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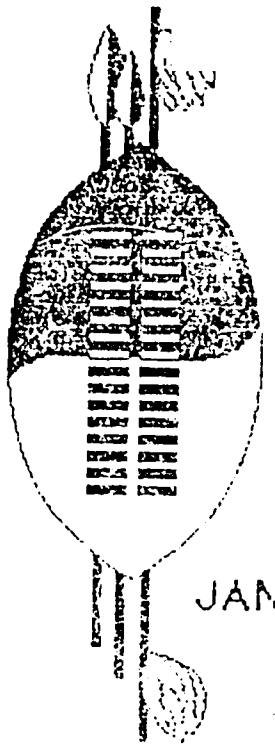

Quarterly Report
SWAZILAND CROPPING SYSTEMS RESEARCH/EXTENSION TRAINING PROJECT

JANUARY 1, 1988 through MARCH 31, 1988

SPONSORS
The Ministry of Agriculture and Cooperatives
and
The United States Agency for International Development

CONTRACT
The College of Agriculture
The Pennsylvania State University
in conjunction with
The School of Agriculture and Home Economics
Tennessee State University

Project Number 645-0212
Contract Number AFR-0212-C-00-2006-00

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January 1 through March 31, 1988

A. Accomplishments and Activities by Objective.

1. To understand expressed needs of SNL farmers and identify constraints which impede productivity.

Socioeconomic Section

The Socioeconomist completed corrections on data files regarding maize, cotton and grain legumes from the 1985-86 Labour and Input Use Survey. The raw data have been summarized by field (panel) and by homestead and are now available in dBASE III and ASCII formats. Cluster and discriminate analysis are being currently used to analyse the data by groupings of sample homesteads based on demographic and management characteristics. These groupings should help to redefine the target groups of farmers currently in use by the Project.

The nutrition consultant did not travel to Swaziland as previously planned. She is presently working on data analysis in the U.S.

A second planting of maize, for use in preference tests for green mealies, was made in late January. However, the maize experienced a severe attack of maize streak virus and never reached maturity. The earlier planted maize matured in mid-March and the Rural Sociologist, in collaboration with nutritionists at UNISWA, conducted a two-day taste test at Luyengo.

Section members worked with agronomists to complete the first round of informal sorghum surveys during the quarter. A meeting was held to summarize the results of the survey. The second series of interviews was postponed due to delays in harvest observed during March.

A major effort was undertaken during the Second Quarter to institute the Technology Adoption Study. Several Section meetings were held to discuss issues concerning the two different surveys to be conducted by Section members. In March, Dr. Rex Warland arrived for a four week consultancy to work with Section members concerning survey design and questionnaire development. Other individuals involved have been Dr. Allan Low, CIMMYT, the Biometrician, On-Farm Agronomist, CRO and COP.

It was agreed that due to the differences of objectives involved in the two studies that complete integration was not possible. There will be considerable overlap in the sample homesteads, and collected data will be shared and analysis accomplished in close cooperation.

The Rural Sociologist completed a first draft of her questionnaire during the Second Quarter. The Agricultural Economist pretested his questionnaire, which had been developed during his stay at Penn State University, selected the sample of 200 households, revised and copied the final questionnaire and trained the MEU enumerators in the administration of the questionnaires. The collection of crop production data from fields of the sample households is approximately 90 percent complete.

A set of questions regarding the use of crop rotations was added to the completed questionnaire for the purpose of identifying farmers who use this technology. These farmers will be subsequently interviewed using a more in-depth instrument. This survey is in support of the Crop Rotation Study reported under Objective 3.

The Rural Sociologist participated in several on-the-job training exercises regarding survey methods and computer software. Dr. Warland provided training in survey design and analysis, questionnaire design, sample selection and analytical techniques to be applied to survey data. The Socioeconomist provided practical exercises in the use of computer software including Symphony, dBASEIII and SPSS.

Extension Section

Interaction with the extension field staff and farmers throughout the Second Quarter provided the Extension Agronomist and the National Subject Matter Specialists (NSMSs) with information concerning contraints to agricultural production. The information was gathered during District T&V Meetings in February, during regular visits to the RDAs, and during field days in the Shiselweni District in March. Information about constraints to production were shared with extension specialists and with Research Officers at collaborative meetings. Among the identified constraints to the increased production of maize were:

1. Low plant populations,

2. Late planting of maize,

3. Shortages of ploughing equipment in the Spring,

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4. Shortages of Labour at weeding time,

5. Late availability of credit,

6. Infestations of stalkborer,

7. Late removal of cattle from growing areas,

8. Inavailability of production inputs,

9. Aluminum toxicity, and

10. Nitrogen deficiencies.

Low Plant Populations: A very serious production constraint in the production of maize has been low plant populations. Although this constraint was previously identified, it continues to be observed on SNL farms and it continues to restrict production in almost every area of the country. Extension personnel are being trained to direct an increasing amount of attention to the problem as they interact with farmers. There are several explanations for low plant populations.

1) Farmers like the big plants and cobs (and multiple cobs) often associated with low populations. The higher populations recommended by researchers will produce higher grain yields but generally result in smaller cobs. The need for teaching farmers the advantages of using higher plant populations was discussed in the February technical training workshop for extension field personnel.

2) Acid soils in some areas kill seedlings. This has been demonstrated in on-farm trials and in demonstrations by the Extension Officer of the Soil Testing Unit.

3) Poor tillage produces poor seedbeds for germinating seeds and, consequently, low populations. Seedbed management has been a topic of T&V messages. Extension workers were also taught how to adjust the ox-drawn plough in the February technical training workshops. A field support guide was recently published on the same topic. The "Ag Retailers Seminars" will feature a talk on replacement parts for the plough during the Third Quarter.

4) Poor planting technique with the ox-drawn planter has been observed to result in lowered plant populations. Many farmers are having trouble using the ox-drawn planter properly. In some areas farmers are returning to hand planting because of problems with the planter. Some farmers claim that bird-damage is increasing and blame shallow planting depth from the ox-drawn planter as a cause. The problem sometimes is improper adjustment of several parts of the planter. Frequently the coulter (or "shoe") is worn out. The result is shallow seed placement. Another problem with the planter is that fertilizer is mixed with seeds in the furrow, killing many seedlings and causing lower plant populations. New shoe designs, developed and tested at MRS, separate the fertilizer and seeds. One design drives the planter deeper into the soil. These designs were shown to field Extension Officers at the February technical training workshops. The officers were also shown how to adjust the planter parts for optimum performance. A field support guide is being prepared to show how to adjust and use the planter properly. The modified shoe and other replacement parts will be featured at the "Ag Retailers Seminars" in the Third Quarter to encourage suppliers to make these available to farmers.

Late Planting of Maize: Once again the problem of farmers delaying the planting of their maize to accommodate the availability of labour was observed to be a problem. If this constraint can be minimized in the production of maize in Swaziland, it could increase production substantially. At field days in the Shiselweni District, farmers were shown excellent fields of maize growing beside relatively poor fields. The main difference was date of planting. The excellent fields were planted early. Additional information on the economics of this possibility is reported in the Agronomy Section later.

Shortages of Ploughing Equipment in the Spring: The poor condition of oxen in early spring is another constraint. In some cases, the oxen are in such poor condition after the dry winter months when the grass is least available, that ploughing must await improvement of the condition of the oxen following the first rains and the regrowth of the grass. Winter ploughing is one solution being pursued by extension personnel. T&V messages drafted by the NSMSs have been directed to this problem. The livestock specialists recently devoted some T&V messages to the preparation of winter feeds (winter pasture, silage, and hay) in an effort to help farmers improve the condition of draft animals during the winter months.

Shortages of Labour at Weeding Time: Most farmers weed in the row by hand, which is labour intensive. Consequently, planting is often delayed

so that the weeding can take place during the December holidays when school students are home and many of the employed members of the family are home on leave. Extension personnel were alerted to the problem in the in-service workshops held in February and through their interaction with the Extension Agronomist during his visits to the RDAs.

Late Availability of Credit to Farmers: Many farmers use credit to purchase production inputs for their cropping programs. Delays in receiving loans force some farmers to plant late. This problem will be a topic of discussion at the Ag Retailers Workshops scheduled for the Third Quarter.

Infestations of Stalkborer: Some farmers are delaying planting to avoid the first flush of stalk borers. The alternative is to invest in pesticides. The increased yields from planting earlier would more than cover the cost of the pesticides in most cases. This topic was addressed with Extension Workers at the February inservice workshops.

Late Removal of Cattle from Cropping Areas: In some locations cattle are not restricted from the cropping areas until November. Fencing is a solution employed by some farmers. The use and effectiveness of fencing is worthy of being explored further with farmers by Extension Workers.

