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FINAL REPORT

Submitted to

Dr. Subhi Qasem, Dean

Faculty of Agriculture

University of Jordan

and

U.S. Agency for International Development

Prepared by

C. Gardner Shaw

Senior Agriculturalist 1977-79

January 31, 1980

Introduction:

In October 1972, a Royal Decree established the Faculty of Agriculture as an integral part of the University of Jordan (UOJ) which was then ten years old. In October 1973, with six faculty members, the Faculty of Agriculture initiated an undergraduate program leading to a Bachelor of Science Degree in Agriculture. Initial enrollment in 1973 was 43 students. The program was (and continues to be) offered in English through the Faculty's four Departments: Plant Production and Protection, Animal Production and Protection, Soils and Irrigation, and Agricultural Economics and Extension.

In early 1975 Washington State University was one of seventeen land grant universities invited to submit a proposal to the Government of Jordan for the purpose of upgrading the Faculty of Agriculture of UOJ so that might become a leading institution in the broad areas of Agricultural research and development, on-campus teaching and adult education (extension) in Agriculture.

After careful evaluation, Washington State University (WSU) was selected as the Contractor by the University of Jordan. The period of the contract extended from June 1, 1975 through December 31, 1979. Provision was made for completion of the Ph.D. programs initiated by participant trainees during the period of the contract but not completed prior to the terminal date.

Prior to the actual commencement of the contract, two members of the WSU faculty (Dean J. S. Robins and Professor Irwin A. Dyer, Sr.) constituted a precontract team which went to Jordan to establish liaison and plan in depth for the conduct of the project. Professor Dyer was

selected as the Senior Agriculturalist and served in this capacity for the first two years (July, 1975 through July, 1977). Professor Dyer then requested replacement, and Professor C. Gardner Shaw was selected to serve as Senior Agriculturalist for the rest of the period of the contract. Professor Max Jensen served as Interim Party Chief between Professor Dyer's departure (July 31, 1979) and Professor Shaw's arrival (Sept. 13, 1977). (Professor Dyer died on December 25, 1979, from an illness called amyotrophic lateral sclerosis).

AID provided funds totaling $2,198,000.00 for the accomplishment of the objectives of this project. When it bacame apoarent that not all participant trainees would complete their Ph.D. programs prior to termination of the contract, the UOJ made available $55,000.000 to fund the completion of these degree programs after December 31, 1979. In addition, because of continuing inflation the UOJ provided a contingency fund of $10,000.00 to be used if necessary to cover the cost of equipment and supplies purchased near the end of the contract period.

The effort and accomplishments under this project fall naturally into three major categories: A) Participant Training; B) Provision of Technical Services; and C) Procurement of Equipment and Supplies. The body of this report discusses each of these categories separately, and concludes with a Summary of Accomplishments.

A) PARTICIPANT TRAINING:

1) Advanced Degree Trainees.

Ten carefully selected Jordanian students were sent to the United States for Graduate Study. All but two of these had completed both a B.S.

and an M.S. in Agriculture prior to starting their academic programs in the U.S. The selection process, the availability of suitable candidates and the lead time required for processing their admissions made it not only impractical but impossible for all ten trainees to commence their programs in September, 1975. The trainees, their areas of specialization, the year each started and completed (or is expected to complete) his Ph.D. are tabulated below:

PARTICPIANT TRAINING PROGRAM UNDER WASHINGTON STATE UNIVERSITY CONTRACT

Name	Field of Specialization Ph.D. Training	Institution	Starting Date	Date of Expected (or Date of) Completion
Suwwan	Horticulture: Vegetables	WSU	Sept. 1975	August 1978
Lubbadeh	Animal Husbandry: Dairy	U. Ill.	Sept. 1975	June 1979
Hattar	Soils	WSU	Sept. 1975	July 1979
Al-Musa	Plant Pathology	WSU	Sept. 1976	July 1979
Haddad	Agronomy	WSU	Sept. 1976	Sept. 1979
Shatanawi	Irrigation	U. Cal., Davis	Sept. 1976	June 1980
Akkawi	Entomology	WSU & U. IDA	Sept. 1976	June 1980
Qunfleh	Horticulture	U. Cal., Davis & Kans. SU	Sept. 1977	June 1983
El Habbab	Agricultural Economics	WSU	Feb. 1978	June 1981
Name	**M.S. Training**			
Baqqain	Extension	WSU	Sept. 1976	June 1979

