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Final Report

Morocco Dryland Applied Agricultural Research Project

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**MidAmerica International Agricultural
Consortium**

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EXECUTIVE SUMMARY

The United States Agency for International Development (USAID), the Kingdom of Morocco as represented by the National Institute for Agricultural Research in Morocco (INRA) and the MidAmerica International Agricultural Consortium (MIAC) joined forces in 1980 to develop Morocco's dryland agricultural research capability. The University of Nebraska-Lincoln was designated as the program management entity for the USAID contract. Other MIAC institutions involved included Iowa State University, Kansas State University, the University of Missouri and Oklahoma State University. The project's goal, to develop a dryland research center with Moroccan leadership and management, was culminated with a most successful Dryland Agriculture Research Workshop held in Rabat, May 24-27, 1994. The workshop was planned and implemented by Moroccan administrators, scientists and technicians.

The objective of the project was the establishment of a dryland research center in the semi-arid area of Morocco at Settat. The environment poses a challenge for crop production in this area because the annual rainfall is relatively low and extremely variable from year to year. Soils vary greatly in productivity. The center provides a research base that contributes to Morocco's food grain supply and enhances an economy made up of mostly small farmers, who are located in an approximate 23,000 square mile area. It was also anticipated that there would be impacts in U.S. agricultural areas where water and soil management are similar and where there are similar constraints to food grain and forage production, such as insects and plant diseases.

The project involved the planning, construction and program implementation for 14 laboratories, a greenhouse complex, four research substations, a technology transfer center and service facilities. Some irrigation equipment was installed in order to insure against the loss of germplasm and to evaluate irrigation strategies which could make the best use of limited supplies of water.

Human resource input was vital to the project's success. Seventy Moroccan participants were trained at the graduate degree level to fill scientist and research management roles. In addition, 171 Moroccans participated in short-term non-degree programs for technical support roles. Technical assistance to the project was provided by 87 short- and long-term consultants from U.S. research institutions and international research centers.

The end result is a dryland research center that is Moroccan managed and staffed and has the capacity for quality research programs that are applicable to the dryland farming areas of Morocco. It also contributes benefits to areas with similar climatic and soil characteristics, especially in other North African nations. The center has the leadership, scientific staff, support staff and infrastructure to design and follow through with a research agenda capable of making a difference in the dryland farming economy and the Moroccan food supply. The framework to conduct on-station and on-farm research has been established. Technology transfer of research-based information to farmers in the dryland area is an important aspect of the overall program effort. The project has the socio-economic capability to guide the development of research agendas and to monitor and evaluate the impacts of new technologies developed at the center. One study reported that the economic return to the

research investment in the development of new wheat varieties resistant to Hessian fly damage was 39 percent.

The project has had an impact on wheat production in the United States. The research on Hessian fly resistant wheat varieties, Russian wheat aphid, and the introduction of new wheat germplasm are of interest to the U.S. wheat industry. There has also been an indication that cooperation with Morocco has contributed to Morocco's importation of U.S.-produced wheat to meet its bread wheat deficit.

The project has contributed to the long standing relationship and goodwill established between Morocco and the United States in 1777 and which has continued for over two centuries. The project has provided U.S. scientists and students a better understanding of Morocco and its culture. It has given the Moroccan participants, scientists and administrators a better understanding of the U.S. society and culture.

The dryland research project investment and the program development effort has resulted in a research center with the potential for linkages with research institutions around the world as it makes a major contribution to water, soil, and crop production scientific knowledge and its applications.

The MidAmerica International Agricultural Consortium and the University of Nebraska-Lincoln are proud to have had a role as partners in the project that has been put in place with Moroccan counterparts.

BACKGROUND

The Dryland Applied Agricultural Research (DAAR) Project was authorized in 1978. The Government of the United States through the United States Agency for International Development (USAID) and the Government of Morocco (GOM) agreed to develop a regional center for applied agricultural research in Settat, Morocco. This activity was implemented through the MidAmerica International Agricultural Consortium (MIAC) through a contract with USAID. The Moroccan agency charged with the implementation of the project was *Institut National de la Recherche Agronomique* through the *Centre Regional de la Recherche Agronomique de la Chaouia, Ahda et Doukkala* and on behalf of the GOM.

The initial project was funded for \$4.5 million to be utilized for technical assistance, procurement and training. During the period 1978 through 1980 USAID managed the project directly from the USAID Mission located in Rabat, Morocco. MIAC was contracted during 1980 to assume responsibility for achieving project objectives and introduced the first technical assistance personnel during 1981. However, the contract for utilization of technical assistance personnel having not been signed until 1980 led to an additional period of delay while initial activities were generated. A drought, which spanned the period 1982 to 1984, seriously disrupted agronomic research activities as was the case again during the period 1991 to 1993.

Regardless of the setbacks due to drought in the early years and difficulties associated with implementation, the initial evaluation recommended extension of the project with additional funding. The project was redesigned and extended to 1988 with a funding ceiling of \$26.3 million. Subsequent evaluations were made during 1986, 1991 and a final evaluation during 1993. During this period the evaluations led to extension of the MIAC contract through August 31, 1994 with a funding ceiling of \$50 million of which approximately \$48.3 million were obligated to the DAAR Project.

During the period 1982 to 1993 major activities undertaken included training, procurement, technical assistance, and construction. As of July 1994, the only construction activity which had not been completed was the INRA Guest House. Fourteen laboratories located in 13 buildings and a greenhouse complex, supported by four substations, sustain the activities of the scientists and support staff.

Eight subprograms and the Service for Research and Development (SRD) provide a decentralized administrative and research capacity in cereal breeding, crop protection, crop management, soil management, food legumes, forages and livestock, agricultural mechanization, rural sociology and economics. The project management systems utilized by the CRRRA in Settat bring the subprograms and the SRD together in multidisciplinary research activities which is one of the major successes of the DAAR Project.

Long-term technical assistance personnel have provided advisory services to returning scientists and participant trainees. During much of the project, technical assistance personnel played an important role in the development of a research capacity while INRA scientists were being trained in the United States.

During 1991 a planned reduction in technical assistance personnel was introduced. Over the period 1991 to 1994 the MIAC technical assistance team was reduced from 13 to five families with only two administrative personnel remaining after June 1994. All technical assistance personnel had left Morocco prior to August 1, 1994. The transition from a large technical assistance component to Moroccan scientists was undertaken with little disruption and no structural collapse.

The MIAC contract was completed on August 31, 1994. During the period 1978 to 1994 MIAC and INRA had collaborated in the development of a functioning dryland applied agricultural research center, supported by four substations. Administrative management tools had been successfully put in place at the CRRRA at Settata to provide for an efficient flow of resources to researchers in support of technology development activities. Supported by a Research System Approach (RSA), which directed research from conceptualization through dissemination, the Project management systems operated effectively to ensure both quality research and an effective marketing of CRRRA/Settata-developed technologies to enhance long-term and linkage opportunities with organizations within Morocco and internationally.

A technology development and dissemination process provided a basis for identifying high priority constraints faced by farm families in the project area. Baseline surveys, special issue surveys and rapid reconnaissance surveys resulted in an effective development of "Micro Research" projects utilizing the LogFrame research and development tools used by CRRRA/Settata to improve its research and administrative management capability. Introduction of rapid reconnaissance surveys and the development of a technique to prioritize research, "A Scoring Technique for Agricultural Research (STAR)," completed the development of a functioning Research Agenda Development component of the RSA.

Monitoring and economic impact assessment tools were developed during the final year of the contract and were used successfully to assess the economic impact of CRRRA/Settata-developed technology. The development of the tool and its utilization completed the successful development of the RSA by providing the ability to address farmer and policy makers' needs for information on the benefit flow to Moroccan agriculture through investment in agricultural research.

The key to the future of the CRRRA at Settata is the continued development of technologies useful to production agriculture which maintain or improve the natural resource base. The CRRRA/Settata is well prepared to meet this challenge but will need continued support through the development of linkages both nationally and internationally. MIAC has supported the development of these linkages during the course of the contract. The CRRRA/Settata has a fully functioning local area network (LAN) connected to an electronic mail service. This communication system provides an opportunity to expand (explode) the flow of information among scientists and administration both in Morocco and internationally. Secondly, but perhaps more importantly, an internal flow of data among scientists at the CRRRA at Settata will expand with the scientists ability to utilize the LAN for multidisciplinary team efforts in addressing problems facing agriculture in Morocco.

Last but not least, is the continuous development of the researchers' capability to implement research which had been prioritized during the research agenda development component. The scientists at the CRRRA/Settata are experts in the development of technologies, both biological

and socioeconomic. On-farm and on-station research activities are undertaken in many different areas of the project zone. The eight subprograms and the Service for Research and Development (SRD) provide a decentralized foundation for undertaking multidisciplinary research activities. Varietal development, cultural practices geared toward farmer needs, socioeconomic information for support of technology development, agricultural mechanization research to promote change in the agricultural sector and the laboratories which support the subprograms result in an integrated research and development capability. The SRD provides the mechanism to transmit information to external organizations and evaluate technologies developed on-station or on-farm under farmer conditions. This capability results in an efficient on-farm evaluation and on-station research component which ties both the research agenda development and monitoring and impact assessment components together in a Research System Approach (RSA); an RSA capable of developing, testing and adapting technologies which meet farmer, researcher, extension and policy maker needs.

PURPOSE

The purpose of the Morocco Dryland Applied Agricultural Research Project was to: "establish a sustainable applied agricultural research capacity relevant to the dryland farming systems and natural resource constraints of the 250-450 mm rainfall region of southern Morocco and capable of providing technologies to improve farmer productivity."

To address this purpose MIAC and INRA introduced, developed and achieved the following objectives:

1. Develop agronomic technologies, farming systems practices, and farming equipment that are appropriate to small and medium scale dryland farmers; (See "Final Evaluation of the Morocco Dryland Agriculture Applied Research Project" pp. 42-48).
2. Direct links between researchers and representative farmers that provide: a) basic understanding of targeted farming systems, b) baseline information for evaluation and feedback of research programs, and c) a model for evaluating economic and social viability of alternative technologies.

Rapid Reconnaissance (RR) Surveys (SONDEO, Informal Survey). The first of these successful surveys was implemented during September of 1992. It resulted in the identification of researchable constraints for the Oulad Said area of the Project. This became the basis for research agenda development activities in the Oulad Said area. The impact that the RR surveys have had on team building among researchers, extension and farmers has been impressive. The future success of technology dissemination and acceptance or adaptation is dependent upon continuation of this type of methodological development.

Baseline Studies. The CRRA/Settat action on baseline studies, funded by the DAAR Project, has led the way in establishment of several national programs directed toward agro-ecosystems in addition to having provided important information for all subprograms. An earlier conflict between the responsibilities of the CRRA/Settat to serve a specific geographic region and its mandate as the CRRA at Settat has been muted as a result of baseline survey utilization.

Monitoring and Impact Assessment. The third component of the Research System Approach (RSA) was addressed through training programs in the "Design and Analysis of On-Farm Trials." This led to a monitoring component associated with multi-year testing which includes consideration of environmental factors. The specific technique requiring this information is referred to as "Modified Stability Analysis."

Methodological advancement has led to the development and utilization of an economic impact assessment process. This prototype methodology utilizes partial budgeting, technical efficiency criteria and a "Least Favorable Most Likely" assessment of CRRA/Settat-developed technologies. The process can account for downstream and upstream flows associated with the technology development and transfer process. It is open, continuous and is standardized in such a way as to be applicable to various categories of technologies including those addressing cultural practices, varietal development, agricultural mechanization and valuation of socioeconomic information.

Panel studies which focus on subsets of activities inherent in the baseline studies should be scheduled for regular implementation following completion of the MIAC contract. The panel studies are post-project activities which will improve the CRRA/Settat's ability to monitor and assess socioeconomic impact of the research, development and transfer process.

3. Links between national and international institutions involved in dryland agricultural research.

Private Sector. Development of linkages has progressed both nationally and internationally. Private enterprise linkage with the CRRA/Settat is evolving for purposes of revenue generation and research. Private business linkage has led to production of a CRRA/Settat-developed animal-drawn seeder and a prototype tractor-drawn seeder. These activities are augmented by other linkages with the private sector for revenue generation through soil analysis services and land rental arrangements.

Internationally, groups such as Valmont Industries, U.S.A., an irrigation manufacturing corporation, are ready to work with the CRRA/Settat. A dialogue with Valmont is being maintained which is designed to provide opportunities for the development of linkages between a multinational private enterprise, U.S. universities, Moroccan universities and the CRRA/Settat.

Team Technologies, Inc., U.S.A., a management training and software development firm, has provided training in project management and is interested in participating in a joint venture with the CRRA at Settat to promote the capability of INRA in management systems to enhance revenue generation. This will reinforce the sustainability of the CRRA at Settat and INRA as an institution.

University. Linkages between IAV-Hassan II University (IAV) and ENA-Meknes University have been encouraged. Two action areas include close linkages between the CRRA/Settat and IAV. MIAC and INRA have promoted collaborative research between USDA/INRA/Washington State University and IAV Hassan II through the Technologies for Soil Moisture Management Project.