Inavailability of Production Inputs: Informal discussions with farmers revealed that they were not always planting the best varieties for their situation. Some of those who knew which variety was best for their situation did not always find it in the local supply shops. Lime, in particular, was generally not available in the rural areas, and other chemicals were often hard to find.

The MRS has an on-going program of maize variety screening. Recently, a field support guide was published which will help Extension Officers to assist farmers in choosing the correct variety for their situations. The Project has also printed a leaflet on selecting maize varieties which can be distributed to farmers and to local input supply shops as well as to Extension Officers. The "Ag Retailers Seminars" in the Third Quarter will make suppliers more aware of the importance of variety selection and the availability of lime and other chemicals.

Aluminum Toxicity: Aluminum toxicity (from soil acidity) is a constraint in some areas. This is often difficult for farmers to see, as the plants are often merely stunted or pale. The Extension Officer of the Soil Testing Unit (Themba Zubuko) conducted several field demonstrations (and trials) this year, in cooperation with field Extension Officers. The effects

of liming were often dramatic, even in fields limed for the first year. Areas receiving lime often had taller healthier plants and higher plant populations. Farmers who are convinced of the benefits of liming still have to buy it. As noted earlier it is sometimes hard to find and it is expensive (about four times the cost American farmers pay). The topic was discussed with the CCU marketing manager. As a result, lime supplies may be more available during the coming growing season. It may also be possible to reduce the cost and improve the availability of lime by delivering it to farm fields in bulk form.

Nitrogen Deficiencies: Nitrogen deficiencies were common in maize fields this year. Topdressing is not as widely accepted as is basal fertilizer applications (these are common but often low). Many farmers apply manure to their fields but the quantities are usually low. Research trials have shown that most fields will show a yield response to nitrogen applications. The Project recently published a field support guide on topdressing which will assist Extension Officers in helping farmers make decisions about the use of nitrogen. This will also be a topic of discussion at the technical training workshops during the Third Quarter. The Soil Testing Unit's Extension Officer conducted field demonstrations of nitrogen topdressing in cooperation with field Extension Officers. Farmers were shown comparisons of maize grown in fields with and without topdressed nitrogen. Differences were generally apparent, despite the low rainfall in many areas this year.

There is an obvious constraint to SNL farmers is the limited technical capability of Extension Workers. There is a need to improve the technical and, to a lesser degree, the pedagogical capability of extension workers and other frontline extension personnel who interact with farmers. Farmers must have confidence in the technical knowhow and/or the ability of the Extension Workers to help them solve problems. Considerable progress was made during the Second Quarter to improve the problem solving ability of Extension Workers in a rather broad range of subject areas. Additional training is planned for the next Quarter.

Another constraint to improved agricultural production is the lack of motivating visual-audio messages which address new agricultural developments which could be used by SEDs, NSMSs and others to inform and to teach Extension Workers and farmers. The use of video messages and 2X2 color slides with taped messages would be very useful for this purpose. Also, Information Section personnel will need to be trained to produce these messages. Subsequently, a plan for the distribution and use of the messages will need to be developed.

2. Develop, through on-farm experiments, cropping practices that are relevant to the needs and constraints of SNL farmers.

Socioeconomic Section

During the Second Quarter, Section members accompanied the on-farm agronomist and horticulturists on site visits to trials in all nine RDAs. Participating farmers were interviewed in preparation for the design and conduct of farmer assessments. This also provided an opportunity for Section members to be up-dated with regard to on-farm research.

A preliminary analysis, using data for one season from one farm, was made regarding the research on trickle irrigation for vegetables. Yields tended to be about 25 percent greater with trickle irrigation compared to traditional furrow methods. This is significantly greater than the five percent yield increase estimated to cover the cost of the system. Labour data indicated that irrigation time was reduced to half but weeding time was doubled compared to furrow irrigation. This second finding is in conflict with the literature, and expectations, which indicates sizeable savings on weeding time using trickle irrigation. Several reasons are offered for this inconsistency which will be included in future research.

1. The trickle methodology was being used for the first time by the farmer and learning to use the system was perhaps the primary objective.

2. Excess water was applied causing more weeds than expected to germinate. This is related to (1.) above.

3. The rows were doubled, i.e. two rows about 20 cm apart were planted with the trickle pipe between. The farmer did not have a proper hand tool to weed this space so weeding was done by hand. The furrow irrigated plots had only one row.

The economic analysis of the results of the maize herbicide trials conducted over the past four seasons (1983-87) was completed. The maize grain yields were significantly higher in only one out of four years. However, farmers expressed the opinion that weeding labour was reduced to 25-50 percent compared with areas where herbicides were not applied. Thus, based on these data, the primary incentive to farmers for using herbicides would be to save labour as opposed to increasing yields. The value of the labour saved (about 110-150 hours per hectare) would cover the cost of the

herbicide application for farmers who have alternative income generating opportunities.

Yield data collected by the RDA Management Unit for the years 1982 through 1984 indicate that, for each week planting is delayed past mid-October, maize grain yields are generally decreased by five percent. Thus, for example, farmers who use herbicides as a management tool to accomodate an earlier planting date, e.g. four weeks earlier, could expect a 20 percent increase in grain yield, other factors being equal. Such an increase would give the farmer a 35 percent increase in net returns.

The Rural Sociologist and Agricultural Economist attended a FSR Training Workshop sponsored by CIMMYT in February. This three week workshop in Harare, Zimbabwe completes the series for the Rural Sociologist.

Section members were involved in the planning and conducting of the Farming Systems Research Workshop held at Nhlangano March 1-4, 1988. The Socioeconomist was one of two Contract team members assigned the responsibility of organizing the workshop. He worked with the Contract Agronomist and Dr. Allan Low of CIMMYT to carry out this function. He also co-authored two papers presented at the Workshop. The Contract Agricultural Economist co-authored two papers and was responsible for a series of group discussions regarding the use of Project developed agricultural information in solving farmer problems. The Rural Sociologist and Agricultural Economist each co-authored one paper.

A FSR/E Workshop related to Objective 2 is reported later under Objective 5.

Agronomy Section

Eighteen of the forty-five on-farm trials planted last year were harvested in March. Most of the remaining trials will be harvested in April. The data analysis and summaries of this work should be completed in July.

There was a serious mid-season drought in certain areas of the country which made it impossible to obtain yield data from some of the on-farm trials. However, this is not expected to seriously impede overall progress on the extension publications that are based upon the on-farm trial results.

Horticulture Section

The summer season is traditionally one of low production by SNL farmers growing vegetables. This is in part due to farmers in the past having

experienced problems with insect and disease control during the warm, wet summers and also to a lack of heat tolerant varieties. Part of the on-farm activities planned by the Horticulture Section for the Second Quarter included demonstration plantings of long-day onions in an effort to extend the practices developed over the past four years. This effort for the most part was successful, with more than 30 farmers successfully producing onions during the summer. Considerable interest in summer onion production was generated by this effort as indicated by the many requests for the seeds of recommended varieties for next summer. Plans for the Second Quarter also included trickle irrigation trials with two farmers in the Central RDA. This work was confounded by the unusually wet season at the location of the trials and the resulting lack of need for supplemental irrigation.

Summer Onions: On-farm demonstration plantings of three of the most promising long-day onion varieties (Pronto S, Rocket, and Taurus) identified for summer production in Swaziland were planned with the help of both Research Assistants (RAs) and the National Subject Matter Specialist (NSMS) for Horticulture, Alfred Kunene. Each of the nine RAs currently serving with the Project were asked to plant demonstrations with three farmers in their area. Responsibility for selecting the farmers and for establishing the plots rested with the RA. None of these planned demonstrations proved to be successful. Reasons given by the RAs for the failures ranged from a loss of seedlings in the seedbed due to "washouts" and diseases to farmers experiencing a shortage of water for irrigation.

On the other hand, more than 75 percent of the demostrations supervised by the National Subject Matter Specialists produced marketable bulbs. Included were nearly 30 plantings in several locations (Malindza, Luyengo, Northern RDA, Sandleni/Luqolieni RDA, and others in the Shiselweni District). Interested farmers were provided with the necessary production information and provided with seeds for a nominal fee. Many of the same farmers as well as some neighboring farmers have subsequently expressed a desire to grow onions again next summer.

As a result of long-day onion research during the past four years and the efforts to extend the practice to farmers, the horticulturists in the Section and cooperating extension personnel estimate that production of long-day onions next summer, by both SNL and Title Deed farmers, will be in the range of 8 to 10 hectares. This compares to no production of onion in the summer period previous to the initiation of the CSRET Project trials.

