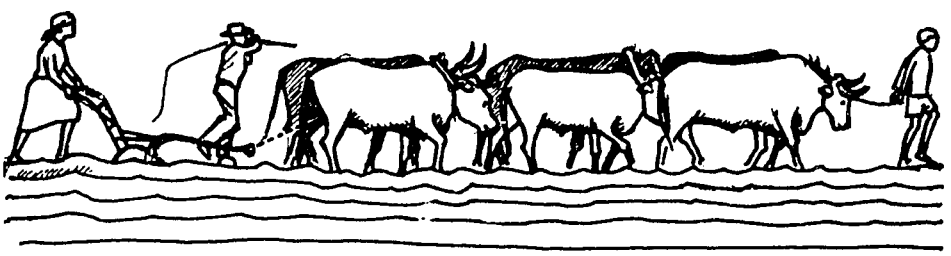
AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT (ATIP)



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PROJECT PAPER SUPPLEMENT

AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT (ATIP)

PREPARED AS A BASIS FOR

THE EXTENSION OF THE MIAC CONTRACT

DECEMBER 1ST, 1987 TO SEPTEMBER 28TH, 1990

27TH AUGUST, 1987

FORWORD

This Project Paper Supplement (PPS) has been prepared as a reference document for the extension of the MIAC contract (Number AFR-0221-C-00-2020-00) from December 1st, 1987 to September 28th, 1990. As such it represents MIAC's considered view of the project over the next trhee years. In the preparation of this document substantial amounts of time were spent in gleaning the views of GOB personnel and USAID/B. An attempt has been made, whenever possible, to incorporate these views.

Executive Director of MIAC:

_____ _____

Name Date

Representative of the Lead Institution (Kansas State University):

_____ _____ _____

Name Position Date

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1. INTRODUCTION

1.1 STATEMENT OF WORK

The contractor -- The Mid-America International Agricultural Consortium (MIAC) with Kansas State University (KSU) as the lead institution -- will continue providing technical advice and assistance to the Government of Botswana (GOB) and to the USAID Mission to Botswana (USAID/B) to implement the Agricultural Technology Improvement Project (ATIP).

1.2 OBJECTIVE OF PROJECT

The objective of the Agriculture Technology Improvement Project is to provide assistance to the Government of Botswana Ministry of Agriculture in developing an improved agricultural capability which will be responsive to limited resource farmer needs. The focus is consistent with the GOB's strategy as articulated in the National Development Plan (NDP VI) to increase agricultural production, farm income, rural employment and to enhance equity.

1.3 PROJECT MONITORING

Since the inception of ATIP in 1982 the project has been monitered internally as follows:

(a).Within ATIP, through holding meetings to discuss the results, work plans and issues, often of a methodological nature.

(b).Within GOB, through contributions to the Annual Report of the Crops Division of the Department of Agricultural Research (DAR) and through discussing results and work plans at the Annual Crop Research meetings. Additionally two meetings -- one on farmers fields -- are held each year attended by farming systems personnel from all the Botswana projects and by other researchers and extension personnel.

(c).Through USAID/B submission of Annual Reports on progress plus work plans and contract budgets.

There have in addition been three external reviews. Two of them were Mid-Term Evaluations in 1984 and 1986 and one was an audit in 1985 as a result of which the Log Frame was first revised.

In general these reviews and evaluations gave very favourable reports on ATIP. There have been no negative comments about the technology strategy. Rather most criticisms have addressed other issues which have been addressed in this Project Paper Supplement (PPS). At the same time it should be recognized that some of the strategies to be discussed are already in fact being implemented. However in order to give completeness to the proposal they have been included in the discussion.

1.4 LAYOUT OF PROJECT PAPER SUPPLEMENT (PPS)

Chapter 2 is devoted to a revised project description and presentation of project outputs. This is a modified version of the one presented in the Revised Amplified Project Description, in Project Implementation Letter (PIL) No. 20 on July 14th 1986. A revised Logframe is given in Appendix A, while a list of benchmarks for assessing the progress of ATIP is presented in Appendix B.

The major body of the PPS is the implementation discussion in Chapter 3. Recommendations of the Second Mid-Term Evaluation are restated in Appendix C as general issues which are addressed in the PPS. Appendix D lists the major assumptions used in deriving a pragmatic strategy for obtaining the end of project status as delineated in Chapter 2.

Other appendices contain the proposed job descriptions of the technicians (Appendix E), an implementation schedule (Appendix F), definitions of the acronyms used in the proposal (Appendix G), and a definition of farming systems work as used by ATIP (Appendix H).

2. REVISED PROJECT DESCRIPTION

The following is a revised version of the project details last ammended in Annex A, Project Implementation Letter Number 20, dated July 14th 1986. Most of the changes incorporated were suggested by the Second Mid-Term Evaluation Team in May 1986.

2.1 PROJECT DESCRIPTION

The purpose of ATIP is:

(a).To improve the capacity of the Ministry of Agriculture's Department of Agricultural Research (DAR) to develop technologies for limited resource farmer needs.

(b).To improve the capacity of the extension service, that is the Department of Agricultural Field Services (DAFS), to develop and transfer appropriate technologies for limited resource farmers, and to strengthen the linkages between research, extension and farmers.

(c).To provide farmers, through the active participation of DAFS staff in the areas where ATIP is working, with information on relevant improved technologies and methods through field trials, demonstrations and farmer training.

Over the remaining project life, FSR teams will be working with limited resource farmers on their farms developing, testing and transferring relevant improved technologies. These teams will serve as the focal points for initiating adaptive farming systems work activities. Technical assistance provided at the national level will complement work undertaken at the regional/district level by improving the capacity of the DAR to focus on problems relating to small farmer needs and by improving linkages between DAFS and DAR.

A revised Logframe is given in Appendix A.

2.2 END OF PROJECT STATUS

By the end of the project it is anticipated that on-going farming systems work will be establisned and tested in selected areas of Botswana. Likewise it is anticipated that acceptance of farming systems work as an approach will have been assured. Within the context of this approach, the following will have taken place by the end of project life:

(a).Farming systems work will be accepted as a process in the Ministry of Agriculture's Department of Agricultural Research (DAR). A procedure will have been established to respond to requests from farming systems teams and some of the DAR research agenda will reflect the field-based research agenda.

(b).Improved linkages will have developed between the Ministry of Agriculture's (MOA's) Research and Extension Departments resulting in

more relevant adaptive technology development capabilities. Extension specialists will have assumed their roles of liaison between the research and field extension staff, and will serve as trainers of field staff. The Department of Agricultural Field Services (DAFS) will more widely disseminate tested technologies that they have helped develop in the two ATIP areas.

(c).Technologies which will increase small farm production, reduce the risk of failure, and/or improve returns to labour/capital will have been identified and tested in the ATIP work areas. In their evaluation care will be taken to preserve the biological diversity and to ensure that they do not have a detrimental effect on the natural resource base in the long-run.

2.3 ANTICIPATED PROJECT OUTPUTS

Benchmarks for measuring progress are given in Appendix B and are designed to help in monitoring progress towards achieving the anticipated ATIP outputs, summarised in this section and discussed in detail in Chapter 3. Achievement of these outputs is very dependent on the support and involvement of DAR and DAFS staff outside ATIP itself. These include, where relevant (e.g., training), the total to be expected for the whole project period from 1982 to 1990.

2.3.1. Farming Systems Approach Designed, Developed and Fully Tested by ATIP in Two Regions

(a).Minimum of two localised teams installed and functioning -- Mahalapye by January 1988, and Francistown by September 1990.

(b).A draft of a handbook for farming systems work in Botswana prepared by September 1988, field tested and put in final form by September 1990.

(c).At least ten different crop and/or livestock technologies tested on farmers' farms at both ATIP locations and, if successful, included in DAFS farmer recommendation programmes by June 1989.

2.3.2. Institutional Capabilities and Skills Developed within the Ministry of Agriculture (MOA) to Execute Farming Systems Work in Two Regions

(a).One MOA staff person trained at Ph.D. level.

(b).Fifteen MOA staff trained at the M.S. level.

(c).Eleven MOA staff trained at the B.S. level.

(d).Twenty seven MOA professional staff will have received specialised short term training in farming systems work and in related complementary topics.

(e).One hundred and fifty MOA professional and junior level staff will have

received in-service training in farming systems work and related topics such as trial layout, interviewing techniques, team formation, use of microcomputer software packages, etc.

(f).Six MOA secretarial and administrative staff trained in administrative and secretarial skills for office operation such as typing, filing and use of microcomputers.

2.3.3. Linkages Strengthened

(a). Within ATIP:

Four programme/research meetings per year for ATIP staff.

(b). Between Farming System Projects:

Two meetings per year including an on-farm workshop hosted by one of the projects.

(c). Between ATIP and Farmers:

(i)...Working through the six farmer groups in the ATIP villages.

(ii)..Holding farmer field days each year in at least four villages.

(iii).Initiating an annual kgotla meeting to report ATIP work and proposals in each of the six ATIP villages.

(d). Between ATIP and On-Station Research:

(i)...Appointment of Soil Management Specialist under the Sorghum/Millet Collaborative Research Programme (INTSORMIL).

(ii)..Appointment of Farming Systems Research Liaison Agronomist.

(iii).Collaborative research.

(iv)..Attendance and participation of ATIP staff at annual research meetings.

(v)...Delivery by ATIP staff of at least three seminars annually.

(vi)..Annual field visits by ATIP staff and station based researchers to each other's work.

(e). Between Research and Extension, both at Headquarters and in the Regions:

(i)...At Headquarters by RELO:

-- Coordinating annual meetings between Crop Production Officers

(CPOs) and research staff in DAR.
-- Facilitating production of recommendations published as Agrifacts.

(ii).Between Headquarters and Regions by RELO:

-- Liaising monthly with RAOs in Central and Francistown Agricultural Regions.
-- Assisting DAFS in organising a continuing in-service training programme to train 80 trainers and to provide support and advice to trainers for training 250 Agricultural Demonstrators (ADs) in specific skills.
-- Creating awareness at Headquarters concerning ATIP regional activities, through information dissemination and visits by staff at Headquarters to ATIP activities in the field.

(iii).In Regions where ATIP is Working:

-- Holding one annual formal meeting between ATIP staff and regional extension staff.
-- Encouraging attendance of extension staff at the farmer field days in the ATIP villages.
-- Implementating collaborative work with a total of 14 Agricultural Demonstrators (ADs), including those in the ATIP villages, by October 1989.

2.3.4. Information Dissemination and Project Monitoring Strengthened

(a).Information dissemination strengthened:

(i)...Provision of microcomputer equipment for facilitating production of publications by the Agricultural Information Division of DAFS.

(ii)..Initiation of farming systems work page in Agrinews.

(b).Project monitoring facilitated:

(i)...Submission by ATIP Chief of Party of a short biannual report to USAID/B.

(ii)..Provision of written and oral reports by ATIP staff to DAR, DPS and DAFS staff.

(iii).Biannual review meetings organized by USAID/B with senior MOA staff including ATIP Chief of Party.

(iv)..Meetings, as necessary, with the Permanent Secrtary (PS) of Agriculture and department heads concerned with project implementation.

(v)...Submission in October of each year, Annual Reports and Work Plans to GOB and USAID/B for approval.

(c).Project evaluation regularised:

MOA/ATIP reviews of progress, problems and plans for the future in October 1988, October 1989 and June 1990.

2.3.5. Farming Systems Work Support Activites Strengthened

(a).Two senior Batswana technicians assigned to the Seed Multiplication Unit trained (B.S. and on-the-job) and the ATIP technician phased out in April 1989, with all positions localised.

(b).CRSP (INTSORMIL and Bean/Cowpea) associated Batswana technicians trained, firm linkage established between farming systems work and on-station agronomic research, positions fully localised and CRSP technicians phased out by April 1990.

(c).Appoint an Agricultural Systems Economist to create a capacity for analysing the economic impacts of technologies and to identify the circumstances affecting farmers' incentives to adopt new technologies. Motswana commodity economist trained and the ATIP technician phased out in September 1990.

2.3.6. Data Generated by ATIP Made Generally Available

(a).Technological and socio-economic data generated by ATIP entered on microcomputers in a manner that can be easily accessed by other GOB staff.

(b).Information disseminated to other GOB staff concerning availability of this data for collation, interpretation and analysis.

(c).A Motswana trained to access and manipulate this data both for present data collection and analysis.

3. IMPLEMENTATION

To facilitate presentation in this section the positions to be funded under MIAC are first discussed. Following this is a discussion on the ways in which the technology, linkage, information dissemination, training and localisation strategies will be implemented. The ways in which the project will be internally monitored are then delineated. This is followed by a discussion on incorporation of farming systems work into the MOA. Finally a short discussion is presented concerning short-term consultancies and administration.

Background information on each of the strategies, including a summary of what has happened in ATIP up to the current time, is given in Appendix C. Appendix D lists some realistic assumptions that need to be taken into account in developing practical strategies.

3.1 MIAC TECHNICIANS

All the current MIAC team members except the Research Extension Liaison Officer (RELO) have tentatively agreed to extend beyond December 1987 when the new contract is due to commence. Given the fact that three will have stayed for more than five years, one for more than four years, and two for more than two years this continued commitment provides an excellent opportunity for exploiting the knowledge and expertise that has been built up during ATIP's existence. The locations and time periods for which funding will be made available for the different positions are as follows:

(a).Chief of Party, Sebele (current to September 1990).