As indicated in the tabulation above, five of the ten trainees have completed their programs and have returned to the UOJ. Mr. Shatanawi is at the University of California, Davis, and should complete his Ph.D. program in Irrigation Engineering in June, 1980 (four years). Mr. Akkawi is at the University of Idaho and is scheduled to complete his Ph.D. program in

Entomology in June, 1980 (four years). Mr. Qunfleh is one of the individuals selected for training who did not have a M.S. degree when he came to the U.S. He is at Kansas State University, has completed a M.S. degree, has started his Ph.D. program, and is scheduled to complete it in 1983 (five years). Mr. El Habbab was the last trainee to start his Ph.D. program, and is scheduled to complete his work at WSU in June 1981 (3½ years).

Teaching in Agricultural Extension is an essential component of a complete academic program in Agriculture. There is still no member of the Faculty of Agriculture at the UOJ trained in this area. Because a M.S. degree is not offered in this area of specialization at any Arab University in the Middle East, a promising candidate with the B.A. in Agriculture was selected for this area of specialization. Mr. Baqqain encountered academic difficulties and other problems in adjusting to life in the United Sates. In addition, he was ill during a portion of his first year here. In spite of these factors, Mr. Baqqain completed a M.S. on Adult and Continuing Education at WSU in June, 1979. At that time he dropped from this program. He is the only student to have dropped to date. However, the training he received under this project prepared him for continuing his education towards the Ph.D. He is currently enrolled in a doctorate program at Mississippi State University; continuing support is being provided by the UOJ separate from this contract. Thus, it can be anticipated that the important area of Agricultural Extension at UOJ will be provided for, in part, as a result of this project.

In initial planning, three years was allocated to each student for completion of his Ph.D. program. This was based on each having a M.S. degree in his area of specialization and not having a commitment for

service to WSU. Three of the ten participants did complete their programs in this minimum period and a fourth is scheduled for completion in three and a half years. In retrospect, and for planning future programs of this type, it must be recognized that allowing only three years each for all students is not realistic. Adjustment in a foreign land, academic deficiencies that do not become apparent until a student has started his program for an advanced degree, illness, etc., can all result in a longer period being required by a participant to complete the Ph.D. program.

That all ten of those selected for advanced training have completed or are still enrolled in Ph.D. programs (even though one has been dropped from this particular project) is an unusual record for this type of project. It is indicative of the care with which participants were selected, their individual ability and perseverence, and the careful supervision given to these participants by their advisors at WSU and the other Universities at which they have been enrolled.

2) Short-Term Practical Training

Eleven members of the permanent faculty in the Faculty of Agriculture at UOJ were selected for refresher training programs in the United States. The names, professional areas, and periods of their training are tabulated below:

Name	Professional Field	Period of Training			Institution
		Started	Completed	Duration	
Khader	Soils	Oct. 1975	Feb. 1976	4½ mos.	WSU*
Faqih	Animal Production	June 1976	Sept. 1976	3 mos.	WSU*
Snobar	Farm Machinery	Mar. 1977	June 1977	3½ mos.	WSU*
Duwairy	Plant Production	Jul. 1977	Sept. 1977	2½ mos.	WSU
Steitieh	Agricultural Economist	Mar. 1978	Apr. 1978	1 mo.	WSU & Stanford
Shatat	Horticulture	June 1978	Sept. 1978	2½ mos.	WSU & U. Cal. Davis
Al-Saket	Soils	June 1978	Aug. 1978	2 mos.	WSU*
Sharaiha	Farm Management	Mar. 1979	July 1979	4½ mos.	U. Cal, Davis WSU
Al-Khaldi	Virology	Apr. 1979	June 1979	3 mos.	WSU (Prosser)
Rawajfih	Soils	Jul. 1979	Aug. 1979	1 mo.	Auburn
Subhi Qasem	Plant Pathology	Jan. 1977	Feb. 1977	1 mo.	WSU

*/ These individuals also visited several other universities.