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Trickle Irrigation: It was planned to expand the trickle irrigation work in Central RDA to include a total of three farmers for the purpose of making further comparisons of trickle and furrow irrigation under summer rainfall conditions. The very unusual and heavy rains resulted in little need for supplemental irrigation. Weather conditions also made it difficult to establish the trials on time. Plantings of three crops were made with two farmers. Yield data has been collected for cabbage, beets and carrots and are shown in Table 1, along with data from a test conducted last season. With few exceptions, yields were higher using trickle irrigation than with furrow irrigation. The increases ranged from about 26 percent with beets and cabbage to more than 110 percent with carrots. With the latter, however, trickle irrigation plots consisted of double rows compared to single rows in the case of furrow irrigation. Results obtained are in close agreement with those from trials conducted on the research station. The use of double rows with trickle irrigation helped maximize yields per unit area of land but also contributed to increased labour use for hand weeding (as reported by the Socioeconomic Section).

Two systems of seedbed preparation have been compared in trickle irrigation trials both on-farm and on-station. Usually, greater yields have been obtained with the flat bed system. Results during the past summer were an exception. Raised beds with their improved drainage produced larger yields. This was probably because of the very wet season. However, the flat bed system has the advantage of requiring less time for preparation.

Table 1. Yields in tons per hectare for three vegetable crops grown in three types of plantbeds and two techniques of irrigation during Summer and Winter seasons in the Central RDA, 1987/8.

	Yield in Tons Per Hectare		
Crop/Season	Trickle - flat bed	Trickle - raised bed	Furrow irrigation
Beet/Winter	39.2	21.4	24.1
Cabbage/Winter	83.7	67.4	65.9
Cabbage/Summer	43.0	41.7	35.0
Cabbage totals	126.7	109.1	100.9
Carrot/Winter	22.6	20.4	8.9

The on-farm trickle irrigation studies will continue to expand during the next two quarters. Studies are planned with three farmers in the Central RDA in which trickle, using low cost drippers at different spacings plus two types of filters, will be compared to furrow irrigation. It is also planned to begin testing trickle irrigation studies in the Northern RDA.

Extension Section

The Extension Agronomist participated in discussions with several Research Officers concerning planning of on-farm trials being conducted this year. The NSMS (horticulture) also participated in some of these discussions. A poster session at the FSR/E Workshop presented (1) examples of the linkages between research and extension and (2) ways and means of using the farming systems approach to coordinate the identification of constraints with the design of research programs and the choice of methods and techniques for delivering new technologies to farmers.

3. Increase the capability of the MOAC research station system to support research applicable to SNL farmers.

Socioeconomic Section

The Contract Agricultural Economist, in cooperation with the Biometrician developed a final format of the data sheet for the on-station field record system. This system, when implemented, will provide researchers with a history of each field at the various research locations regarding crop grown, soil treatment and conditions, problem areas, etc.

The crop rotation study continued on six fields at Malkerns Research Station. Soybeans and cowpeas were planted on two fields in early January. All crops are progressing well.

The Contract Agricultural Economist served on an ad hoc committee to make recommendations regarding a reorganization of sections at Malkerns Research Station. This activity was a direct result of the Farming Systems Research Workshop (reported under Objective 2). The committee interviewed all Research Officers and Contract team members and submitted their report to the Chief Research Officer on March 21.

Agronomy Section

The Contract Agronomist attended a Workshop on Alley Farming at IITA in Nigeria. This workshop improved his capability and that of the Project to

evaluate the potential of adopting cultural practices, crop species and fodder rotations to improve winter feed sources for livestock. A seminar and report on this topic will be presented at MRS during the Third Quarter.

The Workshop on Farming Systems Research and Extension in Swaziland, held in Nhlangano in March has had a positive impact on the agronomists at MRS. There is some evidence to suggest that they more clearly see the vital role that on-farm research has to play in the technology development and dissemination process. They also appear to have a better understanding of their role in interacting with the extension specialists. Thus, there is reason to believe that on-farm and on-station linkages in future research activities will be positively influenced.

The Workshop highlighted the progress which has been made in recognizing and planning research and extension programs which will meet the needs of farmers. Also, the quality of the presentations and displays, and the amount of discussion generated provided further evidence of the improvements to the research-extension system that have come about since the Project started in 1982.

Horticulture Section

Station based research trials with vegetables centered in three areas during the Second Quarter, namely; trickle irrigation, disease control measures for tomato, and variety evaluations. Major fruit tree efforts were directed towards the establishment of a propagation nursery. Some difficulties in planting and maintaining trials were experienced early in the season, due in large part to the weather and internal problems at the research station, but most trials did provide valuable information. Selected horticultural trials were shown to extension personnel, selected farmers, students, and those involved in horticultural research and education during two field days held at the MRS in February. The first was planned by the Project and the second jointly by individuals from the Swaziland Farmer Development Foundation, the Luyengo Campus of the University of Swaziland and the MRS.

Trickle Irrigation: Plots demonstrating six different trickle irrigation systems were established at Malkerns Research Station and shown at the two field days during the Second Quarter. Systems differed in the levels of technology employed, mainly in use of water filters and/or emitter types. System features are listed in Table 2.

Table 2. Descriptions of drip irrigation systems being considered for vegetable growers in Swaziland.

System	Water Filter	Emitter	Injector	Cost E/ 1000sq.m	Uses
Elevated tank	screen	drip hose or Tamdrip	none	100.*	home gardens
Min. Tech.	none	Tamdrip	none	728.	up to 1000 sq m, low prod. manag.
Low Tech.,	in-line	Tamdrip	none	778.	up to 1000 sq m, med. prod. manag.
Med. Tech.	screen	Tamdrip	none	943.	up to 2500 sq m, med. prod. manag.
Med Tech.	screen	moulded	none	1086.	up to 2500 sq m, med. - high manag.
High Tech.	disc	moulded	yes	1331.	up to 1 ha, high level management

* Cost is for a 100 square meter area only.

Studies conducted thus far have indicated that a trickle irrigation system can be used without some means of water filteration provided that emitters are used which can be easily removed for cleaning. However, the use of a screen filter or a disc filter is suggested for all but very small set-ups. The system involving "Medium Technology" is presently considered to have the greatest potential for most small scale SNL vegetable/fruit growers. Using data from current trials, it is hoped that recommendations on system design can be made by the end of this year.

A replicated trial similar to the on-farm study in the Central RDA was harvested at the MRS during the Second Quarter. Five vegetables were used to compare trickle irrigation, using both flat and raised seedbeds, with furrow irrigation. Again, trickle irrigated plots tended to out-yield furrow irrigated plots with all crops tested. Results appear in Table 3. Water meters were used to measure water use with the two different methods of irrigation but the uncommonly frequent rains confounded the trial. In this test as well as with the on-farm studies, it has been observed that with trickle irrigation there is a tendency for inexperienced persons who are responsible for timing of irrigations (research recorder or farmer) to over supply water to the crops. This seems to be due to the slow application rate of trickle resulting in high infiltration into the soil and, thus, adequate moisture remaining in the root zone for considerable time after the soil

surface has dried. In future studies at MRS soil moisture will be measured and guidelines developed to help farmers determine how often to irrigate.

Table 3. Mean cabbage, carrot and chard yields and other evaluations in trickle irrigation trials, MRS 1987.

	Means				
	Carrot			Chard*	Cabbage
Treatment	Tons/ha.	No./plot	g/root	Tons/Ha	Tons/Ha.
Trickle-flat bed	33.0	533	134	56.8	61.4
Trickle-raised bed	40.5	573	100	53.6	62.1
Furrow	32.4	575	122	55.8	53.2
LSD .05	ns	ns	ns		14.4
CV = 13.5 percent	16.6	13.6			5.4

*Chard yields are totals for five harvests covering a two month period. Statistical analyses have not been completed for chard.

Tomato Trials: Trials with tomatoes planted during the First Quarter in cooperation with Y. P. Rao and Milton Mkabala from the Luyengo Campus have been harvested but the data have not yet been tabulated and analyzed. Two trials were established for the purpose of screening varieties for disease resistance, one for early blight (at MRS) and the second for bacterial wilt (at Luyengo). Germplasm will be preserved from the early blight resistant lines for future use, possibly in a breeding program at Luyengo.

In the bacterial wilt screening trial, lines were inoculated with the organism before planting. One variety developed in South Africa, Zest, had a high survival rate. Seed of this variety will be available in country for the use of farmers during the next summer season.

Two new varieties available from MayFord Seed Company in the Republic of South Africa were tested. Zest and Traffic Jam have performed very well in comparisons with standard cultivars and both have tolerance to important diseases. Tomato variety recommendations can now be revised.