(b).Research Extension Liaison Officer, Gaborone (current but to be replaced in December 1987 with continued funding until September 1990).

(c).Farming Systems Research Liaison Agronomist, Sebele (current to September 1990).

(d).Agricultural Systems Economist, Sebele (current to September 1990).

(e).Farming Systems Animal Scientist, Francistown (current to September 1990).

(f).Farming Systems Agronomist, Francistown (current to September 1990).

(g).Farming Systems Economist, Francistown (current to September 1990).

It would be highly desirable -- as indicated above -- for all the positions to be carried through to the end of the project extension. This would facilitate smooth development in all areas and improve the potential for developing good results and well coordinated final reports. It is possible however, that not all the technicians will stay until that time. Therefore it is possible that some of the positions will become vacant during the last year. Because of the shortness of the contract extension period it is

proposed that that such vacancies will generaly not be filled except in the case of the COP and possibly the RELO.

The changes in the positions compared with the current situation are as follows:

(a).The job description of the RELO post in the Department of Agricultural Field Services (see (b) above) has been changed -- see Appendix E.

(b).The Mahalapye Farming Systems Economist position has been eliminated and the position of Agricultural Systems Economist at Sebele has been created.

(c).The Mahalapye Farming Systems Agronomist has been eliminated and a position called Farming Systems Research Liaison Agronomist has been created at Sebele. This person will be expected to develop close relationships with DAFS and on-station researchers in DAR.

In addition the three other positions which will receive some funding from ATIP are as follows:

(a).The INTSORMIL Agronomist, who is at Sebele, will continue receiving some local support costs from ATIP funds kept by USAID/B.

(b).A Soil Management Specialist position has been created under INTSORMIL. The minimum level of ATIP funding for this position will be local support at the level currently applied to the INTSORMIL Agronomist. The position will start in August 1987 and, depending on the availability of INTSORMIL funding, continue for three years.

(c).A Seed Technologist position is financed with funds allocated to ATIP in Gaborone by USAID/B. These funds are channeled through the Academy for Educational Development (AED). This position is being funded outside the contract and staffed with a person who was already working in Botswana. Funding for this position commenced in April 1987 and will last for two years.

The job descriptions for each of the individuals listed above, apart from the INTSORMIL agronomist position, are included in Appendix E. Discussion of these job descriptions will emerge in later sections of this chapter.

Two Peace Corps Volunteers will continue for the remaining part of the project, one being stationed in Francistown and one in Mahalapye. A third one would be highly desirable to help with the organization of the in-service training courses, the operation of the microcomputer equipment being purchased for the Information Division of DAFS, and the overall administration of the project.

The contract will make provision for short term consultants to support the long term resident staff. These short term consultants will cover a wide range of professional expertise as appropriate to requirements determined by the Chief of Party, the USAID/B Project Manager, and the cognisant MOA technical representative. Typically short term consultants will provide services in Botswana, or elsewhere as appropriate, for periods from two or three weeks to six months.

3.2 IDENTIFICATION OF STAFF

In order for the MIAC technicians to work effectively there must be counterparts. Table 3.1 reflects the positions of the MIAC technicians, the names when known, and the current counterparts in the field. It also includes those who are expected to resume their role as counterparts on their return from long-term training. The counterparts, as defined in this proposal, refer to persons being trained to take over the jobs currently occupied by the MIAC technicians.

TABLE 3.1: SENIOR STAFFING IN ATIP, CURRENT AND EXPECTED

(A). CURRENT — SEPTEMBER 1987

LOCATION	POSITION	MIAC TECHNICIAN	COUNTERPART
Sebele	Chief of Party	D. Norman	[None]
Gaborone	RELO	C. Trent	[None]
Mahalapye	Farming Systems Agronomist	J. Siebert	E. Modiakgotla
	Farming Systems Economist	D. Baker	A. Caplan (PCV)
			C. Jonas
Francistown	Farming Systems Agronomist	G. Heinrich	S. Masikara
	Farming Systems Animal Scient.	R. Gray	[None]
	Farming Systems Economist	F. Worman	B. Mabongo
			S. Bock (PCV)

(B). CURRENTLY EXPECTED IN CONTRACT EXTENSION

LOCATION	POSITION	MIAC TECHNICIAN	COUNTERPART (DATE TO START)
Sebele	Chief of Party	D. Norman	M. Tjirongo (May 1989)
	Farming Systems Liaison Ag.	J. Siebert	[None]
	Agricultural Systems Ec.	D. Baker	[Being recruited]
Gaborone	RELO	[Being recruited]	G. Ramolemana (Aug. 1988)
Mahalapye	Farming Systems Agronomist	[Phased out]	E. Modiakgotla/*
	Farming Systems Economist	[Phased out]	A. Caplan (PCV)
			M. Tjirongo (Jan. 1988)
			C. Tibone (May 1989)/*
Francistown	Farming Systems Agronomist	G. Heinrich	S Masikara
			P. Gaosigwele (Jan. 1989)
	Farming Systems Animal Scient.	R. Gray	W. Mahabile (Jan. 1988)
	Farming Systems Economist	F. Worman	B. Mabongo
			T. Seleka (Jan. 1989)
			S. Bock (PCV)

*.In a sense these could be considered counterparts to the two new positions created at Sebele, although to the end of the contract period they will be located in Mahalapye.

3.3 TECHNOLOGY STRATEGY

Cross references: For background, see Appendix C, Section C.1.
For estimated outputs, see Sections 2.3.1(c), and 2.3.5(a) and (b).

3.3.1 Developing Strategies

A number of technologies have been developed or tested by ATIP during the current drought cycle but their relevancy is very much determined by the human (resources at the farmer's disposal, appeal to the farmer, etc.) and technical or natural (soils, rainfall pattern, etc.) environment. A number of actions, based on these technologies, will be discussed with the farmer groups in the six villages, in which ATIP staff members have concentrated their efforts. Participants in these farmer groups, developed primarily on the initiative of ATIP in collaboration with DAFS, will decide what options they are interested in and then test them on their own farms, usually at the farmer managed and implemented (FMFI) level. The farmers in these groups will feedback, on a regular basis, their feelings about the technologies thus providing the means for closer targeting of the recommendations (see also Section 3.4.2 for further discussion on farmer groups). Basically this is a continuation of the procedure that has developed in the project over the last couple of years. The numbers of farmers testing the different technologies and the farmers also spontaneously adopting them are indicators of acceptance. These can be documented in the Annual Reports.

Research programmes will be developed to include some topics that can result in returns in the short run, thereby contributing to obtaining greater credibility. One, for example, is the Rotary Injection Planter. This planter, developed at IITA, has been tested extensively in two other farming systems projects, in addition to ATIP. It enables row planting to be done without the use of animal traction. The plan for the coming months is to have 25 planters made locally with the aid of the Rural Industry Innovation Centre (RIIC), at Kanye. Comparative testing of the locally manufactured units and the imported ones will take place during the coming year. Subject to satisfactory testing, and assessment of the relevancy to Botswana environmental conditions, a proposal then will be put forward to ALDEP for further local manufacturing and inclusion of the unit in the equipment packages that they offer to farmers at subsidized rates. Other technologies that, subject to satisfactory final level testing, will be passed to DAFS for dissemination include donkey harnesses, seed dressing of groundnuts and recommendations for sole planting of cowpeas and groundnuts, double ploughing, row planting, thinning and gap filling.

The farming systems teams at Mahalapye and Francistown that have been operational during the five years of the current contract will continue until 1990. The Mahalapye team will be reduced because of the two new MIAC positions at Sebele and the desirability of localising a farming systems team as soon as possible. Activities in both areas will continue on the technology strategy. Nevertheless, as indicated earlier, there will be increased attention in both locations to the other strategies that will be discussed in detail in later sections.

3.3.2 Soil Management Specialist

Soil water and plant relationships continue to be poorly understood both by on-station and on-farm researchers. As a result DAR has expressed strong support for the recruitment of a Soil Management Specialist. The job description that appears in Appendix E was consequently drawn up as a result

of a collaborative effort between the Soil Scientists at Sebele, the INTSORMIL Agronomist at Sebele, and ATIP staff. ATIP has become convinced over the years that much of the variability in results from farm level trials has been due to complications arising from the complex soil/water/plant relationships. For example, double ploughing involving the concentration of water in the soil profile, is more effective on deeper soils with higher clay content and consequently higher water retention capacity. What is wanted, from the ATIP viewpoint, is a better understanding of the soil/water/plant relationships in order to better target technologies. Development of simple field measurements are needed so that extension workers can classify soils into different management groups as the basis for advising what technologies would be most suitable for the types of soil on specific farmers' fields. Such measurements would be proxy variables for what could more easily be done in a laboratory situation. From a practical viewpoint, it is unreasonable to expect laboratory analyses to be possible for samples from most farmers' fields. It is unlikely that, at the end of two years, the Soil Management Specialist will be able to finish the tasks outlined in the job description. However, progress in these areas would provide an incentive for more permanent funding of such a position by GOB.

3.3.3 INTSORMIL Agronomist

The INTSORMIL Agronomist will continue at Sebele to do collaborative work in conjunction with the ATIP farming systems teams. The job description will remain unchanged. Indeed the job description initially was drawn up as a result of an agreement between DAR scientists and INTSORMIL with some input from ATIP staff. This relationship has worked well in the past and should continue to be effective. Examples of some collaborative work that has been undertaken are the investigation of deep ripping and assessment of the optimum ploughing interval between the first and second ploughing for double ploughing.

ATIP recently contributed information to the External Evaluation Panel of the INTSORMIL programme in Botswana. The successful collaborative relationship between INTSORMIL and ATIP was acknowledged by the review team.

3.3.4 Seed Technologist

In the original project design one of the anticipated contributions of ATIP was to help set up a commercial seed production system to ensure that adequate supplies of needed seed are available for distribution to Batswana farmers. This objective was modified during the implementation of the ATIP project. An individual has been sent for long-term training in Seed Technology but, until recently, no long-term technical assistance was given. As indicated earlier the current officer-in-charge of the Seed Multiplication Unit is being funded out of ATIP funds for a two year period starting in April 1987. At the end of that two year period the Seed Multiplication Unit at Sebele will be completely localised. The job description appearing in Appendix E was drawn up as a result of discussions with the Seed Technologist and the Director of Agricultural Research.

3.3.5 Agricultural Systems Economist

Improved technologies make it possible to increase food output. Agricultural programmes and support systems affect the ability of farmers to adopt new technologies, and their incentives to change the way they farm. Therefore, it is important to ensure compatibility between technologies, programmes and support systems.

The farming systems projects have access to the Policy Committee in the Ministry of Agriculture via the head of the Department in which the farming systems project is located. However, because the farming systems economists have been heavily involved in technology development activities they have not prepared analyses of programmes or support systems for the Policy Committee. This has resulted in a gap between on-station technical research and planning as well. Therefore, closer linkages are needed in order to take better advantage of the complementarities between technology research, assistance programmes and support systems.

The Agricultural Systems Economist position is being created to help:

(a). Evaluate the effects of the Ministry's programmes on farmers' incentives to adopt improved technologies.

(b). Identify opportunities to improve the support systems affecting the incentives to adopt improved technologies.

(c). Determine the likely contribution of on-station and on-farm research to the Ministry's overall mandate to improve food output and create agricultural employment opportunities.

(d). Assess the relative contributions of new technologies versus changes in programmes and support systems for accomplishing the Ministry's objectives.

3.4 LINKAGE STRATEGY

Cross references: For background, see Appendix C, Section C.3.
For estimated outputs, see Sections 2.3.3(a) to (e) and and Section 2.3.5(c).

One of the major issues discussed in the Second Mid-Term Evaluation Report was that of linkages. Therefore this section of the proposal explicitly addresses those linkages which will receive increased attention over the remaining part of the project.

3.4.1 Between On-Station And On-Farm Research

Farming system workers view on-station research as being complementary to on-farm research. Without station based research there is no way that on-farm research can be viable. This relationship operates in two directions;

(a).From the station to the field. Here technologies are developed on the research station that possibly can be used -- sometimes after a little adaptive work -- in addressing the farmers' needs as identified at the field level by farmers, farming systems teams and extension workers.

(b).From the field to the station. Problems identified by the farming systems workers at the field level, which are better solved through on-station research, can be fed back into the research programmes of station based scientists. These can be one set of factors that go in to determining the research priorities of station based scientists.

Although compelling arguments can be made for strong linkages between station based research and on-farm research, such linkages are often not as well developed as would be desirable. Some linkages have indeed been formed by ATIP and other farming systems projects in Botswana. However there is room for improvement. The appointment of a Farming Systems Research Liaison Agronomist at Sebele is designed to help facilitate these linkages. It is anticipated that this person will be able to encourage stronger linkages as follows:

(a).By examining carefully the work of the scientists at Sebele with a view to providing the farming system workers with ideas on possible technologies that might be suitable at the farm level.

(b).By helping, in conjunction with the station-based scientists, to decide what work being done at Sebele would be amenable to adaptive testing in cooperation with the farming systems teams at the farm level.

(c).By helping to coordinate possible collaborative work between the farming systems teams and station-based scientists on problems identified by the farming systems teams as requiring a greater degree of careful investigation. This additional testing often at the researcher managed researcher implemented (RMRI) level, would involve work which would benefit from multi-locational testing, and/or long term testing, and/or on-station research.

(d).By helping, along with other ATIP staff, in encouraging station based scientists to visit the work of farming systems teams.

The Farming Systems Research Liaison Agronomist position, to be funded initially under the contract, would involve linkages between on-station and on-farm research that go beyond ATIP itself to embrace other farming system projects.