A program tailored for each trainee was planned in advance. Some (e.g., Professors Rawajfih, Duwairy and Mr. Al-Khaldi) spent essentially all their time at one location; others (e.g., Professors Khader and Snobar) visited a large number of institutions. Some participants adhered closely to the programs planned for them; in other instances there was deviation after their programs had been initiated. In one instance the program planned was materially shortened. With perhaps this one exception the objectives established for each trainee were completed.

In evaluating the short term practical training program it is concluded that a single primary objective should be selected for each trainee; an institution should be chosen at which this objective can best

be accomplished; and the trainee should spend the great majority of his time at that institution. Short visits to one or two other institutions, preferably after the primary assignment has been completed, can be beneficial, but training programs involving short visits to several institutions are the most expensive and least productive.

Travel and per diem expenses make short term practical training programs very expensive. For this reason programs of 3-4 mos are more cost efficient than shorter ones. The best practical training programs are those planned in precise detail in advance. If the trainee goes to an institution where he already knows one or more members of the staff, if one of these agrees to supervise the trainee's total program, if there is correspondence between the trainee and staff members at the host institution as well as with the Campus Coordinator of the Contractor, and if all aspects of each traineeship are arranged in advance (course enrollment, actual participation in ongoing research and accompanied short field trips in the vicinity of the host institution, etc.), the practical traineeships will be most effective. In budgeting for short term traineeships, provisions should be made for professional travel for research and practical field experience in the vicinity of the host institution. Additionally, the host institutions should receive some reimbursement for the professional time devoted by their faculty to providing effective training programs.

Upon return, Faculty Trainees should prepare and submit a report summarizing their experiences. This report should be distributed as are the reports of the Professional Field Staff.

Inflation during the period of this contract influenced all aspects of the program, and specifically curtailed the programs that could be

developed for some faculty trainees, particularly those undertaking their traineeships during the last 18 months of this contract.

B. PROVISION OF TECHNICAL SERVICES

Twelve professional staff served in the field on this contract. They are listed below with their field of specialization, the period of assignment, and total man months:

WASHINGTON STATE UNIVERSITY CONTRACT FIELD PROFESSIONAL STAFF

Name	Position	Dates	Man-Mon
Irvin A. Dyer, Sr.	Senior Ag. & Animal Scientist	Sept. 1975 - Aug. 1977	24
C. Gardner Shaw	Senior Ag. & Plant Pathologist	Sept. 1977 - Oct. 1979(+1mo.)	25½
Max Jensen	Irrigation Specialist	Oct. 1976 - Sept. 1978	24
Day L. Bassett	Irrigation Specialist	Sept. 1978 - Aug. 1979	12
Perry C. Crandall	Hort. Specialist - Tree Fruits	Sept. 1978 - Oct. 1978	1½
Fenton E. Larsen	Hort. Specialist - Tree Fruits	Feb. 1979 - June 1979	4½
Harry A. Cosgriffe	Extension Specialist	Sept. 1976 - Feb. 1977	5
Gaylord 1. Mink	Virologist	Jan. 1976 - May 1976 Sept. 1978 - Oct. 1978	5 1½
June Roberts	Agricultural Machinery Spec.	May 1976 - Sept. 1976	4
Robert Thompson	Animal Scientist	Oct. 1977 - Jan. 1978	4
Robert Wilcox	Agricultural Marketing Spec.	Feb. 1978 - June 1978	5
Lowell W. Rasmussen	Administrative Consultant	Apr. and May 1979	1
		Total	117

With the exception of Professor Robert Thompson of the University of Idaho Extension Staff, all field professional staff were from Washington

State University. Each has submitted a report summarizing his individual activities. Since these reports have been widely distributed, only a brief summary of the activities of the field professional staff will be presented herein.

The philosphy adopted by the Field Staff was to work cooperatively with members of the UOJ Faculty. The American Field Staff did not work unilaterally on problems they selected or thought important. The field research and development programs undertaken were those on which Jordanians were already working or which the UOJ Faculty recognized as needing attention. Professors Dyer and Thompson teamed with Professor Kader in Animal Science. Professor Shaw worked closely with Professor Mamlook and Dean Qasem on a comprehensive Plant Disease survey of Jordan. Professor June Roberts cooperated with Professor Snobar on the adaptation of farm machinery to Jordanian conditions. Professors Jensen and Bassett assisted Professor Judah in the development of irrigation systems for tomatoes, cucumber, citrus and other crops grown extensively in the Jordan Valley. In addition, they helped to design the irrigation system for the new Irrigated Agriculture Research and Training Center (IARTC) of UOJ in the Jordan Valley. This significant addition to the facilities of the Faculty of Agriculture has been developed during the period of this contract.

