. Proposal Evaluation Workshop

The participants should be able to

1. evaluate proposal objectives in terms of clarity, achievability and support of program objectives.
2. evaluate the egrees to which the methods support the objectives.
3. evaluate the degree to which the budget supports the methodology.

4. determine the validity of the reporting milestones.

E. Proposal Preparation Workshop

The participants should be able to

1. write clear, concise and achievable objectives that are time phased.
2. develop methodology that supports the objectives.
3. develop budgets that support the methodology.
4. demonstrate necessary coordination mechanisms.
5. develop meaningful reporting milestones.

Estimate of Research Equipment Needs and Operating Expenses

a. Basic Research Equipment

Based on estimates prepared for the PID, discussions with the GOT, and further analysis by the team, an overall estimate of equipment needs at INRAT has been developed, as shown below. This list will be revised and finalized by the commodity procurement TDY scheduled for May 1983.

	($000) AID	GOT	I
1. Research Greenhouse (incl construction)	175	75	250
2. Field equipment	70	25	95
3. Laboratory Equipment	225	40	265
a. Plant genetics and breeding	60	10	90
b. Agronomy and pest control	45	5	50
c. Food and forage legumes	20	5	25
d. Grain quality	40	10	30
e. Animal husbandry and livestock	60	10	70
4. Other (including audio-visual equipment)	50	-	50
Total	520	140	660

In addition to the equipment listed above, the GOT will make available to the project approximately $200 worth of field and laborary equipment.

b. Research Expenses

Year	83-84	84-85	85-86	Total
Projects begun year 1	6	6	6	-
Projects begun year 2		12	12	-
Projects begun year 3			12	-
Total in operation	6	18	30	-
Research cost at $10,000/yr	60	180	300	540
U.S. share (percent)	100	66	33	-
(amount)	60	120	100	280
GOT share (percent)	0	34	67	-
(amount)	-	60	200	260