The Agricultural Systems Economist will probably play a minor role in these linkage arrangements. DAR would like this person to help by providing an economic input into some of the technology work at Sebele which is amenable to economic analysis. The input of this person is likely to be more indirect in nature in that a Motswana is to be appointed who will be guided initially by the economist in the Animal Production Research Unit (APRU) of DAR and later, after he departs, by the person appointed under the MIAC contract.

3.4.2 Between Research and Extension

Linkages between research and extension need to be strengthened at two levels:

(a). At the national level among station-based and farming system researchers, and headquarters-based extension staff, and subject matter specialists.

(b). At the regional/district level between farming systems workers and regionally based extension personnel.

At the national level the Research Extension Liaison Officer (RELO) position was designed to provide this linkage. For reasons discussed in Appendix C (see Section C.3.2), this has not been very successful. There is now some feeling that, in the long run, there may not be a role for such a position within the Department of Agricultural Field Services. The need for such a position would become questionable once the expertise and knowledge of the Subject Matter Specialists has been raised to a level at which they can operate on a collegiate level with the research staff. However, in the meantime, there is certainly a role for the RELO. The job description has been modified somewhat to take into account the type of duties that this officer has in fact been doing in the last two to three years. Much of this work has involved laying the framework for increasing the capacity of the extension staff through in-service training.

In order for the research extension liaison activities of the RELO individual to be more effective it is proposed that a complementary post on the research side to be called Farming Systems Research Liaison Agronomist, be funded under the MIAC contract (see Section 3.4.1). Such a person will provide an initial contact point for the RELO in DAR. Although the RELO will continue to have primary responsibility for the meetings held between Crop Subject Matter Specialists and DAR research workers, the Farming Systems Research Liaison Agronomist will be able to suggest possible topics for such meetings based on his knowledge of on-going work at Sebele. The Farming Systems Research Liaison Agronomist will also be expected to help improve communications between DAR and DAFS personnel at national headquarters. Such a person will also be expected to encourage research workers to write Agrifacts or technological recommendations that can be given to extension personnel to help in their extension work.

Since the Second Mid-Term Evaluation, stronger efforts have been made to establish linkages between regional/district level extension staff and ATIP personnel, at least on an informal level. Some of the elements mentioned in the following discussion are already operational. Better linkages can be forged in the following manner:

(a). Meetings within regions. ATIP staff wish to be involved in relevant regional level meetings that have some relationship to the mandate of the project. Such meetings could be at the initiative of RAOs or their representatives, or could be the initiative of ATIP. For example, ATIP intends to make a much greater effort in informing and seeking comments from regionally based extension staff on results

arising out of the project's work and on work plans. Currently there is some initiative in one of the regions for ATIP staff to be involved in meetings called by the RAO. ATIP has also recently been requested to be involved in Regional Staff Committee meetings of ALDEP staff. ATIP intends to be supportive and responsive to such requests.

(b). Farmers' groups and field days. In the six villages where ATIP works farmer field days and farmer groups will continue to operate over the duration of the project. The extension workers stationed in the villages will continue to be invited to attend the farmer group meetings and to participate in directing the farmer groups. Also developmental programme staff (e.g., ALDEP, ARAP, etc.), other extension staff (including those of a more senior level) and station based researchers will be invited to address farmer groups and to attend the farmer field days that are held in most of the villages each year. At these field days, farmers see on each other's farms the result of the various tests and trials. In order not to inhibit farmer dialogue consideration will be given to two field days in some of the villages: the first, where those present would primarily be farmers, ATIP and local extension staff; and, the second, where other MOA (researchers, extension, developmental) staff would be invited as well.

(c). Developing relationships with CPOs and APOs. With the approval of the RAOs, collaborative work will be undertaken with the CPOs and APOs in each region. The objectives would be to promote greater dialogue between ATIP staff and these senior officers so that total knowledge of the area can increase and to provide a wider framework for testing possible relevant technologies. For example, it is proposed, with the approval of the relevant authorities, to work through the CPOs with some ADs to change the format of their demonstrations which are carried out on an annual basis into more of a trial testing format. In addition to providing a multilocational testing of some of the possible recommendations it will help in developing linkages and improving dialogue and knowledge about possible relevant improved technologies. Another area that will be explored with the CPOs and APOs are ideas on the farmer group approach to testing and possibly extending technologies. The farmer group approach in fact is advocated within the extension service but is not operating currently in many extension areas. It is planned, that if DAFS agrees, these types of groups will be operating in a total of 14 villages by the end of the contract extension period,

Some of the suggestions proposed in this section have already been implemented or are under discussion in the Francistown Agricultural Region. The situation is, however, somewhat more complex in the Central Agricultural Region where the Mahalapye farming systems team is located. Two problems relating to this region are the distances involved and the fact that the RAO is located in Serowe, while the team is located in Mahalapye, and secondly that, during the next farming year, a smaller team will be in place in Mahalapye. One good feature is that there are now three CPOs in Central Agricultural Region, one of whom is located at Mahalapye. In order to implement some of the strategies mentioned above, it is proposed that the Farming Systems Research Liaison Agronomist stationed at Sebele will work through the Mahalapye farming systems team with the CPO at Mahalapye to

develop strategy (c) above. The Mahalapye farming systems team will continue to assume major responsibility for strategy (b) while the Farming Systems Research Liaison Agronomist and the farming systems team at Mahalapye will share responsibilities with reference to strategy (a).

It is also proposed that the RELO located in the DAFS in Gaborone be kept properly informed of these linkages at the regional level through attendance at some of the meetings plus visits to some of the trials, etc. The RELO will encourage senior DAFS staff at national headquarters to accompany him on these trips. The information gained on such trips will be used by the RELO to inform other staff at headquarters and to relate, when possible, to extension staff in regions where farming systems projects are not represented.

3.5 INFORMATION DISSEMINATION STRATEGY

Cross references: For background, see Appendix C, Section C.4.
For estimated outputs, see Sections 2.3.4(a) and (b), and 2.3.6(a) and (b).

Greater attention needs to be given to information dissemination about the principles of farming systems work and results. Therefore all ATIP personnel will have roles to play in this area. The proposed channels through which information is disseminated -- some of which are already operational -- are as follows:

(a). ATIP Publications. As indicated elsewhere (Appendix C, Section C.4) ATIP does produce six series of papers which have not generally been widely circulated. A recently compiled computerized mailing list greatly facilitates the circulation of these papers. This activity will continue.

(b). Farming Systems Activities in Agrinews. The farming systems projects in Botswana believe it would be desirable to have news on farming systems activities widely circulated in a more popular format. The Agricultural Information Division in DAFS, which publishes Agrinews (circulation 6-8,000) on a monthly basis, has agreed to have such news placed on a special farming systems page. A logo has been produced for this page and information is now being published. It is also widely circulated among agricultural officials and other interested personnel in Botswana, and has a small circulation outside Botswana.

(c). Aid to Agricultural Information. The Agricultural Information Division in the Department of Agricultural Field Services is responsible for producing the various types of extension bulletins circulated to extension staff. The continuing delay in publishing bulletins like Agrifacts has been caused by difficulties of making camera ready copy for publishing via the Government Printer. ATIP is therefore proposing to fund a MacIntosh microcomputer plus a laser printer to enable this process to be speeded up. The equipment being proposed for purchase is exactly the same as that financed by the Pennsylvania State University project in Swaziland. The recent visit by the RELO and Agricultural Information Division staff to Swaziland

convinced them that similar equipment would be ideal for Botswana. Help from ATIP will be required by the Agricultural Information Division to ensure that this equipment is used properly after its purchase.

(d). Agrifacts. Coordinating the updating and re-publishing of Agrifacts on different topics has occupied some of the time of the RELO during the current project period. In addition Agrifacts, relating to donkeys, have been prepared by the ATIP Animal Scientist in conjunction with the Farm Machinery Development Unit at Sebele. The RELO, along with the Farming Systems Research Liaison Agronomist in the Department of Agricultural Research, will continue to encourage the writing and publication of Agrifacts . Whenever appropriate Agrifacts will be written by ATIP staff members which, after approval by relevant authorities in the Department of Agricultural Research, will be forwarded to the RELO for publication.

(e). Seminars and Talks. ATIP staff members will give talks and seminars on topics relating to their activities. The proposed reinstatement of the seminar series in the Department of Agricultural Research at Sebele provides an opportunity for such information dissemination. ATIP staff members will also participate in lectures at the University of Botswana, Botswana Agricultural College, Botswana Agricultural Society, etc. when invited to do so.

(f). Farming Systems Inter-Project Meetings. ATIP will continue to be supportive of the Farming Systems Inter-Project meetings. Two meetings are held annually, the first one on the day following the Annual Division of Arable Research Meeting and the other is hosted on farmers' fields by the different projects on a rotating basis. The RELO will continue to act as coordinator of those meetings if so desired by the rest of the farming systems projects. A possible alternative could be the Farming Systems Research Liaison Agronomist at Sebele.

(g). Kgotla. At the beginning of each cropping year the AD, in each of the six villages where ATIP is working will, with the approval of the village authorities, arrange for ATIP staff and cooperating farmers to briefly explain the results of the previous year's work and plans for the coming year.

(h). Farmer Field Days. ATIP will continue to host, in the six villages where it is concentrating its activities, farmer field days where farmers view the result of trials on each others farms. Extension, station-based researchers and developmental staff will be invited to be present at some of the field days.

(i). Farmer Groups. Extension personnel and researchers from Sebele interested in collaborative adaptive testing of technologies at the farm level will be invited to attend the farmer group meetings in the six ATIP villages. Although these group meetings are primarily for the benefit of the farmers, themselves, they do provide a conduit for interested agriculturalists to address a number of farmers at the same time.

(j). Databases. A great deal of data have been collected by ATIP on

trials and surveys, which have been entered on microcomputers. Since these data are in the public domain and could be of use to other GOB personnel, the databases will be properly documented over the next couple of years, the computer operator at Sebele will continue to be trained in their use, and the data will be made accessible to other staff in GOB.

3.6 TRAINING STRATEGY

Cross references: For background, see Appendix C, Section C.5.
For estimated outputs, see Sections 2.3.2(a) to (f).

During the remaining part of the project training will continue in the four areas that have been emphasised to date plus investigations will be made into the possibility of adding one additional area. Details are as follows:

(a). On-The-Job Training. In order to achieve this type of training counterparts in the field are essential. Whenever possible, GOB should continue to replace individuals sent away on long-term training. This will enable a total increase in the amount of training given to Batswana. There are limited qualified members of staff in the Ministry of Agriculture. When people are sent away on training those positions cannot be filled by hiring other local replacements. Consequently the total functional staff level is reduced. Thus it is sometimes difficult for the GOB to come up with replacements for those sent on training. Not surprisingly a number of in-field counterparts are lacking at the present time. Specifically in-field counterparts do not exist for the Chief of Party and the RELO. In addition issues of counterparts arise with reference to the Agricultural Systems Economist and the Farming Systems Research Liaison Agronomist to be stationed at Sebele. It is likely that DAR will appoint an Agricultural Economist who can be considered a counterpart for the Agricultural Systems Economist, in the sense that that person would concentrate on economic analyses of technologies on the station at Sebele. DAR has also expressed some support for the research extension type of role for the Farming Systems Research Liaison Agronomist. Whether or not a suitable counterpart will be identified, given the constrained staffing situation, remains to be seen, but identification of such an individual should be encouraged if at all possible. It is essential to have a counterpart appointed as soon as possible for the three MIAC technicians who currently lack in-field counterparts. At the very least, as indicated earlier (see Section 3.2), it is important that those currently overseas return to the positions indicated in Table 3.1, if there is to be any hope of localisation by September 1990. Although it would be unreasonable, given the realities, to press GOB too hard on appointing in-field counterparts it does mean that not having them lowers the productivity of the MIAC technicians and reduces the potential for rapid localisation.

(b). In-Service Training. As far as direct ATIP sponsored activities are concerned, in-service training courses over the last couple of months have been held for DAR and DAFS staff in technical writing and for enumerators in MOA on interviewing techniques and on the relationship

between data collection activities and research activities. These courses obviously included many staff outside ATIP. Consideration will be given to further courses for secretarial staff, on the use of microcomputers for word processing and data entry and analysis, while continued support will be given for the more senior technical staff to attend the field workshop meetings sponsored by the Farming Systems Inter-Project Group. Other in-service training courses will be supported as needs are identified. Those courses proposed at the moment are listed in Appendix B (see, for example, the proposed training programme for farming system workers based on the proposed farming systems's handbook (see Section 3.7(b)). A major preoccupation of the RELO in the near to mid-term future will be, along with others in DAFS, to help implement and coordinate the in-service training courses for upgrading the level of technical training of extension workers. The suggestion to request assignment of a third Peace Corps Volunteer (see Section 3.11) will provide extra help for organising and administering such training programmes.

