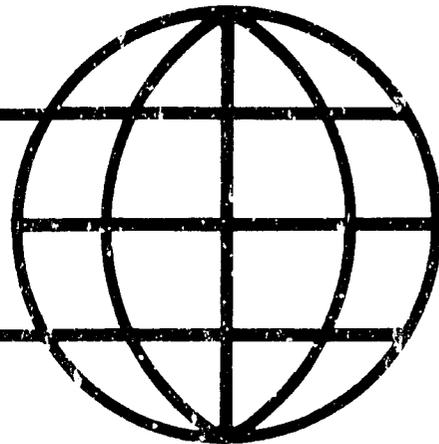


AD-1135-1-00-1078-00  
135-1-00-1078-00  
135-1-00-1078-00

**COOPERATIVE AGREEMENT ON HUMAN SETTLEMENTS  
AND NATURAL RESOURCE SYSTEMS ANALYSIS**



**Clark University**  
International Development Program  
950 Main Street  
Worcester, MA 01610

**Institute for Development Anthropology**  
99 Collier Street  
Suite 302, P.O. Box 2207  
Binghamton, NY 13902

AD-1135-1-00-1078-00

EMPLOYMENT GENERATED BY PROJECTS  
OF THE  
CENTRAL TUNISIA DEVELOPMENT AUTHORITY

Susan Schaefer-Davis  
October 1985

## CONTENTS

	<u>Page</u>
Acknowledgments	1
Executive Summary	3
Introduction	8
Different Types of Farmers	17
Methodology	23
Site Selection	23
Sample Selection and Data Collection	27
Training	34
Results and Discussion	34
Introduction	34
Farming	37
Project Construction and Implementation	61
Business Conditions in Sbeitla, Foussana and Majen Bel Abbes	63
Recommendations	69
Aid for Different Types of Irrigated Farming	70
Improvement in Marketing of Produce	75
Livestock	79
Credit	80
Bibliography	82
Appendix A	84
Farmer Questionnaire	84
Merchant and Service Questionnaire	91
Appendix B	96
Report on <u>Delegation</u> of Sbeitla	97
Report on <u>Delegation</u> of Majel (or Majen) Bel Abbes	117

## ACKNOWLEDGEMENTS

Many people were very helpful to me in the process of gathering data for this report. William Egan, of USAID/Tunis, was very helpful during the course of the study. In the central office of CTDA in Kasserine I would like especially to thank Mohamed Sakri, Bashir Nayja, and Mohamed Hajji, as well as Mme. M'Della Bouazizi and Mr. Hattab Ben Chaabane. The CTDA staff at each of the three sites where I collected data are thanked for giving me a great deal of time and information. Abdelmalek M'Nasri of Sbeitla, Lakdhar Ben Othman of Majen Bel Abbas, and Mohamed L'Arusi of Foussana are all subdivision chefs whose explanations of conditions in their areas were invaluable. Several local agents generously spent long, hot hours and missed their lunches in helping me with interviews; they include Lakdhar Ben Othman of Majen Bel Abbas, Houcine Daly and Haen Saaduni of Sbeitla, and Abdellatif Bennani of Foussana. Ali Ajlani of Sbeitla provided detailed information on several local projects. Our research assistants, Mmes. Najwa Harrathi and Sonia Tlili, are thanked for helping with interviews and with written translations, and Wassila Nasraoui is thanked for her translation and typing. The advice of Bob Smith, Bill

Graulich, Mike Lamb and Mylen Bohle, all Americans who had worked in agriculture in this area, was also appreciated. Ongoing discussions with Muneera Salem-Murdock and the comments of Michael Horowitz, both of IDA (the Institute for Development Anthropology), were especially useful in formulating the research. I also want to thank my husband, Douglas Davis, for support that ranged from child care to computer programming. Finally, the farmers and merchants who participated in this research are thanked for their cooperation and their hospitality.

## EXECUTIVE SUMMARY

This report analyzes the employment generated by the projects of the Central Tunisia Development Authority (CTDA), an agency that since 1978 has worked to promote integrated development in the relatively deprived area of Central Tunisia. Often the success of development projects is evaluated solely on how well they accomplish their primary goals, for example, making it possible for a certain number of farmers to practice irrigated agriculture. While such evaluation is certainly necessary, projects often have further effects, which are overlooked but nonetheless important. One of the general goals of CTDA is to improve rural living conditions, both by providing means of livelihood with farm assistance and by improving the infrastructure in terms of health care, potable water, and roads. If certain CTDA projects generate greater employment as they are implemented, this too contributes to better living conditions. People can remain in rural areas with their families, and they can afford to eat, dress, and live more comfortably with the extra income. During the summer of 1985, research on employment generation in CTDA projects focused on

two types of CTDA projects, infrastructure construction projects, and irrigated farming projects. The first involved examining the labor used in constructing such infrastructure projects as health centers and potable water sites. While a good deal of employment was generated, it was on a one-time basis. Projects in irrigated farming, however, provided both one-time (well-digging) and ongoing (agricultural labor) employment. Thus most of the research effort was directed at better understanding the types and amounts of work generated by farmers who had land in Public Irrigated Perimeters (PIIs) as compared to work by farmers who had individual shallow wells. CTDA provides support for both types of farming.

Generalized data were collected on CTDA projects from agency officials at the central office in Kasserine and several regional offices. On the basis of this information, it was decided to interview PPI and shallow-well farmers at three sites. Majen Bel Abbas is in the drier, poorer southwestern corner of the Kasserine governorate, and has had CTDA assistance only since 1983. Sbeitla provides a contrast in that it is one of the more fertile and rich areas of the governorate and has had CTDA involvement since 1979. Foussana, to the northwest of Kasserine, has also had a CTDA presence since 1979, but its PPIs have been in

operation for only two years. This variation allows a contrast of areas in terms of general economic climate and in length of CTDA involvement. Five farmers of each type were individually interviewed for about two hours at Sbeitla and Majen Bel Abbes and three of each at Foussana. Two dryland farmers were also interviewed at each site to provide contrast. All were questioned about several topics, including family size, amount of time working with irrigation, size of plots, crops grown and sold and their prices, and large expenditures (to show disposable income). Farmers were also asked about the amount of labor they hired and the names of merchants they dealt with. Subsequent interviews were conducted with twenty-six of the merchants to see how much of their business came from irrigated farmers and to get their assessment of the current economic climate. A final type of data was the amount of employment generated in the construction of CTDA projects as estimated by agents who had observed the work teams in Majen Bel Abbes and Sbeitla.

CTDA projects were found to generate a great deal of employment, and agricultural projects to generate more than the construction phase of infrastructure projects. Further, much of the work in agriculture is recurrent, while construction work is over after a hospital or water point is built. If we compare the two

types of farming, we find that shallow-well farmers at all sites hire considerably more labor (to farm, transport crops, plant trees, dig wells, and build houses) than do PPI farmers at any site. While the former obviously must hire labor for wells and PPI farmers need not, this alone does not account for the difference in their rate of hiring. Comparing reported agricultural income and general expenditures site by site, shallow-well farmers at Majen Bei Abbas and Sbeitla earn and spend more than those on a PPI. This is reversed at Foussana, however, with PPI farmers earning much more, and spending somewhat more, than the shallow-well farmers there. It is likely that the Foussana PPI farmers were more successful than is typical for the area, but their performance shows that one can do very well on a PPI.

Recommendations suggest that more support be given to shallow-well farmers than to those working on PPIs, in light of the larger number of people hired by the former. It is noted that shallow-well farmers appear to depend more on working abroad to earn "start-up costs" in farming; with the closing off of jobs in Libya, local assistance is even more important. Several of the recommendations are in the form of an experiment: one involves comparing PPI farmers who have dug shallow wells with others outside the PPI to help determine if

greater access to water is the key to farming success. Other recommendations focus on marketing farm produce. These include small, "pilot" co-ops composed of relatives in each area; truck loans given to needy and to average farmers and the success of the enterprise and the loan repayment compared; and improving ease of communication in arranging pickups between truckers and farmers. A major improvement in marketing would be to provide a stable demand for certain crops by building a processing plant that would purchase them. Another suggestion is for loans to provide small numbers of sheep to both male and female farmers and to compare their productivity, use of profits, and repayment rates after a few years. Finally, since many farmers said that access to capital was a major problem, an agricultural credit program should be established or expanded. This too, could be made experimental, to determine which conditions are most likely to lead to prompt repayment.