Professors Perry Crandall and Fenton Larsen worked closely with Professors Al-Wir and Suwann on Horticulture problems, especially grapes and tree fruits. Professor Wilcox investigated with Professor Steitieh the development of agricultural marketing systems in the Jordan Valley. Near the completion of the program in Jordan, Professor Rasmussen made a significant contribution by providing an overall administrative review of research activities within the Faculty of Agriculture.

Because there were no counterparts yet on the faculty in the areas of Extension and Plant Virology, Professors Cosgriffe and Mink could not team with a specific member of the UOJ Faculty. Professor Cosgriffe made a significant contribution by introducing the philosophy of Cooperative Extension to the faculty and students in agriculture at UOJ. Professor Mink undertook an investigation of tomato leaf roll virus, the most serious single vegetable disease in Jordan. Working cooperatively with Mr. Al-Khaldi, who was in charge of greenhouses for the Faculty of Agriculture, it was conclusively demonstrated that the white fly is the vector of this disease. Subsequently, Mr. Al-Khaldi was selected for short-term training in the U.S.; his training period was spent with Dr. Mink at the Irrigated Agriculture Research and Extension Center at Prosser, Washington. In addition, one of the Ph.D. trainees had Professor Mink as his thesis advisor and now has returned to Jordan. Mr. Al-Khaldi will serve as Dr. Al-Musa's technical assistant; as a team they should competently tackle tomato leaf roll and other important plant virus diseases of Jordan.

Most of the Field Staff also participated in teaching. Again the approach was to present material applicable in Jordan. Each Field Staff member spent time prior to his arrival in Jordan accumulating and organizing material applicable to agriculture in the arid Middle East, and to the subtropical conditions in the Jordan Valley. This approach was further implemented by drawing on local sources of information after arrival, including the staff member's Jordanian counterpart. In some instances, courses were presented jointly, some lectures being given by the field staff member and others by the Jordanian Faculty Member. Lecture outlines and notes utilized by the Field Staff were left with the Jordanian faculty member who would have responsibility for teaching a particular course in the future.

In September, 1977 the Faculty of Agriculture initiated a graduate program at the Master of Science level. Professors Jensen, Bassett, and Shaw, i.e., those on long term assignment after that date, served as theses chairmen for 1-4 students each. Professor Shaw was the Thesis Chairman for the first candidate to receive the M.S. Degree in Agriculture from the University of Jordan. Members of the Field Staff on short term assignments after the graduate program started contributed significantly to this program by advising students, but obviously could not serve as Theses Chairmen.

At the termination of the contract, approximately 30 candidates for the M.S. were enrolled. At least 12 of these should complete all requirements for their degrees during the current academic year.

The first undergraduate degrees in Agriculture were granted in 1977. There were about 23 graduates that year and 35 in 1979. The total undergraduate enrollment in the Faculty of Agriculture for 1979-80 was about 250. Included is an increasing number of students from other countries.

Thus, the Field Staff has contributed significantly to the development of both the undergraduate and graduate cirricula now offered by the Faculty of Agriculture, UOJ. The courses offered cover the major areas of Agriculture encompassed by the four departments. The Faculty wisely is emphasizing the improvement of the courses now in the curriculum, rather than immediate expansion of the curriculum. The curriculum includes both the standard courses offered in the classroom and courses emphasizing practical field experience. The latter are taught at IARTC, where all seniors now spend one semester. Currently, the academic program offered in Agriculture at UOJ is the equal of any offered in the Arab Middle East.

Field Staff members regularly attended the faculty meetings of their respective departments, and continuously participated in day to day operations. Such participation provided a constant input of ideas, advice and recommendations, consciously and unconsciously, which should continue to influence the future development of the Faculty. Several of the Field Staff as well as other WSU faculty (e.g., Dr. L. L. Boyd) contributed books, journals and reprints from their personal libraries to the Library of the Faculty of Agriculture or to individual members of the Faculty of Agriculture.