(c). Short-Term Training. Under the original proposal 40 person months of short term training were to be funded outside the MIAC contract. Since some of these have not been used this figure will be increased to a total of 45 person months for the whole of ATIP. Activities in this area will continue to be exploited and supported, particularly in the area of on-farm research. ATIP, for example, will try and ensure that there are always representatives from Botswana in the CIMMYT run farming systems courses. These representatives will not always be people within ATIP but will include people who would benefit from such training in order to facilitate development of the linkage arrangements discussed earlier. Other types of courses, on experimental methods for example, often run at international institutes or by USDA or universities in the U.S. or elsewhere, will continue to be used as a way of training some senior staff who are not eligible for long-term degree training. There is a problem over the type of financial commitments made for such training. Currently ATIP is able to fund per diem and tuition costs but is not able to fund air fares. A financial commitment on the part of GOB, indicates its support for such training. However air fares can be a major component of the total cost, particularly in situations where courses are held some distance from Botswana. There have been several occasions recently when individuals have not been able to go on short-term training, in spite of support from ATIP, because of the inability of GOB to come up with the necessary travel funds. It is proposed that the cost responsibilities be changed somewhat. ATIP would fund the tuition plus air fares while GOB would be responsible for per diem. It is likely that such an arrangement would make the financial burden of short-term training less onerous for GOB.

Another variant on short-term training that will be utilized will be funding visits by GOB officials to see work being undertaken in other countries similar to that mandated for ATIP.

(d). Long-Term Training. Up to 12 person years will be financed under the contract extension, in addition to the 40 funded to date. For a summary of the commitments to date, by discipline and departmental origin, see Table C.1 in Appendix C. Since participating individuals would not depart until January 1988 most if not all of the

participants will have to be at the M.S. degree level or will have to be financed by GOB for the latter part of their degrees. The individuals to be trained under this extension still need to be identified and will be determined to some extent by who actually departs on training under the 15 person years currently being funded by GOB. Tentatively under this the following breakdown is currently being proposed: a maximum of two each from DAFS, DPS and DAR, one each at the B.S. and Ph.D. levels and four at the M.S. level. It is likely that, if all goes according to plan, extra contract funds will cover six M.S., two each from DAR, DAFS and DAR. However any decisions made in regard to this will be made only after approval of the relevant authorities in MOA has been obtained.

(e). Botswana Agricultural College (BAC). If it is feasible, as far as BAC is concerned, a course on farming systems work will be developed for individuals being trained as extension workers. Primary responsibility for actually teaching the course would be given to ATIP personnel located in the Gaborone/Sebele area.

3.7 LOCALISATION STRATEGY

Cross references: For background, see Appendix C, Section C.6.
For estimated outputs see Sections 2.3.1(a) and (b).

ATIP recognizes that there must be a major effort to localise (replace expatriates with Batswana) the two farming systems teams by September 1990. Whether or not the teams will remain in place after that time will depend on decisions made by GOB as to whether farming systems work should be continued, and if so, in what form (see Section 3.9). Of course a major assumption necessary for localisation to take place is that long-term training participants returning to Botswana will continue working with ATIP.

Given the above caveats, it is proposed that both the Mahalapye and Francistown farming systems teams be localised by September 1990. Mahalapye will be localised by January 1988. Mahalapye will be a good pilot study for examining the process of localisation. It is important to give nationals responsibility as soon as possible. Responsibility can have a very positive effect on the rates of professional growth and maturity.

At the same time it is proposed that strategy (a) below is put in place to use as a possible model for localisation of future teams while strategy (b) below will be completed by September 1990. These two strategies are as follows:

(a). Professional Backstopping. The Farming Systems Research Liaison Agronomist at Sebele and the Agricultural Systems Economist, also at Sebele, will provide professional backstopping for the Mahalapye team. The roles that these two individuals will play are mainly supportive in nature in providing help on problem identification, experimental methods, implementation and data analyses. It is anticipated that this help will be primarily in the form of advice although on occasion some help may be required in terms of actual implementation. In the future such an approach may help functioning localised teams that consist of individuals who may not have M.S. degrees.

(b). Handbook for Farming Systems Work in Botswana. During the contract extension a handbook for undertaking farming systems work in Botswana will be collaboratively developed by all ATIP staff members. The ATIP Chief of Party will take responsibility for coordinating this effort. This handbook will be written to provide very clear guidelines for farming systems teams in Botswana to undertake their work. The handbook will not be a comprehensive statement on the methods for undertaking farming systems work. Where feasible written material will be undertaken from methodological books published elsewhere. Material developed by ATIP staff will cover subjects that relevant to the harsh climatic environment of Botswana not adequately covered elsewhere. It should be recognized that any handbook is going to necessitate updating over time and therefore it is reasonable to expect continued updating after the ATIP contract extension to September 1990. Also it would be desirable, if it is at all possible, for inputs to be contributed by other farming systems projects in Botswana. It is planned to have a first draft completed by September 1988 with an ATIP sponsored training programme held by December 1989.

3.8 PROJECT MONITORING

Cross references: For background, see Appendix C, Section C.6.
For estimated outputs, see Section 2.3.4(b)

There has been a fair amount of internal project monitoring throughout the project. This will continue under the extension. Details are as follows:

(a). Project Review Meetings Hosted by USAID/B. A Reference Group was written into the original design of the project. It was planned that this Reference Group consisting of the Permanent Secretary (PS) as chairman, the Chief Agricultural Economist and the Heads of the Departments of Agricultural Research and Agricultural Field Services and the Chief of Party of ATIP would meet about once every six months to discuss progress and problems with reference to the project. This Reference Group in fact has met only once or twice. The Ministry of Agriculture currently has 80 donor funded projects and understandably feel somewhat reluctant to arrange special meetings for every project. However what has taken place in the last two years are semi-annual meetings hosted by USAID/B at which the Chief Agricultural Economist and the Director of DAR are usually present. The DAFS Director has also been invited to attend. This group has taken the place of the original Reference Group. Thus, given the present situation it would be better to reconstitute the Reference Group to consist of the same membership as the semi-annual meetings hosted by USAID/B. To ensure that key GOB personnel are kept informed -- in particular the PS -- a representative of ATIP or USAID/B will, after each meeting, provide them with information on progress and problems.

(b). Annual Research Meetings. ATIP staff members participate in the Annual Crop Research meetings in DAR, which are attended by DAR and some extension staff. At these meetings held annually in September or October presentations on progress and annual work plans proposed for the coming year are given. These are commented on and, after discussion and possible modification, agreed to by researchers within

the Division of Arable Crops Research. Animal science work undertaken by ATIP is also discussed at the same forum. Animal scientists attached to ATIP will also continue to attend meetings of the Livestock Technical Committee in the MOA.

(c). ATIP Meetings. ATIP meetings are held on a reasonably regular basis. They have become more frequent in the last two years. It is proposed that these meetings will be further regularized in order to discuss progress, issues and proposed work plans. In fact work plans have always been discussed in some detail prior to their being presented at the Annual Crop Research Meeting. Also at such ATIP meetings INTSORMIL and Bean/Cowpea CRSP individuals plus, on occasion, other researchers have been invited to attend. It is proposed that apart, from the Bean/Cowpea CRSP participants whose contribution in Botswana is being phased out, a similar format will continue in the future.

(d). ATIP Reports and Work Plan. In September or October of each year a substantial Annual Report is produced for USAID/B. In this Annual Report are details on progress made during the preceding year and the work plan proposed for the following year. Also an indication is given in terms of numbers of trials, surveys, etc. carried out and the number proposed for the next year. The annual work plans will be approved by the GOB (see (b) above) and USAID/B. The MIAC budget is submitted seperately at the same time for the coming year. It is proposed that such reports will continue but, in order to provide less of a time bottleneck, it is proposed that these reports be submitted in October, compared with September in earlier years of ATIP. In addition a much smaller report will be produced every six months indicating progress, problems and plans. These will provide material for the review meeting mentioned under (a) above.

(e). Final Reports of Short and Long-Term Miac Technicians. Both short and long-term MIAC technicians will be required to make final reports to USAID/B, in oral and written form.

(e). Final Report by MIAC to USAID/B. A final report must be submitted by MIAC to USAID/B within 90 days after September 1990. This report will contain a summary of activities, accomplishments, methods of work, analysis of problems and recommendations for the future.

(f). Evaluations. During the ATIP extension period three evaluations will be undertaken -- two internal and one external (see Appendix H for timing).

3.9 GOB ACCEPTANCE OF FARMING SYSTEMS WORK

Cross references: For background, see Appendix C, Section C.2.
For estimated outputs, see Sections 2.3.4(b).

Much of the proposal delineated above is designed to show that farming systems work has a potential role to play in Botswana to create conditions conducive for some form of acceptance and incorporation. At this stage it is difficult to suggest a definite approach to use but it is expected that the proposed annual MOA/ATIP reviews will provide a forum for the evolution

of ideas on what might be done in the future. Incorporation of farming systems work as pointed out elsewhere (see Section C.2), does not have to involve major commitments of resources. What is more relevant is to try and get the principle of farming systems work into the research, extension and planning processes.

Consideration of a continuation of an ATIP-type project would depend to some extent on whether there is a move to incorporate farming systems work fully into the GOB system, and if GOB is desirous of such a continuation.

3.10 SHORT-TERM CONSULTANCIES

Possible short-term consultancies are as follows: Agricultural Economics, Range Management, Anthropology/Rural Sociology, Communications, Organization Management, Extension Administration, Agricultural Information Dissemination, Professional Writing, etc. It is anticipated that most of the short-term consultancies will be in the non-technical area. This is likely to be the case since the deficiencies pointed out in ATIP have not been technical in nature. However, if problems in the technology area are identified that are amenable to resolution by short-term consultancies, these would then be used.

It is proposed that if there are topics and analyses that can more easily carried out on the home campus, then some short-term consultancy funding may be used to support such activities. Ideally, if at all possible, this should be done in conjunction with Batswana graduate students who are on campus. Another area currently being explored, together with the Rural Sociology Unit (RSU) in DPS, is building a linkage with anthropology/sociology staff at the University of Botswana. This could be particularly valuable, especially as it appears RSU will not be able to second another staff member to ATIP, in place of the two that have departed on long-term training.

All short-term consultants will be expected to provide final oral reports to USAID/B, and written reports for general dissemination.

It is anticipated that six months of short-term consultancy will be funded per year making a total of 15 person months over the 34 month period. These include visits by the Campus Coordinator, Executive Visits, annual visits by the ATIP, COP to home campus, etc.

3.11 ADMINISTRATION

Cross references: For background, see Appendix C, Section C.7.

The amount of time spent on the administrative tasks was a matter of concern to the Second Mid-term Evaluation Team. Four strategies which can help address this problem are as follows:

(a). With the appointment of two additional positions in Gaborone/Sebele it will be possible for the Chief of Party to distribute some of the administrative tasks to the three other individuals located in the Gaborone area.

(b).The computerization of administrative records will continue and both the Computer Operator and Administrative Assistant will continue to be trained to keep them up to date.

(c).As required the Peace Corps Volunteers from Mahalapye and Francistown will come to Sebele for short spells, for example three days, in order to help sort out any backlog administrative tasks. This in fact has already been done and is proving to be very useful.

(d).An additional Peace Corps Volunteer is suggested to help undertake administrative tasks and to help train Batswana staff in administrative, typewriting and computer related tasks.

3.12 CONCLUSIONS

ATIP views farming systems work as a process not a product. There are many groups in Botswana contributing to efforts for improving the productivity of farmers. Without linkages among these groups, success will be much more difficult to achieve. Therefore ATIP views its major objective as being one of helping to ensure such results. Because there are many contributors to the success equation, quantitative verifiable indicators of success are not easy to develop. About the only one which can be verified easily is with reference to training -- both in terms of numbers and quality. Thus it is difficult, in the light of the dependency relationships that ATIP feels crucial to the success of this type of work, to give very specific indicators of progress. However, ATIP does believe that an evaluation of the linkages, the attitude of GOB towards further acceptance of farming systems work, and the ability to localise the teams at the end of the project should -- together with an evaluation of the technological contributions of ATIP -- be taken into account in determining whether an attempt should be made for USAID/B to fund farming systems-type work beyond 1990. An External Evaluation should occur about one year before the end of the extension to examine this issue.

APPENDIX A
ATIP LOGICAL FRAMEWORK, 1987

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
A-1. PROGRAMME OR SECTOR GOAL: THE BROADER OBJECTIVE TO WHICH THIS PROJECT CONTRIBUTES:	A-2. THE MEASURE OF GOAL ACHIEVEMENT:	A-3.	A-4. ASSUMPTIONS FOR ACHIEVING GOAL TARGETS:
To assist the GOB in developing an agricultural system that provides relevant technology leading to increased productivity for Botswana farmers.	Organizational changes made within MOA to institutionalize FSW.	MOA official papers.	Agricultural research and extension continue to be high priorities of GOB, and that MOA will review the effectiveness of its approaches.
	Increased returns to labour and other inputs demonstrated.	Farm surveys.	
	Increased crop production under specified rainfall conditions.	Farm surveys and meterological data.	The amount and distribution of rainfall is sufficient to enable production to occur.
B-1. PROJECT PURPOSE:	B-2. CONDITIONS THAT WILL INDICATE PURPOSE HAS BEEN ACHIEVED: END-OF-PROJECT STATUS:	B-3.	B-4. ASSUMPTIONS FOR ACHIEVING PURPOSE:
To improve the capacity of the Ministry of Agriculture's research and extension programmes to develop and effectively extend improved technology and practices relevant to the needs of small farmers in selected pilot areas.	The Ministry of Agriculture's DAR will be able to participate effectively in on-going FSW and be responsive to farmers' needs.		