In general, it was concluded that CTDA projects are generating substantial amounts of employment, in addition to promoting integrated rural development in more direct ways. Their important and productive work deserves further support.

## INTRODUCTION

This report analyzes the employment generated by the projects of the Central Tunisia Development Authority (CTDA). It attempts to be as comprehensive as possible, including both on- and off-farm and direct and indirect work as assessed by research in Central Tunisia. This research was done under the auspices of the Institute for Development Anthropology (IDA) under a Cooperative Agreement with Clark University and the Agency for International Development. Information about the CTDA and the goals of the research will be useful in clarifying the scope of this report.

The Central Tunisia Development Authority was established by decree in August 1978 to promote integrated regional development in the relatively deprived area of Central Tunisia (see Figure 1). Central Tunisia falls behind the country's northern and eastern coastal areas on several important economic measures: the coasts, with their higher rainfall, have more productive agriculture as well as large concentrations of consumers, more industry, and tourism as bases for their greater development. The Government of Tunisia created the CTDA to help the inland area catch up with the rest of the country. There has been some variation in the length of time the CTDA has worked in different parts of



central Tunisia; in general it has been involved longer in the northern part of the CTDA domain than in the southern. For example, CTDA has worked in Sbeitla since it began operations in 1979, but in more southern Majen Bel Abbes only since 1983. Currently CTDA works in all twelve delegations of Kasserine governorate as well as in Siliana to the north and Gafsa North and Sned to the south.

The main purpose of CTDA is to encourage integrated regional development via a variety of projects. Regional officials often stressed this point of difference from already existing agencies such as the Ministries of Agriculture or Social Affairs. Thus CTDA has projects to set up plots of public irrigated land, to provide loans to farmers to buy well motors, to build rural health centers, to provide sources of potable water, and to build stables, to mention a few. However, most projects can be grouped into two main categories: agricultural assistance and the creation of rural infrastructure. Table 1, reproduced from a chart in the Kasserine office of CTDA, lists the categories of projects sponsored by CTDA and shows the areas of emphasis and total expenditures for each.

Development projects are usually evaluated on how well they have achieved their primary goals, e.g., potable water accessible to rural people in a certain

**TABLE 1:**  
**LIST OF CTDA PROJECTS**

<u>Project</u>	<u>Money spent 1979-1985</u>
 <u>I. Hydro-agricultural Projects</u>	
Equipment (pumps and pipes)	160,000
Repair of PPIs	1,354,100
Creation of PPIs	1,919,950
Improvement of surface wells	441,500
Repair and deepening of surface wells	21,000
Creation of surface wells	679,450
Equipment for surface wells	992,950
Creation of deep wells	60,000
Improvement of springs	42,000
Drainage and cleaning	70,000
Subtotal I	5,740,950
 <u>II. Animal and vegetable production</u>	
Plantings	863,270
Demonstration and pilot plots	107,600
Improvement of fodder crops	306,600
Genetic improvement	30,000
Beekeeping	78,500
Construction of animal shelters	110,000
Forest clearings	180,000
Construction of sheep dips	25,000
Subtotal II	1,590,970
 <u>III. Improvement of basic living conditions</u>	
Weekly markets	45,000
Storage centers	239,000
Motorized equipment centers	205,000
Refrigerated storage center	80,000
Agricultural roads	2,060,000
Electrification	1,108,400
Potable water - SONEDE	870,900
Potable water - G.P.	1,000,000
Rural health centers	2,134,280
Subtotal III	7,742,580

IV. Diverse projects

Motorpool	146,000
Extension	749,890
Studies and surveys	176,000
Central office	318,400
Experimental funds	195,000
SONEDE (water)	328,200
Subtotal IV	1,913,490
Grand Total	16,987,990

area. While this is essential, such projects may have important secondary effects that are not assessed at all. Consequently, they may provide real benefits which are never reported. This research on employment generation is an attempt to evaluate such a secondary effect. In fact, one could argue that employment generation, even if indirect, should not be considered a secondary but rather a primary effect of CTDA projects. In the building of rural infrastructure and the provision of agricultural aid, one of the general goals of CTDA is to make available to rural citizens a quality of life comparable to that of town and city dwellers, thus making rural life more attractive. If there are not enough jobs, however, people will have to leave rural areas no matter how much they would like to stay. Employment generation allows more people to remain in rural areas, a goal that many of the families I interviewed indeed espoused. The scope of work for my research called for assessment of employment generated by "CTDA projects" in general, but after consultation with CTDA officials it was narrowed to focus on irrigated agriculture plus an overview of work generated by project construction at two sites. One reason for this selection was the time constraint: it would be impossible to follow up on the employment generated by all CTDA projects. More important, not all

projects have an equal potential to generate jobs. Most of the infrastructure projects (such as building rural health centers or roads) provide jobs only in their construction phase. Since these jobs are not usually considered in project evaluations, I have assessed them for two CTDA areas (Sbeitla and Majen Bel Abbas) to give an indication of the work generated, which is both useful in itself and for comparison with other, ongoing employment that is generated. The importance of ongoing employment led me to focus on CTDA projects in irrigated agriculture.

Agricultural assistance is given mainly to farmers on Public Irrigated Perimeters (PIPs) or to individuals to dig and equip shallow wells to irrigate their land. These two categories of farming were examined separately because they represent different CTDA approaches to irrigation and are judged by most local officials to have different results. The PIPs are relatively large plots of land (40-120 hectares), which are irrigated by one or more deep wells. Families have plots of two to five hectares each and receive water, as scheduled by the CTDA, for which they pay. Individual shallow-well farmers operate more independently of local authorities once they have received assistance to dig, build, and equip a well with a motor. They buy their own fuel and draw water as often as they wish. Local

officials frequently voiced the opinion that shallow-well farmers were more productive than those on PPIs, and this was often attributed to what they called a bu-blash attitude of the PPI farmers. Bu-blash means "one who is always wanting" in the Tunisian dialect of Arabic; in the US it would probably be translated as "a welfare mentality" or "wanting something for nothing." It was stated that the PPI farmers had benefited from irrigation by the chance of living where a well had been drilled, while those with shallow wells had to exercise their initiative to obtain all the necessary permits and loans. This was taken to indicate that the latter were harder workers and put more effort into their farming. Another differentiating factor, not stressed by local officials but noted both by me and by Salem-Murdock in her research on households, was that PPI farmers had much less frequent access to water, which has a definite impact on producing irrigated crops. Crop production and labor hired will be analyzed separately for the two types of farmers in order to quantify some of the differences and perhaps illuminate some of their origins. Both on PPIs and in areas with shallow wells, agricultural productivity has been calculated to require greater labor input than in dryland farming. The availability of water allows the CTDA-assisted farmer to practice intensive irrigated agriculture

rather than the traditional local dryland cereal agriculture (growing mainly wheat and barley and perhaps some olive and/or almond trees) combined with sheep raising. It is estimated that dryland cereals require about one person/month a year labor per hectare (about 2 1/2 acres) without mechanization and 20 days a year with it; many farmers in Central Tunisia use both methods. On the other hand, one hectare with one crop a year of irrigated vegetables (and some local farmers grow two a year) requires one and one-half person/years of labor, while one hectare of irrigated trees requires a little over one person/year. Thus agricultural assistance clearly generates ongoing employment directly on the farm, and off-farm as well, as will be seen below. In addition, while CTDA officials stress the integrated nature of their projects, they also feel that irrigation is one of the most important areas. For all these reasons, my most intensive research focused on irrigated agriculture.

Since much of the employment generated by assistance for irrigated agriculture is not immediately apparent, I used the most inclusive approach possible, assessing both direct and indirect and on- and off-farm work growing out of irrigated agriculture projects. Since there is not general consensus on what is considered direct and indirect work, I will define my use

of these terms, which is related to the source of funds for the work. Direct work is that directly financed by project funds, such as employment of workers hired to build a health center or to install a well motor, and also includes the farmer who works his own irrigated land when project funds have made the irrigation possible. Indirect work is that work paid for by other funds, such as the farmer hiring agricultural laborers with money he has earned selling crops (this money is not given to him by the project; he has worked to produce it), or hiring construction workers to build him a house. However, hiring construction workers to build a pumphouse with funds provided by CTDA would be an example of direct labor. Other examples of indirect jobs generated by CTDA funds include the proportion of merchants' jobs such as selling cement, meat, or vegetables, that involve work with farmers who are ultimately able to buy because of CTDA assistance.