Varietal Evaluations: Vegetable variety trials at the Malkerns Research Station included cabbage, squash and tomato. New cabbage varieties were compared to the standard variety for summer production (Hercules) in

summer trials both in 1986/7 and 1987/8. The tests have resulted in changes in the varieties that will be recommended to farmers. Some of the newer ones have strong resistance to black rot, the most troublesome summer disease. The revised listing is currently being prepared in cooperation with the National Subject Matter Specialists, and will be presented at the Agricultural Retailers Seminar in April. Results of the two cabbage variety trials are presented in Table 4.

Table 4. Yields and head characteristics for selected cabbage varieties tested at Malkerns Research Station during 1986-87 and 1987-88.

Vaeiety and Year		Days to Harvest	Tons/ Ha.	Kg/ Head	Head Diameter(cm) Polar/Equatorial
Summer 1987/8					
Conquistador	MayFord	78	88.0	2.99	19.1/20.3
Conquest	MayFord	65	49.2	1.67	19.2/15.7
Hercules	MayFord	70	64.6	2.19	16.7/20.8
Sanibel	Peto	70	65.5	2.21	18.7/15.3
Top Most	MayFord	70	73.9	2.48	20.0/18.0
Summer 1986/7					
Fortuna	Peto	77	33.8	1.1	12.8/12.2
Tropic Kross	Peto	67	40.5	1.3	15.4/17.9
Rio Grande	Peto	77	40.7	1.3	13.2/13.0
Golden Acre	Wetsel	56	35.6	1.1	16.2/14.0
Hyb. No. 111	Sakata	67	34.3	1.1	12.4/18.1
Hyb. No. 112	Sakata	67	50.3	1.6	12.9/22.2
Head Start	Asgrow	60	35.4	1.1	12.8/12.8
XPH 848	Asgrow	77	41.0	1.3	13.1/15.8
Hercules	MayFord	77	41.0	1.3	13.5/16.2

Squash Trials: Squash trials, both summer types and winter storage types, have been conducted at the Research Station. Many of the winter storage types have excellent nutritional value and can be stored for extended periods at the homestead. New varieties identified have desirable characteristics, e.g., single serving size, excellent flavor and high yields. Several of these are already being sold by seed companies in the Republic of South Africa. A report on squash variety trials is being prepared.

Tomato Bacterial Wilt: Soil treatments (both pre- and post-planting) for reducing bacterial wilt problems are being tested in field experiments

at both the MRS and the Luyengo Campus. Treatments include the use of chemicals applied before planting, a soil sterilization treatment employing solar energy, and the use of mulch to reduce soil temperatures while the crop is in the field. The "solar sterilization" treatment was not effective since it was not possible to get soil temperature underneath clear polyethelyene to levels sufficiently high to kill the organism. It is felt that in a summer with more "normal" amounts of sunshine this may still be a viable treatment. Data collection has not been completed. However, one chemical treatment (ethylene dibromide) appears to have been effective in controlling the soil borne disease.

Miscellaneous Vegetables: Fifteen types or varieties of greens (including some traditional) and 20 types of beans have been planted at the MRS. These will be evaluated for potential production in Swaziland and will be used in a vegetable seminar being planned for interested extension personnel and farmers in April.

Fruits: Apple harvests for four varieties (Anna, Ein Shemer, Winter Banana and All Red Jonathan) were completed during the Quarter. Winter Banana and All Red Jonathan were late in maturing and showed other signs of insufficient response to chilling. Foliar diseases, especially scab, were more of a problem this year than in the previous season, due to the wet weather and problems in getting pesticides applied in a timely manner.

A limited number of rooted M 793 cuttings were budded to Anna and Ein Shemer during the late summer. An order has been placed with a nursery in the Transvaal for peach seeds for producing rootstock material. These will be budded to selected varieties from Florida which were established at the MRS in late 1986. Additional work in establishing a propagation nursery is planned for June as part of Dr. Robert Crassweller's consultancy.

4. Use appropriate methods and materials to increase the effectiveness of agricultural information that is understandable and relevant to the Swazi farmer and to enhance the organizational effectiveness of the Information Section.

Socioeconomic Section

The two agricultural economists in the Section served on the committee to plan and conduct the Malkerns Research Station Field Day. The Section members wrote and produced a taped slide presentation regarding the contributions of the Socioeconomic Section in research efforts aimed at solving farmers problems. It was shown to each of the touring groups

followed by a period for questions and discussion. The presentation was also shown at The Farming Systems Workshop at Nhlangano.

Malkerns Research Station Field Day: The 1988 MRS Field Day was held on February 15 and aimed at addressing the needs of Extension staff. Approximately 325 guests were in attendance. The program was opened with remarks by The Director of Research and Planning. The Honorable Minister of Agriculture and Cooperatives provided the keynote address.

Those in attendance were divided into ten groups with each group having a Research Assistant or Research Recorder as a guide. Eight demonstrations were organized as follows:

1. Pasture Management: Various species of grass being tested for yield and quality, and several varieties of forage and grain millets were shown.

2. Soil Fertility: An experiment testing various fertilizer application rates on maize was shown.

3. Horticulture: Varieties and management practices of peach and apples were demonstrated. Also, seven systems of trickle irrigation and work on bacterial wilt was included.

4. Socio-Economics: An audio-visual presentation on how social scientists participate in the research process was shown.

5. On-Farm Agronomy: The use of the modified ox-planter and rates of basal fertilizer application were discussed.

6. Crop storage: A demonstration of construction methods for various types of crop storage facilities was shown.

7. Seed Multiplication: The cleaning, grading and packaging of seeds were discussed.

8. Crop Screening: Varieties of maize, sorghum and grain legumes under test were discussed.

Spontaneous comments following the event by those in attendance indicated a high degree of appreciation on the part of extension staff regarding the Field Day. The event ran on time and many of the problems encountered last year did not surface.

Agronomy Section

The MRS On-farm Agronomist produced the first draft of a Dry Bean Production Guide as the result of her involvement in a technical writing workshop.

Extension Section

New computer equipment has been ordered to increase the effectiveness of the Information Section to produce printed materials. Hard disks to expand the capacity for existing computers and a scanner to be used in quickly transferring printer material directly to the computer have been ordered.

Field support guides and other printed materials from the Information Section are being distributed through Ag Retailers in a effort to reach more farmers in a timely manner. The number of field days and other public agricultural events have been increased to stimulate closer communications with farmers. The MRS Research Field Day and the Horticulture Field Days are two examples which were described elsewhere in this report.

Currently there are 27 publications in-progress. Essentially all are directed to the needs of SNL farmers.

Identification of Appropriate Production Topics for the Development of Educational Materials: The Extension Training Specialist and Extension Agronomist have continued their efforts to institutionalize the various methods of identifying appropriate production topics for educational materials development. The methods being implemented to identify relevant topics included:

1. National Subject Matter Specialists submit topics that are based on feedback received from Extension Workers, District Subject Matter Specialists, and Project Managers,

2. Research Officers suggest topics based on results and conclusions from their work,

3. Surveys conducted by MOAC Information and Extension Training Sections identify needed topics,

4. Individuals from agribusiness enterprises suggest topics that address private sector needs, and

5. Experts from other donor agency projects or programs submit ideas for field support guides based upon their project needs, study results or field experiences.

The following Production topics were submitted to the Information Section for consideration and development.

1. How to Assess Crop Damage,

2. How To Form a Cooperative.

3. Marketing Guide for Poultry, and

4. How to Grow Vegetable Seedlings.

Field Meetings: The Extension Agronomist and NSMSs met with extension field staff members informally and at district and RDA-level meetings throughout the Second Quarter. Informal discussions and collaborative meetings were also held with Research Officers. This interaction provided feedback which was used to prepare topics for T&V "messages", in-service training of extension workers, and extension publications. The "message" topics have been presented at the monthly collaborative meetings with Research Officers and the general reaction to the content has been positive.

Development of Field Support Guides: The Extension Training Specialist and Extension Agronomist have continued to encourage National Subject Matter Specialists and Research Officers to write and develop field support guides for the use of Extension Workers. A writing skills workshop conducted during the second quarter assisted the Swazi technicians, specialists, and research officers in their writing capability.

No field support guides were printed or released during the Second Quarter. However, a large number of new manuscripts have been developed. These new manuscripts have been submitted and are in the various stages of development as indicated below in Figure 1 on the next three pages.