PROPOSED ATIP LOGICAL FRAMEWORK, 1987, (CONTINUED)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
SUB-PURPOSES			
(a). Improve the capacity of the Ministry of Agriculture's Research (DAR) to develop technologies for small farmer needs.	1. On-station agronomic research at DAR strengthened in sorghum, millet and cowpeas. 2. Systems established for DAR to respond to requests from farming systems teams and conduct trials based upon these requests.	DAR's Annual Report and records. Reports of INTSORMIL and Bean/ Cowpea CRSP. Records of meetings/workshops held with DAR/DAFS staff.	That potential exists in the agricultural system to improve productivity. That research for small farmers continues to be given high priority.
(b). To improve the capability of the extension service to transfer appropriate technologies and strengthen the linkages between research, extension and farmers.	Improved linkages will have developed between the MOA research, extension and planning, resulting in more relevant adaptive technologies.		That the extension positions in the pilot area will be staffed and have sufficient time to engage in farming systems related work.
	1. The Subject Matter Specialists trained and working effectively.	MOA staffing pattern and manpower training plans.	
	2. DAFS disseminating tested technologies in the ATIP areas.	DAFS and contractor records.	That improved technologies can be identified, tested and made available for extension.

PROPOSED ATIP LOGICAL FRAMEWORK, 1987, (CONTINUED)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
(c). To provide Botswana farmers in selected pilot areas with relevant innovations in agricultural production technology and methods through field trials, demonstration and farmer training.	Technologies identified which improve returns to labour/capital and/or increased production and/or reduce risk of failure.	Project Records.	
C-1. PROJECT OUTCOMES	C-2. MAGNITUDE OF OUTPUTS:	C-3.	C-4. ASSUMPTIONS FOR ACHIEVING OUTPUTS:
(a). Farming systems designed, developed and tested in two areas.	1. Minimum of two localised teams installed and functioning.	Project Records.	That the GOB will implement its current research strategy.
	2. Handbook for farming systems work in Botswana prepared.	Project Records.	
	3. At least 10 alternative crop and livestock technologies tested on farmers' farms at ATIP locations and moved into DAFS farmer recommendation programmes.	Project Records.	That potential exists in system to improve new technologies. That DAR has capacity to test technologies. That DAR is able to respond to FSW requests for on-station trials.

PROPOSED ATIP LOGICAL FRAMEWORK, 1987, (CONTINUED)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
(b). Institutional capability and skills developed within MOA to carry out FSW in selected pilot areas.	1. Qualified staff developed in needed speciality areas, 25 persons trained at the M.S. and B.S. level, 27 in short-term farming system related courses, and 156 in in-service training courses.	MOA Records.	That sufficient numbers of qualified staff can be released for training
	2. Evaluation of farming systems work concluded near end of the project and plan prepared regarding the further incorporation and expansion.	Project Records and GOB policy/planning documents.	That GOB concludes farming systems work has merit and has the resources to incorporate it.
	2. Organizational structure and systems established to integrate research, extension and planning in order to prove the benefits of FSW.	MOA Records.	That DAFS, DAR and DPS are willing and able to share responsibility for farming systems work.
(c). Necessary FSW support activities strengthened.	1. Seed Multiplication Unit strengthened and progress made on localization of all positions.	MOA Records.	
	2. Training plan implemented for at least 6 Subject Matter Specialists.		

PROPOSED ATIP LOGICAL FRAMEWORK, 1987, (CONTINUED)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	3. On-station agronomic research programmes on sorghum, millet and cowpeas strengthened.		Bean/Cowpea and INTSORMIL Projects will continue to receive the bulk of their training and TA support from centrally funded CRSP projects.
(d). Research and information	1. ATIP socio-economic and technological data systematically entered on microcomputers to facilitate future data collection and accessibility by trained Batswana.	Project Records.	
	2. Data collected by ATIP made available and used by other GOB personnel	Project Records.	That other GOB staff perceive a use for the data and can easily access it.
D-1. PROJECT INPUTS:	D-2. IMPLEMENTATION TARGET	D-3.	D-4. ASSUMPTIONS FOR PROVIDING INPUTS:
(a). AID:			
Technical Assistance	56.5 person years long-term.	AID Records.	That funds are made available from bilateral and supporting centrally funded sources.
	52 person months of short-term consultancies.	AID Records.	
Local Staff Training	8 person years.	AID Records.	
	45 person months of short-term training.	AID Records.	
	52 person years of long-term training.	AID Records.	

PROPOSED ATIP LOGICAL FRAMEWORK, 1987, (CONTINUED)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
(b). GOB:			
Counterparts	109 person years.	GOB Records.	That funds are available.
Other Staff	10 person years PCVs (local support costs).	GOB Records.	
	16 person years secretaries.	GOB Records.	
	24 person years drivers.	GOB Records.	
	176 person years technical staff.	GOB Records.	
	Casual labour (P4,000/year for eight years.	GOB Records.	
Commodities	5 vehicles and replacements.	GOB Records.	
	14 houses for MIAC staff and counterparts.	GOB Records.	
Training	15 person years.	GOB Records.	

APPENDIX B. BENCHMARKS FOR CONTRACT EXTENSION

The following list indicates expected progress through time in attaining the estimated project outputs list in Section 2.3. To facilitate comparisons cross references are given to the relevant point in Section 2.3 and section in Chapter 3. Estimated progress is delineated in quarterly periods.

DATE COMPLETED BY	ACTIVITY	— CROSS REFERENCES — SECTION 2.3	CHAPTER 3
June 1987	Four long term participants [1 DPS, 2 DAFS, 1 DAR] already returned from training	.2[a][b][c]	3.6[d]
	14 professional staff already returned from short term training	.2[d]	3.6[c]
	29 staff already benefited from in-service training courses financed by ATIP	.2[e][f]	3.6[b]
	ATIP staff meeting	.3[a]	3.6[c]
	ATIP "Reference Group" Meeting	.4[b]	3.8[a]
	Farmer field days have been hosted in six ATIP villages	.3[c][ii]	3.5[h]
	Farming systems work page starts appearing regularly in Agrinews	.4[a]	3.5[b]
Sept. 1987	Soil Management Specialist largely financed under INTSORMIL starts work at Sebele	.3[d][i] .5[b]	3.3.2
	Departure of six GDB financed long-term participants on training [1 DPS, 4 DAFS, 1 DAR]	.2[a][b][c]	3.6[d]
	Return of two staff from CIMMYT-run farming systems course	.2[d]	3.6[c]
	70 staff to attend ATIP financed in-service training courses in professional writing, team formation and topics designed to help enumerators function efficiently	.2[a]	3.6]
	ATIP staff meeting	.3[a]	3.5[c]
	ATIP staff with resident extension staff address kgotlas in the six ATIP villages on progress and plans	.3[c][iii]	3.5[g]
	ATIP staff meeting with DAFS staff in ATIP areas to discuss research results and proposals, and agree on areas of collaboration	.3[e][iii]	3.4.2
	Microcomputer documentation completed on 10 ATIP databases	.6[a][b][c]	3.5[j]
Dec. 1987	ATIP Mahalapye localised with professional backstopping from Sebele	.1[a]	3.7[a]
	Farming Systems Research Liaison Agronomist starts work at Sebele	.3[d][ii]	3.7[a]
	Agricultural Systems Economist starts work at Sebele	.5[c]	3.7[a]
	Return of three long-term participants from training [1 DPS, 2 DAR]	.2[a][b][c]	3.6[d]
	Departure of six long-term participants on training [2 DPS, 2 DAFS, 2 DAR]	.2[a][b][c]	3.6[d]

DATE COMPLETED BY	ACTIVITY	— CROSS REFERENCES — SECTION 2.3	CHAPTER 3
Dec. 1987	ATIP staff meeting	.3[a]	3.8[c]
	ATIP staff attend annual research meetings in DAR	.3[d][iv]	3.8[b]
	ATIP annual report work plan and budget submitted to USAID/B for approval	.4[b]	3.8[d]
	ATIP "Reference Group" meeting	.4[b]	3.6[a]
	Initiate in Francistown and Mahalepye, cooperate work with CPO's/APO's, and at least 2 AD's outside ATIP villages	.3[a][iii]	3.4.2
	ATIP staff attend Farming Systems Inter-Project Meeting in Gaborone	.3[b]	3.5[f]
	Microcomputer equipment purchased and installed in Agricultural Information Division, DAFS	.4[a]	3.5[c]
	Bean/Cowpea CRSP programme localised	.5[b]	——
Mar. 1988	ATIP staff meeting	.3[a]	3.8[c]
	Visit by up to 5 senior extension staff to farming systems type activities in selected countries in Eastern and Southern Africa after visiting ATIP field sites	.2[d]	3.6[c]
	ATIP staff tour on-station research at Sebele	.3[d][vi]	3.4.1
	Meeting/field visit, coordinated by RELO, held between CPOs and research staff	.3[a][i]	3.4.2
	Seminars given by ATIP staff to DAR (two seminars) and DPS staff (one seminar)	.3[d][v]	3.5[e]
June 1988	Evaluation of rotary injection planter and donkey harness completed and, if positive, negotiations started with ALDEP for inclusion in their packages and with RIIC for mass manufacture	.1[c]	3.3
	Evaluation of seed dressing on groundnuts completed and, if positive, passed to DAFS for general dissemination.	.1[c]	3.3
	Evaluation of double ploughing (without row planting) and, if positive passed to DAFS for general dissemination and submitted to DPS for designing a policy to encourage adoption by limited resource farmers	.1[c]	3.3
	ATIP staff meeting	.3[a]	3.8[c]
	ATIP "Reference Group" meeting	.4[b]	3.8[a]
	Farmer field days hosted in at least four ATIP villages	.3[c][ii]	3.5[h]
	ATIP staff attend Farming Systems Inter-Project field workshop probably to be hosted by MDP	.3[b]	3.5[f]
Sept. 1988	First draft on handbook for farming systems work in Botswana completed	.1[b]	3.7[b]

DATE COMPLETED BY	ACTIVITY	— CROSS REFERENCES — SECTION 2.3	CHAPTER 3
Sept. 1988	Return of one long-term participant from training (DAFS)	.2(a)(b)(c)	3.6(d)
	Return of two staff from CIMMYT run farming systems course	.2(d)	3.6(c)
	ATIP staff meeting	.3(a)	3.8(c)
	ATIP staff with resident extension staff address kgotlas in the six ATIP villages on progress and plans	.3(c)(iii)	3.5(g)
	ATIP staff meeting with DAFS staff in ATIP areas to discuss research results and proposals, and agree on areas of collaboration	.3(a)(iii)	3.4.2
	Microcomputer documentation completed on 40 ATIP databases and made accessible to GOB personnal outside ATIP	.6(a)(b)(c)	3.5(j)
Dec 1988	Return of four long-term participants from training (2 DPS, 1 DAFS, 2 DAR)	.2(a)(b)(c)	3.6(d)
	ATIP staff meeting	.3(a)	3.8(c)
	ATIP staff annual research meetings in DAR	.3(d)(iv)	3.8(b)
	ATIP annual report, work plan and budget submitted to USAID/B for approval	.4(b)	3.8(d)
	ATIP "Reference Group" meeting	.4(b)	3.8(a)
	Undertake in Francistown and Mahalapye, cooperative work with CPOs/APO's, and at 4 least AD's outside ATIP villages	.3(a)(iii)	3.4.2
	ATIP staff attend Farming Systems Inter-Project Meeting in Gaborone	.3(b)	3.5(h)
	MOA/ATIP review of progress, problems and plans	.4(c)	3.9
	First draft on the methodology handbook for FSW completed	.3.1(b)	3.7
Mar. 1989	ATIP staff meeting	.3(a)	3.8(c)
	ATIP tour on-station research at Sebele	.3(d)(vi)	3.4.1
	Meeting/field visit, coordinated by RELO, held between CPOs and research staff	.3(a)(i)	3.4.2
	Seminars given by ATIP staff to DAR (two seminars) and DPS staff (one seminar)	.3(d)(v)	3.5(a)
June 1989	Evaluations completed on row planting, housing for smallstock, sole planting of speciality crops (cowpeas and groundnuts), gap filling, thinning and, if successful passed onto DAFS for general dissemination	.1(c)	3.3
	Third Mid-Term Evaluation completed	——	3.8(g)

DATE COMPLETED BY	ACTIVITY	— CROSS REFERENCES — SECTION 2.3	CHAPTER 3
June 1989	Return of one long-term participant from training (DPS)	.2[a][b][c]	3.6[d]
	ATIP staff meeting	.3[a]	3.8[c]
	ATIP "Reference Group" meeting	.4[b]	3.8[a]
	Farmer field days hosted in at least four ATIP villages	.3[c][ii]	3.5[h]
	ATIP staff attend Farming Systems Inter-Project field workshop probably to be hosted by ATIP	.3[b]	3.5[h]
	SMU localised	.5[a]	3.1
Sept. 1989	Return of two staff from CIMMYT run farming systems course	.2[d]	3.6[c]
	ATIP staff meeting	.3[a]	3.8[c]
	ATIP staff with resident extension staff address kgotlas in the six ATIP villages on progress and plans	.3[c][iii]	3.5[g]
	ATIP staff meeting with DAFS staff in ATIP areas to discuss research results and proposals, and agree on areas of collaboration	.3[e][iii]	3.4.2
	Microcomputer documentation completed on remaining ATIP databases and made accessible to GOB personnel outside ATIP	.6[a][b][c]	3.5[j]
	Return of three GOB financed long-term participants (3 DAFS)	.2[e][b][c]	3.6[d]
Dec. 1989	Up to 50 staff to have received ATIP financed in-service training based on the methodology handbook for farming systems work	.1[b]	3.7[b]
	ATIP staff meeting	.2[e][f]	3.6[b]
	ATIP staff attend annual research meetings in DAR	.3[a]	3.8[c]
	ATIP annual report, work plan and budget submitted to USAID/B for approval	.3[d][iv]	3.8[b]
	ATIP "Reference Group" meeting	.4[b]	3.8[d]
	Undertake in Francistown and Mahalapye, cooperative work with CPO's/APO's, and at least 8 AD's outside ATIP villages	.4[b]	3.8[a]
	ATIP staff attend Farming Systems Inter-Project Meeting in Gaborone	.3[e][iii]	3.4.2
	Return of six long-term participants (2DPS, 2 DAFS, 2 DAR)	.3[b]	3.4.2
	MOA/ATIP review of progress, problems and plans	.2[a][b][c]	3.6[d]
		.4[c]	3.9