MIAC and the CRRA at Settat promoted the development of international linkages with other U.S. universities. A developing linkage with the University of Georgia's Sustainable Agriculture and Natural Resource Management Collaborative Research Support Project (SANREM CRSP) provides opportunities for strengthening linkages with other CRRAs and U.S. universities. It also provides an opportunity to support ongoing development activities associated with natural resource economic issues of interest to the CRRA at Settat in conjunction with IAV Hassan II University.

These cases are augmented by Memorandums of Understanding signed between INRA and the University of Nebraska-Lincoln (UNL) and INRA and Washington State University (WSU). These institutional linkages strengthen the ongoing scientist to scientist interactions which are robust.

International Centers. Linkages with the international centers have been promoted. Support for ICARDA's regional coordination meetings held in Morocco and other countries have provided the CRRA/Settat's scientists with a model for future collaboration. Collaborative activities have been undertaken with the ISNAR, USDA, CIMMYT, IDRC, IFAD, UNDP and more recently with the FAO. The result of these linkage development activities will be the provision of technologies necessary for increasing sustainable production, incomes and nutrition for farm families in Morocco and other countries of North Africa.

4. A functioning and sustainable regional research station at Settat (CRRA).
5. A functioning and sustainable network of supporting satellite research substations for the CRRA at Settat.

Realization of objectives 4 and 5 are stated plainly in the "Final Evaluation of the Morocco Dryland Applied Agricultural Research Project (DAARP)" document which declares the following under the heading, "SUMMARY OF MAJOR ACHIEVEMENTS:"

"A functioning and sustainable research center (CRRA/Settat), along with four satellite research stations, has been developed that is capable of generating technology for dryland agriculture. This center will serve as a model for other INRA centers as INRA pursues its goal of decentralization."

6. A management system in place to carry out effective research programs and develop budgets, accountability and evaluation.

Project Management. Training in the use of the LogFrame Approach (LFA) has influenced all levels of administration and scientists' project development activities at the CRRA/Settat and at the regional and national level. The training resulted in the development of both DAAR Project-level logframes as well as multidisciplinary research project logframes and associated documents. Subsequent training in the use of PC TeamUP software provided the opportunity to tie together the logframed projects with a budget and scheduling capability. This provided a basis for the development of unsolicited proposals for submission to various organizations, both public and private. In the future, with continued

utilization and additional training (both internal to the CRRA/Settat and from the external sources), these management procedures will become the basis for research and administrative action across INRA.

7. A functioning and sustainable technology transfer unit that is transmitting new technology information to clients.

A model for implementation of a technology development and transfer process has been institutionalized at the CRRA at Settat. This model draws on the Research System Approach and the Project Management System for its strength. Farmers', scientists', and policy makers' expertise are combined with socioeconomic characteristics to make the model an effective method for diffusion and infusion of technologies which have been developed at the CRRA/Settat.

A functional audiovisual laboratory, established in 1993, provides the CRRA/Settat with a capability to translate ideas into viable messages for transmission at all levels of decision making. Training on communication techniques augments this capability. Information dissemination to policy makers, extension and farmers and back to researchers is an ongoing, daily activity which draws upon the expertise of the Service for Research and Development's audiovisual laboratory.

Rapid rural appraisal surveys (SONDEO), undertaken by a multidisciplinary research team, extension personnel, and farmers provide consensus building opportunities. The goal to identify constraints to crop and livestock production as perceived by farmers, researchers, and policy makers has led to organized, area-based activities with targeted impact.

Communication pertaining to project activities and outputs are presented to decision makers through:

- a. Participation in the collaborative on-farm agronomic research trials.
- b. Training, fiche techniques, and on-farm research activities.
- c. Reports to policy makers on special themes which deal with components of the Research System Approach or address specific administrative issues.

THE CRRA AT SETTAT

A successful, sustainable research center (CRRA/Settat), along with four satellite research stations, has been developed that is capable of generating technology for dryland agriculture. Functions which are operable to ensure a sustainable center include the following:

- ▶ A management and research base supported by the *Institute National de la Recherche Agronomique* and the Ministries of Agriculture and Finance.
- ▶ A capability and process in place to develop and disseminate technologies.
- ▶ The capacity to measure intermediate and long-term impacts of technology development activities.

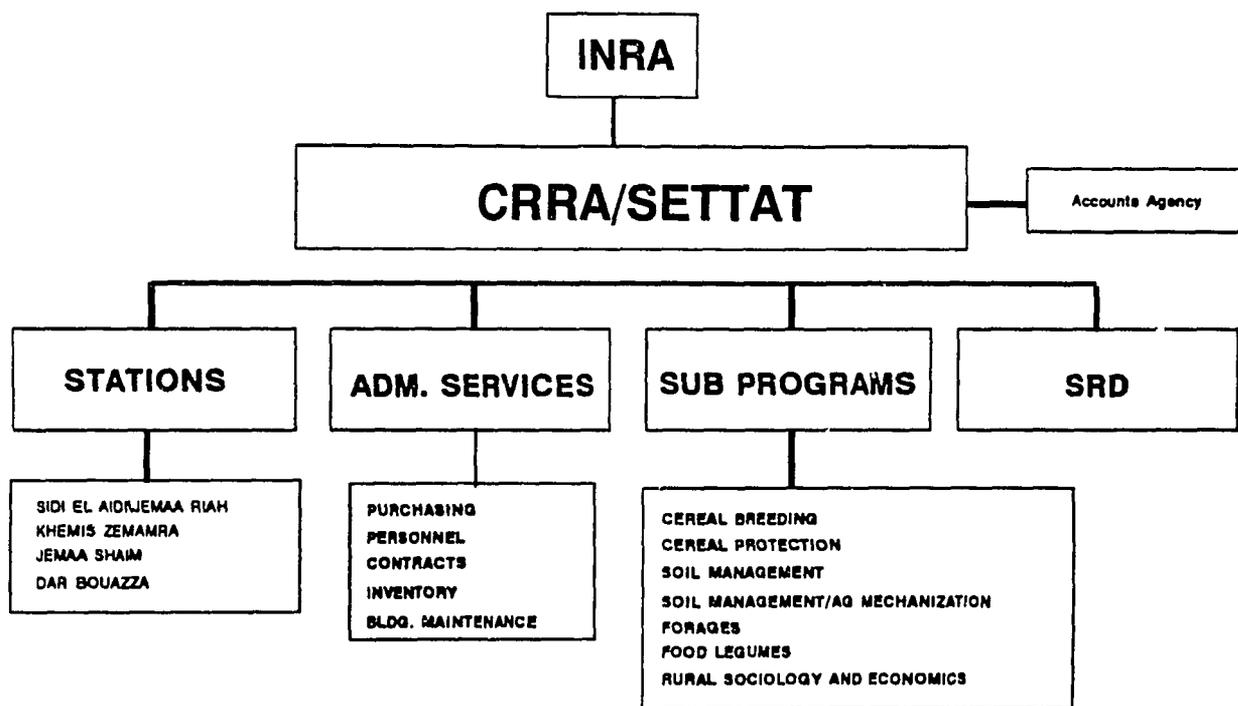
These functions are complimented by the CRRA/Settat's ability to generate resources which are utilized through an efficient resource allocation process. This is supported by an effective resource management capability.

CRRA AT SETTAT, ADMINISTRATIVE STRUCTURE

Figure 1 presents a flow chart of the administrative structure in existence at the *Centre Regional de la Recherche Agronomique de la Chaouia Abda et Doukkala*.

FIGURE 1. ADMINISTRATIVE HIERARCHY - REGIONAL CENTER OF AGRONOMIC RESEARCH FOR CHAOUIA, ABDA AND DOUKKALA

CRRA/SETTAT ADMINISTRATIVE STRUCTURE



ADMINISTRATION

The possibility of reaching farm families in Morocco is directly related to the administrative and human resource capacity of the *Centre Regional de la Recherche Agronomique de la Chaouia Abda et Doukkala* (CRRA) in Settat, Morocco, and its interaction with the national administration of the *Institut National de la Recherche Agronomique* located in Rabat, Morocco. DAAR Project-trained administrators have provided a model for the administration of agricultural research in Morocco. The administrative capacity which exists today has resulted from human resource development, coupled with the development of administrative structures which support technical proficiency of CRRA at Settat scientists. Existing components which provide institutional support for administrative capability at the CRRA at Settat are briefly reviewed below.

The Subprogram. The subprogram administrative structure is an example of decentralization of decision making necessary for a center the size of the CRRA at Settat to maintain efficient administration. As this decentralization of decision making has evolved, more accountability for technical activities has resulted. An example of this impact is the development of multidisciplinary research projects designed to coordinate research activities. These subprogram-routed activities better address the most important environmental, socioeconomic, production, household and market constraints faced by producers. A lasting product of the subprogram decentralization policy will be a center with more efficient use of resources directed toward the critical issues facing farmers in the Project region and, moreover, the North African countries with similar agro-ecological characteristics. The effort which is being institutionalized has already augmented the sustainability of the CRRA at Settat through generation of more cost effective technologies and information bases.

The Service for Research and Development. The Service for Research and Development (SRD) compliments activities undertaken by the subprograms. SRD provides capability for on-farm evaluation of technologies developed by CRRA at Settat. The SRD is also responsible for promoting liaison with farmers, government and parastatal agencies, and private sector groups for the dissemination of research results generated from the CRRA at Settat. It provides a feedback mechanism for scientists working with the CRRA at Settat by examining constraints associated with the acceptability of their technology development activities.

The Agent Comptable. The *Agent Comptable* is an instrumental position for the CRRA at Settat. The *Agent Comptable*, a staff member assigned responsible to the Ministry of Finance, provides the CRRA at Settat with the opportunity to contract and react quickly to the financial needs of the center on a daily basis. This agency, could perform additional important functions for the CRRA at Settat. It can and should actively perform the function of a catalyst and facilitator for multi-agency or multi-institutional funding for collaborative research projects. This is an important opportunity for the CRRA at Settat to exploit as a post-project activity.

TECHNICAL ASSISTANCE PERSONNEL

The Dryland Applied Agricultural Research Project undertook technical assistance activities in support of INRA administration, eight subprograms, the Service for Research and Development, and four substations. The CRRA at Settat was provided with technical

personnel during the period INRA was developing its human resource capacity -- the single most important capability developed during the project.

Technical assistance personnel undertook research and development activities while 63 scientists were being trained by the Project at U.S. universities in preparation for the transition to a fully functioning research center. Scheduled reductions in the technical assistance staff, beginning in 1991, enhanced a constructive transition to research administration and management in eight subprograms and the Service for Research and Development (SRD). This designed approach to reductions in technical assistance personnel, as Moroccan scientists returned from pursuit of their higher education objectives, has yielded one source of sustainability to the CRRA at Settat.

While providing services as advisory and/or technical assistance personnel, MIAC staff involved themselves in collaborative research, research management training, methodological design, technology transfer and in-service training activities, with their Moroccan colleagues. The integration of the MIAC personnel into the subprograms provided opportunity for full collaboration in efforts undertaken with their counterparts. The provision of in-service training activities provided a new level of confidence amongst the returning scientists, which at the end of the project provided a positive example of a maturing institution.

Long-term technical assistance personnel, housed with their counterparts at the CRRA/Settat, developed multidisciplinary research projects. These projects required team efforts demanding the cross-cutting of disciplines to ensure the integrity of the project, budget and schedule of activities. Together, MIAC and the CRRA at Settat have promoted a project management system which has positively influenced INRA-Rabat and other CRRAs within the domain of INRA.

TRAINING

DAAR Project inputs were used in the development of the CRRA/Settat Program Center human resource capital. Emphasis was placed on long-term training at the Ph.D. and M.Sc. levels to promote disciplinary research capacity which could be further developed to provide multidisciplinary research projects.

Long-Term, Off-Shore Training

During the life of the DAAR Project 78 students undertook post graduate training in the United States. Forty-seven undertook Ph.D. training, 18 M.Sc. degree training and 13 undertook coursework only training. Two individuals were terminated and one withdrew from the program.

Emphasis throughout the Project has been on training in, cereal breeding, cereal agronomy, sociology, economics, soil moisture management, pathology, virology, soil fertility, station development and management, forages and livestock, entomology, weed science and administrative management. The training activities focused on problems faced by Moroccan farmers and the need, by policy makers, for information to act to remove and/or reduce constraints faced by Moroccan farmers.

Short-Term, In-Country Training Courses

Short-term training that was undertaken in-country proved to be effective. The recognition by colleagues of the expertise which exists within a group and an ability to exploit each person's potential more effectively contributed to the effectiveness of in-country training.

In-country training courses undertaken, during the period 1991 through 1994, focused on:

- ▶ Farming systems research techniques for on-station and on-farm design and implementation of research activities.
- ▶ Project management utilization of LogFrame Research and Development and TeamUP software to organize, budget and schedule research and administrative projects.
- ▶ Audio/visual communication techniques for the delivery of information to farmers, policy makers and scientists.
- ▶ Maintenance of agricultural equipment to ensure the longevity and proper use of ag equipment.
- ▶ Writing for proposal and publication which was designed to ensure improved capability by the scientists to produce high quality papers and proposals.
- ▶ Planning-by-objective activities carried out by ISNAR in Morocco in support of the national program in priority within research.

Short-Term, Off-Shore Training

Short-term training in the United States was oriented toward clerical staff. There was also an emphasis on management and training in farming systems research and extension.