#### Different Types of Farmers

To help the reader better understand and also visualize the situation of farmers in Central Tunisia, the following sketches describe farmers whom I interviewed. In some cases the descriptions are composites, and in all the names have been changed. However, characteristics typical of each type of farmer are

included; they will be explained in more detail in the section giving results of the research.

Salah, a PPI farmer in Majen Bel Abbas. Salah and his wife and six children live on their three hectares on the PPI of Oom El Aqsab. The PPI is located twelve km southwest of the town of Majen Bel Abbas; as you approach it on the bumpy piste, the PPI and the nearby shallow wells stand out as green plots in the flat brown landscape. Salah has worked on irrigated land since he was small, since this area used to be irrigated by river water. Now CTDA has expanded the amount of irrigable land. Although his father originally owned the land and is still alive, he has given Salah title to the land instead of following the tradition of passing on the inheritance at his death. This occurs on many PPIs: where no one person should have too large a plot, land is divided among relatives.

Salah's children range in age from two to 18 years, and he says they start helping him in the fields at eight or nine; his wife also helps. In addition, he hires someone else living on the PPI to help out for two months in the busy spring planting season. He has two sons who are old enough to do this, but both attend boarding school in other towns. This year he planted squash, tomatoes, and onions, even though the same crops dried up last summer for lack of water; irrigation was

infrequent and water sparse when his turn arrived. He also has ten hectares of dryland on which there are almond, olive and apricot trees, and these provided the only produce he sold last year. He would like to grow wheat and barley for family consumption, but because of the ongoing drought he has not planted grains for the last five years.

He has not had any very large expenses in the last few years. His home was already built, though he did sell two goats in order to put on a new roof. His two sons in boarding school receive government scholarships that cover most of their expenses. He bought some farm tools and a bottled gas stove for cooking, but these do not require large outlays, for which he does not have the capital. He supplements his farming income with a second job as the keeper of a small shop on the PPI. He sells non-perishable items like oil, sugar, tea, and matches, and says his profit is only about ten Dinars a month. He would like to have his own shallow well so he can control his supply of water, and is planning to build one.

Mahmud, a shallow-well farmer in the Sbeitla area.

Mahmud, about 30, lives with his wife and two small children in an area of scattered hills southeast of Sbeitla. The landscape here has more scattered green than the area around Majen Bel Abbas, probably because

water is more widely available instead of being concentrated underground in a few spots. This is a new farm, which has been in operation only two years. The interview took place in front of a newly built two-room stone house, looking toward irrigated fields of recently picked tomatoes and young fruit trees. Mahmud irrigates seven of the 14 hectares near his well and lets the other seven rest, although he would eventually like to plant them almost all in trees when he has enough water; he wants to dig a second well. In addition he has four ha of dryland inherited from his father on which he plants wheat.

Mahmud's children are both under three and too young to help him farm, but his pregnant wife continues to work in the fields. He has hired his brother's son (18) to work with him year round for 45 Dinars a month plus room and board. He has his own tractor (bought from an acquaintance on credit) so does not hire someone to plow, but did hire men to dig holes for the 900 fruit trees he planted this year. The holes should be a meter square, and because the land here is soft a man can dig about four a day at 0.700 Dinars each. Planting fruit trees is very popular among irrigated farmers and provides a great deal of one-time employment.

There is a much wider variety of crops on this farm than on the PPI above. Only wheat and olives are

planted on the dryland, but irrigated crops include wheat, barley, oats, sorghum, and corn (mostly for animals), and onions, tomatoes, peppers, watermelon, melon, squash, and parsley. There are also plum, apple, pear, and peach trees which are too young to produce fruit. He irrigates both the vegetables and fruit trees three times a week (with all the crops, this means his pump works almost constantly), although some extension agents say this is not necessary for the fruit trees. He visits the successful fruit farmers at Sbiba, over 50 km to the north, and follows the advice they give him. He also is following the advice of farmers in nearby Sidi Bouzid, who told him that animal fodder crops are less labor intensive than vegetables, and because his labor pool is small at present, he has planted more fodder this year than last. This is also the reason he wants to have more trees and fewer vegetables. However, last year tomatoes sold to the canning factory in Sidi Bouzid produced over 1300 of his 1700 Dinar crop sales.

These crop sales help support Mahmud's several large expenditures, but he could not have managed them all without another source of income. In his case, as for many shallow-well farmers, funds to start farming were earned by working abroad for several years. Mahmud worked in an office in Libya from 1971 to 1983,

returning occasionally to visit and to purchase land. All his irrigated land was bought between 1978 and 1983 and cost a total of 9400 Dinars; the price increased from 500 to 800 Dinars a hectare in that period. He also used this money to pay about 5000 Dinars to dig and reinforce his well (CTDA gave him a motor loan), and to pay part of the cost of his new house. In the future he hopes to try irrigation with large sprinklers and to have a greenhouse.

Bashir, a dryland farmer near Foussana. The Foussana area has more hills than Sbeitla, lying about 20 km north of the two low mountains that form the Kasserine pass. There are dryland trees and some forests on the surrounding hills, making the area more scenic than the other two sites. Bashir's seven hectares of inherited dryland lie in a flat area between the mountains, but he lives in the town of Foussana because he has a full-time job as a civil servant. His married son and wife and daughter live with him and his wife, and the son also has a job. In fact, the two women help Bashir at harvest time, but his son "doesn't know how because he went to school." The only farm help he hires is a tractor to plow and thresh his two crops, wheat and barley.

In the last several years, Bashir has spent quite a bit of money, more than he has earned even with his

job. His son was married two years ago, and at that time he bought a television set, refrigerator, armoire, bottled gas stove, and gold jewelry. He has also built onto the house in town and is digging a well. Much of these expenditures were financed by selling some of his dryland, and he has CTDA help for his well. He also buys on credit; he purchased 1100 Dinars of building materials and says he is repaying 10 Dinars a month. It is clear that he could not afford these expenses if he had only his farming as a source of income.

## METHODOLOGY

### Site Selection

Although the parts of Central Tunisia in which CTDA operates (the twelve delegations of Kasserine governorate plus those of Siliana, Sned and Gafsa North) share the characteristic of lagging behind much of the country in development, they still vary in important ways. The research was designed to take these variations into account.

The first step was meeting with CTDA officials in the central office in Kasserine to discuss the characteristics of the different delegations and the types and distribution of their projects. Next, several possible sites were visited, including Kasserine North, Sbiba, Feriana, Majen Bel Abbes, Foussana and Sbeitla. (See

Figure 1 for site locations.) Based on talks with local agents, site visits, and factors of variation in climate, economy, and period of CTDA involvement, three sites were chosen: Majen Bel Abbas, Foussana, and Sbeitla. The major contrasts will be between Majen Bel Abbas and Sbeitla, with Foussana providing additional information.

The sites of Sbeitla and Majen Bel Abbas allowed me to sample regional variation in both economy and climate. When CTDA staff were asked to rank the prosperity of the various delegations, Sbeitla was one of the first two and Majen Bel Abbas one of the last two. This judgment is supported by the fact that while the two are virtually the same in area, Sbeitla's 1984 population of 48,356 is triple that of Majen Bel Abbas at 15,311. The denser settlement of the land is related to climatological differences: the rainfall in east central Kasserine is higher than that in the southwest. Finally, while both areas have high unemployment, the 29% of Sbeitla is substantially less than the 51% of Majen Bel Abbas. (Figures are from a printout provided by Mr. Mohamed Sakri, Chief, Planning and Evaluation Division.)

These sites also provide a contrast in the period of CTDA involvement; the agency has been active in Sbeitla since 1979, but only since 1983 in Majen Bel

Abbes. (Official involvement began in 1982, but no project work was intended until 1983.) One indicator of the period of CTDA involvement is the amount of irrigation in the two areas. Sbeitla has three PPIs with an area of about 262 hectares divided among 108 beneficiaries. Majen Bel Abbes has two PPIs with an area of about 150 hectares and 65 beneficiaries. By 1985 Sbeitla had 310 shallow wells and Majen Bel Abbes had 60. Thus in over six years' work in Sbeitla, CTDA has, as one would expect, provided almost twice the irrigation it has in its almost three years in Majen Bel Abbes.