Professor Dyer prepared the complete text for a book in the area of Animal Nutrition which was to be translated into Arabic and published by the University of Jordan. Several of the Field Staff also have authored jointly with UOJ Faculty scientific publications based on the research accomplished during their tours. Prof. Shaw left an initial draft of an Index to Plant Diseases of Jordan with Professor Mamlook. It is now in final preparation for publication.

In addition to cooperative participation in ongoing research, each Field Staff Member became involved in planning new research programs in his area of specialization. These included not only research projects to be funded by the University of Jordan, but also by other Agencies of the Government of Jordan and international development agencies.

Through joint planning and participation in research and joint publication of research results' ties have been established between the faculty of UOJ and field staff members that will continue to be mutually beneficial in the future. For example, Professor Duwairy UOJ (Agronomist) is now planning to spend his sabbatic year at WSU working with Professors R. A. Nilan and C. F. Konzak.

In Land Grant Universities in the U.S., extension programs, especially those of Extension Specialists, are closely integrated with the academic and reseach programs of subject matter departments. Extension is the official responsibility of the Ministry of Agriculture in Jordan. No personnel of the Ministry are located on the University Campus, although the Division of Research and Extension of the Ministry of Agriculture is headquarted in a building adjacent to the University Campus. Dean Qasem and other members of the Faculty previously have been employed by the Ministry of Agriculture. To a limited extent the research stations maintained by the Ministry of Agriculture are utilized by the Faculty for research. Nevertheless, there is little day-to-day contact between the Ministry staff responsible for Extension programs and the Faculty of Agriculture. Dr. Cosgriffe tried to establish better liasion between the Ministry and the Faculty. Other Field Staff became involved in varying degrees in extension activities in cooperation with members of the Faculty of Agriculture.

With the continuing development of the IARTC in the Jordan Valley, and increasing research productivity in the laboratories, greenhouses and field plots on the main campus, the Faculty of Agriculture is planning Open Houses and Field Days for farmers. However, until the National Planning Council of Jordan assigns the Faculty of Agriculture a specific responsibility in Agricultural Extension beyond the mere presentation of one or two formal courses in this area, the role that the Faculty can play in Extension will be limited. The development of truly cooperative programs, especiallv in Extension, but also in Research remains one of the major challenges in agricultural development in Jordan.

Because of a detached retina Professor Perry Crandall had to return to the United States in advance of the scheduled completion of his assignment. No other member of the Field Staff had any health problems, nor did any of the accompanying wives. The good health enjoyed by everyone except Professor Crandall made possible maximum professional contributions by the field staff.

C. PROCUREMENT OF EQUIPMENT AND SUPPLIES

A total of $948,000 was available from A.I.D. for the purchase of equipment and supplies, including vehicles. In addition, because of inflation, and the recognized need in late spring, 1979 for items of equipment and supplies not yet ordered, the University of Jordan made available an additional $10,000. This document does not constitute a financial statement; that is to be prepared by the C troller's Office. For information purposes, all A.I.D. funds have been expended and approximately $6,000 of the funds provided by the University of Jordan have been spent.

As in other aspects of the program, every effort was made to satisfy the needs for equipment and supplies indicated by the Dean and Faculty of UOJ. The Field Staff served as a source of information on the quality and suitability of equipment and supplies of American manufacture.

At the start of this contract, the Faculty of Agriculture had just occupied a new building. Initially, little of the equipment needed for teaching and research laboratories in agriculture was available. As of September, 1979, a second wing of the Faculty of Agriculture Building was scheduled for occupancy. With funds made available by this contract, and

with all other funds available to the Faculty, the laboratories in the original building have been equipped and are in full utilization. In addition, some items obviously essential to the utilization of the laboratories in the new wing were ordered so that they could be put to use immediately after construction had been completed.

Much of the research equipment and machinery was of a high level of sophistication. The Field Staff devoted considerable effort to acquaint the faculty members who would utilize the new equipment with its operation. The short term practical training made available to most of the senior Faculty was helpful in acquainting them with newly developed equipment in their areas of specialization. Of the 40 members of the Faculty of Agriculture as of September 1979, a large majority have completed doctoral programs during the past 1-5 years. In their graduate training, either in Europe or the United States, these younger faculty members have become familiar with the operation of scientific equipment currently in use in agriculture and biological research. Thus, with cooperative effort between the Field Staff and the Faculty, equipment ordered was installed and brought into normal operation.