USDA courses in research project management, farming systems research and extension and use of audio/video equipment were successfully integrated with short-course work in the utilization of spreadsheets, databases, typing and computer applications. Future activities in support of administrative support staff should be undertaken in-country on a team basis.

Specific Training Activities

A summary of specific activities undertaken in training for sustainability are listed in Table 1. These activities strengthen both research and administrative capacity to address farmer and policy maker demands.

TABLE 1. SPECIFIC ACTIVITIES UNDERTAKEN IN TRAINING FOR SUSTAINABILITY

SHORT-TERM TRAINING IN MOROCCO	
1. Administrative and Research Management	Introduce and utilize tools for improved budgeting and scheduling for PBO
2. Training of Trainers	Training of trainers program for development of training capacity in project management systems
3. Editing and Publications	Editing and publication criteria development and implementation of techniques for center scientists
4. Data Base and Financial Management	Development of data base and financial management tools for INRA administration
5. Local Area Network (LAN)	Installation and training in the use of a LAN system for internal and external linkage development
6. Electronic Mail Communications	Usage of electronic mail options and installation of services for INRA at Rabat and the CRRA at Settat
7. Irrigation Equipment	Usage of linear move and pivot irrigation equipment for research and revenue generation.
8. Equipment Utilization Training	Short-course in calibration of Wintersteiger planters and harvesters
SHORT-TERM TRAINING IN THE U.S.	
9. Communications	Custom training which builds upon initiatives in the field of audio/video communication of CRRA/Settat's information
10. Project Management	USDA-sponsored course to develop additional capacity in project administrative management
11. Administrative Staff Computer Utilization	Usage of computers for data base development, wordprocessing and spreadsheet analysis
DEGREE-BASED TRAINING	
12. Advanced Degree (M.Sc., Ph.D.)	Course work and research leading to an advanced degree at either the M.Sc. or Ph.D. level
13. Advanced Degree (Course Work Only)	Course work only studies designed to allow INRA scientists to undertake research in collaboration with IAV Hassan II University professors leading to Ph.D. degrees post-contract completion date.

ACCOMPLISHMENTS AND IMPACT

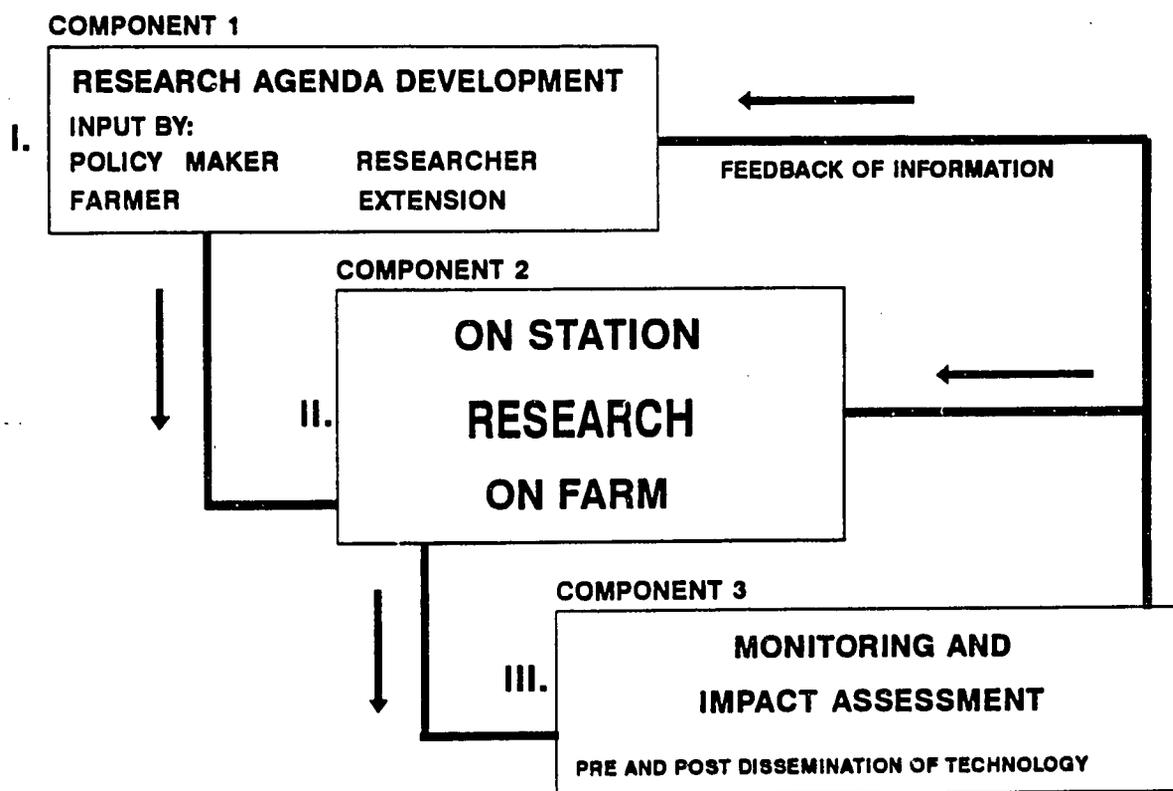
Research System Approach

The "Research Systems Approach" (RSA) is comprised of three components:

1. The "Research Agenda Development" component.
2. The "On Station and On Farm Research" component.
3. The "Monitoring and Impact Assessment" component.

FIGURE 2. COMPONENTS OF THE RESEARCH SYSTEM APPROACH

RESEARCH SYSTEM APPROACH ENHANCEMENT OF TECHNOLOGY TRANSFER



INRA and MIAC have successfully introduced a model which facilitates the targeting of research. This model allows early impact on the farm family, the regional economy and national level policy makers. The "Research System Approach (RSA)", described in Figure 2, has provided the CRRA at Settat with the opportunity to move well beyond what was envisioned during the development phase of the project.

The RSA charted a course for INRA which strengthened the development of:

- ▶ The institutional base established at the CRRA at Settat.
- ▶ The capability and processes necessary to conceive and disseminate technologies generated by the CRRA at Settat.
- ▶ The capacity to measure potential and/or actual impacts of technology development activities.

Addressing these broad issues was accomplished through dissecting the RSA. The RSA allowed projects to be viewed as manageable elements. These elements could be addressed sequentially and still be integrated into the complete RSA as particular component requirements were met.

Specific activities for the advancement of each of the RSA's components were identified during the year of its introduction, 1992. These activities directly influenced the efficiency of both research and administration at the CRRA at Settat. Research prioritization, which had relied on programming by objective activities from a national level was elaborated through the development of a foundation, upon which the national program initiative could settle, thereby strengthening each of the components. Building on this success, MIAC and the CRRA at Settat undertook a coordinated effort to fortify the attempts by INRA, as a national institution and a regional resource on agricultural issues, through strengthening the three components through specific activities as follows:

Research Agenda Development

- Project and research management training.
- Training of trainers educational activities.
- Technology design and evaluation techniques incorporating farmers' perspectives.
- Continual utilization of sociological and economic baseline information.
- Information procurement through Rapid Rural Appraisal (SONDEO) Surveys.
- Incorporation of feedback associated with results flowing from monitoring and impact assessment methodological developmental activities.

On-Station and On-Farm Research

- Utilization of socioeconomic baseline data information in the development of research projects.
- Incorporation of budget and scheduling of research projects through training in the use of TeamUp, a project management tool.
- Project assistance activities designed to diversify portfolios which in turn, strengthened proposal development and institutional sustainability.

- Introducing techniques for writing of reports to improve publication and proposal development.

Monitoring and Impact Assessment

- Development of a methodology for monitoring the flow of agricultural technologies from the CRRA at Settata to farmers.
- Development of methodologies for the socioeconomic assessment of technology-generated impact.
- Development of the audio/visual capabilities within the Service for Research and Development for technology transfer.

Administrative Actions

Administrative actions in support of the RSA were strengthened by:

- Developing procedures for center acquisition and management of resources.
- Expansion of management and maintenance training activities to station management staff.
- Investigating and developing alternative plans for the generation of revenue by the CRRA at Settata.
- Developing irrigation for sustainable research and revenue generation.
- Project assistance support activities which introduced and trained personnel in methods to diversify funding portfolios.
- Linkage development activities, national and international, which fostered sustainability of the CRRA at Settata.

From these actions, the RSA continued to flourish and has led to the development of cohesive, multi-disciplinary research projects which addressed each component and were more targeted to the needs of the clientele.

RESEARCH, DEVELOPMENT AND TECHNOLOGY TRANSFER

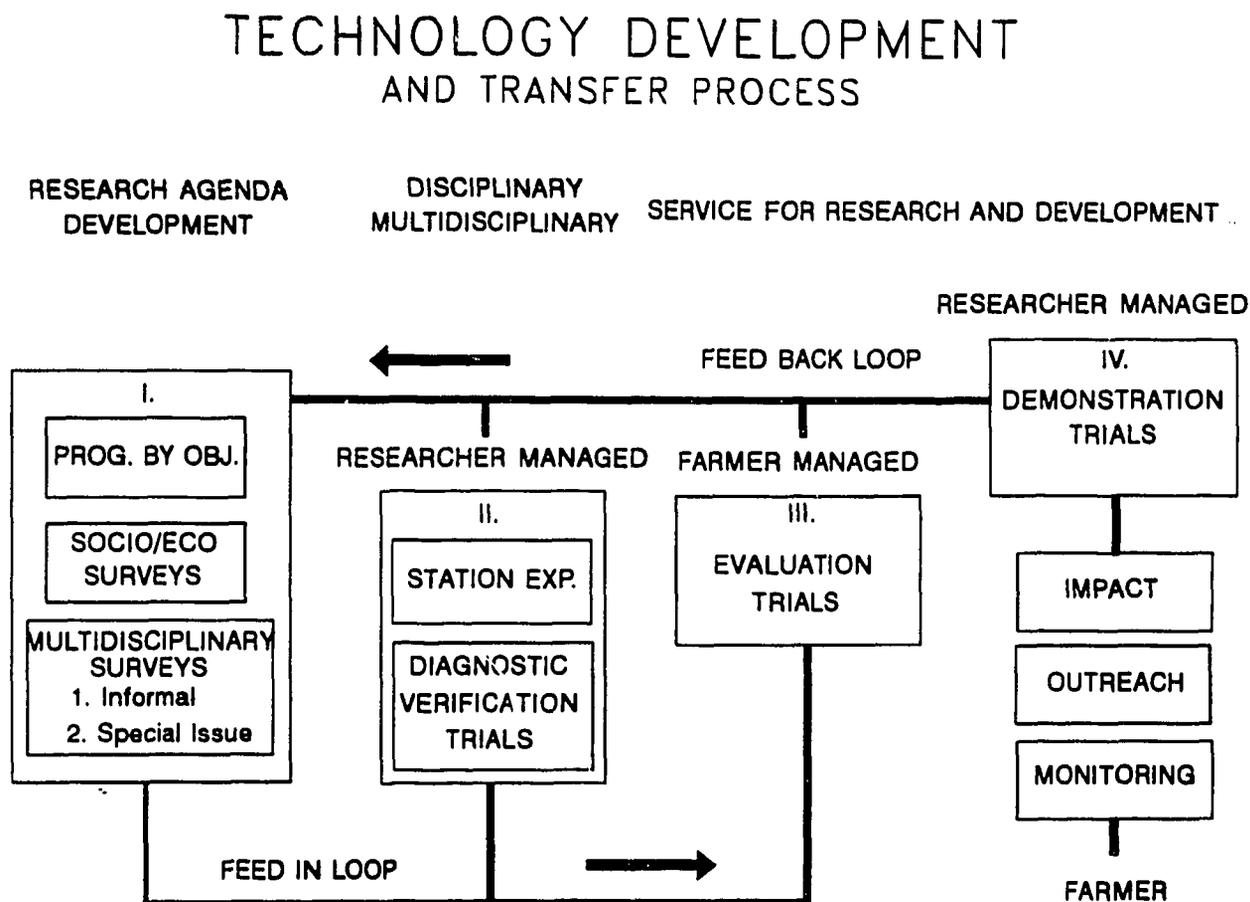
The capacity to measure impacts of technology development activities is directly related to the CRRA at Settata's capability to transfer technologies appropriate to the clientele's requirements and needs. This relationship has been emphasized by the CRRA at Settata. It is recognized that feed back mechanisms which exist today will need to be expanded tomorrow. These mechanisms will continue to be generated by CRRA/Settata scientists, each of whom considers themselves agents for technology development and dissemination.

Service for Research and Development

The CRRA at Settata has developed a capability to develop and disseminate information to external organizations through the Service for Research and Development (SRD). The SRD is also charged to undertake the evaluation and transfer of technologies through an on-farm research effort. This capacity is supported by a process for the development and dissemination of agricultural technologies and is being developed for utilization by INRA at other CRRAs in Morocco.

Figure 3 presents the technology development and transfer process which is being institutionalized within the CRRA at Settat and INRA at the national level.