Besides the period of CTDA involvement, the areas contrast in the length of time most of the population has been involved in agriculture, and the access of some of these to irrigation. A local agent who knew both areas well said residents of Sbeitla delegation were much more accustomed to agriculture because of the higher rainfall. He said "85%" of Majen Bel Abbes is still covered with wild halfa grass because it is too dry to make farming profitable without irrigation. Further, in both areas irrigated agriculture was practiced before the creation of CTDA, but to a much larger extent in Sbeitla. The three PPIs in Sbeitla were created in 1954, 1959, and 1971 under the Mejerda agency, which still exists in northern Tunisia and is

concerned with irrigation and the Mejerda River. The Sbeitla office has an employee on its payroll who has been a water distributor in an irrigated area since 1946; some state lands also used irrigation. Thus while their number is not large, Sbeitla has many more farmers with experience in irrigated farming. Majen Bel Abbas was never served by the Mejerda agency, so I was surprised when an elderly farmer replied to my "How long have you worked on irrigated land?" with "Forever" (literally, "Since my grandfather's grandfather"). A part of the PPI on which he worked (12-15 ha) used to be irrigated by a nearby river, perhaps since Roman times.

In the early 1970s a well was drilled to expand the area to 90 hectares, but the water was insufficient. CTDA added another well, but water was still not enough for the full 90 ha.

The delegation of Foussana has some things in common with each of the other two sites. CTDA has been active there for over six years, since 1979, as it has in Sbeitla. It has helped farmers to dig and equip shallow wells in an area where water is relatively close to the surface; Foussana now has 600 shallow wells, the largest number of any Kasserine delegation. As in Majen Bel Abbas, though, the state-run PPIs are quite new to the area, having begun in February 1983. In fact, unlike the other two sites, all the PPI farmers at

Foussana are having their first experience with irrigation. There are currently two functioning PPIs with an area of about 160 ha and 98 beneficiaries. A third PPI is ready to operate but not functioning because of a land dispute, and a fourth one has located water and is now building the necessary distribution system. Foussana offers an opportunity to examine an "old" CTDA site with new PPI irrigation.

#### Sample Selection and Data Collection

Types of Data. Several types of data were collected, including general information on CTDA projects from officials and records in both the central and regional offices, detailed information on the number employed in project construction in two delegations, and intensive interviews with farmers and the merchants and service people with whom they dealt. Collecting the data in this order also provided a good introduction to the community from both my perspective and that of the community. I began with an overview of the area and CTDA's involvement from my talks with local agents, and they, in turn, became familiar with the information I wanted so they could better explain my presence to the community. Visiting and interviewing farmers gave me an idea of their situation; and their comments on merchants, CTDA, and their problems provided a view of both their specific and general context. When I then went

into town to interview merchants, often we had already heard about each other, and all were very helpful. While the specific methodology of collecting general information is self-evident, the data on project construction, farmers, and those with whom they dealt require some explanation.

At both Sbeitla and Majen Bel Abbas I spent several days interviewing office staff about the number of workers who had been hired in the construction or implementation phase of each CTDA project in their area. Thus I learned that building the hospital at Sbeitla generated about six person/years of construction work; and training people in Majen Bel Abbas to make baskets (scourtins in French) to be used in oil presses involved 4 1/2 person/months of employment. The complete information from these interviews is in Appendix B, and a summary in the section on results. It should be noted that this information is based on estimates by a staff member who often observed the project. At first I attempted to obtain precise data and considered interviewing the heads of construction firms who are hired to build projects, or consulting CTDA financial records. However, costs are calculated with labor and materials necessary to build a certain area of wall or floor all in one figure, so labor could not be extracted. Since it was felt that agricultural projects generated

more ongoing employment, the time necessary to locate company heads was deemed too much, and CTDA officials provided estimates. In general, project construction and implementation led to many jobs and should thus be considered as a seldom-reported project benefit.

Further, it is interesting to be able to compare the magnitude of employment generated by construction with that generated by agricultural assistance.

Data on farmers. The most intensive data were collected from farmers, most of whom had some assistance from CTDA. The first step was to select samples of farmers at each site who worked on PPIs or who had private surface wells in a way to represent characteristics of different types of farmers. Local CTDA chefs helped by pointing out differences in PPIs that should be sampled, such as an adequate or insufficient supply of water. Both PPIs were sampled at Sbeitla and Foussana. The local officials knew most farmers and could suggest especially effective or ineffective ones, so that both ends of the spectrum could be included. This allowed me to substantially avoid a common bias, which is to focus outside research on only the best local farms. In order to encompass the effects of other factors the sample included farmers with larger and smaller plots of irrigated land, farmers nearer to and further from transport to markets, and

older and younger farmers (to obtain variations in the amount of family labor available). Very few female farmers were formally recognized as heads of household (though much or perhaps most household labor on irrigated farms comes from females; see Salem-Murdock for details), but one was interviewed at each site. This sampling allows us to assert that we interviewed groups of farmers at each site that span the range of possible characteristics, rather than selecting only excellent farmers with sufficient water at one site and comparing data on them to a group of poor farmers with insufficient water in another area. Unfortunately, because of the small sample size, it is impossible to examine individually the effects of isolation from transport or large or small family size; these factors often overlap and so confound one another. However, sampling does allow us to meet the primary goal of general comparability of samples both across geographic sites and between the different interventions of PPIs and shallow wells. In addition, although they are not usually directly affected by CTDA projects, a few dryland farmers were interviewed to provide a contrast with those having access to irrigation.

The next step was the farmer interviews, the largest component of this research in both time required and results produced. The farms were located over a

wide area, and were visited by me and a local CTDA staff member who would locate the farm, introduce me as a legitimate researcher, explain the nature of my work, and help explain any unclear questions. We were often accompanied by one of two young women who worked as research assistants, and they or the agents helped me administer the 1 1/2 to 2 hour questionnaire in the Tunisian dialect of Arabic. The situation was quite relaxed, and we sat either in the shade of a tree in the fields or in the farmer's home; family members often clustered around. This atmosphere allowed me to go beyond a strict administration of the questionnaire and to ask the farmer and family about other topics as well as to observe characteristics of their interactions (such as a farmer's repeated admonitions to his eight year old son to keep the sheep out of the crops) and living conditions (a surprising number had television sets, powered by car batteries). Although it took almost two hours to complete the interview, farmers were very cooperative in answering questions, and usually frank as well.

Since my main goal was to assess employment generation, the questionnaire asked about the amount of work generated for the farmer and his or her family on irrigated plots, in addition noting agricultural laborers they hired for wages, and looking at workers

who dug wells and built irrigation canals and pump houses. I also asked farmers about recent large expenditures, both to get an idea of their disposable income and to see what work might be generated by the way they spent it. For example, many farmers had recently built onto their homes, or rebuilt homes of adobe in cement blocks, providing a great deal of employment for others in the area. Most farmers sold their produce in nearby towns, hiring truckers to transport it and selling to greengrocers; I asked for amounts of different crops raised and sold and profits earned. Many bought new household items like bottled gas stoves or cassette players or television sets. Those who built bought large amounts of cement and iron in town, and hired truckers to haul it out. All this information is included in the farmer questionnaire, which was revised four times before reaching its final form; it appears in Appendix A.

Data on merchants and service people. The second phase of data collection involved interviews with merchants and service people with whom farmers dealt; it was assumed their jobs were at least partially generated by having more productive and prosperous farmers in the area. Thus after interviewing farmers I spoke to several of the merchants they had mentioned (I requested names, which the farmers found humorous but I found

very helpful), to assess how much of their trade came from farmers with irrigation, and to ask how their operation and the town's business climate had changed since CTDA began operating in the area. Interviews with merchants took about 1/2 hour and were conducted by me and an assistant or CTDA official at the place of business, including vegetable and butcher shops, home appliance and building supply stores, a garage, and corners where truckers parked while they waited to be hired. Again, these people were very helpful; the questions they answered may be examined on the merchant and service questionnaire in Appendix A.

To summarize, the data collected include:

- 1) Estimates of person/months of labor generated by the whole range of CTDA projects in Majen Bel Abbas and Sbeitla; 2) Interviews with five PPI farmers and five shallow-well farmers each in Majen Bel Abbas and Sbeitla, with three of each type in Foussana, and with two dryland farmers at each site, a total of 32 farmers; 3) Interviews with twelve merchants and service people in Majen Bel Abbas, six in Sbeitla and four in Foussana, plus an interview with the largest local supplier of well pumps and motors in Kasserine.

## Training

Several local CTDA officials and two female research assistants received training in the content and administration of survey questionnaires for farmers, merchants, and service people. One research assistant was a primary teacher and the other a university student; both live with their families in Kasserine and should be available to help future researchers, primarily during summers. Six CTDA officials, including local chefs, extension agents, and other staff at Majen Bel Abbas, Sbeitla and Foussana, learned to administer survey questions. The training was via discussions of sampling and method (for example, admonitions not to "feed" people responses) and direct participation with me in helping to conduct interviews. One chef commented that my work had been very useful to him; by his participation he had learned a great deal about the area in general and about different types of farmers.