One aspect of ordering equipment is worthy of special mention. Spectrophotometers are sufficiently delicate instruments that the original installation should be performed, or at least checked, and the machines calibrated by a company representative. Only if such a checkup is performed by a company representative is the full warranty effective. This service is provided without cost within the U.S. Bids were obtained from two American companies for spectrophotometers. Only after the lower bid had been accepted and the equipment received was it learned that the nearest representative of the company we had ordered from was in Italy and there would be a $1,500 charge for travel and per diem to accomplish the

installation and calibration. Subsequent service would involve similar travel costs. The higher bidder had qualified technicians in Jordan to perform the original installation without charge and to provide subsequent service without travel costs being involved. The latter company, for obvious reasons, declines to work on equipment not of their manufacture. Such aspects must be taken into consideration when purchasing any high-cost, delicate instruments in developing countries.

One continuing problem in the procurement of electrical equipment from American companies is the difference in voltage required in the U.S. (110-120v; 60 cycle) and practically every other country in the world (220-230v; 50 cycle). Even when the cover pages of purchase orders specify the correct voltage, and the correct voltage is indicated on every individual piece of electrical equipment or supplies being ordered, American companies as often as not will ship equipment overseas meeting U.S. requirements, not those specified. Some shipments were received containing both 120 volt and 220 volt items. In some instances the basic unit would be correct, but accessories (bulbs, etc,) would be for the lower voltage. This is but another instance wherein the reliable supplier who ships items complying with the voltage specified is the better source, even if his bid is slightly higher than a competitor.

To avoid return of major items of equipment which had arrived undamaged, suppliers not complying with specified voltage requirements were offered the alternative of providing without cost transformers of sufficient size to service the equipment involved.

Other companies without requesting advance approval, would ship equipment designed to operate on 120v, 60 cycle and send a transformer along with the item, not charging for the transformer. The time and effort required to requisition, order, ship and actually receive desired equipment

in Jordan and the desperate need for the equipment justified acceptance of 120v equipment as long as transformers were supplied.

Another difficulty encountered far too often was noncompliance with the requirement that all goods be shipped initially on an American carrier. Even though every purchase order prepared by WSU carried this stipulation, some suppliers did not comply, even on repeat orders after written notification from WSU of their provious noncompliance. This problem was solved by the UOJ agreeing to pay the freight charges involved in such shipments.

Procurement problems such as those indicated are justly considered by citizens of cooperating countries as unsatisfactory service from American businesses. When ordering equipment and supplies on unrestricted funds, there is an increasing tendency to order from European suppliers. If American companies wish to remain competitive in international markets, they must comply with the terms stipulated in purchase orders requiring international shipment.

At the inception of this contract surface shipments were still being processed through Beruit, Lebanon. The Civil War in that country necessitated rerouting some items then en route, with resultant delay. Delays also resulted from misplacement of shipments in the warehouse of the supplier before shipment, off-loading at the wrong airport or seaport, and actual loss of some shipments. About three months after arrival in Jordan (i.e., in December, 1977) Professor Shaw realized that some purchase orders (presumed shipments) were long overdue. With excellent cooperation of the Purchasing Office at WSU, particularly Mr. Brooks Hanford, the principal buyer for this project, the status of all purchase orders for which goods had not been received in Jordan was reviewed both in Jordan and in the U.S.

Insurance in most air freight contracts provides coverage for only 120 days from the date of shipment; surface shipments are normally covered for six months. If claims of loss are not filed within the stipulated periods, they may be disallowed. Thus, the actual date of shipment, and notification thereof, is critical.

WSU purchase orders all carried the stipulation that the Chief of Party in Jordan be notified as to the actual date of shipment. Some suppliers complied; others did not. The problem was further complicated by interminable delays sometimes occurring between placement of an order and shipment. Again certain suppliers gave prompt and satisfactory service; they either cancelled or backordered items not in stock, and got the major portion of the shipment on its way. Others would hold up a whole shipment until every last item ordered had been restocked. In combination, these factors resulted in the Senior Agriculturalist not knowing whether nonreceipt meant loss, delay or nonshipment. Equally exasperating as delay was the illogical shipment of an equipment item lacking one or more of its major components so that the items as received could not be installed or used. Backordering of complete units is logical; backordering of one or more components essential to the operation of a major piece of equipment is not.