DATE COMPLETED BY	ACTIVITY	— CROSS REFERENCES — SECTION 2.3	CHAPTER 3
Mar. 1990	ATIP staff meeting	.3[a]	3.8[c]
	ATIP staff tour on-station research at Sebele	.3[d][vi]	3.4.1
	Meeting/field visit, coordinated by RELO, held between CPOs and research staff	.3[e][i]	3.4.2
	Seminars given by ATIP staff to DAR (two seminars) and DPS staff (one seminar)	.3[d][v]	3.5[e]
June 1990	Final draft of methodology handbook for farming systems work in Botswana completed	.1[b]	3.7[b]
	State of the art document produced on tillage/planting options and farmer groups, also containing proposals for future work, and if possible, recommendations that can be passed to DAFS for general dissemination	.1[c]	3.3
	ATIP staff meeting	.3[a]	3.8[c]
	ATIP "Reference Group" meeting	.4[b]	3.8[a]
	Farmer field days hosted in at least four ATIP villages	.3[c][ii]	3.5[h]
	MOA/ATIP review of progress, problems and plans	.4[c]	3.9
Sept. 1990	ATIP Francistown localised with professional backstopping from Sebele	.1[a]	3.7[a]
	Return of three GOB financed long-term participants (1 DPS, 1 DAFS, 1 DAR)	.2[a][b][c]	3.6[d]
	ATIP staff with resident extension staff address kgotlas in the six ATIP villages on progress and future	.3[c][iii]	3.5[g]
	Return of two staff from CIMMYT run farming systems course	.2[d]	3.6[c]
	ATIP staff meeting	.3[a]	3.8[c]
	INTSORMIL posts localised	.5[b]	3.3.2
	MIAC technicians depart		3.3.3

APPENDIX C. ISSUES THAT NEED TO BE ADDRESSED

C.1 TECHNOLOGY

The whole of ATIP's existence has coincided with serious drought. Rainfall in Botswana is normally highly variable. This is true between years, within years, between villages and even between lands areas in the same village. In addition there are extended dry periods within the season which may be four to eight weeks long. Thus the development of relevant improved technologies is a challenging task where, on average, there is no month where rainfall exceeds potential evapotranspiration.

In spite of these constraints ATIP has made progress over the first five years of its existence. In the Mahalapye and Francistown areas a much better understanding of the human and technical environment has evolved while many technologies have been tested. ATIP believes that double ploughing, use of phosphate fertiliser, row planting, short season varieties, sole planting of secondary crops, hand planting for gap filling, fungicide treatment for groundnuts, and improved harnesses for donkeys all have considerable promise and merit immediate dissemination. Areas of work that show promise are water harvesting, thinning of plant stands and improved goat management. Much has been written by ATIP staff on most of these technologies (see list of ATIP papers at the back of Annual Report Number 4).

In addition, the difficulty of developing relevant technologies for limited resource farmers in Botswana has been recognized. ATIP has become convinced that on-farm work has a pivotal role to play in helping develop relevant improved technologies. Such work is fully justified on the following grounds:

(a). There is considerable heterogeneity in the farming population in terms of the resources (both technical and human) at a farmer's disposal. Due to this variability it is likely that different types of technologies need to be developed for different types of farmers. Such heterogeneity cannot easily be taken into account in experiment station-based-research. Thus undifferentiated technological packages applicable to only certain parts of the population result. Work at the farm level constantly brings this issue into focus. Also evaluation of technologies on experiment stations tend to be mainly in terms of return per unit area. Where labour rather than land is more limiting, as is often the case in Botswana, it is extremely important to evaluate technologies in terms of return per unit labour, not area, particularly during labour bottleneck periods. (Increasing the return per unit area does not always increase the return per unit of labour). In a harsh climatic environment, such as Botswana, farmers tend to buffer their farming systems by putting considerable emphasis on off-farm enterprises and on livestock activities. Thus any proposed intervention for improving the productivity of arable agriculture must be evaluated in terms of whether the resources used for implementing that intervention could be better and more reliably invested in activities other than arable agriculture. Such considerations can only reasonably be taken into account through work at the farm level.

(b). The great inter- and intra-annual variability in terms of rainfall means

that there is little flexibility in the timing of farm operations. Thus interventions have to address the issue of breaking bottlenecks (e.g., exploiting the water when it is available) rather than exploiting flexibility in the farming system (e.g., planting later to avoid a labour bottleneck). The former is a much more difficult task and tends to demand greater change on the part of farmers. Cognizance of this is extremely important in designing relevant improved technologies. Also there has to be much more flexibility in viewing what technologies will work. The relevant technologies will be dependent on how the season develops environmentally. Thus ATIP now assumes that a farmer has potential production at the beginning of the cropping year but few prospects for production until the planting rains develop. Depending on how the cropping year develops, different technologies may become appropriate. Thus the farmer is faced with a series of decision points where the decision to choose among several technologies is necessary. This flexibility in terms of deciding what technologies will be relevant according to how the year develops can be articulated easily only at the farm level.

Two issues, arising to some extent out of the above discussion, need to be addressed in the proposal:

(a). It is unlikely that it will be possible to derive single technologies that are relevant to all types of farmers, climatic variations and soil differences. Instead the experience of ATIP has demonstrated the necessity of targeting technologies to specific human and technical environments. As far as the proposal is concerned this has implications for linkages with on-station research, extension and planning, and the need of a soil management specialist.

(b). GOB and USAID/B are quite rightly concerned about getting technologies disseminated as soon as possible. Implications as far as the proposal are concerned involve trying to shorten as much as possible the time period for return from research efforts, and to develop linkages to extension and planning.

C.2 ACCEPTANCE OF FARMING SYSTEMS WORK

ATIP is the youngest of the four farming system projects in Botswana. The others are Farming Systems Southern Region (FSSR formerly IFPP), the Agricultural Development Ngamiland Project (ADNP) and the Molapo Development Project (MDP). Another one called Evaluation of Farming Systems and Agricultural Implements Project (EFSAIP) was phased out a couple of years ago. All the projects have a donor funded component while the Government of Botswana (GOB) has made substantial commitments. Legitimate issues can be raised with reference to the possible institutionalization of farming systems work in Botswana. From the perspective of GOB the following issues have some relevance:

(a). Credibility of farming systems work is important. Obviously it is important to demonstrate that farming systems work has contributed to the improvement of farmers' income largely through the adoption of relevant improved technologies. Unfortunately the persistent drought in Botswana has certainly made this a difficult task during the existence

of ATIP. Also it can be argued that since farming systems work is a process and not a product, there are many other contributing factors to improving farmers' incomes. Thus it would not be reasonable for farming systems workers themselves to receive the full credit for such improvements or indeed to receive all the blame for failures to bring about such improvements. What can be done, however, is to demonstrate that the technologies tested intrinsically could result in improved farmers' incomes, if adopted by them. The onus then lies on the farming systems teams to provide the most realistic assessment of whether that technology could or could not be adopted by farmers.

(b). ATIP believes that farming systems work at the farmers' level is complementary to on-station research which is critical to the effectiveness of work at farm level. Unfortunately, however, when there are limited resources available, it is perceived to be competitive. This particularly tends to be the case in situations where incorporation of such work involves reallocation of resources rather than an expansion of resources. In Botswana many of the projects have demanded resources in situations where resources and personnel have not been increased to absorb them. Inevitably this causes problems and a more strict evaluation of the value of such work.

(c). Farming systems work involves working with farmers but also establishing linkages with on-station research, with extension and potentially with planning. Since in many countries including Botswana, governmental ministries tend to be organized to operate vertically with extension, planning and research in different departments, it is difficult to incorporate the horizontal linkages that are implied in the successful implementation of farming systems work.

In late 1985, the farming systems projects in Botswana, with the prior approval of the former Permanent Secretary of the Ministry of Agriculture, did submit a joint proposal for the institutionalization of farming systems work in the country. The Ministry of Agriculture decided to shelve the proposal for the time being. Basically their attitude was one of continuing support for farming systems work without making a commitment for full institutionalization at this stage. Their concerns revolved around the issues mentioned under (a) and (b) above. The proposal that was submitted did involve some substantial changes. The issue that therefore arises and is addressed to some extent in the proposal is whether a less resource demanding approach to institutionalization is possible and whether credibility for FSR can be obtained over the next few years. Discussion in the proposal on linkages and information dissemination attempts to address this issue. In fact ATIP staff do not necessarily believe that the words "institutionalization" and "farming systems work" need to be used. Possibly some of these now have an emotive connotation. Instead words like linkages and on-farm research may be more relevant. ATIP certainly does not believe that farming systems work should be separated from established units within the Ministry of Agriculture.

C.3 LINKAGES

C.3.1 Between On-Station And On-Farm Research

It is very apparent in Botswana that the strongest link that farming systems

projects have is with the department that they are associated with or responsible to. In the case of ATIP the strongest links therefore exist between on-station and on-farm research. This does not mean to say that this link could not be improved. The linkage is two-way: adaptive testing of technologies developed on the experiment station at the field level with the farmers, and on-farm research sometimes suggesting research priorities for consideration by station based scientists. In certain instances strong linkages from the station to the farm level work have certainly been developed and to a lesser extent developed in the reverse direction. The issue is how can this linkage be made stronger. Also there is the issue of some economic evaluation work at the experiment station level before technologies are tested at the farm level. The proposal addresses these issues through stationing an agronomist and an agricultural economist at Sebele.

C.3.2 Between Research and Extension

Linkages between research and extension are necessary at two levels:

(a).Between on-station research and extension in Gaborone.
(b).Between the farming systems work on farmers' fields and extension at the regional/district level.

At the centre the linkage still needs to be more strongly developed. One of the potential problems has been that the Research Extension Liaison Officer (RELO) position within the Crop Division of the Department of Agricultural Field Services (DAFS) has been difficult to make operational. It is difficult for such a linkage function to be achieved by an individual who is housed within one of the two departments between which linkages are supposed to be achieved. Also the RELO has been involved in many other activities within DAFS. The issue of the linkage at the centre is addressed in the proposal through redefining the job description of the RELO and through having an agronomist at Sebele in the Department of Agricultural Research (DAR). This will be the same agronomist mentioned under Section C.3.1.

At the regional level the issue is addressed in the proposal through setting up stronger linkages with the RAOs, CPOs, and APOs. It is hoped that, providing agreement is obtained, such linkages can help both farming systems personnel and extension personnel to be more effective in their work.

C.3.3 Conclusion

ATIP believes that through developing linkages the process of farming systems type work can be incorporated into the Ministry and demonstrated to other units. If such linkages can be established this may help create an effective way of institutionalizing the process of farming systems work in a low cost manner.

C.4 INFORMATION DISSEMINATION

The issue of information dissemination has been raised on several occasions as a result of an apparent lack of understanding of farming systems principles by some GOB personnel and little knowledge of what ATIP and other farming system projects are doing. Although ATIP staff have written a great deal, much of it

has not been distributed or is too voluminous for most readers to wade through. ATIP staff publish the materials in a series of forms. These are Externally Published Papers, Research Reports, Working Papers, Miscellaneous Papers, Progress Reports and Annual Reports. The different series vary according to whether or not the theme is still being developed, and also according to the proposed readership. A computerized mailing list has recently been developed which facilitates the different types of publications being sent to different people.

The proposal specifically addresses the issue of disseminating in a more popular format what farming systems type work is and what the farming systems projects -- including ATIP -- are doing. The proposal also suggests an ATIP input designed to speed up the publishing of extension materials. These new inputs are in addition to those already being undertaken in the area of information dissemination. Those are also discussed in the proposal.

C.5 TRAINING

Training under the ATIP Project has been a major thrust. Training has been considered necessary at many levels and of many different types: on-the-job, in-service, short and long-term in nature.

On-the-job training is particularly important and has been one of the reasons why GOB, whenever possible, has been willing to replace counterparts in the field when others have gone on long-term training.

With reference to the in-service training courses, ATIP has organized a few for farming systems staff but the major thrust has been in the DAFS. The RELO has played a key role in developing an in-service training schedule for extension workers. ATIP believes that this is of critical importance in developing the extension staff so they can operate on a collegiate level with research staff. Interaction at such a level is critically important if any linkage between research and extension workers is to be productive.

TABLE C1: NUMBER, ORIGIN AND DEGREES OF THOSE SENT ON LONG-TERM TRAINING, ATIP RELATED FUNDS, 1982-87

	-SENT (USAID)-		---- TO BE SENT (GOB) ----			TOTAL
	B.S.	M.S.	B.S.	M.S.	Ph.D.	
Origin:						
DAR	3/a	3	--	--	1	7
DPS	4/a	2	1	--	--	7
DAFS	2	1	1	3	--	7
Discipline:						
Ag. Econ.	3	2	--	1	--	6
Agronomy	5	3	1	1	--	10
Animal Sc.	--	1	--	1	1	3
Rural Soc.	1	--	1	--	--	2
Total	9	6	2	3	1	21

a.One of these has also proceeded straight on to take an M.S. degree.