## RESULTS AND DISCUSSION

### Introduction

Before reporting specific findings, I would like to raise a few general points that will be helpful to the reader in interpreting these results. The first is that

the figures in the tables are in most cases medians, not means, because I felt this would present a more accurate picture of the farmers' actual situations. For example, the five PPI farmers interviewed in Majen Bel Abbas spent 580, 0, 400, 6365 and 0 Dinars (1 DT = \$1.25 in August 1985) on non-agricultural construction. The mean or average of these figures is 1469 DT, while the median, or middle number between the higher and lower figures, is 400 DT; this latter number is closer to what most of the five actually spent than is 1469 DT. The mean is inflated because of the much higher figure of 6365, spent by one unusual farmer who was building a mosque for his community. Thus medians are used because they avoid the influence of extreme figures.

A second point to note is that figures are listed in tables as "reported" income, expenses and so on. This is done to emphasize the fact that these data are from farmers' recall and report, rather than precisely measured production figures. For example, in some cases agricultural expenses exceed agricultural income, most probably because there is a tendency to underreport the latter. However, these figures are still very useful for comparisons across sites or types of farms. While both PPI and surface-well farmers at Sbeitla may underreport their income, the latter report nearly three times the income of the former.

Third, the data on dryland farmers will be reported in the text but not in the tables because I feel it is not representative and might be misinterpreted without verbal explanation. I deliberately interviewed 'average' farmers, that is, those with between ten and twenty hectares of dryland, to avoid the desperately poor and the very rich. This in fact focuses on about one-third of the farming population according to Attia ( ), who says that in the Kasserine governorate 34% of farmers have 11-20 ha and another 36% have 0-10 ha. However, when I reviewed my data I found I had basically one 'poor' and one 'rich' dryland farmer at each of the three sites. Only two fell outside the 11-20 ha range, one having 7.25 and the poorest of all with 24. The variable that differentiated the rich and the poor was not amount of land but whether they had a profitable job outside farming. The rich farmers were a butcher, a grocer, and a retired man who had supplemental income and an employed son in the household. They thus had money to spend to hire workers and make large purchases, while the poor farmers did not. I did not feel that citing a median between the two was a good compromise because most dryland farmers do not have these resources. Yet to cite figures given by only one individual per site did not seem right either, especially since in two cases these people had no income and it was

difficult to see how they survived. In the section on farming results I will mention dryland figures when appropriate, but for the reasons above they are excluded from the tables.

### Farming

The data collected from farmers allow us to assess both employment generation and the relative success of different types of farms. Employment can be judged both from the number of people reported hired for different tasks and from the amount of money spent by farmers. The latter does not give precise job figures, but one can assume that the more money farmers spend, the more active the local economy and more work generated. The amount of money farmers spend and their reported earnings also give an indication of farm success, although other factors must also be considered.

Employment Generation. Table 2 summarizes the employment generated by PPI and surface-well farmers at the three sites. In general, surface-well farmers hire and utilize more labor than do those on PPIs. Utilizing labor refers to the unpaid help of family members, including the farmer. In nearly all cases farmers said their families helped them, including children over six years old. Wives were said to do all

TABLE 2:  
EMPLOYMENT GENERATED ON DIFFERENT TYPES OF FARMS

WELLS MEDIAN Fous	PPIB			SURFACE		
	Majen	Sbeit	Fous	Majen	Sbeit	Fous
# of Ha. irrigated	4.5	2.5	3	4	5	4
# of Ha. dryland	10	6.3	12	6	11	
# in family who work on land	3.5	4	3	3.8	4	6
% of household heads with other jobs	60	20	66	0	0	33
income	80	100	66	25	60	66
person/months hired for annual crop production	0.1	0.4	2.8	2.3	6.1	0.1
person/months hired to dig tree holes	0*	0	0	na	1.9	1.2
person/months hired to create wells	0*	0	0	0.2*	12.2	0
person/months hired for non-agricultural construction	0.8	0.1	0	0.6	4	4.5

TOTAL PERSON/MONTHS HIRED:							
by each		0.9	0.5	2.8	3.1	20.2	5.8
by farm type		----- 1.4 -----			----- 9.7 -----		
by site							
Majen	4.4						
Sbeitl	20.7						
Fous	8.6						

\* Figure based on less than total data set.

the same jobs as men except heavy plowing, unless they had several very small children who needed their attention. While between three and four people at all sites help the main farmer (except at Foussana, where it is six), the figures at each site are higher or the same for shallow-well farmers. The figures for dryland farmers were between 2 and 3.8 family helpers.

The next line on Table 2 gives the median person/months hired for annual crop production. This figure represents the major ongoing employment generated by irrigated farming; while other hiring may be considerable, it is for one-time projects such as well or house construction. People are often hired on an annual basis in the spring, to help plant seedlings and to dig or repair irrigation canals. In the summer they may hoe around vegetable crops and trees, and specialists are often hired to trim trees annually. While the family usually picks vegetable crops, workers may be hired to pick fruit and nut tree crops in the summer and olives in the winter. Tractor drivers may be hired to plow and level fields as well as to reap and thresh grain crops, which may be grown on irrigated or dry land. Truckers are hired to transport crops to market. All these types of labor were included in the calculation of hiring for annual crop production.

At both Majen Bel Abbas and Sbeitla, much more labor is hired by shallow-well farmers than by those on PPIs. Although this could be partly explained in Sbeitla by the fact that the median shallow-well farmer has twice as much land as the PPI farmer, the labor hired is well beyond double; it is in fact almost twenty times as great. Hired labor is not replacing family help; both Sbeitla sites have a median of four household members farming. The case is similar for Majen Bel Abbas, except there PPI farmers have more land than those with shallow wells, yet still hire much less labor. However, at Foussana we find this trend reversed, with PPI farmers hiring substantially more labor. Two factors may account for this reversal. One is that the Foussana PPI farmers have twice as much family assistance as do those with shallow wells, so have less need to hire workers. The second factor is that two of the three PPI farmers interviewed at Foussana were selected by CTDA officials, who understandably want to present their most successful cases. At other sites I counterbalanced very successful farmers with more typical cases, but because time permitted only three farmers of each type at Foussana, this was less feasible, and successful PPI farmers dominate that category. In fact, the third PPI farmer I interviewed was indeed less successful, and hired only

about three days as opposed to the median three months of labor. In spite of the reversal of the trend at Foussana, in general shallow-well farmers seem to provide considerably more ongoing agricultural employment.

In terms of one-time employment, shallow-well farmers again usually provide more than do PPI farmers. No PPI farmers hired help to dig holes for new trees, while Foussana shallow-well farmers employed people for over a month and those at Sbeitla for almost two months. (These data are not available for Majen Bel Abbas because farmers there were not asked about tree holes in an earlier version of the questionnaire.) Dryland farmers did not hire anyone. On the surface it is surprising that PPI farmers hired no labor for tree holes, because irrigated farmers in general are enthusiastic about planting trees and encouraged by CTDA to do so. One possible explanation is that at two of the three sites PPI farmers had been on their plots for several years, had already established orchards, and thus were doing no new planting. This was not true for Foussana, but they still hired no tree hole labor.

Another one-time event that hires a considerable amount of labor is the digging and building of wells and pumphouses. As one would expect, shallow-well farmers hire more than those on PPIs, who in principle do not

dig wells (but in fact sometimes do, to supplement their water supply). Again, the one exception is Foussana, where all three farmers had dug their own wells before CTDA began offering loans for this purpose. The first two cases like this were chosen to provide a contrast with the majority at other sites, who had agency assistance. The third case by chance turned out to be similar, and circumstances did not allow more interviews to offset this presumably atypical situation. Foussana dryland farming also provides an exception; no dryland farmers hired workers to dig wells except the one in Foussana who hired seven months of labor. Sbeitla shallow-well farmers hired by far the most well labor.

The final type of major hiring done by farmers is that of construction workers to build or add rooms to homes. In general the shallow-well farmers again provided more employment, including at Foussana. There is a minor exception at Majen Bel Abbas, where they hired 0.6 months as opposed to 0.8 months for the PPI farmers, but at the other two sites it was about four months compared to little or nothing on the PPIs. Dryland farmers also hired quite a bit of construction labor, with 1.4 months at Foussana and between 3.5 and 4 months at the other two sites. Yet when we examine the data closely, we find that in the last two cases the labor was hired by the 'rich' farmers who had other

incomes, and the poor farmers at those sites hired none. Thus these data cannot be considered as typical.