To reduce these problems it is recommended that suppliers be required to notify the Purchasing Office of the Contractor in the U.S. as well as the Senior Agriculturalist in the Cooperating Country as to the date of shipment. Mr. Brooks Hanford developed what was referred to as a "tickler file"; each 30 days after placement of the order, if he had not been informed that shipment had occured, he ascertained the status of the order from the supplier. Because an exchange of letters with the Senior

Agriculturalist in the cooperating country requires almost one full month, the status of purchase orders must be checked by the Contractor's home office if claims for loss are to be filed within the periods stipulated.

Claims for reimbursement or replacement were submitted in those instances where shipments had been lost. As a result of checking early in 1978 the status of all purchase orders for which goods had not been received, and keeping very close tabs on the status of subsequent purchase orders, losses from all causes were kept at a minimum.

Excellent cooperation was provided this project by the Staff of the Purchasing Office, WSU.

SUMMARY OF ACCOMPLISHMENTS

1. In 1975, when this contract was inititated, the Faculty of Agriculture at UOJ numbered ten. In September, 1979 there were forty professional members of the Faculty of Agriculture. Five have completed their Ph.D. programs under the auspices of this contract. The Faculty of Agriculture will continue to grow as those (four in number) still enrolled in Ph.D. programs under this contract complete their degrees and return to UOJ. Outside this contract, but stimulated by it as a result of receiving their undergraduate and graduate study at UOJ during the period of this contract and having contact with the Field Staff, several other superior students are currently enrolled in Ph.D. programs in Europe, and will return to join the Faculty of UOJ in the next 2-4 years.

   The Faculty is provided with a reasonable number of technical assistants, and their productivity is enhanced thereby.

2. Eleven of the senior Faculty UOJ praticipated in short-term training programs at various universities in the United States. Each returned better equipped and stimulated to perform their teaching and research responsibilities.

3. The academic program of the Faculty of Agriculture has been materially strengthened. The first B.S. degrees in Agriculture were granted during the period of this contract (1977). Thus, all graduates to date have been influenced by this program. The graduate program in the Faculty of Agriculture was also initiated during this contract. The Field Staff played a significant role in the initial development of the M.S. program, by assisting in the development of courses required for the degree by different departments, by teaching solely or jointly with UOJ Faculty some of the courses required for the degree the first times they were offered, by serving as theses chairmen and advisers for some graduate students during 1977-1979, and by making available to UOJ Faculty lecture notes, outlines and syllabi they had developed for courses they taught in the U.S. These imputs should have a continuing influence on the future development of the academic program.

4. The Field Staff has materially assisted the Faculty in the development of a broad and productive research program. As appropriate for different research projects, all facilities available in the laboratories, glasshouses, and at IARTC are being utilized. The research currently in progress logically emphasized the solution of existing problems which limit agricultural production in Jordan. However, the Faculty has the capability for, and the existing facilities permit, tackling basic problems in biological and physical

sciences as such effort becomes appropriate to the agricultural needs of Jordan.

5. The Library of the Faculty of Agriculture, used for both research and teaching, was strengthened by text and reference books, technical journals and other audio-visual materials purchased with contract funds. In addition, the Field Staff and some other members of the WSU Faculty who did not serve on the Field Staff, donated materials to the Library.

7. A modern Farm Machinery shop was constructed with UOJ funds during this contract. Much of the machinery needed to equip the shop was purchased with funds provided by the contract. The shop is used for the modification and repair of farm machinery, instructional purposes, and for the original design and construction of machinery adapted to Jordanian Agriculture.