FIGURE 3. TECHNOLOGY DEVELOPMENT AND TRANSFER PROCESS



Technology development and transfer at the CRRA/Settat is considered an extension of thematic research, leading to adaptation of results for improved acceptance. This provides a better forum from which to assess socioeconomic impact of the disseminated technologies. Technology development and transfer is viewed as a process to identify constraints both technical and/or social which, through technology development and transfer, will be reduced or removed resulting in a higher standard of living for farm families in Morocco and other similar areas across North Africa.

Monitoring and Impact Assessment

The monitoring and impact assessment of technologies generated by the CRRA/Settat has been addressed creatively and effectively by the CRRA/Settat administrative and scientific personnel. Specific needs for monitoring and evaluation vary across subprograms. As a result, it was necessary to tailor assessment techniques to the types of technology development programs which exist within the subprograms. Recent experience in the dissemination of agricultural mechanization equipment has highlighted the necessity to develop specific methodologies for dissemination of CRRA at Settat-developed technologies. These methodologies are directly related to and cannot be separated from the monitoring and impact assessment function. Coordination of monitoring and impact assessment activities should be undertaken by the rural sociology and economics subprogram.

Resource flows in the future will be dependent upon the scientist's willingness and ability to respond, with hard data, to questions focused on the socioeconomic impact of their technology development activities. The development of a strong capability to measure the impact of technologies in the short, intermediate and long run will provide support for requests to design and undertake ever more important research activities.

Prioritization of Research

An innovative approach to prioritization of research has recently been introduced at the CRRA in Settat. This procedure called "A Scoring Technique for Agricultural Research" (STAR) was developed to provide an alternative to the ISNAR-developed scoring technique which was found inadequate for the needs of the center. The STAR procedure incorporates results from project management training activities at the CRRA at Settat which are instrumental for the sustainability of the CRRA at Settat. STAR is being implemented, initially by the CRRA at Settat, and then on a national basis. Developed through collaboration between MIAC and Moroccan scientists it provides for both subjective and quantitative criteria as inputs into the process of prioritizing agricultural research. The results from the use of STAR will determine the basis under which resources are allocated across research projects.

COMMUNICATION/COMMUNICATIONS LINKAGES

Local Area Network

This development and training program provided opportunities for communication among scientists within the CRRA/Settat, in Morocco, in other North African nations and in other nations of the world. The technology reduces a communication constraint which was a barrier to technology development and transfer activities.

The local area network at the CRRA at Settatt has accomplished the following objectives:

- ▶ Improved internal communication amongst scientists on research and administrative tasks.
- ▶ Improved, post-project opportunities to communicate with U.S.-based colleagues, Morocco-based collaborators, and institutional organizations via electronic mail services.

Electronic Communication

The electronic mail service introduced at the CRRA at Settatt provides a new opportunity to improve communication of scientific knowledge across institutions. This may well result in reducing negative competition between institutions and improve opportunities for collaborative and complimentary research.

The electronic mail capability at the CRRA at Settatt has accomplished the following:

- ▶ Improved the capability to communicate externally within Morocco and outside of Morocco.
- ▶ Reduced costs associated with external communications.
- ▶ Improved sustainability of the CRRA at Settatt through enhancement of scientist to scientist and institution to institution linkages.

Irrigation Development for Research and Revenue Generation

Development of irrigation for research and revenue generation on-station has provided the CRRA at Settatt with an important tool with which to address a growing issue and questions facing dryland agriculture of Morocco. What social and economic impacts will result from irrigation development in the dryland areas of Morocco? What will be the impact of unregulated expansion of irrigation on the natural resource base of the country? Answering these questions will be addressed by the CRRA in Settatt with possible collaboration from the University of Nebraska-Lincoln and Valmont Industries, U.S.A., a leading manufacturer and developer of irrigation systems.

FLOW OF ECONOMIC BENEFITS

Finally, the Project has, over the course of time, provided a flow of economic benefits back to the United States. It is likely, that this flow of benefits, if measured, would be larger than the contracted cost of the project. This benefit flow includes:

1. Transfer of germplasm to U.S. universities which has, subsequently, been incorporated into U.S. wheat breeding, barley breeding and legume breeding programs.
2. Development of Hessian Fly resistance in wheat varieties for Morocco which has led to the identification of resistant genes. Several of these resistant genes are of little use in Morocco but can be incorporated into varieties for utilization the U.S. The CRRA/Settatt has played the major role, in providing this genetic material.

3. Participation of CRRA/Settat scientists with European Biological Control Lab (USDA) and U.S. universities in the identification and collection of parasites utilized in control of the Russian wheat aphid, which is a major pest associated with U.S. wheat production.
4. Improvement in capabilities of U.S. scientists to undertake applied agricultural research has resulted from the Project. Those who have participated in a collaborative effort with scientists from the CRRA/Settat are better able to perform duties associated with agriculture as it is practiced on 75% of arable land. This has led to better capabilities in advising graduates and improved comprehension of the needs of scientists working in Morocco as well as other countries in North Africa.
5. The continued linkage between U.S.-based scientists and Moroccan-based scientists provides a communications medium necessary for the transfer of information which benefits both U.S. and Moroccan clientele groups.
6. Memorandums of Understanding signed between INRA and
 - a. United States Department of Agriculture, IAV Hassan II University and Washington State University (active);
 - b. University of Nebraska-Lincoln (to be implemented post-project);
 - c. Washington State University (To be implemented Post Project).
7. Letter of Intent signed between INRA and Team Technologies, Inc. to participate in a joint venture with the private sector.

CHALLENGES FOR THE TRANSITION PHASE

Several research and administrative challenges remain. These challenges, inherent in the RSA, include:

- Continued and expanded support for the Station and Field Research Component through research proposal development which successfully competes for both unsolicited and solicited funding .
- Increased efficiency in the Research Agenda Development Component through continued and expanded articulation of farmers', researchers' and extension personnel' perspective.
- Action to address outstanding issues pertaining to the development and utilization of the Monitoring and Impact Assessment Component.
- Private sector cooperation for equipment manufacturing.
- Private sector cooperation for dissemination of improved varieties.

The capability to develop and disseminate technologies is a function of scientists' level of competency, types of information and/or requests received from policy makers, extension administrators and farmers and level of funding associated with the type of research to be implemented. The operations budget for the CRRA at Settat becomes more important during the transition phase to alternative financing opportunities. MIAC reduced operation

expenditures over the last three years of the project to provide the opportunity for INRA to substitute funds for future recurrent costs. This has been successful. MIAC is confident that INRA will be able to take over the recurrent costs of the CRRA at Settat without undue hardship. MIAC and the CRRA at Settat have chosen to make this transition smoother by diversification of the funding portfolio through long-term linkage programs which emphasizes both private and public funding alternatives. Continuing to place emphasis on training in research, administration and technology development and transfer to meet future needs of Morocco will ensure the sustainability of the CRRA at Settat.

LINKAGE DEVELOPMENT FOR POST-PROJECT SUSTAINABILITY

Regional Information Networks

Morocco, Mauritania, Algeria and Tunisia participate in the information network, *Reseaux Thematiques de Recherche Agricole au Maghreb*. Institutions linked by this network include the following:

Morocco:

INRA (*Institute National de la Recherche Agronomique*),
IAV Hassan II University,
ENA Meknes University,
CE (*Centre des Experimentation, Direction de l'Equipement Rurale*),

Algeria:

ITGC (*Institute Technique des Grandes Cultures*),
INES (*Institute National d'Enseignement Superieur*),
INA (*Institute National d'Agronomie*),

Tunisia:

INRAT (*Institute National de la Recherche Agronomique de Tunisie*),

Mauritania:

CNRADA (*Centre National de la Recherche Agronomique de Developpment Agricole*).

The capability which exists at the CRRA in Settat, Morocco is providing more of the information and biological materials for introduction into the networks. The CRRA at Settat's reputation as a center of excellence will provide opportunities for the staff to introduce more relevant technologies and management decision-making tools into the networks.

Linkage development activities must be diversified to meet the needs of disparate agricultural production, consumption and marketing system constraints. A coordinated effort to identify, access, and manage opportunities which exist through contact with national and international agencies will result in a sustainable CRRA at Settat into the future.

LESSONS LEARNED AND FUTURE ACTIONS

1. Linkage Between USAID Funded Institutions

IAV Hassan II University and INRA are two institutions supported in their development through USAID funding. During the development stages of these institutions no functional institutional linkages were put in place until 1992. This institutional linkage was fostered by MIAC through USDA/Washington State University/CRRA at Settat/IAV institutional Memorandum of Understanding among organizations. With stronger support from USAID, the complementarities between the INRA, and specifically the CRRA at Settat and IAV could be enhanced. IAV as an institution of higher education and the CRRA at Settat as center for applied agricultural research could become the engine for growth in the agricultural sector of countries across Africa and the Mid East. This opportunity should not be missed. USAID needs to foster the complementarities which exist across the two institutions. A negative competition, the sort which is observed among many national agricultural research services and institutions of higher education in Africa, is being allowed to negate the growth of complimentary, collaborative research and educational functions. This is an issue which USAID can correct but which cannot be managed by a contracting organization such as MIAC. This may well be the most important lesson learned through the development phase of the CRRA in Settat; promote the positive institutional linkages which have developed and expand upon them when the opportunity presents itself.

2. Technology Transfer

Technology development and transfer is a process which requires participation by farmers, researchers, extension personnel and policy makers. It is a bottom-up process which incorporates macro-level policy issues but is not driven by them. The CRRA at Settat technology development and transfer process cannot be successful without close interaction among scientists, farmers and extension. Extension's participation is the second key to this process. Farmer participation is the primary agent for success. Within the context of the Research System Approach (RSA), research agenda development is the first step which relies on these interactions for future successes in development and dissemination of technologies. Rapid Reconnaissance (RR) surveys followed by baseline surveys, which focus on constraints identified in the RR surveys, should be introduced early in any project. This provides the opportunity to build a base from which a team effort evolves which include researcher, farmer and extension participation. This foundation needs to be developed through educational programs introduced by the scientists to extension. This is the only mechanism which will successfully provide opportunities for rapid expansion of the dissemination process to the farm population.

3. General Linkage Programs

Internal and external linkage development programs should be addressed simultaneously at a point in time during a project when an operative administrative and research management system has been put in place by the host country organization. The linkage programs should deal with international, national and internal linkages. These linkages should be fostered by the granting agency after the end of the project to ensure continuity and broader development

of these linkages. International linkages and internal linkages are likely to be the most important focus of a contractor for two practical reasons. The first is the continuous interaction of the contractor with extra-national organizations and the second is the likelihood that the contractor can effect changes in the internal flow of information better than can the host due to a degree of objectivity which may not exist within the host's array of opportunities. Local area networks and electronic mail services enhance the possibility of a positive economic and intellectual impact from introduction of internal linkage programs.

In today's changing environment of donor funding it is imperative that both the private and public sectors are approached in any linkage development activity. When a private sector alternative exists, or a private/public sector collaborative activity can be implemented which reduces a constraint faced by the CRRA at Settat, management should carefully consider introducing new techniques to facilitate this linkage.

4. Agricultural Research

Agricultural research is a process which has evolved rapidly at the CRRA at Settat. Agricultural research is recognized as beginning with farmers and ending with farmers. This requires that the farmer be involved at each step in a process designed to develop and transfer technology. Until recently, this recognition was not fully operationalized in the activities of the CRRA. The process, referred to by the CRRA at Settat as the Research Systems Approach, is still fragile. Resources necessary for on-station research and research which directly involves the farmer must be carefully allocated to ensure that on-station research, which is not basic research in nature, should be directed by findings which have been generated from the research agenda development component of the RSA. Downstream results must be tested for their success through both on-farm trial activities and implementation of the monitoring and impact assessment component. Both on-station and on-farm research and the monitoring and impact assessment components of the RSA should have their results built back into the research agenda development component, directly and immediately, as research results become available at the CRRA at Settat or from alternative secondary sources. A Research System Approach (RSA) should be introduced as early in a project as appropriate to guide the allocation of resources among different components.

5. Project Management Efficiency

The effectiveness of the CRRA at Settat to define, develop and disseminate technologies is dependent on the efficiency of management, both project and administrative. As can be seen from the recent success of the center in marketing its capabilities, research project design through the use of management tools can reinforce an already strong research program. However, improved research project management without a comparable effort in administrative management will lead to frustration due to inconsistencies and dislocations within the resource allocation process; information, budgets, etc. Management tools are designed to be utilized by both researchers and administration. A simultaneous introduction of management tools should be considered a high priority early in a project for both the management of research and administration.

6. Decentralization of Decision Making

Decentralization of administrative decision making to the regional research centers leads to more effective applied agricultural research which address constraints facing the farm population. However, the decentralization has the negative impact of threatening the administrative nucleus of INRA in Rabat, especially in the case of a center such as that developed in Settat. It is important that resources, both physical and human, which have been generated through development of the CRRA at Settat, be utilized to strengthen the other CRRA's capabilities. This has been an ongoing activity in research and to a lesser extent in the use of management tools. Over the next eight to ten years, it is imperative that the CRRA at Settat make a concerted effort to train other CRRAs in the use of the research management tools now being introduced at the CRRA at Settat. A focus on research and administrative management will allow a better understanding, amongst the other CRRAs, of the techniques used and strategy implemented by the CRRA at Settat to facilitate research and the allocation of resources in support of research by the CRRA at Settat. A clearer understanding of these tools and their utilization will improve the efficiency of research at the other CRRAs. This in turn will reduce any perceived risk incurred by INRA in Rabat as a result of a successful decentralization program.