It is useful to total the person/months hired at each site, by the type of farm and by both types at each site. While this involves combining annual and one-time hiring figures, the results are still comparable in terms of magnitude.

Looking at the total person/months hired at each site, we find that all the PPI totals are less than the shallow-well totals by site, and that the highest PPI figure (2.8 months at Foussana) is less than the lowest shallow well figure (3.1 months at Majen Bel Abbas). The dryland totals are the highest overall, ranging between 10 and 13 months, but as was noted above, this is an artifact of including atypical rich farmers in the sample and it cannot be used to generalize about dryland farming.

The differences between work generated on PPI and shallow-well farms is really striking when figures for the three sites in each category are combined and averaged. This indicates that hiring for shallow-well farms is 9.7 person/months as opposed to 1.4 for PPI farms. There are also differences by site, but these are less striking in two of the three cases. Combining the two types of farms at Majen Bel Abbas we find 4.4 months of employment generated, compared to 8.6 at

Foussana and 20.7 at Sbeitla. While at first it appears that the Foussana figure is nearly double that of Majen Bel Abbas, it must be remembered that farmers were asked about hiring over the period of CTDA work in the area, and this is nearly twice as long at Foussana (and Sbeitla). Given more time, Majen Bel Abbas farmers may have done proportionately more hiring. On the other hand, while PPIs have been operated by CTDA at the two sites for the same length of time, in fact Majen Bel Abbas farmers have worked on PPIs much longer. Nevertheless, they hire only 1/3 the labor that Foussana PPI farmers do.

The outstanding figure is the 20.7 months for both types of farms at Sbeitla, although in fact 20 of these months are provided by shallow-well farmers. What factors might explain this much greater use of hired labor? These shallow-well farmers do not appear to be inherently richer (and thus have more money to use in hiring) than others; they have about the same amount of dryland as PPI farmers in Majen Bel Abbas and Foussana, and fewer have outside jobs or non-farm incomes than in most other cases. Family labor is about the same as at other sites, so there is no special need for more hiring. Two of the farmers were selected by CTDA officials so one could argue that they provided the best examples, but while this was true of three cases in

Majen Bel Abbas, yet hiring there was much less. In addition, the three other Sbeitla farmers should counterbalance this. Thus there is no clear explanation of the much greater success of Sbeitla farmers found in examining characteristics of these farmers compared to those at other sites. More general characteristics that may have an influence are that Sbeitla is the most prosperous of the three sites, that farms there are located close to a relatively large town (Sbeitla) and the regional capital of Kasserine, and that the Sbeitla CTDA office has a general reputation for effective work plus more agents actually involved in extension than the other two sites. Unfortunately, the scope of this work on employment did not lead me to investigate each of these possibilities in detail, so it is difficult to cite a specific cause.

A final factor to bear in mind with regard to employment generation is that the figures in Table 2 are medians based on individual farmers at each site. To estimate total employment these figures must be multiplied by the number of beneficiaries or families involved in each type of farming at each site. This will be done below for comparison with work generated in project construction and implementation.

Expenditures. Another factor that can be related to employment generation is the amount of money spent by

the different groups of farmers. They were questioned about large expenditures for items like construction materials, animal feed, and marriage and circumcision celebrations, on the assumption that this money would encourage jobs in the sale or manufacture of these items or for ceremonial musicians, foodstuffs, or garments. For example, many farmers buy feed for their sheep in the lean grazing season; in Majen Bel Abbes they buy at the small local factory that employs four men to produce, package and sell it.

The bottom line in Table 3 gives the total of median expenditures for PPI and shallow-well farmers at the different sites. As with the hiring reported in Table 2, this includes both annual and one-time expenses, but since the same expenses are considered for each category of farmers, the results are comparable across categories with one exception. This is that the farmers in Majen Bel Abbes were asked about one-time expenditures over a three year period (of CTDA presence) instead of the five years for farmers at the other two sites. Thus when we see in Table 3 that Majen farmers' expenditures are much lower than those at other sites, it should be realized that they are an underestimation compared to the others. However, even if they are doubled (which is more increase than is necessary for one-time expenses over two extra years), they are still far below the expenditures at other sites.

TABLE 3:  
CROP PRODUCTION, INCOME AND EXPENSES\*\*

MEDIAN	PPIB			SURFACE WELLS		
	Majen	Sbeit	Fous	Majen	Sbeit	Fous
Number of summer crops grown	6	6	6	9.5	13	10
Number of times irrigated per month in summer	na	2.5	3.5	5.9*	7*	8
# ) irrigated of ) Ha ) dryland	4.5	2.5	3	4	5	4
# in family working on land	3.5	4	3	3.8	4	6
Reported annual agricultural: income	90	380	1230	625	1035	334
expenses	181	292	730	265	2902	164
Reported annual livestock: income	0	800	360	0	1000	360
expenses	0	0	400	0	320	0
Reported 1-time agricultural expenses for: tree holes	0*	0	0	na	200	80
well construction	0*	0	0	250*	2216*	100
land purchase	0	0	0	0	9400	150
Construction expenses	400	762	0	221	1056	2350
Other major expenses/yr	120	1885	4354	135	2480	2100
Number of large expenditures	1	1	4	3.5	4	4
MEDIAN TOTAL EXPENDITURES	701	3739	5844	871	19,574	5304

\* Figures based on less than total data set.

\*\* Cash figures refer to Tunisian Dinars; 1 DT=\$1.25 in August 1985

The total expenditures, with their potential to generate employment, seem to be more related to geographic site than to type of farming, with one exception. The Majen Bel Abbas farmers on both types of farms spent about 700-900 DT, and those at Foussana between 5000 and 6000 DT, a much larger amount. The exception comes from Sbeitla's successful shallow-well farmers, who spend about 19,500 DT compared to about 3700 DT for PPI farmers. This much larger expenditure cannot be linked to any one type of expense; Sbeitla's shallow-well farmers spend more than her PPI farmers in all categories of expense, and in fact more than any other irrigated farmers in all but two categories.

Reasons for success. An attempt to explain why some farmers have greater reported expenses, and thus more money available to spend, brings us to the second section of results on farming: the examination of the success of different types of farms and the reasons for this success. It is assumed that successful farmers will have more income to spend and this will generate work. Table 3 presents information on land owned, frequency of irrigation, crops grown, income, and expenses, all of which can be examined for indications of success and possible reasons for it.

One possible reason for the success of certain farmers is that they were richer to start with when they

began farming, so had greater resources to use in becoming more productive than others. In this case, their success could not be attributed to a certain type of farming that could be encouraged by CTDA; the relevant factor would be outside agency control unless they decided to concentrate their work on richer farmers, an unlikely decision. Thus it is important to see if there are factors that indicate greater wealth from sources outside farming for certain groups. One such factor would be the amount of land owned; a man with 50 hectares of dryland with trees is better off in general than one who has ten treeless hectares, and five irrigated hectares are much more productive than one. Table 3 gives the median amount of land owned, with a low of 2.5 hectares for Sbeitla PPI farmers and a high of 5 ha for Sbeitla shallow-well farmers. Foussana shallow-well farmers have no dryland, while Foussana PPI farmers have the most, with 12 ha. Although there is some range in land ownership, it is not large enough to indicate gross general differences in wealth. Farmers estimated that a family needed about 30 ha of dryland to live adequately, and 12 ha is far below that, certainly not an indication of great wealth. Thus on the basis of access to land, we can assume that the farmers interviewed were all comparable in terms of wealth.

We can begin looking for indications of successful farming in reported income. First, however, a few cautionary notes. I attempted to obtain an accurate report of income by asking about sales of different crops rather than for a lump sum earned last year. Farmers often recall the details for a particular crop but do not sum sales mentally. I also expected they would be less likely to underestimate with several crops to report instead of just one figure. While this worked to some extent, I expect there was still some underestimation. This stems mainly from the facts that in some cases agricultural production expenses exceeded income, and that in no cases did agricultural income exceed total expenses; in fact, it was well under half in all but one case. On the surface this makes it look as if farming is not a viable enterprise, but other factors must be taken into consideration. One is the underestimation of profits. Another is the contribution that farming makes to feeding household members and animals. While this is not quantified in this report, Salem-Murdock's report contains details of household production and consumption. I noted that of the many farmers who grew wheat and barley, only one or two sold any; the rest consumed the wheat and used the barley as animal feed. One farmer said that even if he produced a surplus he would not sell it; he could easily store

it, and who knew what next year's harvest would be like. I expect that shallow-well farmers produced more of the fruits and vegetables they consumed because they grew more than PPI farmers. In general, although production of crops for consumption is not calculated here as 'income', it is a benefit available to farmers that should not be overlooked.