Title	Author(s)	Development Stage
Avocedo Production Guide	D. Gama, D. Grenoble	Conference needed with authors and Info Officer
Bacterial Wilt	A. Kunene	First draft completed and edited.
Beneficial Insects in Cotton	B. Bhembe	First draft completed and edited.
Calibrating a Knapsack Sprayer for Herbicide Applications	C. Seubert, Mkhonta	Ready for paste up.
Control of Coccidiosis	J. Mavuso	First draft completed and edited.
Control of Internal Parasites in Livestock	J. Nsibandze	First draft completed and edited.
Control of Mastitis	P. Mhlambi	First draft completed and edited.
Disease and Insect Control for Fruits	D. Gama, D. Grenoble	ready for editing
Disease and Insect Control for Vegetables	D. Gama, D. Grenoble	ready for editing
Dry Bean Production	Z. Mamba	First draft completed and edited.
Fruit Preservation Using the Water Bath Method	T. Gooday	First draft completed and edited.
Grazing Capacity Norms	S. Khumalo	First draft completed and edited.

Guidelines for Getting Young People Involved in Farming	S. Mathunjwa	First draft completed and edited.
How to Make and Use a Cattle Weight Tape	J. Diamond	Field test completed, author revisions and paste up completed. waiting for printing
Hybrid Maize Seed Production	A. Simelane	First draft completed and edited.
Improved Maize Storage	P. Dlamini	First draft completed and edited.
Introduction to Beekeeping	P. Bectel, K. Gau	Layout complete, waiting for printing.
Nomination Process for Training	R. Matsebula	First draft completed and edited.
Open-Pollinated Maize Seed Production	M. Dlamini	First draft completed and edited.
Post-Harvest Handling of Fruit	D. Sithole	First draft completed and edited. Need to compare with work of F. Witham. Perhaps content can be combined
Production Guide for Groundnuts	J. Pali	First draft completed and edited.
Producing Maximum Maize	N. Petrick, K. Iversen, S. Dlamini	Ready for printing
Soil Sampling	T. Zubuko, K. Iversen	Field test completed, authors revisions completed. paste up being completed and will be ready for printing by end of March

Stalk Borer Control in Maize	C. Seubert, G. Masina	Missing photo, awaiting paste-up
Tobacco Production Guide	S. Lukhele	First draft completed and edited
Using the Ox Planter	A. Enguro-Ebino, C. Dlamini	Awaiting authors review and illustrations
Weed Identification Guide	M. Dlamini	First draft completed and edited.
Plowing with Oxen	Enguro-Ebino, A. Dlamini, C. Seubert	Completed and awaiting illustrations
Revisions to the Citrus Production Guide	Gama and Grenoble	With the Information Section
Banana Production Guide	Gama and Grenoble	First draft finished
Guava Production Guide	Gama and Grenoble	First draft finished

Figure 1. New manuscripts in various stages of development.

The manuscripts in Figure 2 on the next page were scheduled for development during the First and Second Quarters but have not yet been submitted to the MOAC Information Section for processing.

TITLE	AUTHOR(S)
Mechanical Weed Control	M. Mkhonta, C. Seubert
Herbicide Recommendations for Maize	M. Mkhonta, C. Seubert, Z. Mamba
Cutworm Control	G. Masina, C. Seubert
Guide for Handling Fresh Produce	D. Gama, D. Grenoble
Maize Streak Virus	S. Kunene, C. Seubert
Chemical Weed Control	M. Mkhonta, C. Seubert
Long Day Onion Production Guide	D. Gama, D. Grenoble
Tomato Production Guide	D. Gama, D. Grenoble

Figure 2. Publications scheduled for completion during the First and Second Quarters and not yet submitted to the MOAC Information Section.

Extension Topics Survey: The Extension Agronomist coordinated the printing and distribution of the "Extension Topics Survey" to Extension staff, NSMSs, ROs, UNISWA agriculture faculty, and secondary agriculture teachers during the Second Quarter. The responses will be compiled in the Third Quarter and used for the planning of commodity "messages", workshops, and field demonstrations.

T&V "Messages" for the Second Quarter

Cotton
Picking and Baling
Pest Control — Safe Use of Pesticides
Poultry
General Disease Prevention

Livestock
Pig Management
Importance of Curing Hides and Skins — Housing Pigs

Dairy
Establishment of Winter Pastures
Fertilization and Management of Winter Pastures
Planting Maize for Silage
Prevention of Mastitis

Maize/Legumes
Maize Crib Construction
Planting of Beans
Methods of Harvesting
Weed/Pest Control

Tobacco
Grading
Topping and Suckering
Baling
Pest Control

Beekeeping
Fall Honey Flow
Tree Planting
Identification of Bee Plants

Horticulture
Choosing Appropriate Vegetable Cultivars
Transplanting Vegetables
Seedbed Preparation Techniques
Vegetable Management
Fertilization of Vegetables

Fisheries
Pond Management
Harvesting Fish

Field Demonstrations: The Extension Agronomist and several NSMSs provided assistance and support to extension field staff throughout the country in choosing, planning, and implementing field demonstrations. The data gathered from extension field staff who planned and conducted the field demonstrations indicated that a total of 51 were implemented this year in the four districts. These demonstrations were implemented by extension field officers and carried out with cooperating farmers. Funds for inputs were obtained by the extension staff.

Crop Production Reference Center: Implementation of a Reference Center for the Crop Production Office in Manzini continues. Space has been set aside for the Center and a list of additional relevant materials to be ordered is being compiled. Some publications have already been ordered. The Center will also contain the Macintosh Plus computer which is already at the Office as well as materials for preparation of teaching aids.

1987/88 EXTENSION FIELD DEMONSTRATIONS

District / RDA Topic	Field Extension Officer	Area	Demonstration
MANZINI DISTRICT			
Central			
	E. Mkhonta	Nyakeni	Maize Fertilization
	M.S. Dlamini	Mbikwakhe	Tomato Spraying Programs
Bhekinkhosi/Mliba			
	T. Mthupha	Bugcilini	Sorghum Management Maize Varieties
SHISELWENI DISTRICT			
Hluti			
	Z. Gwebu	Mgamudze	Maize Varieties
Sandleni/Lugolweni			
	S. Bhembe	Dumako	Long-Day Onions Sorghum Management
	P. Ndlovu	New Haven	Maize Varieties
Southern			
	M. Mndlovu	Godloza	Sorghum
	P. Mamba	Mputseni	Maize Management
Madvulini/Mshlalini			
	B.B. Hlatswego	Madvulini	Maize Varieties
Mahamba/Zombodze			
	D. Shongwe	Mbukwane	Long-Day Onions Maize Varieties Lime/Nitrogen Topdress
	B. Vilakati	Mapondweni	Maize Varieties
LUBOMBO DISTRICT			
Malindza			
	S. Dlamini	Siweni	Soybean Varieties/Mgmt.
	I. Ndlela	Malindza	Sorghum Varieties/Mgmt. Sunflower Varieties/Mgmt.

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HHOHHO DISTRICT			
Northern			
	J.M. Nhleko	Mvembili East	Soyabean Mgmt. Maize/Sorghum Varieties
	M.M. Shongwe	Mshingishingini	Maize/Sorghum Varieties
	W.B. Gwebu	Ndzingeni	Maize/Sorghum/ Soyabean Varieties
	A. Madonsela	Lomshiyo	Maize/Sorghum Varieties
Motshane			
	E.M. Khumalo	Hawane/Majotini	Lime Soyabean Mgmt. Groundnut Mgmt. Sweet Pot. Mgmt.
Nkambeni/Manglangampisi			
	J. Tsabedze	Mandlangampisi	Maize/Sorghum/ Sunflower Varieties
Mayiwane/Ebulandzeni			
	P. Sukati	Bulandzeni	Maize/Sorghum/ Sunflower/
	T. D. Matse	Nkamanzi	Maize/Sorghum Varieties
	D. Nkambule	Ndlalambi	Sweet Potatoes (8 demos) Groundnuts (4 demos)Soya-beans (4 demos) Vegetable Rotation and Mgmt. and Sorghum Varieties
	G. Mkhonta	Nyakatfo	Maize/Sorghum/ Sunflower/ Soyabean Varieties
	C. Dlamini	Mayiwane	Maize Varieties
	E. Nxumalo	Mavula	Maize Varieties

The Extension Agronomist visited many of the demonstrations during the Second Quarter, including all or most of those in Hluti, Mahamba/Zombodze, Southern, Madulini/Mahlalini, Sandleni/Lugalweni, Motshane, Centre, and

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Bhekinkosi/Mliba RDAs. In general, the quality of the demos was good concerning populations, siting, and management. Areas which need to be improved for the future include administrative support (especially timely delivery of inputs) and topic selection. A summary report of the 1987/88 demonstration program will be completed in the Third Quarter.

5. Improve the extension training program of the Ministry and assist in selection and training of Swazi Nationals to improve skills and insure that integrated programs will continue after the conclusion of the SCSRET Project.

Socioeconomic Section

Sam Dlamini, Station Agricultural Economist, returned from Penn State University on December 30, 1987. While there, he worked with Dr. Frank Goode to develop a research study that will lead to his MSc. thesis. Progress on this study is reported under Objective 1.