7. Maintenance and replacement of equipment

This is a serious problem which the donor organizations need to address formally. Maintenance and replacement of equipment is made difficult through donor organization requirements associated with purchasing. With little or no in-country service for expensive laboratory and field equipment, the host organization is placed in a difficult position. Alternatives for providing the necessary replacement parts and equipment can be developed by the center, but not without the support of INRA in Rabat and USAID. USAID should consider entering discussions with the government to allow duty-free importation of U.S. manufactured parts and/or equipment for an agreed upon period which commences at the end of a project. During this period the host country institution should be encouraged to develop private sector linkages to provide the necessary access to U.S. manufactured equipment and parts under existing import procedures.

8. Revenue Generation

Revenue generation is necessary for the CRRA at Settat to maintain the quality of research activities undertaken. Revenues generated through land rental arrangements, soil testing, joint ventures, etc., should be protected for use by the center in activities that support the development of other CRRAs and the CRRA at Settat. It is imperative that revenues generated by the center not lead to associated reductions in budget allocations by INRA/Rabat or the Ministry of Finance to the CRRA at Settat. This would result in removal of incentive for the center to expend valuable human resources in the pursuit of alternative means for generating revenue.

9. On-Shore, Short-Term Training

Short-term training programs which were undertaken during the final years of the Project were successful because they developed an institutional understanding of capabilities inherent

among the research staff. This is quite different from the effect of off-shore, short-term training which may result in expanded capability that is not easily observed by either scientists or administration and therefore not exploited. Short-term training, in-country, provides a valuable institutional knowledge base which is ready for implementation, adaptation and transfer if the knowledge base is clearly recognized by the institution.

10. Off-Shore, Short-Term Training

Off-Shore, short-term training requires that a minimum of two individuals participate in any short-term training provided. This is directly related to the benefits which are described in on-shore, short-term training. Individuals who are sent on short-term training off-shore should be given an opportunity to exploit their newly gained knowledge for the immediate benefit of the institution as soon as possible after returning to the CRRA at Settat.

11. Research Agenda Development

For a research result to be successful in an applied agricultural research setting it must be adopted by farm families. In this sense, setting the research agenda is an important first step. It is possible and has been the norm to ignore this component when developing research projects. This component of the Research System Approach utilized at the CRRA at Settat is very important for the development of research projects which will produce successful research results.

MOROCCO DRYLAND APPLIED AGRICULTURAL RESEARCH (DAAR) PROJECT

TRAINING SUMMARY

SHORT-TERM NON-DEGREE TRAINING

Participant Name	Location of Training	Type of Training
1. Lazzaoui	Am Lang Center	English Training
2. Nafati	Am Lang Center	English Training
3. Ouriniche	Am Lang Center	English Training
4. Rabh	CIMMYT	Cereal Breeding
5. Slogue	Am Lang Center	English Training
6. Tlohi	Pigier	Computer Training
7. Mahmaj	Nebraska	Soils Lab Tech
8. Ghai	Nebraska	Forage Lab
9. Benjemaa	Maryland	Pathogenic
10. Samir	Nebraska	Station Mgmt
11. Kayal	CSU/UNL/WSU	Research Mgmt
12. Benhoumt	Nebraska	Station Mgmt
13. Boutfirass	Nebraska	Station Mgmt
14. Jellouli	Nebraska	Station Mgmt
15. Kettouch	AM Lang Center	English Training
16. Kettouch	USDA	Research Mgmt
17. Rachiq	USDA	Research Mgmt
18. Zouttane	Pacific Coast Univ	Research Mgmt
19. Rachiq	AM Lang Center	English Training
20. Mouktafi	Pigier	Computer Training
21. Adli	ICARDA	Cereal Agronomy
22. Haddan	ICARDA	Cereal Agronomy
23. Hassani	ICARDA	Cereal Agronomy
24. Naisari	ICARDA	Cereal Agronomy
25. Zazia	ICARDA	Cereal Agronomy
26. Boutfirass	CIMMYT	Station Mgmt
27. Ejrhom	Nebraska	Range Mgmt/Forage lab
28. Ifnou	Nebraska	Soil/Plant Analysis
29. Aouragh	CIMMYT	Station Mgmt
30. El Ouari	ICARDA	Soils Workshop
31. Bouizar	AM Lang Center	English Training
32. Lahrache	CIMMYT	Cereal Agronomy
33. Alilou	Nebraska	Soils Lab Tech
34. Cherkaoui	Auto Ecole	Driver's License
35. Raqui	Auto Ecole	Bus Driver's License
36. Zniber	Auto Ecole	Bus Driver's License
37. Mouktafi	CIMMYT	Station Mgmt
38. Chakir	Kansas	Entomology
39. Nouraki	Colorado	Soil Mgmt

40.	Grass	Kansas	Seed Multiplication
41.	El Brahli	CIMMYT	Crop Mgmt
42.	El Brahli	IOWA	Comunications Wkshop
43.	Lyamani	IAV/Colorado	In Vitro
44.	Nsarellah	IAV/Colorado	In Vitro
45.	Rah	CIMMYT	Cereal Agronomy
46.	Hamdaoui	AM Lang Center	English Training
47.	Echafai	Eurelec	Electronics
48.	Lambassi	Eurelec	Electronics
49.	Marah	Eurelec	Electronics
50.	Ouriniche	Eurelec	Electronics
51.	Ghai	Eurelec	Electronics
52.	Kamel	IDMC/ANI/UNL	Research Mgmt
53.	Cherkaoui	CNEARC/France	Ag Engineering
54.	Bouchoutrouch	Arkansas	Farming Systems
55.	Boulanouar	Arkansas	Farming Systems
56.	El Mzouri	Arkansas	Farming Systems
57.	Sefrioui	Arkansas	Farming Systems
58.	Krimi	Nebraska	Ag Engineering
59.	Samir	KSU/ISU/UNL	Green house Mgmt
60.	Marah	CIMMYT	Plant Pathology
61.	Jlibene	Missouri	NRS ops
62.	Bouchoutrouche	CIMMYT	Research Mgmt
63.	Lyamani	CIMMYT	Research Mgmt
64.	Mergoum	IAV/Colorado	In vitro
65.	Chahid	AMII	Computer Training
66.	Salihi	AMI	Computer Training
67.	Tayeb	AMI	Computer Training
68.	Echafai	U. Laval	Plant Pathology
69.	Bachkade	AMI	Computer Training
70.	El Hail	AMI	Computer Training
71.	El Kassassi	AMI	Computer Training
72.	Lemsyah	AMI	Computer Training
73.	Mahmaj	AMI	Computer Training
74.	Tlohi	AMI	Computer Training
75.	Ghai	Lincoln University	Electronics
76.	Bahou	AMI	Computer Training
77.	Benzaria	AMI	Computer Training
78.	Lahrache	AMI	Computer Training
79.	El Kheir	Nebraska	Desktop/AudioVis
80.	Sefrioui	ISNAR	Atelier Francophone
81.	Baya	Team Technologies	Logframe/Proj.Mgmt
82.	Bouazzaoui	Team Technologies	Logframe/Proj. Mgmt
83.	Cheikh	Team Technologies	Logframe/Proj. Mgmt
84.	Dahan	Team Technologies	Logframe/Proj. Mgmt
85.	El Gharous	Team Technologies	Logframe/Proj. Mgmt
86.	El Gharras	Team Technologies	Logframe/Proj. Mgmt
87.	El Mourid	Team Technologies	Logframe/Proj. Mgmt

88.	Farih	Team Technologies	Logframe/Proj. Mgmt
89.	Gabone	Team Technologies	Logframe/Proj. Mgmt
90.	Hamal	Team Technologies	Logframe/Proj. Mgmt
91.	Karrou	Team Technologies	Logframe/Proj. Mgmt
92.	Lyamani	Team Technologies	Logframe/Proj. Mgmt
93.	Mergoum	Team Technologies	Logframe/Proj. Mgmt
94.	Moukhli	Team Technologies	Logframe/Proj. Mgmt
95.	Moussaoui	Team Technologies	Logframe/Proj. Mgmt
96.	Nsrellah	Team Technologies	Logframe/Proj. Mgmt
97.	Nassif	Team Technologies	Logframe/Proj. Mgmt
98.	Sebbata	Team Technologies	Logframe/Proj. Mgmt
99.	Sefrioui	Team Technologies	Logframe/Proj. Mgmt
100.	Tanji	Team Technologies	Logframe/Proj. Mgmt
101.	Ait Lhaj	INRA/MIAC	Logframe/Proj. Mgmt
102.	Bahri	INRA/MIAC	Logframe/Proj. Mgmt
103.	Benaouda	INRA/MIAC	Logframe/Proj. Mgmt
104.	Bendaoud	INRA/MIAC	Logframe/Proj. Mgmt
105.	Boughlala	INRA/MIAC	Logframe/Proj. Mgmt
106.	Boutfirass	INRA/MIAC	Logframe/Proj. Mgmt
107.	El Bouhssini	INRA/MIAC	Logframe/Proj. Mgmt
108.	Farihane	INRA/MIAC	Logframe/Proj. Mgmt
109.	Herzenni	INRA/MIAC	Logframe/Proj. Mgmt
110.	Lhaloui	INRA/MIAC	Logframe/Proj. Mgmt
111.	M'rabet	INRA/MIAC	Logframe/Proj. Mgmt
112.	Amrani	INRA/MIAC	Logframe/Proj. Mgmt
113.	Bouayad	INRA/MIAC	Logframe/Proj. Mgmt
114.	Bouzoubaa	INRA/MIAC	Logframe/Proj. Mgmt
115.	Chriyaa	INRA/MIAC	Logframe/Proj. Mgmt
116.	El Brahli	INRA/MIAC	Logframe/Proj. Mgmt
117.	El Hafid	INRA/MIAC	Logframe/Proj. Mgmt
118.	El Mejahed	INRA/MIAC	Logframe/Proj. Mgmt
119.	Fouhami	INRA/MIAC	Logframe/Proj. Mgmt
120.	Laamari	INRA/MIAC	Logframe/Proj. Mgmt
121.	Lamnouni	INRA/MIAC	Logframe/Proj. Mgmt
122.	Zouttane	Pacific Coast Univ.	Research Mgmt
123.	Ait Lhaj	USDA/Florida	Farming systems
124.	Benaouda	USDA/Florida	Farming systems
125.	Abdelmalki	INRA/MIAC	Rapid Rural Appra
126.	Ait Lhaj	INRA/MIAC	Rapid Rural Appra
127.	Amrani	INRA/MIAC	Rapid Rural Appra
128.	Belgout	INRA/MIAC	Rapid Rural Appra
129.	Bendaoud	INRA/MIAC	Rapid Rural Appra
130.	Benaouda	INRA/MIAC	Rapid Rural Appra
131.	Boughlala	INRA/MIAC	Rapid Rural Appra
132.	Chriyaa	INRA/MIAC	Rapid Rural Appra
133.	El Hafid	INRA/MIAC	Rapid Rural Appra
134.	El Nady	INRA/MIAC	Rapid Rural Appra
135.	El Mzouri	INRA/MIAC	Rapid Rural Appra

136.	Jabane	INRA/MIAC	Rapid Rural Appra
137.	Lhaloui	INRA/MIAC	Rapid Rural Appra
138.	Nasrellah	INRA/MIAC	Rapid Rural Appra
139.	Nassif	INRA/MIAC	Rapid Rural Appra
140.	Omari	INRA/MIAC	Rapid Rural Appra
141.	Rahali	INRA/MIAC	Rapid Rural Appra
142.	Rhazrani	INRA/MIAC	Rapid Rural Appra
143.	Sefrioui	INRA/MIAC	Rapid Rural Appra
144.	Soussi	INRA/MIAC	Rapid Rural Appra
145.	Abdelmalki	INRA/Florida	On-Farm Trial Dsg
146.	Acherkouk	INRA/Florida	On-Farm Trial Dsg
147.	Amrani	INRA/Florida	On-Farm Trial Dsg
148.	Bachir Alam	INRA/Florida	On-Farm Trial Dsg
149.	Bendacud	INRA/Florida	On-Farm Trial Dsg
150.	Bouafia	INRA/Florida	On-Farm Trial Dsg
151.	Boughlala	INRA/Florida	On-Farm Trial Dsg
152.	Bouhlal	INRA/Florida	On-Farm Trial Dsg
153.	Chriyaa	INRA/Florida	On-Farm Trial Dsg
154.	El Alami	INRA/Florida	On-Farm Trial Dsg
155.	El Gharras	INRA/Florida	On-Farm Trial Dsg
156.	El Hafid	INRA/Florida	On-Farm Trial Dsg
157.	El Kriti	INRA/Florida	On-Farm Trial Dsg
158.	El Nady	INRA/Florida	On-Farm Trial Dsg
159.	Guirrou	INRA/Florida	On-Farm Trial Dsg
160.	Jellouli	INRA/Florida	On-Farm Trial Dsg
161.	Kradi	INRA/Florida	On-Farm Trial Dsg
162.	Laloui Rach	INRA/Florida	On-Farm Trial Dsg
163.	Lamine	INRA/Florida	On-Farm Trial Dsg
164.	Lhaloui	INRA/Florida	On-Farm Trial Dsg
165.	Oufquir	INRA/Florida	On-Farm Trial Dsg
166.	Radi	INRA/Florida	On-Farm Trial Dsg
167.	Rahali	INRA/Florida	On-Farm Trial Dsg
168.	Sefrioui	INRA/Florida	On-Farm Trial Dsg
169.	Sillou	INRA/Florida	On-Farm Trial Dsg
170.	Tanji	INRA/Florida	On-Farm Trial Dsg
171.	Zirari	INRA/Florida	On-Farm Trial Dsg