To date 42 individuals have benefited from short-term training -- including 13 outside the country -- while 40 person years of long-term training have been funded with USAID funds allocated to ATIP. In addition another 15 person

years of long-term training are currently being funded by GOB, as agreed in the original project agreement. The origin of the people trained and the degrees they have been trained in are given in Table C1.

ATIP believes that farming systems training is not an end in itself. Strong training is needed in a particular discipline followed by training in farming systems work. Farming systems work is simply a process of how to address the problems of farmers. Long-term training has mainly concentrated on training within a particular discipline while short-term training has emphasised training in farming systems work.

The proposal addresses the need for further training in order to create conditions conducive to the localisation and institutionalization of farming systems work.

C.6 LOCALISATION

Three factors important in determining the rate, degree and quality of localisation of staff -- namely replacement of expatriates with national staff -- are: the availability of suitable people, the training they have received, and the experience they have obtained in farming systems work.

In terms of the availability of people there continue to be shortages of qualified GOB personnel. Although the long-term training programme has been successful, it has been difficult to retain the services of returned participants due to GOB placing individuals in other posts urgently needing to be filled. This is not necessarily bad for Botswana as a whole but does often have a negative impact on the potential for ATIP to achieve localisation. Also much of the training as illustrated above has had to be done to the B.S. level. It is unlikely people at that level will be well enough qualified to undertake independent farming systems activities. Also it is likely that farming system activities will continue to have poorer qualified individuals from the academic viewpoint relative to those in on-station work while shortages of qualified manpower remain.

Given the manpower situation and the fact that many of the on-farm research workers in the near future will not have higher than a B.S. degree there are likely to be problems of being able to work effectively in a very independent manner. It is probable that such individuals will be very good on observation and implementation but may well have problems in terms of problem definition, choosing appropriate experimental designs, and data analyses including the use of computers.

In the light of these issues the proposal does give a strategy that should result in the localisation of the two farming systems teams by 1990 with the help of some professional backstopping.

It is important that the move towards localisation is started as soon as possible. Until people are given responsibility for conducting farming systems work they will not grow professionally. Responsibility can help accelerate professional growth.

C.7 ADMINISTRATION

The amount of time spent in administrative tasks by all ATIP staff members has been considerable although the greatest burdens are borne by the Chief of Party and the Deputy Chief of Party. Administrative tasks have been complicated by having team members located in four different places (Francistown, Mahalapye, Sebele and Gaborone), by ATIP having to develop close working relationships with three different agencies in the Government of Botswana (DAR, DAFS and DPS), and by having to relate to the requirements of the GOB, USAID/B, the contracting agency MIAC, and the lead institution, Kansas State University.

Nevertheless many of the tasks have now been streamlined through the extensive use of microcomputers. Both the Administrative Assistant and the Computer Operator at Sebele have been trained to use the machines. In addition the Computer Operator is now taking a course in type writing. As time goes on more and more complex tasks are being undertaken by them such as word processing, keeping financial, inventory and leave records, etc. The proposal does address to a small extent the area of the administrative issues. However it is difficult to see a way in which administrative tasks can be practically reduced much further as far as the Chief of Party and the Deputy Chief of Party are concerned. Nevertheless, because of other suggestions in the proposal it should be possible to spread administrative tasks among other individuals in the Sebele/Gaborone area.

C.8 TRADE-OFFS

It is not unreasonable, given the limited availability of staff, time and the resources available, that some difficult trade-off decisions have to be made between addressing the issues of technology, linkages, information dissemination, training and localisation. Concentrating on issues other than technology will slow down the rate of progress on the technology front. However given the revised Log Frame and the recommendations coming out of the Second Mid-Term Evaluation it is apparent that ATIP emphasis should shift somewhat towards addressing the question of linkages, information dissemination and localisation which of course implies continued emphasis on the training front. Such a shift can contribute to the eventual acceptance of farming systems work in the Botswana context thereby encouraging a move to acceptance of the approach. Therefore the proposal does lay more emphasis on these other issues compared with the approach used by ATIP prior to the Second Mid-Term Evaluation Report.

APPENDIX D. REALISTIC ASSUMPTIONS FOR ATIP

In order to be realistic and make a reasonable estimate of what might be possible to accomplish by September 28, 1990, a number of assumptions need to be made in drawing up a pragmatic proposal. These assumptions arise out of an assessment of the current situation within GOB. A number of these have already been alluded to in earlier sections. The assumptions are as follows:

(a). Given the fact that a proposal for the institutionalization of farming systems work, which was drawn up by all farming systems projects in the country, was recently shelved by GOB, it is unrealistic to expect a major institutional commitment for farming systems work by GOB in the near future.

(b). Given the limited resources in MOA and DAFS it is unrealistic to expect that there will be a major change in the actual duties of extension staff in the field in the near future. Recently one RAO observed that currently 95% of ADs time is spent in servicing programmes such as ALDEP, ARAP and Drought Relief, thereby leaving only 5% time for genuine extension activities. (This may not be true in the future if recommendations arising out of a recent External Evaluation of ALDEP are implemented).

(c). Given the continuing shortage of qualified personnel within the Ministry of Agriculture it is unlikely that ATIP will continue to receive the services of all the individuals sponsored by ATIP for long-term training.

(d). It is likely, because the shortage of qualified personnel continues within the MOA, that the majority of local farming systems personnel will continue to have B.S. degrees.

Given current plans it is unreasonable at this stage to assume there will be a Phase II of ATIP starting in October 1990 as far as funding by USAID is concerned. It is important that the work of ATIP over the next three years thus provides, to the extent possible, the rationale for the continuation of farming system type activities in Botswana and a means for these activities to be undertaken with a minimum of donor agency support. Of course ATIP is not acting alone in this regard. As mentioned earlier there are other farming systems projects in Botswana. Nevertheless the implementation plan outlined in Chapter 3 takes these assumptions into account.

APPENDIX E. JOB DESCRIPTIONS OF TECHNICIANS

CHIEF OF PARTY

(1). Duration and Location. December 1987 - September 1990 in the Department of Agricultural Research at Sebele.

(2). Qualifications. Ph.D. in a relevant agricultural discipline is required with experience in organizing and conducting farming systems work or similar interdisciplinary research/extension programmes. Leadership ability and personal characteristics to work effectively with colleagues in performing the supervisor functions for the team is important. At least five years of professional experience in the international setting, preferably involving micro-level research is required.

(3). Duties.

(a).Serve as administrator and programme leader of the scientists conducting the project (long-term and short term), and liaison with appropriate GOB officials in the MOA and MFDP, the private sector, and USAID/Botswana. The incumbent will report to the Ministry of Agriculture as follows:

-- To the Director of the Agricultural Research Department for the conduct of the research elements of the project

-- To the Permanent Secretary, MOA, for the overall direction and coordination of the project.

(b).Liaise with:

-- The Chief Agricultural Economist of the Division of Planning and Statistics on the analysis and interpretation of the ATIP field data and the effects and implications results might have on national policy and planning levels.

-- The Director of the Agricultural Field Services Department for the extension elements of the project and with other officials within the MOA as necessary to keep them advised and informed on the progress of the project.

(c).Assist in the recruitment of the technical assistance team and short term consultants or advisors to augment and support the long-term resident staff.

(d).Guide and direct the ATIP field teams in the planning and conduct of the project. Provide guidance to others in planning and undertaking farming systems work and in analysing results.

(e).Participate in scientific symposia outside Botswana and serve as a professional link between the Botswana ATIP project and similar projects in other countries and at international research centres for the mutual benefit of those concerned. Encourage an interchange of information between technical staff through periodic visits.

(f).Facilitate the flow of information between the farming systems teams, the research staff at Sebele, and the staff of the Division of Planning and Statistics through personal contact and by arranging professional seminars and debriefings.

(g).Maintain appropriate communications with the Director of Agricultural Field Services and other relevant MOA officials through personal contact, field trips and other appropriate venues.

(h).Perform such other tasks that may be requested by the cognisant MOA administrator and approved by the USAID Project Manager.

(i).Participate with other ATIP staff in disseminating information on ATIP activities and farming systems work in general.

(j).Coordinate efforts so that before the end of the contract extension a handbook on farming systems methodology appropriate for Botswana is developed.

(k).Train a counterpart to undertake his/her tasks.

RESEARCH EXTENSION LIAISON OFFICER

(1). Duration and Location. December 1987 - September 1990 in Gaborone at the Department of Agricultural Field Services.

(2). Qualifications. M.S. or Ph.D in agronomy, agricultural extension and/or rural sociology. A minimum of four years' experience in planning and implementing agricultural extension programmes, understanding of basic agronomic and animal technology, basic principles of management and administration, human relations, planning and evaluation, motivation, techniques of agricultural and social research, technology transfer, communications, teaching and learning, social systems, rural development, and farming systems. Experience in such areas as academic and applied research, extension organization and administration, working as a field extension officer, working as an extension specialist, conducting field trials and demonstrations, university teaching, and agricultural communications. Experience in working in developing countries is desirable.

(3). Duties.

(a).As requested, advise the Director of the Department of Agricultural Field Services on the organization and administration of all extension activities.

(b).Assist in the development and implementation of an organized long-term in-service training programme for all extension staff.

(c).Assist in identifying, selecting, placing, monitoring, and counseling long-term degree training participants funded with ATIP related funds.

(d).Assist in training extension specialists in methods and procedures of extension work; oral, written, and visual communications; programme development implementation, and evaluation; time management; adoption-diffusion; social systems; farming systems concepts, methods, and procedures; teaching and learning; interpreting research findings; and preparation of extension publications.

(e).Promote cooperation between extension specialists and agricultural research workers through personal contact and the development and scheduling of joint meetings and conferences.

(f).Promote cooperation and coordination of efforts among all divisions and sections of the Department of Agricultural Field Services, and liaise on a monthly basis with the RAOs of Francistown and Central Agricultural Regions.

(g).Assist Extension Subject Matter Specialists in facilitating the two-way flow of communications between extension and research officers to ensure that farmers' problems are brought to the attention of research workers and that research results are interpreted and developed into appropriate recommendations for farmers' use.

(h).Provide in-service training for extension specialists to upgrade their skills in extension methods and procedures, teaching techniques, interpreting research results to field staff, and communications.

(i).Assist Divisions within the Department of Agricultural Field Services in improving management and communication practices.

(j).Assist the Agricultural Information Division with the development and maintenance of a system to speed up the production of extension publications.

(k).Keep informed and disseminate information about farming system/extension linkages in the ATIP areas and ensure CPOs and APOs are active members of the farming system related activities. Attend, and encourage other headquarter staff to attend, farmer field days in the villages where ATIP is working.

(l).Provide additional services as determined necessary by the COP and the cognisant MOA administrative representative, and as approved by the USAID Project Manager.

(m).Participate with other ATIP staff in disseminating information on ATIP activities and farming systems work in general.

(n).Help other ATIP staff so that a handbook on farming systems methodology appropriate for Botswana is developed.

(o).Train a counterpart to undertake his/her tasks.

FARMING SYSTEMS RESEARCH LIAISON AGRONOMIST

(1). Duration and Location. December 1987 - September 1990 in the Department of Agricultural Research at Sebele.

(2). Qualifications. Ph.D in agronomy with an interest in farming systems work. Experience in the conduct of trials on farmers' fields is essential. The scientist must have international experience. Persons with M.Sc degrees and relevant experience will be considered if desirable candidates at the Ph.D level are not available. Must have ability to work with scientists from other countries both on and off experiment stations.

(3). Background. The posting of the former Farming Systems Agronommist at Mahalapye to Sebele, will allow the ATIP Team Leader to devote more "quality time" to the project, as the Farming Systems Research Liaison Agronomist will be able to help in the agronomic analysis and interpretation of data. Much data have been collected over the initial five years of the project, and now requires consolidated systematic analysis over time. Much of the data to date have been analysed only on an individual trial or annual basis.

(4). Duties

(a).Participate in developing effective research-extension linkages. Efforts would be focused at both regional and national levels.

-- At the regional level, helping the farming systems team at Mahalapye and the CPO of Mahalapye establish collaborative on-farm research and demonstration activities. If feasible this programme should utilize formats developed by both ATIP Mahalapye and Francistown.

-- At the national level, work through RELO, Chief Arable Research Officer (CARO) and Chief of Party of ATIP to increase communication on pertinent issues with Crop Subject Matter Specialists DAFS headquarters.

(b).Backstop the farming systems team at Mahalapye with responsibility for additional farming system locations as required.

(c).Provide coordinator role for design activities of cropping systems at Mahalapye and, if so desired, for other farming systems teams. Included are relevant Ministry Extension Specialists (i.e, Soil Conservation Unit) and on-station commodity research specialists.

(d).Help analyse agronomic data collected over the current life of the project (1982-1987).

(e).Make contributions to in-service training and BAC training.

(f).Provide additional services as determined necessary by the COP,

and the cognisant MOA administrative representative.

(g).Participate with other ATIP staff in disseminating information on ATIP activities and farming systems work in general.

(h).Help other ATIP staff develop a handbook on farming systems methodology appropriate for Botswana: surveys, data collection, analysis and interpretation, etc.

(i).Train a counterpart to undertake his/her tasks.

AGRICULTURAL SYSTEMS ECONOMIST

(1). Duration and Location. December 1987 - September 1990 in the Department of Agricultural Research at Sebele.