In an effort to help extension staff extend new agricultural technology to the SNL farmer, the Section continues to be represented at the monthly National Subject Matter Specialists meetings. Considerable progress has been made in recent months in getting some of the NSMSs and the Research Officers to work more cooperatively toward this outcome.

The Contract Agricultural Economist collaborated with the Contract Extension Agronomist in developing plans for the Extension Planning Conference and the Agricultural Retailers Seminars scheduled for April.

Agronomy Section

The Agronomy Section provided support for the Technical Training Workshops offered by the Extension Training Section during the Second Quarter. Lectures to front line Extension Workers were provided. The lectures covered the following topics: ox-drawn planter calibration and use, ox-drawn plough maintenance and use, control of maize stalkborer, nutgrass and witchweed control in maize, calibrating fertilizer rate applications, and knapsack sprayer calibration for herbicide applications.

The lectures and practicals were based on information that has come from the on-farm and on-station research programs. This information, which has also been incorporated into the field support guides, provides appropriate technical information needed by extension workers to help farmers solve their crop production problems.

The Mechanization Subject Matter Specialist handled the ox-drawn equipment lectures in the four districts without any technical support from the Contract Agronomist. Among the topics of discussion was the improvement of plant populations in the production of maize through the use of the modified ox-drawn planter shoe.

The Malkerns Research Station Field Day provided the Section with another opportunity to extend research information to Extension Workers. The Swazi On-farm Agronomist prepared exhibits and talked to the Field Day visitors about the on-farm research efforts and explained how that work would help to solve farmer's problems. In particular, attention was focused on the use of herbicides in the control of weeds, one of the most serious constraints to improved maize production.

Extension Section

Plans for the professional improvement of 16 extension personnel via BSc and MSC degree programs were included in the log frame for the extension of the SCSRET Project. Once these personnel have received their degrees it should go a long way toward balancing the capacities of the extension and research activities of the Ministry to respond to the needs of farmers.

Listed below are the training programs which were completed during the Second Quarter.

Second Quarter
(January, February, March, 1988)

Microcomputer Training Course (HLOPE, Matsebula, Diamond, and Iversen)	(2)	14-15 January 1988	MOAC	MOAC/CSRET Counterparts/Staff Subject Matter Specialists
Microcomputer Training Course (HLOPE, Khumalo,Matsebula, Diamond, and Iversen)	(2)	17-18 March 1988	MOAC	MOAC/CSRET Counterparts/Staff

A series of three "Microcomputer Training Courses" were conducted at Headquarters in Mbabane during the past two quarters. The last two courses, noted above, were held during the Second Quarter. The objective of all three courses was to improve the competence of the participants in basic word processing skills (micro-soft word) using the Macintosh Plus microcomputer. The targeted audiences included MOAC Subject Matter

Specialists, Research Officers, Agricultural Officers, Home Economics Officers, Secretaries, and other personnel who expressed a need to use the microcomputer. Mr. Craig Payne and Mr. Don Hlope, respectively, taught the last two courses. Mr. Hlope coordinated and screened the individuals who enrolled in the courses. A total of 33 people demonstrated to the instructors acceptable competency for each of the basic word processing skills learned during all three courses. One hundred per cent of the course participants reported that the training was needed and they plan to use the word processing skills they learned. They also reported they liked having hands-on experience with the microcomputer during the course.

Advanced Agriculture In-Service Training (KHUMALO, Matsebula, B. Kunene, Diamond, and Iversen)	(5)	15-19 February 1988	Nhlangano FTC	Extension Workers
Advanced Agriculture In-Service Training (KHUMALO, Matsebula, P. Dlamini, Diamond, and Iversen)	(5)	15-19 February 1988	Low Veld FTC	Extension Workers
Advanced Agriculture In-Service Training (KHUMALO, Matsebula, A. Shongwe, Diamond, and Iversen)	(5)	22-26 February 1988	Lutheran FTC	Extension Workers
Advanced Agriculture In-Service Training (KHUMALO, Matsebula, C. Manana, Diamond, and Iversen)	(5)	22-26 Feb 1988	Mpisi Vet Trn'g Cntr	Extension Workers

An "Advanced Agricultural In-Service Training Program" was held in each of the four administrative districts. The objectives of the workshops were to enhance the capability of Extension Workers to disseminate technical agricultural information to farmers and to update Extension Workers in the current technical information necessary to advise farmers. A total of 151 participants attended the workshops and fourteen resource people taught the 19 topics included in the curriculum. The curriculum was based on expressed needs and focused on developing basic agronomy, horticulture, and livestock skills. The participants particularly liked the practical hands-on activities offered in the curriculum. Each of the four Senior Extension Officers approved the training curriculum and organized the workshops in

their respective districts. The involvement of various staff as instructors in the workshops has been noted previously.

Writing Skills Course (HLOPE, Matsebula, and Diamond)	(40)	1 Feb - 31 Mar 1988	MOAC, MRS, and Manzini	Subject Matter Specialists, Regional Staff, and Research Officers

Mr. Steve Dembner, freelance writer/editor, Rome, Italy was employed to teach the course. The goal of the course was to enhance the writing capability of selected Ministry of Agriculture and Cooperatives personnel. Thirty seven people enrolled in the course of which twenty-six successfully completed the requirements of the program. The first draft and/or revised draft of 14 field support guides, five production guides, two research reports, two proposals, and three annual reports were completed in the course and submitted to the Information Section. One hundred percent of th course participants reported that the content of the course was needed and they plan to use the skills they learned.

Farming Systems Research Workshop* (CURRY, and Seubert)	(5)	March 1988	Nhlangano Sun	SAO's, RO's,NSMS's SEO's, and RA's

A workshop on Farming Systems Research and Extension for MOAC personnel was held in Nhlangano, 1-4 March. Approximately 60 people attended. The purpose of the workshop was to present a summary of Project FSR/E activities/accomplishments to date, and to provide a forum for discussion of issues related to on-farm research and extension.

The MOAC Principal Secretary, Mr A.V. Kunene, opened the workshop. During the opening session, The Director of Research and Planning, Ms. N. Dlamini, presented a history of agricultural research in Swaziland. Dr. Allan Low of CIMMYT provided a regional overview of FSR/E activities in Southern Africa. C. Seubert and D. Grenoble summarized the research activities in rainfed agronomy and horticulture conducted by the Project since its inception.

During the second day of the workshop, Project members presented details of research methods and results in order to improve participants' understanding of FSR/E work in Swaziland. These presentations took the form of a series of case studies in six farmer problem areas. These were:

1. Low Maize Plant Populations, (Mamba, Patrick, and Seubert);

2. Seasonality of Vegetable Production on Swazi Nation Land, (Grenoble, Gama, and Curry);

3. Poor Weed Management, (Seubert, Patrick, and Mamba);

4. Low Dry Bean Production, (Mamba, Pali, and Malaza);

5. Water Shortages for Vegetable Crops: Trickle Irrigation, (Gama, Grenoble and S. Dlamini); and

6. Poor Cotton Pest Control, (Curry, and B. Bhembe).

In addition to these activities, the Pasture Agronomist, P. Mkhatshwa, and Crop Screening Section Head, J. Pali, hosted a field visit to the Research Division substation at Nhlangano. In the evening, the workshop held a poster session containing displays on maize and bean varieties, socioeconomic surveys, horticulture, agricultural information and extension activities. The session was organized by the Contract Extension Agronomist, K. Iversen.

The major objectives of the morning of "day three" were to demonstrate how research results had been put into field support guides and how these guides could be used to make recommendations to farmers. Three presentations were given. These were:

1. How Field Support Guides are Produced, (Diamond, Hlophe and Matsebula);

2. How to use Field Support Guides, (Seubert); and

3. Small Group Sessions for Problem Solving and Making Farmer Recommendations: Using the Field Support Guides, (Patrick and Diamond).

The small groups reported back to plenary sessions.

In the afternoon, workshop participants were divided into five groups to discuss issues concerning research/extension linkages, and the institutionalization of on-farm research.

The workshop resulted in the consolidation of the on-station and on-farm staff in the various sections of the MRS. This management decision by the

Chief Research Officer has very positive implication for the institutionalization of the research activities of the Ministry.

Research Assistant Training Workshop (D. GAMA, M. Hlope)	(5)	14-18 March 1988	CODEC MRS	Research Assistants

This workshop mistakenly appeared in the 1987-88 Annual Work Plan. It was not intended that two Research Assistants Training Workshops would be scheduled so close together (another workshop was scheduled for April 3 to 8). Therefore, this workshop was cancelled.