ANNEX 22

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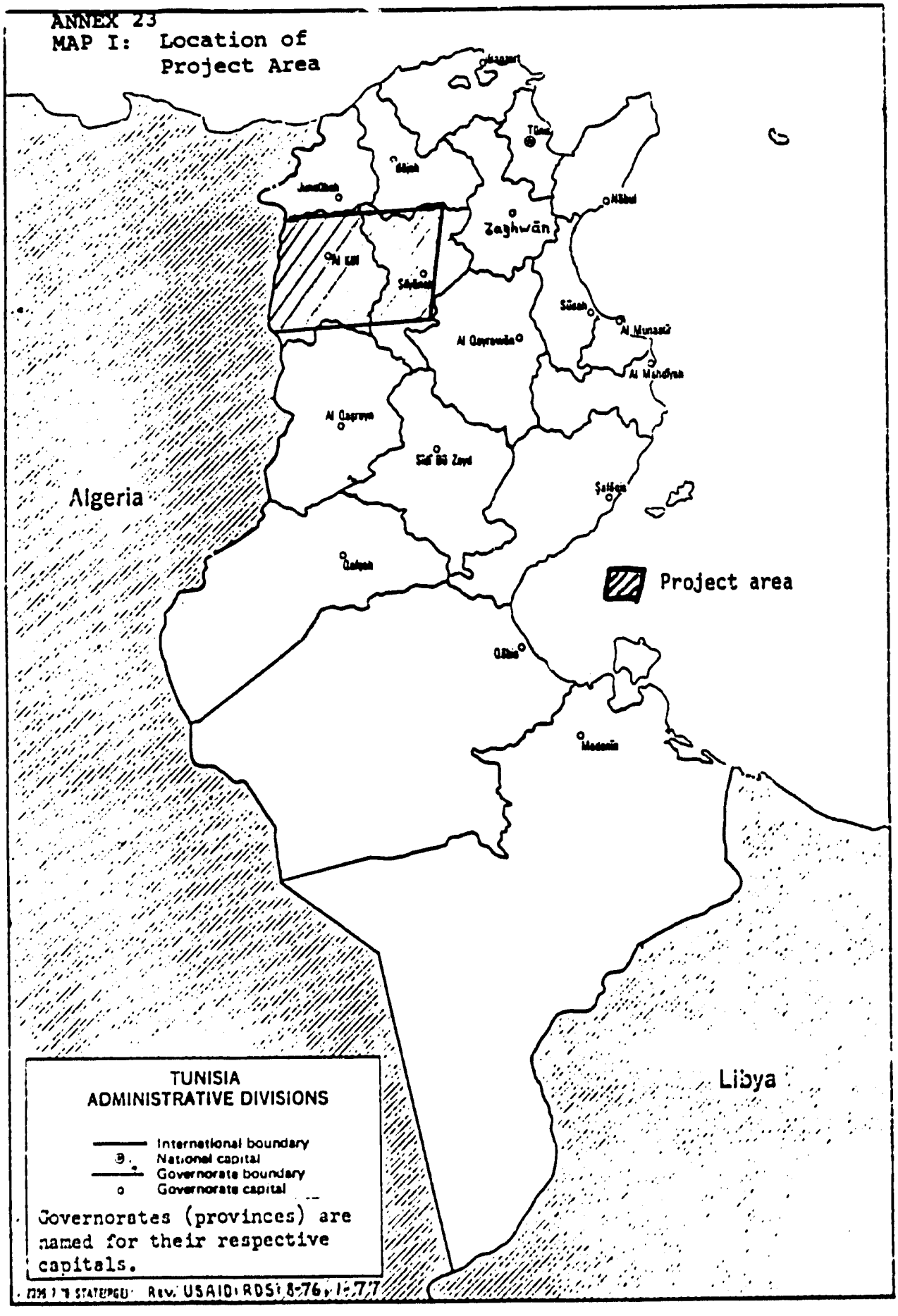
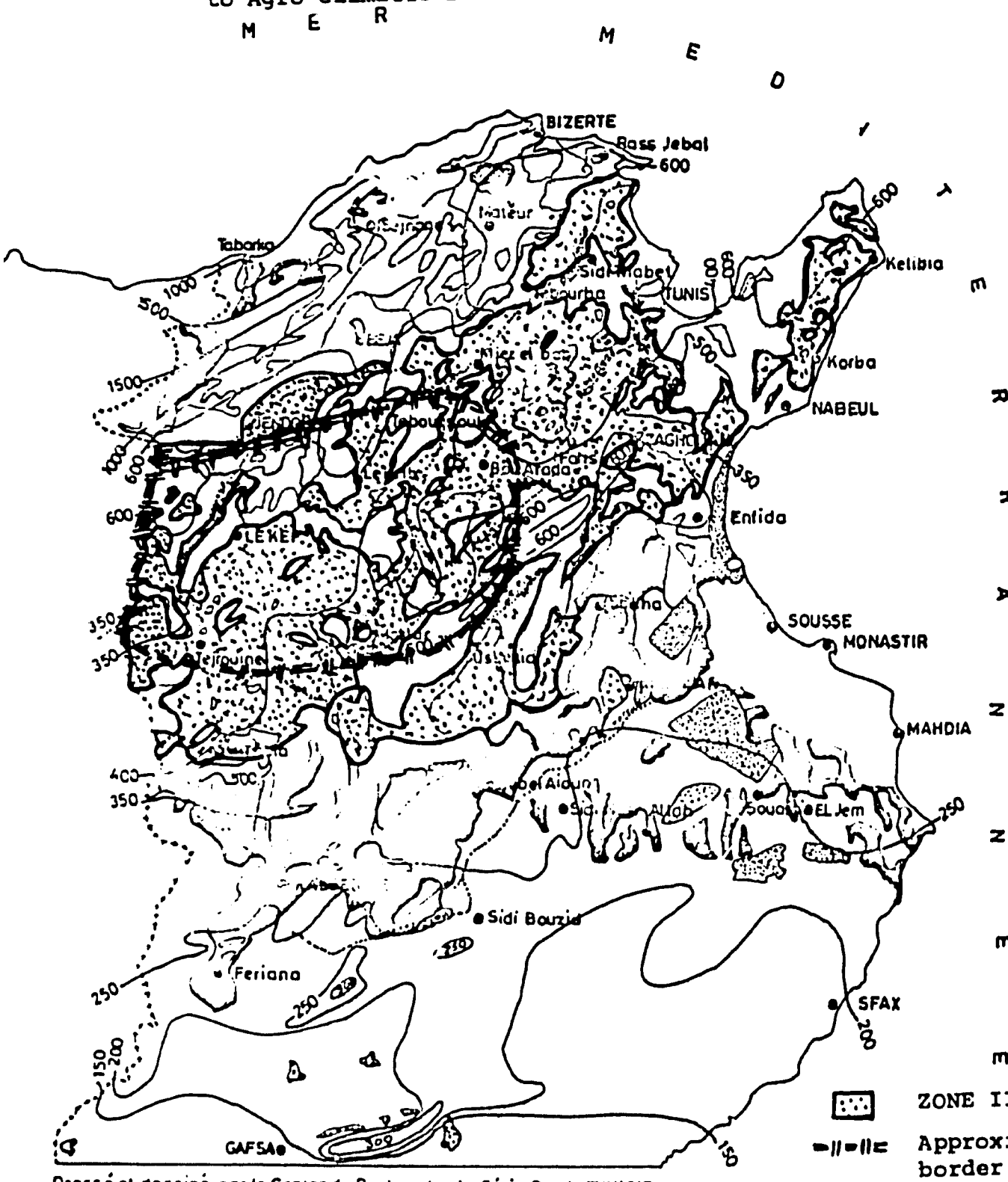
ANNEX 23
MAP I: Location of Project Area



CARTE DE LA VOCATION CEREALIERE DE LA TUNISIE

ANNEX 24

MAP II: Relation of Project Area to Agro-climatic Zone II



Dressé et dessiné par le Centre de Recherche du Génie Rural - TUNISIE

D'après AFRIKA KARTENWERK N° 11 1976

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