8. During the period of this contract, land and some buildings were acquired for the University's Irrigated Agriculture Research and Training Center in the Jordan Valley. In cooperation with the UOJ Faculty, the Field Staff helped develop IARTC into a functioning unit consisting of some 200 acres. Funds from this contract proviced some of the farm machinery, other equipment, and supplies used at IARTC. About ¼ of the land currently has irrigation water available and is used as plot land for research and teaching. Another ¼ is planted to nonirrigated cover crops for soil improvement. Fifteen plastic houses have been constructed and drip and sprinkler distribution systems developed for them and for some other plot areas. Gravity-flow ditches now irrigate the rest of the land receiving water. All facilities of the center are being utilized for active

academic and research programs. Equally important, the Field Staff, particularly Professor Bassett (see his final report) has assisted Professors Judah and Sharaiha and others in the preparation of detailed plans for the further expansion, development and operation of IARTC.

9. During this contract construction was completed on three glasshouses, together with a well designed and equipped head house. Again basic construction costs were paid for by UOJ; this contract purchased some of the equipment and supplies utilized in the glasshouses. Field Staff assisted in the initiation of the research and academic programs which utilize this facility.

10. Professor Dyer assisted in planning and helped supervise the construction of sheep pens and barns needed for research and teaching purposes.

11. The Field Staff assisted in the preparation of numerous research proposals, some of which were submitted to: The Jordan Valley Authority of the Jordan Ministry of Agriculture, The Arab American Oil Company (ARAMCO), and U.S.A.I.D., for consideration. The Jordan Valley Authority has funded several of the proposals submitted to it. Those submitted to other agencies continue under consideration. The proposal prepared for submission to A.I.D. requests support for the continued development of the Irrigated Agriculture Research and Training Center so that it may become truly a Center of Excellence in the Middle East for research, Adult Education, and practical field training in Agriculture. With further development, this facility can provide not only an effective program needed by farmers in the Jordan Valley but will also permit UOJ, by subcontract, to serve as a training center for Agriculturalists from other Arab countries

12. During the period of this contract, the Faculty of Agriculture had support in the area of poultry production from the British Development Corporation. Also, a cooperative program with the International Center for Agricultural Research in the Dry Areas (ICARDA) was funded and initiated. These programs, along with the U.S. AID contract, were all mutually supportive of the Faculty of Agriculture, UOJ.

13. The Field Staff, individually and collectively, and in cooperation with the Faculty, supported Dean Qasem in his recommendation that the Faculty of Agriculture perform the research function for the Jordan Valley Authority, rather than have that agency hire its own personnel or contract independently with non-Jordanian research organizations for such services. As of July, 1979, the JVA had accepted this proposal in principle and had contracted with UOJ for the performance of research on several projects involving the development of irrigation systems.

14. The education of Jordanian students at WSU and other U.S. universities, the short term training of Jordanian Faculty, and the participation of Field Staff in the day-to-day activities of the Faculty of Agriculture, UOJ for varying periods, have resulted in professional ties that will continue to the mutual advantage and productivity of all indefinitely.

15. The Faculty of Agriculture, UOJ, has provided practical field experience to agricultural technicians from Saudi Arabia. Emphasis was on growing crops under plastic. The Faculty has the expertise and supporting facilities to undertake expanded programs of this type in several areas, and thus provide a type of training needed by agriculturalists from many Arab countries.

In conclusion, as this project terminates the Faculty of Agriculture of the University of Jordan consists of an energetic group of qualified Agricultural Scientists with the land, structural facilities, equipment and supplies to continue and to expand the current, sound academic programs at the B.S. and M.S. levels and its productive research programs.

Continued growth of the Faculty over the next several years has been provided for.

The Faculty is providing the academic education essential for young men and women entering farming, agribusiness, and professional careers in Agriculture in Jordan and elsewhere, particularly in other Arab countries.

Its research programs--from the development of new cereal varieties with higher yield potential and better adapted to Jordan's soils and climate, to better range management, improved nutrition of poultry and grazing animals, reducing soil salinity by modification of irrigation practices, solving plant disease problems, and improvement in the Agricultural Marketing Systems so as to reduce post harvest spoilage--are providing the information needed for producing, processing, and utilizing agricultural commodities.

The Faculty has already become involved in the training of nationals of other Arab countries in practical Agriculture.

The Faculty has the background, knowledge, experience, and ability to become involved in Adult Education (Extension) but basic decisions must be made by the Jordan National Planning Council before the University can assume more than an academic role in this area.

The Faculty of Agriculture at the University of Jordan is now one of the best in the Arab world and is on the way to becoming a Center of Excellence in the Middle East for research and educational programs.