Bearing these cautions in mind, we note that the highest income from crop production was 1230 DT, reported by PPI farmers at Foussana, and the lowest was the 90 DT reported by PPI farmers at Majen Bel Abbas. If we compare income at the same site for the two types of farmers, we find that it is much greater for shallow-well farmers except at Foussana, where the trend is reversed. Income from livestock ranges from nothing for both types of farmers at Majen Bel Abbas to 1000 DT for Sbeitla shallow-well farmers. In this case the income for farmers is quite similar site by site. If we sum these two types of agricultural income, Sbeitla shallow-well farmers earn the most with 2035 DT/year and PPI farmers at Majen Bel Abbas the least with 90 DT/year. Shallow-well farmers overall tend to earn more in crop production and a little more with animals, and those at Sbeitla earn the most, indicating that they are the most successful in this category.

Another indication of success, perhaps more reliable in terms of accurate reporting, is the amount of money spent. Since the amount is much greater than reported annual income, it gives a better picture of the amount of disposable income available to farmers. Again, a few facts should be borne in mind when interpreting the total median expenditures at the bottom of Table 3. One is that these are not all annual expenditures; they include one-time expenses over three or five years. Since they are for the shorter time at Majen Bel Abbas, one could approximately double those figures to make them comparable with the other sites. Finally, the reader may wonder about the accuracy of these figures since they are so much higher than reported income. It was found that many farmers had non-agricultural sources of income, which will be discussed below.

Although the figures are much higher, the total median expenditures at the bottom of Table 3 repeat the pattern of highest and lowest reported agricultural income, with Sbeitla shallow-well farmers having the former and Majen Bel Abbas PPI farmers the latter. The shallow-well farmers spend more than PPI farmers at each of the sites except Foussana, whose PPI farmers spend about 5800 DT compared to the 5300 DT of the shallow-well farmers. Thus both in terms of money spent

and reported farm income, Sbeitla shallow-well farmers are very successful, and those with shallow wells usually do better than PPI farmers in the same area. The one exception to this involves the PPI farmers at Foussana, who we noted above may be more successful than the typical PPI farmer in that area.

What is the basis of this greater success for shallow-well farmers in general and those of Sbeitla in particular? We have already noted that the amount of land available does not indicate a great difference in initial wealth between different categories of farmers. However, surface well farmers have a median of 4-5 ha of irrigated land while those on PPIs have between 2.5 and 4.5. Although this is not a large amount in absolute terms, perhaps this land is so productive that a small difference may be important. The very productive shallow-well farmers of Sbeitla do have the most irrigated land, with a median of five ha. However, the next largest landholders are the PPI farmers at Majen Bel Abbas, who are the least productive. Thus amount of land per se cannot be making the difference.

A more likely basis for the greater financial success of shallow-well farmers is their much greater access to water for irrigation. Frequent irrigation in the summer is essential for crop survival, but PPI farmers were able to do so only 2.5-3.5 times a month,

while shallow-well farmers irrigated each crop between six and eight times a month. The most important aspect of irrigation does not appear in Table 3: shallow-well farmers usually irrigated daily, so they could water melons on Monday, peppers on Tuesday and so on. The PPI farmers were allocated water from the central well about every ten days, and had to scramble to make a limited amount for a limited time period reach all their crops. More than one PPI farmer told me he had given up growing vegetables and used his water allocation for trees; crops like peppers and tomatoes die if they are watered only every ten days. Thus shallow-well farmers are able to grow both a greater amount and variety of crops. This is supported by the first line in Table 3, where all shallow-well farmers grow more crops than PPI farmers. This variety of crops also offers an indirect benefit to production; if one or two crops fail because of disease, the shallow-well farmer is less hard hit because the loss is probably less of the total production. There is also less vulnerability to low prices because of a glutted market with a wider variety of crops. In several ways, the greater access of shallow-well farmers to irrigation contributes to their success. However, it is not the sole factor; Foussana shallow-well farmers irrigate about eight times a month compared to only 3.5 times for those on PPIs, yet the

latter are more successful in terms of agricultural income and spend more overall. Other factors must be examined.

Another possible contribution to farming success is having enough money to buy seed and fertilizer, get crops to market, and in general use the available resources to improve one's harvest. Farmers were asked if they had other sources of income besides crop production. One very common source that was not quantified but often mentioned was the use of sheep as a sort of 'savings fund' for large expenses. Some kept a few to be used as needed to fund fall school expenses, a circumcision celebration, or buy a TV set. Others had sold entire herds to finance digging a well or buying additional land. Off-farm jobs provided another major source of income. A trip to work in a Tunisian city or abroad (to France or more often to Libya) was another means of saving up capital for farming. The frequency of these two sources (off-farm jobs and migrant labor) is compared in Table 4. Figures for family and hired labor are also included; one would expect farmers with another job to need additional labor.

Table 4 clearly shows that PPI farmers and their relatives more often have a non-farm job or other sources of income (e.g., a farmer's son contributes some of his earnings as a mason to running the farm) than do

TABLE 4:  
NON-FARM SOURCES OF INCOME

	PPIs			SURFACE WELLS		
	Majen	Sbeit	Fous	Majen	Sbeit	Fous
# in family who work on land	3.5	4	3	3.8	4	6
% of household heads with other jobs	60	20	66	0	0	33
income	80	100	66	25	60	66
% who have been migrant laborers hhd heads	20	0	66	33*	40	66
sons, bros	60	60	66	100*	100	100
person/months hired for annual crop production	0.1	0.4	2.8	2.3	6.1	0.1
TOTAL PERSON/MONTHS HIRED:						
by each	0.9	0.5	2.8	3.1	20.2	5.8
by farm type	-----	1.4	-----	-----	9.7	-----
by site						
Majen	4.4					
Sbeitl	20.7					
Fous	8.6					

\* Figure based on less than total data set.

shallow-well farmers. This trend is reversed with regard to labor migration, with more shallow-well farmers or their sons or brothers having worked outside the local area. Both groups thus have access to funds that could be used in operating their farms. While we do not have data on the actual amounts involved (it was felt too sensitive a topic to expect an accurate response), at first glance one might expect the PPI farmers to have more funds available, since their other jobs are current and ongoing, while for the shallow-well farmers their migration was in the past. Yet we have seen above that PPI farmers spend less in general than those with shallow wells; how do these facts fit together?

The answer involves a closer look at the situation of the two types of farmers. The jobs held by the PPI farmers themselves are often part-time, for example in construction or agricultural labor, or in operating a small shop. (There are a few small shops on several of the PPIs visited, but they do not provide substantial employment or income. Most people buy there only in "emergencies," since prices include the cost of transport from town and are thus higher.) Thus the income from other jobs is usually small and irregular. The people receiving "other income" are more likely to receive a regular sum like a pension or insurance

payment, but again it is not large. In addition, this income is usually spent on day-to-day expenses as it trickles in rather than saved for a major purchase. On the other hand, migrants usually earn higher wages than they would locally, and often save until they have a considerable amount (or did in the past; Libya's currency export rules have changed) that they bring home. These lump sums are often invested in digging a well, building a home, or marrying. Many farmers described working in Libya to amass funds that would allow them to buy land and dig a well so they could practice irrigated agriculture. Migration provided money for what Hopkins (1978) called the "push" to move them from a lower to a higher income category. With this in mind, we can look at Table 4 to see if the very successful Sbeitla shallow-well farmers had more access to funds from migration than did others; perhaps this is the key to their success. In fact, it appears not to be; a larger proportion of Foussana PPI and shallow-well farmers have been migrant laborers. All of the Sbeitla farmers have a brother or son who has done migrant labor, but this is true of all the shallow-well farmers. So while migrant labor appears to be more related to farming success than having a consistent income from another job, it is not the factor leading to the great success of Sbeitla shallow-well farmers.