The following workshop was not completed during the Second Quarter as planned but has been rescheduled for the Third Quarter.

Library Staff Trn'g. (HLOPE, Matsebula, and Diamond	(30)	1-31 March 1988	MOAC & MRS	Library Staff

The Extension Training Specialist in consultation with both the Agricultural Officer (Training) and Agricultural Officer (Information) has requested and obtained approval from the Peace Corps Director to make available a small group of Peace Corps Volunteers to organize the MOAC library.

Planning T&V Messages: The National Subject Matter Specialists are advance planning their monthly T&V lesson plans without the assistance or encouragement of the Extension Training Specialist or Extension Agronomist. Evidence of this activity was exhibited in the February, March, and April 1988 T&V messages. At this point, it appears that advance planning and distribution of T&V message plans has moved closer to being institutionalized within the Swazi extension system.

Plans for the Extension Planning Conference: The Extension Agronomist and Extension Training Specialist have conducted two planning meetings (16 and 22 March) with the appropriate Ministry Agricultural Officers to discuss the goals, objectives, and program of work for the Extension Planning Conference scheduled on 21-22 April 1988.

Advanced Agricultural In-service Training Workshop Plans Completed: The Extension Training Specialist, and Extension Agronomist attended the monthly National Subject Matter Specialist and Research Officer collaborative meetings in Manzini during the Quarter. At the March

meeting, SEO's, NSMS, SAO's, and RO's approved the curriculum, as amended, for the Advanced Agricultural In-Service Training scheduled in May.

Helping Provide Extension Education Diploma Program, University of Swaziland, with Additional Educational Resources to Enhance Basic Educational Skills: The Extension Training Specialist was invited to be a guest lecturer at the University of Swaziland/Luyengo. The topic presented on 9 March 1988 was titled "Leadership Development in Rural Communities." The topic presented on 22 March 1988 was titled "Train and Visit Extension System." The audience for each presentation consisted of 22 first year students majoring in the Agriculture Diploma program. -

Training for the NSMS's in the Use of the Microcomputer: The Extension Agronomist worked individually with a few NSMSs in the Crop Production office to teach the use of the Macintosh Plus computer. Several NSMSs are now using the computer. One of the secretaries is also using it for office work and for preparing materials for the NSMSs.

6. Improve the capability of the MOAC to formulate policy, plan and implement programs and projects which will relieve constraints to productivity of SNL farmer.

The following are activities and accomplishments during the Second Quarter which have been achieved by MOAC personnel, including those provided through the Contract.

The Rural Sociologist continued work with the T&V evaluation team. Questionnaires were distributed to all Extension Workers and Extension Officers in January. Completed questionnaires were received in March and entry of the data into the computer has begun.

Paul Jakus, computer programming consultant, departed Swaziland on January 7. All aspects of the Scope of Work were completed prior to his departure except for the writing of the relevant reports. The consultancy report, written after his return to North Carolina State University, was received in late February.

During the consultancy, computer programs which were originally written for West Africa were revised for Swaziland conditions, and MEU staff were trained in their use and application. These programs develop input/output, cost/return budgets for individual fields/crops, individual farms/ livestock and whole farms as well as aggregate budgets of the same three types. Since the departure of Mr. Jakus, the two Agricultural Economists

have been meeting regularly with MEU staff to implement the system. Presently, data from the 1986-87 crop season are being recorded for input into the "Swaziland Agricultural Statistics Program" (SASP). It is planned that this will provide experience to MEU staff in the operation of the system as well as in the development of some crop budgets for use by the Malkerns Research Station Agricultural Economists and others in the MOAC.

The Contract Agricultural Economist has written a draft of the "SASP users Manual" which will be sent to Penn State University for consideration for publication.

POLICY ADVISOR

Activities have centered on the Agricultural Development Program exercise initiated previously. Contributions were made to several subobjectives.

1. Improve the capability of the MEU to serve the statistical needs of the MOAC.

   a. A draft project proposal was prepared for submission to UNDP to strengthen the MEU and increase its statistics-gathering capacity.

2. Strengthen the planning and policy making capabilities of the MOAC.

   a. A proposal for administrative/management training and improvement for senior MOAC officials was submitted to a private foundation, and a training program for one of the Directors was planned.

   b. Technical assistance needs were identified in the Phase II Report and costs for various programmatic levels determined. Meetings were held with Directors, Section Heads, and others, and a general meeting with the Project Committee was held.

   c. Two personnel in the planning unit are being trained at the present time--not by CSRET--.

3. Policy and planning guidance attuned to MOAC's current needs.

   a. Several reports were prepared and used by administrators.

   b. The research for the project entitled "Changes in Agricultural Land Use: Institutional Constraints and Opportunities" was completed and reports made available to the MOAC and others by the Land Tenure

Project. Two meetings were held, one internal to MOAC, to review tentative findings. The final research report and the draft options paper are being reviewed and two meetings to discuss the report and the paper have been scheduled. A seminar, capping the formal exercise and reviewing policy options, is being planned.

c. A consultant advised on National Maize Cooperatives policy and operations.

4. Secure full review and acceptance of MOAC/C/1986-84.

a. The Phase II Report is based on MOAC/C/1986-84.

5. Prepare subsector strategies and Ministry-wide program for implementing strategy.

a. Great progress was made toward achieving the sub-objective. Sub-sector strategies were completed and a Ministry-wide program to implement them prepared. A six person consultancy, provided by USAID, assisted MOAC personnel in the preparation of the report entitled "Workplans for Sub-sector Strategies, Agricultural Development in the Kingdom of Swaziland", Phase II.

b. Draft sub-sector strategies are complete and ready to be reviewed by the Minister and Principle Secretary, and final decisions made on them.

c. A Ministry-wide program for implementing the strategy is in hand. Other projects are flowing from the program. (UNDP, MEU and Annual Campaign Project; EEC RP Department strengthening project and others. See 6 below.)

6. Improve organizational structure.

a. The need for some reorganization was recognized during the Agricultural Development Program exercise.

b. Administrators through the Directorate level are committed to considering reorganization, and a project identification brief prepared.

A Three Year Rolling Plan of Professional Development Activities was drafted for the review of upper-level MOAC administrators. The plan includes a projection of training needs and selected other activities anticipated during the 1988-89, 1989-90 and 1990-91 fiscal years.

DEPARTMENT		1988-89	1989-90	1990-91
AGRICULTURE	WHAT:	Annual Extension Planning Workshop		
	PURPOSE:	Develop Annual Calendar of Extension Training Activities		
	IN CHARGE OF PROGRAM DEVELOPMENT:	SAO/E, and Ag Officers for Extension Training and Information		
	WHEN:	April		
	VENUE:	CODEC		
	PARTICIPANTS:	SEOs, PMs, NSMSs, EOS, Coordinators, DSMSs, and VOs		
AGRICULTURE	WHAT:	Advance Agriculture Inservice Workshop		
	PURPOSE:	Up-date on New Research Technology		
	IN-CHARGE OF PROGRAM DEVELOPMENT:	Agriculture Officers for Extension Training and Extension in Conlultation with ROs		
	WHEN:	Feb. and Mar.		
	VENUE:	District Training Centers		
	PARTICIPANTS:	EOs		

THREE YEAR ROLLING PLAN OF PROFESSIONAL DEVELOPMENT ACTIVITIES FOR THE MINISTRY, DEPARTMENT OF AGRICULTURE, AND DEPARTMENT OF RESEARCH AND PLANNING

DEPARTMENT		1988-89	1989-90	1990+91
MINISTRY	WHAT:		Management and Leadership Skills Workshop	
	PURPOSE:		Development of Management and Leadership Skills with Special Emphasis on Understanding: Personality Types and Leadership Skills	Management Styles and Developing Support
	IN-CHARGE OF PROGRAM DEVELOPMENT:		Deputy Principal Secretary	
	WHEN:		August	
	VENUE:		Protea Piggs Peak Hotel	
	PARTICIPANTS:		Upper and Middle Level MOAC Administrators	
PERSONNEL	WHAT:		Secretarial Training	
	PURPOSE:		Develop Office Management Skills	
	IN-CHARGE OF PROGRAM DEVELOPMENT:		Under Secretary for Personnel	
	WHEN:		February	
	VENUE:		Headquarters	
	PARTICIPANTS:		MOAC Sec. Staff	