LONG-TERM TRAINING SUPPORT

Degree Goal	Participant Name	University Attended
M.Sc.	Hamal	IAV Hassan II University
M.Sc.	Lamnouni	University of Marakech
M.Sc.	Bouchoutrouch	University of Nebraska
M.Sc.	El Gharous	Oklahoma State Univ.
M.Sc.	Azzaoui	University of Missouri

M.Sc.	Toufiq	University of Minnesota
M.Sc.	Karrou	University of Missouri
M.Sc.	Tanji	Kansas State University
M.Sc.	Lhaloui	Nebraska
M.Sc.	El Bouhssini	Kansas State University
M.Sc.	Sakr	Washington State Univ.
M.Sc.	Bahri	University of Nebraska
M.Sc.	El Gharras	Oklahoma State Univ.
M.Sc.	El Hadi	Washington State Univ.
M.Sc.	Bouksirat	University of Missouri
M.Sc.	Rahmi	University of Arkansas
M.Sc.	Aouaragh	University of Arkansas
M.Sc.	Ait Ounejjar	Kansas State University
M.Sc.	Guedira	Kansas State University
Ph.D.	Afella	
Ph.D.	Bouzza	University of Nebraska
Ph.D.	Nazhar	University of Missouri
Ph.D.	Kamal	Washington State Univ.
Ph.D.	El Mourid	Iowa State University
Ph.D.	Lyamani	Iowa State University
Ph.D.	Ouassou	University of Nebraska
Ph.D.	Arif	University of Nebraska
Ph.D.	Derkaoui	Oklahoma State Univ.
Ph.D.	El Yamani	Iowa State University
Ph.D.	Jlibene	University of Missouri
Ph.D.	Amri	Kansas State University
Ph.D.	Tikdirine	Oklahoma State Univ.
Ph.D.	Mergoum	Colorado State Univ.
Ph.D.	Kacemi	Colorado State Univ.
Ph.D.	Selmani	Kansas State University
Ph.D.	El Mejahed	University of Nebraska
Ph.D.	Nsarellah	North Dakota State
Ph.D.	Farih	Oklahoma State Univ.
Ph.D.	Dahan	Iowa State University
Ph.D.	Herzenni	University of Kentucky
Ph.D.	Moussaoui	University of Nebraska
Ph.D.	Chriyaa	University of Nebraska
Ph.D.	Douiyssi	University of Minnesota
Ph.D.	Ouabbou	Kansas State University
Ph.D.	Hadarbach	University of Nebraska
Ph.D.	M'zouri	Iowa State University
Ph.D.	Boulanouar	University of Nebraska
Ph.D.	Meskine	University of Nebraska
Ph.D.	Grass	Iowa State University
Ph.D.	El Antri	North Dakota State
Ph.D.	Moujib	Kansas State University
Ph.D.	Zouttane	Pacific Coast University

**SECOND DEGREES -
PARTICIPANTS WHICH COMPLETED M.SC. DEGREES WITH PROJECT ASSISTANCE**

Degree Goal	Participant Name	University Attended
Ph.D.	Azzaoui	University of Nebraska
Ph.D.	El Bouhssini	Kansas State University
Ph.D.	El Gharous	Oklahoma State Univ.
Ph.D.	Karrou	University of Nebraska
Ph.D.	Lhaloui	Kansas State University
Ph.D.	Tanji	Colorado State Univ.
Ph.D.	Sakr	Washington State Univ.

PARTICIPANTS COMPLETING LONG-TERM COURSE WORK ONLY TRAINING

Degree Goal	Participant Name	3) University Attended
1. Ph.D.	Boutfirass	Kansas State University
2. Ph.D.	El Brahli	Colorado State University
3. Ph.D.	Hamdaoui	Colorado State University
4. Ph.D.	Bouayad	Colorado State University
5. Ph.D.	M'Rabet	Colorado State University
6. Ph.D.	Amrani	Oklahoma State University
7. Ph.D.	Bahri	University of Nebraska
8. Ph.D.	El Gharass	Oklahoma State University
9. M.Sc.	Cheikh	University of Florida
10. Ph.D.	Ramdani	Kansas State University
11. Ph.D.	Ferrahi	University of Nebraska
12. M.Sc.	Fouhami	Colorado State University
13. Ph.D.	Benaouda	University of Montpieler
14. Ph.D.	Ait Lhaj	Colorado State University
15. Ph.D.	El Hafid	Colorado State University

SHORT-TERM U.S. TECHNICAL AND ADMINISTRATIVE ASSISTANCE

<u>NAME</u>	<u>ASSIGNMENT</u>	<u>UNIVERSITY</u>	<u>DISCIPLINE</u>	<u>YEAR</u>
Arbi Ben Achour	Interview	Missouri	Rural Socio.	1989
I. C. Anderson	Advisor	Iowa State	Cereals	1986
I. C. Anderson	Consultant	Iowa State	Cereals	1987
Roy Arnold	Administrative	Nebraska	Administrative	1983
Azzeddine Azzam	Consultant	Nebraska	Ag Economics	1989
Azzeddine Azzam	Advisor	Nebraska	Ag Economics	1990
Azzeddine Azzam	Advisor	Nebraska	Ag Economics	1992
Steve Baenziger	Advisor	Nebraska	Cereal Breeding	1988
Steve Baenziger	Consultant	Nebraska	Cereal Breeding	1989
Kenneth Von Bargaen	Technical	Nebraska	Ag Engineering	1986
Kenneth Von Bargaen	Consultant	Nebraska	Ag Engineering	1988
Leonard Bashford	Technical	Nebraska	Ag Engineering	1986
Leonard Bashford	Consultant	Nebraska	Ag Engineering	1987
Leonard Bashford	Recruiting	Nebraska	Ag Engineering	1987
Dwayne Beck	Recruiting	South Dakota State	Soil Management	1988
Abderrezak Belaid	Sci Review Panel	Montreal, Canada		1993
R. D. Bell	Technical	NIAE,UK	Ag. Mech.	1986
Paul Beueselinck	Advisor	Missouri	Forages	1987
Dan Bigbee	Administrative	Nebraska	Administrative	1984
Dan Bigbee	Administrative	Nebraska	Administrative	1985
Dan Bigbee	Administrative	Nebraska	Administrative	1985
Dan Bigbee	Administrative	Nebraska	Coordinator	1986
Dan Bigbee	Administrative	Nebraska	Coordinator	1987
Dan Bigbee	Administrative	Nebraska	Coordinator	1989
Larry Bitney	Sci. Review Panel	Nebraska	Ag Economics	1988
Larry Bitney	Consultant	Nebraska	Ag Economics	1990
Larry Bitney	Administrative	Nebraska	Coordinator	1993
Kenneth Brengle	Consultant	Professional Consultant	Soil Management	1988
Thomas G. Brown	Technical	Missouri	Ag Economics	1983
Charles Browning	Administrative	Oklahoma State	Administrative	1985
Charles Browning	Administrative	OSU	MIAC	1989
J. S. Burris	Advisor	Iowa State	Agronomy	1994
Larry Buschman	Interview	Kansas State	Entomology	1989
Dwayne Buxton	Advisor	Iowa State	Forages	1993
Duane Byerly	Consultant	Nebraska	Ag Engineering	1988
Thomas Gillard-Byers	Recruiting	Wash State Univ	Ag Economics	1990
John Caddel	Advisor	Oklahoma State	Forages	1985
John Caddel	Advisor	Oklahoma State	Forages	1986
Arden Campbell	Recruiting	Iowa State	Breeding	1984
Robert Cannell	Sci Review Panel	VA Poly Ins & State Univ	Soil Mgmt	1990
Roy Cantrell	Consultant	North Dakota State	Plant Breeding	1987
Roy Cantrell	Consultant	North Dakota State	Plant Breeding	1990
Conception del Castillo	Sci. Review Panel	Professional Consultant	Social Anthropology	1988
Fred Cholik	Consultant	South Dakota State	Cereal Breeding	1987
Scott Christiansen	Recruiting		Forages	1987
Jack Claar	Design Team	Illinois	Extension	1987
Phillip Cocks	Sci. Review Panel	ICARDA		1987
P. J. M. Cooper	Sci. Review Panel	ICARDA		1985
Peter J.M. Cooper	Sci. Review Panel	ICARDA		1987
Milton Coughenour	Sci Review Panel	Kentucky Univ	Sociologist	1993
Stan Cox	Advisor	Kansas State	Breeding	1985
Stan Cox	Advisor	Kansas State	Cereal Breeding	1988
Stan Cox	Consultant	KSU	Cereal Breed	1990

R. J. Crabtree	Consultant	Oklahoma State	Soil Management	1987
Kathryn Craven	Technical		Ag Economics	1984
Lavoy Croy	Recruiting	Oklahoma State	Cereals	1984
Lavoy Croy	Consultant	Oklahoma State	Cereal Production	1988
Lavoy Croy	Consultant	Oklahoma State	Station Mgmt.	1989
Robert E. Danielson	Consultant	Colorado State	Soil Management	1987
Jean Dawson	Sci Review Panel	Wash State Univ	Weed Sci	1990
Robert E. Deuson	Consultant	Purdue Univ	Ag Economics	1988
Robert E. Deuson	Proj. Eval.	Purdue Univ.	Ag Economics	1989
Elbert C. Dickey	Technical	Nebraska	Tillage	1981
Vance Ehmke	Consultant	Professional Consultant	Ag Journalism	1988
Hari Eswaren	Consultant	USDA/SCS	Soils	1990
Hari Eswaren	Consultant	USDA/SCS	Soils	1992
Conrad Evans	Administrative	Oklahoma State	Administrative	1983
Charles Fenster	Technical	Nebraska	Tillage	1981
Charles Fenster	Technical	Nebraska	Tillage	1982
Charles Fenster	Technical	Nebraska	Tillage	1984
Albert J. Fischer	Recruiting	Oregon State	Weed Science	1987
R.A. Fischer	Sci. Review Panel	CSIRO		1987
T. Fisher	Sci. Review Panel	CSIRO		1985
Cornelia Flora	Sci. Review Panel	Kansas State	Rural Sociology	1988
John Foster	Administrative	Purdue	Pathology	1984
John Foster	Sci. Panel Review	Purdue Univ.	Entomology	1989
John Foster	Dept. Hd.	Nebraska	Entomology	1990
Charles Francis	Administrative	Nebraska	Administrative	1982
Charles Francis	Administrative	Nebraska	Administrative	1983
Charles Francis	Administrative	Nebraska	Administrative	1983
Charles Francis	Administrative	Nebraska	Administrative	1984
Clive Francis	Sci. Review Panel	W. Aust. Dept. of Ag.	Forages	1989
Ken Frank	Administrative	Nebraska	Administrative	1984
Peter Frerichs	Consulting		Television	1987
Peter Frerichs	Consultant		Television	1988
Robert Fritschen	Dept. Heads	Nebraska	Administrative	1988
Robert Furgason	Administrative	Nebraska	Administrative	1985
Raymond Gagne	Consultant	USDA/ARS	Entomology	1989
McIntyre, Gary	Dept. Hd.	Colorado State		1990
Charles Gay	Animal Sci. Review	Utah State	Range Science	1987
Joel Geyer	Consultant	Nebraska	Television	1988
Bikram S. Gill	Consultant	KSU	Plant Path	1990
James Gilley	Technical	Nebraska	Ag Engineering	1984
Christina Gladwin	Consultant	U of FL	Rural Sociology	1990
Roger Gold	Dept. Heads	Nebraska	Administrative	1988
Peter Goldsworthy	Design Team	ISNR	Management	1987
Peter Goldsworthy	Sci. Review Panel	The Hague, Netherlands		1993
Lance Goodan	Consultant	Prof. Consultant	Greenhouse	1988
Jerry Grant	Design Team	Oklahoma State	Cereal Breeder	1987
Steve Grant	Interview	U. of Delaware	Soil Mgmt.	1989
Perry Gustafson	Consultant	Missouri	Plant Breeding	1987
Perry Gustafson	Advisor	University of Missouri	Cereal Breeding	1988
Perry Gustafson	Consultant	Missouri	Cereal Breeding	1989
George Ham	Administrative	Kansas State	Administrative	1985
Richard Hamilton	Sci. Review Panel	Agriculture Canada	Plant Pathology	1988
John Hammon	Technical	Professional Consultant	Seed Production	1985
Kermit Hansen	Administrative	Nebraska	Regent	1987
Roger Hanson	Advisor	Missouri	Soils	1984
Roger Hanson	Advisor	Missouri	Soils	1986