(2). Qualifications. Ph.D. in agricultural economics with specialization in farm management/production economics. Experience in conduct of micro-level research involving farm surveys. Scientist must have experience in farming systems work in the international setting. Persons with M.S. degree and relevant experience will be considered if desirable candidates at the Ph.D level are not available. Must have ability to work with scientists from other countries as a member of a multi-disciplinary team.

(3). Background. The posting of the former Farming Systems Economist at Mahalapye to Sebele, will allow the Team Leader to devote more "quality time" to the project, as the Agricultural Systems Economist will be able to help in the economic analysis and interpretation of data. Much data have been collected over the initial five years of the project, and now requires consolidated systematic analysis over time. Much of the data to date have been analysed only on an individual survey or annual basis.

(4). Duties.

(a).Assess the impact of modified production technologies, support systems and Ministry programmes on food output, employment and the agricultural opportunities of resource poor farmers.

(b).Assist the Department of Agricultural Research in:

-- Providing an input into commodity orientated economic assessments.

-- Providing support in terms of project planning, preparation, development and evaluation.

-- Bringing relevant issues of agricultural policy to the attention of the Director of Agricultural Research for submission, if appropriate, to the Ministry of Agriculture Policy Committee.

(c).Help analyse economic data collected over the current life of the project (1982-1987).

(d).Help develop training courses in on-farm research methods for farming systems workers, BAC students, RSU and FMU enumerators, and DAFS staff.

(e).Provide backstopping for the farm management research and extension activities of the Mahalapye farming systems team and others as instructed.

(f).Provide additional services as determined necessary by the COP, and the cognisant MOA administrative representative.

(g).Participate with other ATIP staff in disseminating information on ATIP activities and farming systems work in general.

(h).Help other ATIP staff develop a handbook on farming systems methodology appropriate for Botswana: surveys, data collection, analysis and interpretation, etc.

(i).Assist with training and development of departmental counterpart agricultural agricultural economist (commodity agricultural economist).

FARMING SYSTEMS ANIMAL SCIENTIST

(1). Duration and Location. December 1987 - September 1990 in Francistown with periodic travel to the Mahalapye area.

(2). Qualifications Ph.D. in animal science with specialization in livestock production including forage and/or experience in small stock. A broad knowledge of related sciences and agricultural engineering as related to draught power is desirable. Must have proven ability to work with scientists from other countries as a member of a multi-disciplinary team. Candidates with international experience are preferred. Candidates with M.S. degree and relevant experience will be considered if suitable persons at the Ph.D. level are not available.

(3). Duties

(a).Participate as a member of the farming systems team which also includes agricultural economists, agronomists, and short-term specialists.

(b).Participate in the planning, supervision and implementation of farm level surveys, trials, and evaluation of improved technologies for the target groups of farmers.

(c).Assist in planning, testing and implementing improved technologies in cattle and small stock animal production and management with target groups of farmers, with emphasis on the interface between crop production and livestock production.

(d).Assist in planning and conducting training courses for the extension staff.

(e).Develop and maintain appropriate professional relationships, interchange, and flow of information with district and regional agricultural staffs.

(f).Provide additional services as determined necessary by the COP, and the cognisant MOA administrative representative.

(g).Participate with other ATIP staff in disseminating information on ATIP activities and farming systems work in general.

(h).Help other ATIP staff so that a handbook on farming systems methodology appropriate for Botswana is developed.

(i).Train a counterpart to undertake his/her tasks.

FARMING SYSTEMS ECONOMIST

(1). Duration and Location. December 1987 - September 1990 in Francistown.

(2). Qualifications Ph.D. in agricultural economics with specialization in farm management/production economics. Some experience in conduct of micro-level research involving farm surveys is desirable. Preference for scientists experienced in farming systems work in the international setting. Persons with M.S. degree and relevant experience will be considered if desirable candidates at the Ph.D level are not available. Must have proven ability to work with scientists from other countries as a member of a multi-disciplinary team.

(3). Duties

(a).Participate as a member of the farming systems team which also includes animal scientists, agronomists, and short-term specialists.

(b).Participate in the planning, supervision, and implementation of farm level surveys, trials and evaluation of improved technologies for farmers.

(c).Assist in the timely processing, analysis and interpretation of results of farm level surveys, trials and tests conducted by the farming systems team.

(d).Undertake village level research on matters relating to support systems and policies.

(e).Assist in the interpretation of results for research and extension workers through seminars, workshops, training meetings, and publications.

(f).Assess the economic viability of different categories of farmers with reference to technologies.

(g).Assist in planning and conducting training courses for the extension staff.

(h).Develop and maintain appropriate professional relationships, interchange, and flow of information with district agricultural and regional staffs.

(i).Provide additional services as determined necessary by the COP, and the cognisant MOA administrative representative.

(j).Participate with other ATIP staff in disseminating information on ATIP activities and farming systems work in general.

(k).Help other ATIP staff so that a handbook on farming systems methodology appropriate for Botswana is developed.

(1).Train a counterpart to undertake his/her tasks.

FARMING SYSTEMS AGRONOMIST

(1). Duration and Location. December 1987 - September 1990 in Francistown.

(2). Qualifications. Ph.D. in a field crop specialty or soil science with emphasis on production and problem solving research at the farm level. Within the context of a multi-disciplinary programme, must have the ability to provide leadership in the identification of agronomic problems as they relate to small farm production. Must have ability to work with scientists from other countries as a member of a multi-disciplinary team. International experience is required. Experience in farming systems work highly desirable.

(3). Duties.

(a).Participate as a member of the farming systems team which also includes animal scientists, agricultural economists, and short-term specialists.

(b).Provide agronomic leadership in the conduct of farm level trials and tests.

(c).Maintain close linkages with experiment station research and the extension service through the RELO on matters pertaining to use and extension of research findings and feedback.

(d).Assist in the timely processing and analysis of the results of farm level surveys, trials and tests conducted in the farming systems work programme.

(e).Assist in the interpretation of results for farmers, extension workers, and policy makers through seminars, workshops and publications.

(f).Conduct appropriate symposia for the MOA staff relating to the agronomic work carried out in the area and generally work to develop methods for improving integration of farming systems work and DAFS work at the regional level.

(g).Assist in planning and conducting training courses for the extension staff.

(h).Develop and maintain appropriate professional relationships, interchange and flow of information with district and regional agricultural staffs.

(i).Provide additional services as determined necessary by the COP, and the cognisant MOA administrative representative.

(j).Participate with other ATIP staff in disseminating information on ATIP activities and farming systems work in general.

(k).Help other ATIP staff so that a handbook on farming systems methodology appropriate for Botswana is developed.

(1).Train a counterpart to undertake his/her tasks.

SOIL MANAGEMENT SPECIALIST

(1). Duration and Location. August 1987 - August 1990 at Sebele Agricultural Research Station, Gaborone, including on-farm studies with the farming systems teams.

(2). Qualifications. Ph.D. in soil physics (or soil/water management) with working knowledge of plant physiology. The scientist should be experienced with instrumentation and be prepared to undertake research both on and off experiment station. Person with M.S. and relevant experience will be considered if desirable candidates of the Ph.D. level are not available.

(3). Background: In order to expand upon the innovative agronomic work performed by INTSORMIL (and Collaborating Scientists) it is proposed that greater attention should be given to the physical aspects of soil characteristics. It is recognized that understanding soil management aspects are fundamental for developing and stabilizing arable agriculture in Botswana.

Crops grown in Botswana under dryland conditions regularly suffer from drought stress periods during their establishment and growth. The availability of soil water is therefore one of the principal limiting factors, if not the principal one, in crop production. Under the limited and erratic rainfall conditions where a significant proportion of the rains are intense and there is weak hydrous stability of the soil aggregates, there can be extensive run-off.

A better understanding of the physical characteristics of the soils and of their response to tillage and cropping practices would be helpful in developing management practices which conserve moisture, increase crop yields and reduce soil erosion by runoff. This knowledge would be instrumental in enabling the generation of practical guidelines on targeting technologies to appropriate soil types or locations within a field.

(4). Duties:

(a). Evaluate the various factors which influence water infiltration rates into and storage within the soil profile for key soil types, preferably where ongoing agronomic trials are being conducted.

(b). Study the rate and degree of change to the cultivated soil zone during the crop season as it effects soil surface characteristics (crusting), water infiltration, water retention, oxygen tension and runoff. Define the importance of any changes observed and ways in which modification is possible.

(c). Develop or advise on development of soil management classes based on:

-- Physical characteristics effecting (a) and (b) above.
-- Site specific hydrological circumstances.

-- Various seasonal rainfall pattern protocols.

(d).Based on (c) above, develop procedure/methodology for determination of soil management classes by the extension service. This would be based on field techniques with minimal input from the lab.

(e).Evaluate potential of FAO soil mapping in terms of soil management classification.

(f).Develop and maintain appropriate professional relationships and flow of information with national and regional agricultural staff, especially in helping to recognize and deal with crop management problems caused by soil physical properties.

(g).Undertake the training of professional and technical staff where appropriate.

SEED TECHNOLOGIST

(1). Duration and Location. April 1987 - April 1989 at Sebele Agricultural Research Station, Gaborone.

(2). Qualifications. At least ten years experience in seed processing systems in the international area. Experience in management critically important as is knowledge of production of basic and certified seed, and of quality control.

(3). Duties.

(a).Provide guidance and training in the production of basic seed. Develop facilities including the UNDP Foundation Seed Project (irrigation) and a basic seed processing plant.

(b).Provide guidance and training in the production of certified seed. Train and instruct Field Inspectors in respect to purity, isolation site history and other standards required of contract seed growers producing certified seed.

(c).Provide guidance and training in seed processing techniques, storage and distribution of certified seed and/or commercial seed.

(d).Provide guidance and training in proper maintenance and repair of seed processing equipment.

(e).Assist in the planning and construction of additional storage facilities and installation of cleaning, treating, grading, bulk storage, and bagging equipment.

(f).Supervise and improve the level of performance of the seed laboratory. Provide training in laboratory seed testing techniques as well as the maintenance and repair of laboratory equipment.

(g).Provide guidance with respect to updating the Seed Act of 1976 and the Botswana Handbook of Seed Certification Standards and Rules to meet a developing agriculture.

APPENDIX F. IMPLEMENTATION SCHEDULE

DATE	MAJOR ACTION	RESPONSIBLE ORGANIZATION
April 1987	Seed Technologist commences work	USAID/B
June 1987	PIOT signed	USAID/B, GOB
June 1987	Recruitment starts for Soil Management Specialist and RELO	MIAC, INTSORMIL
August 1987	Soil Management Specialist commences work	INTSORMIL, MIAC, GOB
July 1987	Internal assessment of 1986/87 field work and Work Plan for 1987/88 prepared	MIAC
August 1987	MIAC Contract Extension signed	MIAC, USAID/B
October 1987	Submission to USAID/B Of Annual Report 1986/87 and Work Plan 1987/88	MIAC
November 1988	Replaced RELO commences work	MIAC, GOB
December 1987	Agricultural Systems Economist and Farming Systems Research Liaison Agronomist start work	MIAC, GOB
January 1988	Long-term participants depart on training	MIAC, GOB, USAID/B
July 1988	Internal assessment of 1987/88 field work and Work Plan for 1988/89 prepared	MIAC
October 1988	Submission to USAID/B of Annual Report 1987/88 and Work Plan 1988/89	MIAC
April 1989	Departure of Seed Technologist	USAID/B
May 1989	Third Mid-Term External Evaluation	USAID/B
June 1989	Decision on future of ATIP	USAID/B
July 1989	Internal assessment of 1988/89 field work and Work Plan for 1989/90 prepared	MIAC
December 1989	Return of last long-term participants funded under the contract extension	MIAC
September 1990	Completion of Final Field Report and Handbook on FSW	MIAC
September 1990	Departure of remaining MIAC and INTSORMIL technicians	MIAC
September 28th,1990	PACD	USAID/B

APPENDIX G. DEFINITION OF ACRONYMS USED

ATIP	Agricultural Technology Improvement Project
ADNP	Agricultural Development Ngamiland Project
APRU	Animal Production Research Unit
ARAP	Arable Rainfed Accelerated Project
AED	Academy for Economic Development
BAC	Botswana Agricultural College
CPO	Crop Production Officer
CRSP	Collaborative Research Support Programme
DAR	Director of Agricultural Research
DAFS	Director of Agricultural Field Services
DPS	Division of Planning and Statistics
EFSAIP	Evaluation of Farming Systems and Agricultural Implements Project
FMFI	Farmer Managed and Implemented
FSSR	Farming Systems Southern Region
FMU	Farm Management Unit
GOB	Government of Botswana
IITA	International Institute for Tropical Agriculture
IFPP	Integrated Farming Pilot Programme
INTSORMIL	International Sorghum and Millet CRSP
KSU	Kansas State University
LOP	Life of Project
MOA	Ministry of Agriculture
MDP	Molapo Development Project
MIAC	Mid-American International Agricultural Consortium
PACD	Project Completion Date
PPS	Project Paper Supplement
RELO	Research Extension Liaison Officer
RAO	Regional Agricultural Officer
RIIC	Rural Industry Innovation Centre
RMFI	Researcher Managed and Farmer Implemented
RMRI	Researcher managed and Implemented
RSU	Rural Sociology Unit
SMU	Seed Multiplication Unit
SMS	Subject Matter Specialist
UNDP	United Nation Development Programme
USAID/B	United States Agency for International Development in Botswana