DEPARTMENT		1988-89	1989-90	1990-91
AGRICULTURE	WHAT:	Intensive Technical Agricultural Training: Maize Diseases	Legumes	Root Crops
	PURPOSE:	In-depth Study of a Commodity Problem		
	IN-CHARGE OF PROGRAM DEVELOPMENT:	Agriculture Officers for Extension Training and Extension	J. Pali	D. Sithole & D. Gama
	WHEN:	Feb. and Mar.		
	VENUE:	Dist. Training Centers		
	PARTICIPANTS:	Extension Personnel with Specific Technical Needs		
AGRICULTURE	WHAT:	Agricultural Input Suppliers Technical Up-date Workshop		
	PURPOSE:	Up-date Retail Agricultural Merchants on New Agricultural Technology for Farmers	Pricing & Marketing	Storage & Distribution
	IN-CHARGE OF PROGRAM DEVELOPMENT:	Agriculture Oficers for Extension Training, Extension, Seed Multiplication, S. Mamba and W. Gindza		
	WHEN:	Feb. and Mar.		
	VENUE:	Dist. Training Centers		
	PARTICIPANTS:	Input Ag Suppliers DSMSs and District EOs		

DEPARTMENT		1988-89	1989-90	1990-91
AGRICULTURE	WHAT:	Microcomputer Training		
	PURPOSE:	Word Processing		
	IN-CHARGE OF PROGRAM DEVELOPMENT:	Agricultural Officers for Information and Extension, and CRO		
	WHEN:	Jan., March, and June		
	VENUE:	MOAC		
	PARTICIPANTS:	MOAC Staff		
RESEARCH AND PLANNING	WHAT:	Research Methods for Research Officers		
	IN-CHARGE OF PROGRAM DEVELOPMENT:	CRO and CSRET Research Methods Officer		
	PURPOSE:	Experimental Design	Research Analysis	Research Reporting
	WHEN:	June		
	VENUE:	MRS		
	PARTICIPANTS:	Research Officers AND NSMSs		

DEPARTMENT		1988-89	1989-90	1990-91
RESEARCH AND PLANNING	WHAT:		Writing Skills Workshop----------	
	PURPOSE:		Improvement of Technical Writing Skills----------	
	IN-CHARGE OF PROGRAM DEVELOPMENT:		Agriculture Officers for Information and Training And CRO----------	
	WHEN:		May----------	
	VENUE:		Foresters Arms----------	
	PARTICIPANTS:		MRS Staff----------	
RESEARCH AND PLANNING	WHAT:	Research Methods for Research Assistants----------		
	PURPOSE:	Farming Systems----------Field Plot Design--------Records & Analysis-----		
	IN-CHARGE OF PROGRAM DEVELOPMENT:	Research Officers and CYMMIT Officials----------		
	WHEN:	June----------		
	VENUE:	MRS----------		
	PARTICIPANTS:	Research Officers, NSMSs, and T&V Coordinators----------		

DEPARTMENT	1988-89	1989-90	1990-91
RESEARCH AND PLANNING	WHAT: MRS Field Day for Research Station-Fruits, Vegetables & Dairy--Cereals & Grain Legumes-		
	PURPOSE: Review of Research Results----------		
	IN-CHARGE OF PROGRAM DEVELOPMENT: CRO----------		
	WHEN: January----------		
	VENUE: MRS----------		
	PARTICIPANTS: Extension Personnel----------	Farmers----------	Farmers----------
RESEARCH AND PLANNING	WHAT: Workshop on Insect Identification and Control----------		
	PURPOSE: Identification and Control of Insects----------		
	IN-CHARGE OF PROGRAM DEVELOPMENT: CRO, SAO/E, SAO/TS and Dean of Faculty UNISWA----------		
	WHEN: December----------		
	VENUE: MRS and UNISWA----------		
	PARTICIPANTS: Selected MOAC and UNISWA Staff----------		

DEPARTMENT	1988-89	1989-90	1990-91
WHAT: PURPOSE: IN-CHARGE OF PROGRAM DEVELOPMENT: WHEN: VENUE: PARTICIPANTS:			
WHAT: PURPOSE: IN-CHARGE OF PROGRAM DEVELOPMENT: WHEN: VENUE: PARTICIPANTS:			
WHAT: PURPOSE: IN-CHARGE OF PROGRAM DEVELOPMENT: WHEN: VENUE: PARTICIPANTS:			

B. Other Activities in Support of the Workplan.

Contract team members prepared and reviewed several sets of materials regarding the proposed Project Extension. All team members participated in the Penn State/Tenn State University internal review in early March.

The Socioeconomic Section members attended a meeting on March 7 to review the report of the Devres team regarding Subsector Strategies for MOAC.

A consultant, Dr. Francis Witham, spent from January 25 to February 26 working with the Horticulture Section in the area of post harvest handling of fruits and vegetables. The first two weeks were spent in visiting irrigation schemes to assess the current situation in regard to handling of fresh produce, and in talking with individuals in the marketing section of MOAC and at the new market facilities near Matsapa. A draft of a field support guide was prepared which will outline practices for farmers to follow in maintaining quality produce between the harvest and marketing periods. The consultant also made presentations on the subject at the Advanced In-Service Agriculture Training workshops held in February in each of the four Districts.

The Extension Agronomist compiled a list of all field extension staff in country for general use by all MOAC staff.

The Extension Training Specialist, Chief of Party, and Agricultural Officer (Training) visited the Managa Agricultural Management Centre at Mhlume on 23 March 1988 at the invitation of Mr. Joseph Mamba, Registrar. The purpose of the visit was for the MOAC Training Section to become familiar with their course offerings, facilities, and administrative procedures in the event that the Project may have the opportunity to sponsor individuals for management courses.

The Extension Training Specialist and National Subject Matter Specialist (Livestock) visited the Lundzi Pig Farm near Bhunya on 31 March 1988 to meet with Mr. Alfred Ndwandwe, Manager. Mr. Ndwandwe was requested to teach a component of the curriculum titled "Pig Production" for the Advanced Agricultural In-Service training scheduled in May.

The Extension Training Specialist was requested to meet with Dr. Greenman Mansini, Dean, College of Agriculture, University of Swaziland/Luyengo Campus on 22 and 26 March 1988 to discuss and offer advice regarding the updating and revision of the curriculum for the Agriculture Diploma and BSc.

degree programs. The curriculum for the Agriculture Diploma program is being changed from a two to a three year program and the BSc. Degree program from a four to a five year program. Additional meetings will be held during the third quarter as well.

The Extension Training Specialist met with the Research Assistant Coordinator, Mbusa Hlope, to review the planned curriculum for the "Research Assistant Training Workshop" scheduled for 5-6 April 1988 at CODEC and Malkerns Research Station. Mr. Hlope did a very commendable job of planning the workshop and curriculum without the assistance of the Extension Training Specialist.

C. Problems or Delaying Actions.

Postponement of two consultancies scheduled for the Second Quarter has caused delays in completion of survey data analysis and reports. Some of this data is necessary in order to complete other related work, for example, the completion of the update of the paper regarding management characteristics of maize growers awaits the completion of the analysis of the Labour and Input Use survey data.

There is evidence to suggest that the RAs need additional inservice training to deal with problems of the types noted on pages 8 and 9.

Transportation remains a serious problem throughout the Ministry. Extension is especially hard-hit due to the amount of travelling required for meetings and visits.

Lack of financial support and or transportation caused several field officers to cancel plans for field demonstrations this year.

Editing and artwork of field support guides continues to be a bottleneck due to staff shortages. Two publications written before the 1987-88 growing season have not yet been released.

D. Proposed Activity for the Third Quarter.

See the 1987-88 Annual Work Plan for a detailed list of the planned activities for the Project. Other activities are noted below.

Using the results of the on-farm trials from the past four years, extension recommendations on the use of herbicides for maize can be made. This means that farmers will have an alternative strategy for combating weed

problems, a serious constraint to improved maize production for SNL farmers.

The results of the maize variety trials will provide additional information needed to update the 1987/88 Maize Variety Recommendation Fact Sheet for the upcoming season.

The results from the grain sorghum and soil moisture on-farm trials will provide information for redesigning on-farm trials in future years. The on-station and on-farm research for these two trials will need to be continued for about three more seasons before resulting in extension recommendations.

The lime and fertilizer on-farm trials will, if enough usable results are obtained from this season, provide for the improvement of the current lime and fertilizer recommendations for maize.

The Field Support Guide titled Fertilizer Grades by C. Seubert is planned for development during the Third Quarter (1 April - 30 June 1988)

Library Improvement: A small group of Peace Corps Volunteers will work full time during a two-week period from May 9 through 20, 1988 in completing the task of organizing and shelving the books in the Headquarters MOAC Library. The Peace Corps Office will support the activity by providing per diem for those who do not live in Mbabane. The specific tasks to be achieved during this effort will be: (1) to label the library shelves according to the system adopted by the Ministry; (2) to separate the books, periodicals, and journals into appropriate categories; and (3) to place all publications on appropriate shelves. When these tasks have been achieved, the MOAC will proceed with the training of a librarian.