D. G. Hanway	Administrative	Nebraska	Administrative	1980
D. G. Hanway	Administrative	Nebraska	Administrative	1980
D. G. Hanway	Administrative	Nebraska	Administrative	1980
D. G. Hanway	Administrative	Nebraska	Administrative	1981
D. G. Hanway	Administrative	Nebraska	Administrative	1981
D. G. Hanway	Administrative	Nebraska	Administrative	1981
D. G. Hanway	Administrative	Nebraska	Administrative	1982
D. G. Hanway	Administrative	Nebraska	Administrative	1982
Marion Harris	Consultant	Kansas State	Entomology	1988
Glen Hartman	Consultant	OSU	Elec. Spec.	1989
T. E. Hartung	Dept. Hd.	Nebraska	Administrative	1990
Ameziane El Hassani	Sci. Review Panel	IAV Hassan II	Forages	1989
Jim Hatchett	Advisor	Kansas State	Entomology	1984
Jim Hatchett	Advisor	Kansas State	Entomologist	1985
Jim Hatchett	Advisor	Kansas State	Entomology	1986
Jim Hatchett	Consultant	Kansas State	Entomology	1987
Jim Hatchett	Consultant	Kansas State	Entomology	1988
Jim Hatchett	Consultant	Kansas State	Entomology	1989
Jim Hatchett	Consultant	Kansas State	Entomology	1989
Jim Hatchett	Consultant	Kansas State	Entomology	1990
E. A. Heinrichs	Recruiting	LSU	Entomology	1989
Homer Hepworth	Design Team	CIMMYT	Agronomy	1987
Gary Hergert	Technical	Nebraska	Soils	1981
Gary Hergert	Technical	Nebraska	Soils	1986
Peter E. Hildebrand	Proj. Eval.	Florida	Farming Systems	1989
John Hill	Advisor	Iowa State	Pathology	1984
John Hill	Advisor	Iowa State	Plant Pathology	1988
John Hill	Advisor	Iowa State	Plant Pathology	1988
Dan Hilleman	Consultant	Colo St	Audio Visual	1993
Dan Hilleman	Consultant	Colo St	Audio Visual	1993
Art Hobbs	Design Team Leader	Kansas State	Soil Management	1987
Glenn Hoffman	Dept. Hd.	Nebraska	Ag Engineering	1990
Neil Humburg	Recruiting		Weed Science	1987
D. S. Humpal	Technical	Professional Consultant	Farming Systems	1985
Robert Hunger	Advisor	Oklahoma State	Plant Path	1989
Richard Jizba	Technical	Nebraska	Library	1985
Richard Jizba	Technical	Nebraska	Library	1986
Walter Kaiser	Consultant	Washington State	Food Legumes	1989
David Keith	Advisor	Nebraska	Entomology	1983
David Keith	Advisor	Nebraska	Entomology	1984
David Keith	Advisor	Nebraska	Entomology	1984
David Keith	Administrative	Nebraska	Entomology	1987
James Kirby	Recruiting	OSU	Food Legumes	1990
Arthur Klatt	Sci. Review Panel	CIMMYT		1985
Arthur Klatt	Sci. Review Panel	CIMMYT		1987
Robert Kleis	Administrative	Nebraska	Administrative	1982
Robert Kleis	Administrative	Nebraska	Administrative	1984
Robert Kleis	Administrative	Nebraska	Administrative	1984
Robert Kleis	Administrative	Nebraska	Administrative	1988
Lee Kolmer	Administrative	Iowa State	Administrative	1984
Milton Kopecky	Technical	Professional Consultant	Technical	1986
John Kraft	Sci. Review Panel	Washington State	Food Legumes	1989
John Kraft	Advisor	Wash. State	Food Legumes	1993
Rattan Lal	Sci Review Panel	Ohio St U	Soil Mgmt	1990
Yon Larrea	Technical	Professional Consultant	Technical	1986
Littlefield, Larry	Dept. Hd.	Oklahoma State		1990

David J. Lewis	Consultant	Iowa State	Plant Pathology	1987
David Lewis	Consultant	Iowa State	Plant Pathology	1988
Willard L. Lindsay	Consultant	Colorado State	Soil Science	1987
Ben Lockhart	Consultant	University of Minnesota	Plant Pathology	1988
R. E. Luebs	Technical	Professional Consultant	Agronomy	1982
Cisco Lunsford	Consultant	Prof. Consultant	Greenhouse	1988
Cisco Lunsford	Consultant	Prof. Consultant	Greenhouse	1988
Jerry Maranville	Administrative	Nebraska	Asst. Coordinator	1988
Jerry Maranville	Advisor	Nebraska	Cereal Prod.	1990
Jerry Maranville	Advisor	Nebraska	Cereal Prod.	1992
Martin Massengale	Administrative	Nebraska	Chancellor	1987
Z. B. Mayo	Sci. Review Panel	Nebraska	Entomology	1989
Denis McGee	Advisor	Iowa State	Pathology	1984
Denis McGee	Advisor	Iowa State	Pathology	1986
Denis McGee	Advisor	Iowa State	Plant Pathology	1987
Denis McGee	Consultant	Iowa State	Plant Path	1990
Wendell McKinsey	Administrative	MIAC	Administrative	1983
Wendell McKinsey	Administrative	MIAC	Administrative	1984
Wendell McKinsey	Administrative	MIAC	Administrative	1985
Owen Merkle	Recruiting	Oklahoma State	Cereal Agronomy	1988
Lloyd Mielke	Consultant	UNL-USDA	Soils	1989
Randall Miles	Advisc	Missouri	Soils Science	1993
William Miller	Administrative	Nebraska	Administrative	1984
William Miller	Technical	Nebraska	Ag Economics	1985
William Miller	Design Team	Nebraska	Ag Economics	1987
William Miller	Consultant	Nebraska	Ag Economics	1987
William Miller	Administrative	Nebraska	MIAC	1989
William Miller	Administrative	Nebraska	Director, MIAC	1992
Harry Minor	Technical	Missouri	Cereals	1985
Gordon Monroe	Recruiting	Auburn Univ	Ag Engineering	1990
Keith Moore	Proj. Eval.	Oklahoma State	Rural Socio.	1989
Keith Moore	Interview	Oklahoma State	Rural Socio.	1989
Kenneth Moore	Consultant	Nebraska	Agronomy	1992
Kenneth Moore	Consultant	Nebraska	Agronomy	1993
Jack Morgan	Sci Review Panel	Colorado State	Cereal Agron	1990
M.A. Morgan	Sci Review Panel	Univ. College, Dublin, Ireland	Soil Fert	1990
Fred Muehlbauer	Advisor	Washington State	Food Legumes	1988
Fred Muehlbauer	Consultant	Washington State	Food Legumes	1990
Hannibal Muhtar	Consultant	CIMMYT	Station Mgmt.	1990
Hannibal Muhtar	Consultant		Station Mgmt	1991
Muneera Salem-Murdock	Consultant	Prof. Consultant	Sociology	1989
Tim Murray	Consultant	Washington State	Plant Path.	1989
John Nalewaja	Sci Review Panel	NDSU	Weed Sci	1990
Gary Naughton	Orientation	Kansas State	Title XII	1988
Darrell Nelson	Administrative	Nebraska	Administrative	1985
Curtis J. Nelson	Advisor	Missouri	Forages	1987
Darrell Nelson	Dept. Heads	Nebraska	Administrative	1988
Peggy Newquist	Orientation	Nebraska	Operations Coord.	1988
T. Nordbloom	Technical	ICARDA	Ag Economics	1985
Marion O'Leary	Dept. Hd.	Nebraska	Biochemistry	1990
Irvin Omtvedt	Administrative	Nebraska	Administrative	1984
Irvin Omtvedt	Administrative	Nebraska	Administrative	1986
Irvin Omtvedt	Administrative	Nebraska	MIAC	1989
A. M. Osman	Sci. Review Panel	ACSAD		1985
Ahmad M. Osman	Sci. Review Panel	ACSAD		1987
Einar Palm	Recruiting	Missouri	Plant Pathology	1986

Gary Paulsen	Advisor	Kansas State	Crop Physiology	1993
John Pesek	Administrative	Iowa State	Administrative	1984
E. J. Peters	Technical	Missouri	Forages	1983
E. J. Peters	Technical	Missouri	Forages	1985
E. J. Peters	Technical	Missouri	Forages	1986
Gary Peterson	Advisor	Colorado State	Crop Systems	1983
Gary Peterson	Advisor	Colorado State	Crop Systems	1984
Gary Peterson	Advisor	Colorado	Cropping Systems	1986
Gary Peterson	Design Team	Colorado State	Soil Science	1987
Gary Peterson	Consultant	Colorado State	Soil Science	1988
Gary Peterson	Consultant	Colorado	Soil Mgmt.	1989
George Primov	Technical	Missouri	Sociology	1984
Gene Quenemoen	Design Team Leader	Montana State	Ag Economics	1987
James Quick	Sci. Review Panel	Colorado State		1985
James Quick	Sci. Review Panel	Colorado State		1986
James Quick	Consultant	Colorado State	Cereal Breeder	1989
James Quick	Advisor	Colorado State	Cereal Breed	1990
Giles Rafsnider	Recruiting	Nebraska	Ag Economics	1984
D. C. Rasmusson	Sci. Review Panel	Minnesota	Plant Breeding	1988
D. C. Rasmusson	Adviser	Minnesota	Plant Breeding	1992
D. C. Rasmusson	Technical	Minnesota	Plant Breeding	1992
David Regehr	Recruiting	Kansas State	Weed Science	1984
David Regehr	Consultant	Kansas State	Weed Science	1987
David Regehr	Advisor	Kansas State	Weed Science	1988
Joe Ritchie	Technical	Michigan State	Soils	1984
Larry Rittenhouse	Sci. Review Panel	Colorado State	Forages	1989
Alan Roelfs	Consultant	Minnesota	Cereal Pathology	1989
Loran Rommann	Recruiting	Oklahoma State	Forages	1984
John Ryan	Recruiting	Arizona	Soil Fertility	1988
Don Sander	Advisor	Nebraska	Soil Science	1983
Don Sander	Advisor	Nebraska	Soil Science	1985
Don Sander	Consultant	Nebraska	Soil Science	1988
Bruce Sandhorst	Consultant	Nebraska	Audio Visual	1988
Bruce Sandhorst	Consultant	Nebraska	Audio Visual	1989
Paul Santelman	Administrative	Oklahoma State	Administrative	1985
Albert Scharen	Sci. Review Panel	Montana State	Plant Pathology	1988
John Scheuring	Sci Review Panel	Basil, Switzerland		1993
John Schmidt	Advisor	Nebraska	Breeding	1983
John Schmidt	Advisor	Nebraska	Breeding	1986
Jerome Schmidt	Consultant	Nebraska	Ag Meteorology	1989
Jerome Schmidt	Consultant	Nebraska	Ag Meteorology	1990
Larry Schulze	Administrative	Nebraska	Administrative	1981
Larry Schulze	Administrative	Nebraska	Administrative	1986
Charles Scifres	Dept. Heads	Oklahoma State	Administrative	1988
John Shanahan	Consultant	Colorado	Soil Mgmt.	1989
Robert Shearman	Dept. Hd.	Nebraska	Agronomy	1990
Richard Shibles	Advisor	Iowa State	Food Legumes	1990
Richard Shibles	Advisor	Iowa State	Food Legumes	1992
James Shroyer	Consultant	Kansas State	Cereal Agronomy	1987
James Shroyer	Consultant	Kansas State	Cereal Agron	1988
Larry Singleton	Technical	Oklahoma State	Pathology	1983
Al Slinkard	Sci. Review Panel	U of Saskatchewan	Food Legumes	1989
Daryl Smika	Sci. Review Panel	Colorado State		1985
Daryl Smika	Sci. Review Panel	Colorado State		1986
Daryl Smika	Sci. Review Panel	Colorado State		1987
Ed Smith	Recruiting	Oklahoma State	Breeding	1984

Ed Smith	Sci. Review Panel	Oklahoma State	Cereal Breeding	1988
John Solie	Advisor	Oklahoma State	Ag Engineering	1992
Parvis Soltanpour	Recruiting	Colorado State	Soils	1984
Lee Sommers	Administrative	Colorado State	Soil Fertility	1986
Bill Splinter	Administrative	Nebraska	Ag Mechanization	1986
James Steadman	Advisor	Nebraska	Plant Path	1993
J. F. Stritzke	Technical	Oklahoma State	Weeds	1982
Gary Strobel	Consultant	Montana State	Plant Path	1990
Jack Stroehlein	Consultant	Arizona	Soil Science	1989
Walter Stroup	Technical	Nebraska	Computer Center	1986
Walter Stroup	Consultant	Nebraska	Biometrics	1987
Walter Stroup	Consultant	Nebraska	Biometrics	1987
Walter Stroup	Consultant	Nebraska	Biometrics	1988
Walter Stroup	Consultant	Nebraska	Biometrics	1988
Walter Stroup	Consultant	Nebraska	Biometrics	1989
Walter Stroup	Advisor	Nebraska	Biometrics	1990
James Stubbendieck	Advisor	Nebraska	Forages	1985
James Stubbendieck	Advisor	Nebraska	Forages	1986
James Stubbendieck	Consultant	Nebraska	Forages	1989
Derrick Sutton	Sci. Review Panel	AFRC	Ag Engineering	1989
Clarence Swallow	Technical	Kansas State	Ag. Mech.	1984
Louis Swanson	Consultant	U of KY	Rural Sociology	1990
Louis Swanson	Advisor	U of KY	Rural Sociology	1992
Henri Talleyrand	Recruiting	Nebraska	Soils	1981
Donald Tanaka	Recruiting	Montana State	Soil Management	1988
Allan Taylor	Recruiting	Montana State Univ.	Cereal Breeding	1990
Bernard Tew	Consultant	Kentucky	Ag Economics	1987
Bernard Tew	Consultant	Kentucky	Ag Economics	1989
Bernard Tew	Consultant	Kentucky	Ag Economics	1990
Bernard Tew	Consultant	Kentucky	Ag Economics	1990
Gerald Thierstein	Technical	Kansas State	Ag. Mech.	1984
Gerald Thierstein	Technical	Kansas State	Ag. Mech.	1986
Gerald Thierstein	Sci. Review Panel	Kansas State	Ag Engineering	1989
James Tiedeman	Recruiting	Wash State Univ	Forages	1990
Arville Touchet	Consultant	LSU-USDA/SCS	Soil Conservation	1989
Arville Touchet	Consultant	USDA/SCS	Soils	1990
Paul Tracy	Advisor	Missouri	Soils Science	1993
Fred Troeh	Recruiting	Iowa State	Soils	1982
T.C. Tucker	Sci Review Panel	U of Arizona	Soil Fert	1990
Jim Underwood	Consulting	Nebraska	Television	1987
Jerry Volesky	Technical	Professional Consultant	Greenhouse	1985
Jerry Volesky	Prof. Consultant		Greenhouse	1988
Bob Volk	Administrative	Missouri	Administrative	1985
Glen Vollmar	Administrative	Nebraska	Administrative	1985
Glen Vollmar	Administrative	Nebraska	Administrative	1987
Glen Vollmar	Administrative	Nebraska	Administrative	1989
Glen Vollmar	Administrative	Nebraska	Administrative	1992
Don Wagner	Animal Sci. Review	Oklahoma State	Animal Science	1987
Richard Waldren	Advisor	Nebraska	Cereals	1984
Steve Waller	Consultant	Nebraska	Range Science	1988
Steve Waller	Consultant	Nebraska	Range Science	1989
John Ward	Animal Sci. Review	Nebraska	Animal Science	1987
John Ward	Consultant	Nebraska	Animal Science	1988
Clyde Wassom	Consultant	Kansas State	Cereal Breeding	1987
Clyde Wassom	Consultant	Kansas State	Cereal Breeding	1989
Darrell Watts	Consultant	Nebraska	Ag Engineering	1981

Darrell Watts	Recruiting	Nebraska	Administrative	1982
Darrell Watts	Administrative	Nebraska	Administrative	1982
Bill Webb	Consultant	Oklahoma State	Administrative	1988
Robert Westerman	Advisor	Oklahoma State	Soils	1984
Robert Westerman	Advisor	Oklahoma State	Soils	1993
Keith Whigham	Design Team	Iowa State	Agronomy	1987
Maurice Wiese	Consultant	Idaho	Plant Pathology	1987
Gerald Wilde	Technical	Kansas State	Entomology	1984
Gerald Wilde	Technical	Kansas State	Entomology	1985
Van Withee	Technical	Kansas State	Entomology	1983
Tsegazeab Woldetatos	Recruiting	WSU	Tech Transfer	1991
W. C. Wright	Administrative	Oklahoma State	Administrative	1985
Robert Zimdahl	Recruiting	Colorado State	Weed Science	1988

LONG-TERM TECHNICAL AND ADMINISTRATIVE ASSISTANCE

<u>NAME</u>	<u>POSITION</u>	<u>START</u>	<u>END</u>	<u>UNIVERSITY</u>	<u>STATION</u>	<u>CLASSIFICATION.</u>
Abdel Monem, Mohamed A.S.	Visiting Professor	86/10/01	90/10/05	Nebraska	Settat	TA
Azzam, Azzeddine	Ag Econ	93/07/01	94/06/30	Nebraska	Settat	TA/Sabbatical
Azzam, Sara	Statistician	93/07/01	94/06/30	Nebraska	Settat	
Baller, Barbara	Student Assistant	82/12/10	87/05/15	Nebraska	Lincoln	SSC
Bansal, Ram K.	Ag Engineer	89/01/01	92/12/31	Nebraska	Settat	TA
Bashford, Leonard	Ag Engineer	88/01/16	90/07/31	Nebraska	Settat	TA
Bashford, Karen L.	Staff Sec. III	88/10/10	90/06/30	Nebraska	Settat	SSC
Bertramson, B. Rodney	Team Leader	81/01/04	82/01/31	Nebraska	Settat	TA
Bigbee, Dan E.	Project Coordinator	83/07/01	92/06/30	Nebraska	Lincoln	ADM
Bitney, Larry	Ag Econ	90/07/01	91/07/07	Nebraska	Settat	TA/Sabbatical
Bodlak, Rita	Student Worker	88/02/29	90/06/15	Nebraska	Lincoln	SSC
Bray, Donald W.	Forage Scientist	81/02/01	84/08/31	Nebraska	Settat	TA
Brengle, Kenneth	Soil Specialist	85/09/01	87/12/31	Nebraska	Settat	TA
Buschman, Lawrent	Entomologist	89/08/19	92/09/05	Kansas State	Settat	TA
Byerly, Duane	Research Technologist	86/08/15	87/12/31	Nebraska	Settat	GRAD STU
Campbell, Arden	Variety Selection Spec.	84/07/01	86/07/01	Iowa State	Settat	TA
Cartier, Richard F.	Administrative Officer	84/08/01	93/07/31	Nebraska	Settat	TA/Admin
Cartier, Jacqueline	Language Tutor	84/10/01	93/06/30	Nebraska	Settat	SSC
Christiansen, Scott	Forages	87/12/20	90/01/16	Nebraska	Settat	TA
Croy, Lavoy	Research Coordinator	84/07/01	87/08/15	Oklahoma State	Settat	TA/Admin
Drake, Robert S.	Maintenance Coordinator	86/07/21	88/09/16	Nebraska	Settat	SST
Edwards, Lewis H.	Research Coordinator	87/07/01	90/09/30	Oklahoma State	Settat	TA/Admin
Edwards, Sandra	Inventory Manager	88/02/12	90/08/09	Nebraska	Settat	SSC
Erickson, Lois	Clerical Assistant	85/07/29	94/08/31	Nebraska	Lincoln	SSC
Ernest, Olivia	Project Assistant	84/08/01	94/08/31	Nebraska	Lincoln	SSC
Finley, Willa F.	Cereal Variety	82/09/01	84/11/15	Nebraska	Settat	TA
Francis, Charles A.	Project Coordinator	82/09/01	84/07/01	Nebraska	Lincoln	ADM
Frank, Kenneth D.	Associate Coordinator	84/06/01	86/12/31	Nebraska	Lincoln	ADM x
Gillard-Byers, Thomas	Ag Econ/Team Ldr.	90/07/01	94/08/31	Washington State	Settat	TA
Gouiller-Moore, Anne	Staff Sec III	89/09/08	91/07/12	Nebraska	Settat	SSC
Hamilton, John H.	Tillage Specialist	85/01/02	87/12/31	Nebraska	Settat	TA
Hanway, Donald G.	Project Coordinator	80/01/01	82/08/31	Nebraska	Lincoln	ADM
Hartman, Olga Lee	Admin. Secretary	90/07/01	91/07/31	Oklahoma State	Settat	SSC
Hartman, Glen	Electronics Tech.	90/07/01	91/06/30	Oklahoma State	Settat	TA
Head, James	Research Technician	88/09/01	89/08/31	Nebraska	Settat	GRAD STU
Heibert, Lenore	Secretary I	87/02/16	87/06/03	Nebraska	Lincoln	SSC
Hendrickson, Mary	Student Worker	88/01/11	88/08/31	Nebraska	Lincoln	SSC
Jerhada, Janet	Staff Sec. III	86/06/01	89/10/03	Nebraska	Settat	SSC
Jones, John P.	Plant Pathologist	87/07/01	90/09/30	Nebraska	Settat	TA
Jones, Joyce	Clerical Asst. II	89/07/28	90/08/09	Nebraska	Settat	SSC
Keith, David L.	Team Leader	87/05/01	91/07/31	Nebraska	Settat	TA/Admin
Keith, Brenda	Administrative Asst.	87/09/01	91/08/23	Nebraska	Settat	SSC
Kirby, Barbara	Admin. Secretary	90/08/15	92/08/31		Settat	SSC
Kirby, James	Food Legume Agronomist	90/08/15	92/08/14	Oklahoma State	Settat	TA
Kouriri, Catherine	Word Proc. Spec.	86/05/23	89/04/06	Nebraska	Settat	SSC
Maranville, Jerry	Assistant Coordinator	87/11/01	90/10/31	Nebraska	Lincoln	ADM
McNamara, Charles	Administrative Asst.	82/07/01	83/09/23	Nebraska	Settat	TA/SST
Merkle, Owen G.	Cereal Agronomist	88/12/31	93/08/31	Oklahoma State	Settat	TA
Mileski, Daniel	Senior Project Asst.	85/03/15		Nebraska	Settat	SSC
Monroe, Gordon	Ag Engineer	90/07/01	93/08/31	Nebraska	Settat	TA
Moore, Keith	Rural Sociologist	89/07/15	93/07/15	Oklahoma State	Settat	TA
Mulitze, Ellen	Computer Hdware Tech.	87/12/04	90/08/30	Nebraska	Settat	SSC
Mulitze, Dieter K.	Cereal Breeder	86/07/01	90/06/30	Nebraska	Settat	TA
Mullen, Matthew	Asst. Machinery Spec.	84/08/01	86/07/31	Nebraska	Settat	SST
Newquist, Peggy	Operations Coordinator	86/02/17	94/08/31	Nebraska	Lincoln	SSP
Primov, George	Sociologist	84/06/01	87/11/30	Missouri	Settat	TA
Pruett, Theresa I.	Secretary I	85/10/14	86/05/22	Nebraska	Settat	SSC
Rafsnider, D. Jean	Computer Center Coord.	85/09/16	91/08/22	Nebraska	Settat	SSC
Rafsnider, Giles T.	Agric. Economist	85/04/15	91/08/31	Nebraska	Settat	TA

Regehr, Judith V.	Computer Center Mgr.	84/10/01	87/07/16	Nebraska	Settat	SSP
Regehr, David	Weed Specialist	84/08/18	87/08/17	Kansas State	Settat	TA
Rice, Jean	Secretary II	87/06/08	94/08/31	Nebraska	Lincoln	SSC
Riddle, Richard	Sociologist	84/02/20	91/12/31	Missouri	Settat	TA/SST/RA
Rommann, Loren	Forage Specialist	84/07/01	87/09/11	Oklahoma State	Settat	TA
Ryan, John	Soil Fertility	88/03/01	92/03/01	Nebraska	Settat	TA
Schulze, Larry D.	Associate Coordinator	80/07/14	87/04/30	Nebraska	Lincoln	ADM
Scott, F. Grant	Interim Team Leader	82/03/07	83/03/05	Nebraska	Settat	TA
Shroyer, James P.	Cereal Agronomist	87/06/01	88/08/17	Kansas State	Settat	TA
Smith, Edward	Plant Breeder	85/09/01	87/08/31	Oklahoma State	Settat	TA
Snyder, John D.	Laboratory Coordinator	85/04/08	86/05/20	Nebraska	Settat	SST
Soltanpour, Parvis	Soil Fertility Specialist	85/01/01	88/01/31	Colorado State	Settat	TA
Starks, Kenneth J.	Entomologist	86/10/01	88/04/30	Nebraska	Settat	TA/Sabbatical
Starks, Barbara	Inventory Manager	87/03/01	87/12/31	Nebraska	Settat	SSC
Swanson, Wallace A.	Machinery Specialist	83/10/01	89/09/30	Nebraska	Settat	TA
Talleyrand, Henri	Soil Scientist	81/01/05	82/02/28	Nebraska	Settat	TA
Taylor, Allan	Cereal Breeder	90/08/15	92/08/31	Montana State	Settat	TA
Te Selle, Betsy	Staff Secretary III	80/06/02	85/07/18	Nebraska	Lincoln	SSC
Tiedeman, James	Forage Agronomist	90/07/01	93/08/31	Washington State	Settat	TA
Troeh, Fred	Soil Scientist	82/09/01	85/08/31	Iowa State	Settat	TA
Watts, Darrell G.	Team Leader	82/09/01	87/01/31	Nebraska	Settat	TA/Admin
Watts, T. Lois	Guesthouse Manager	84/10/01	87/10/31	Nebraska	Settat	SSP
Wells, Mary E.	Admin. Assistant	83/04/01	84/04/02	Nebraska	Lincoln	SSP
Woldetatos, Tsegazeab	Tech Transfer	91/11/07	93/08/31	Washington State	Settat	TA
Zimdahl, Robert	Weed Scientist	89/06/01	91/02/28	Colorado State	Settat	TA
Zimdahl, Ann	Lang. Specialist	89/11/03	91/02/28		Settat	SSC