One final outside source of income to consider is the assistance given to farmers by CTDA. For PPI farmers this involves setting up an irrigated perimeter and providing water for what they calculate is about 1/5 of its actual cost. Shallow-well farmers receive loans and grants to pay for digging and building wells and the purchase of motors and pumps. The loans are often in fact grants, since they have a very low payback rate. Both types of farmers are eligible for partial loans for the cost of fertilizer, fruit trees, and the construction of greenhouses. Farmers were asked if they had loans, but the amounts were not calculated as part of the money spent (e.g., motor purchases were not calculated as expenditures), so having a loan did not directly affect expenses reported. That is, most loans were for motor purchase, and that cost was not calculated in expenses, since almost none of the farmers interviewed paid it themselves. While loans did not make more cash directly available to farmers, they gave shallow-well farmers who had not migrated the same "push" as those who did, and this same large push was not given to PPI farmers. A large amount was spent to set up the PPIs (they may cost more to establish an irrigated hectare than do the shallow wells; see Salem-Murdock for details), but that less direct and less effective push has not provided the benefits that help in building wells has.

In general, shallow-well farmers hire more labor overall than do those on PPIs. In a site by site comparison, shallow-well farmers report more expenditures, at least part of which creates more work, than do those on PPIs. (Foussana is an apparent exception, but it was noted above that it is an atypical group of PPI farmers.) However, shallow well irrigation alone does not make greater expenditure possible, since we see at the bottom of Table 3 that PPI farmers at Sbeitla and Foussana spend more than do PPI farmers at Majen Bel Abbes. Local factors are also important.

#### Project Construction and Implementation

The largest likely source of employment generation outside farming was that generated in the construction phase of CTDA infrastructure projects such as building rural hospitals, drilling wells, or building canals for potable water. Data on numbers employed in these projects were collected for Sbeitla and Majen Bel Abbes, and are summarized in Table 5. Complete information on the various projects and the numbers of workers on each is given in Appendix B.

TABLE 5:

COMPARISON OF EMPLOYMENT GENERATED  
BY CTDA IRRIGATION AND PROJECT IMPLEMENTATION AND CONSTRUCTION\*

Irrigation

Site	# of PPI benefics	X	mean # hired	TOTAL	# of surface well benefic	X	mean # hired	TOTAL	GRAND TOTAL
Sbeitla	108	x	0.5 =	54 p/mo	305	x	20.2 =	6161	518p/yr
Majen Bel Abbes	65	x	0.9 =	58.5 "	80	x	3.1 =	248	20.7 "
Foussana	98	x	2.8 =	274.4 "	270	x	5.8 =	1566	153.4 "

Project implementation and construction

Sbeitla	32.8p/yr
Majen Bel Abbes	21.3 "
Foussana	na

\* Some of the figures in this table require further explanation to be fully comprehensible.

- The mean # hired refers to person/months except when given at the far right as a grand total, when it refers to person/years.
- The irrigation employment figures include both one-time and annual expenses for one year over a six year period at Sbeitla and Foussana and over three years at Majen Bel Abbes.
- The construction and implementation figures cover the same time periods at each site as in b. above.
- "Benefics" refers to the people CTDA calls "beneficiaries" of their projects, and are the household heads listed as owning a plot of PPI land or a private well. Of course their family members also benefit, but the numbers in the table refer to household heads.

## Business Conditions in Sbeitla, Foussana and Majen Bel Abbes

In addition to looking at workers hired directly by CTDA or by the farmers they aided, I wanted to explore the less direct and less obvious ways that having more prosperous farmers in the area might generate employment. To this end I asked the farmers I interviewed about merchants and service people with whom they did business, and then contacted these people in the towns where they worked; most of the farmers' trade was in these local centers. I interviewed twenty-six merchants and service people in all; two were excluded because of incomplete data. The remaining twenty-four were distributed as follows:

- 5 vegetable sellers
- 6 truckers
- 2 mechanics
- 2 butchers
- 2 grocers (nonperishables)
- 2 grocers/building material suppliers
- 2 building material suppliers
- 2 appliance/department stores
- 1 well supplier.

These merchants ranged from a grocer whose father had begun the business in Foussana 45 years ago and who had himself worked in the store for 27 years to a butcher who had opened his shop in Majen Bel Abbes in the last two months. Thirteen of the businesses were in Majen Bel Abbes, six in Sbeitla, four in Foussana, and the well supplier was in Kasserine.

In general, the business climate was very good. Of the 24 people I interviewed, 10 had begun their businesses since CTDA had begun operating in the area. Together, the 24 businesses had hired 20 full-time and seven part-time employees since CTDA's presence. If we include the business operators, this totals 37 people employed part or full-time, or an average of 1 1/2 people hired per business in the CTDA operating period. Of course we cannot assume that all of the increased business that leads a vegetable seller or trucker to hire workers is generated by CTDA farmers; most businesses have mixed clientele. In addition, both Foussana and Majen Bel Abbes have recently become regional governmental seats, thus expanding with more offices and civil servants.

I did ask merchants how much of their business they thought came from farmers with irrigation. (At first I asked them to distinguish between PPI and surface well farmers, but the majority could not, and some of the large merchants did not know if their customers were farmers or not.) The amount of business done with farmers practicing irrigation ranged from none for some garage mechanics to 100% for the supplier who sold well motors and pumps to farmers so they could irrigate. The average was from 10 to 25%, which may look low until one considers that the large majority of farmers do not

irrigate. I also asked if merchants gave credit to irrigated farmers, assuming this would indicate they were good, frequent customers. It turns out that few of these farmers are given credit (ranging from none to about 20%), not because they are bad risks, but because they usually have enough cash to pay for their purchases.

Some merchants did in fact complain about the business climate, but their comments suggest a general situation of growth. One grocer said that his business had declined in the last three years, because before that there had been only 20 shops in town and now there were 45. Another man in town had the same general idea but different figures; he said that in the last ten years, the licenses given for grocers had increased from 35 to 74. A mechanic with a garage said his business wasn't doing so well: he had little cash because he had bought new equipment and land to build a larger new garage--whose construction would employ three men for eight months. Someone else noted that in the last few years the number of mechanics in town had gone from zero to six, and the number of building suppliers had increased from two to six in just the last year. A butcher said that he used to sell ten to twelve sheep a week, but since six more shops have opened in the last two years he only sells seven a week. One wonders if

all these new businesses are feasible, and a definite answer is difficult. However, those who complained the most were the well-established merchants with large stores and often other incomes; it seems unlikely that losing some business will ruin them. What is especially interesting about all these comments is that they come from the town of Majen Bel Abbas, the newest CTDA site, whose population is given as only 942. It indeed seems a town on the move, and it will be interesting to observe its progress.

Brief sketches of a merchant and a service person who deal with CTDA farmers may help the reader to better understand their operations. The most common service person a farmer sees is the trucker who hauls his produce to market, usually to one of the three towns we have discussed because the fares are lower. In fact, these are the only service people interviewed who deal directly with farmers; the mechanics were included as a secondary link because they provide a necessary service to the truckers. Most truckers have a Peugeot 404 or Isuzu truck that holds a ton or 10 gantar, and they may use them to haul produce, animals, or people although different licenses may be required. They may do most of their work in a relatively small area, say a 20 km radius of town. Two of the six truckers said they did 70-80% of their business in one irrigated area. Farmers

contact them by seeing them passing and asking them to return, or by going into town to the corner where they wait for business contacts; one trucker receives messages at his brother's grocery store. (While farmers seldom had crops ruined by lack of transport, it is quite an effort to contact it when you need it; this will be addressed further in the recommendations.)

These truckers contribute to the local economy with their earnings in general, and specifically, they are a large part of the clientele of the diesel fuel sellers and the local mechanics. They have minor repairs done on their trucks once or twice a month (they travel much on pistes) plus regular overhauls. Those who had salaries earned from 90 to 120 DT a month, and nearly all said that business had improved since CTDA came to the area. One said "The farmers at Oom El Aqsab (with shallow wells and a PPI) are succeeding--and so am I."

Vegetable dealers may have shops in the municipal vegetable market (marche) or be scattered through town; Foussana and Sbeitla have marchés but Majen Bel Abbes does not--yet. An average of about 40% of the produce they sell is bought from irrigated farmers, with seasonal variation. They buy 50-60% locally in the summer, but only 20-30% in the winter when the area is quite cool and they must import much from the warmer coast. One man said that 80% of his local produce was

bought from CTDA farmers. Usually farmers bring in all or a sample of their produce to the market and the dealer will buy it if he needs the crop and it looks good. If they need a particular crop and none comes in, dealers will sometimes go out to the farm and ask for it. Some dealers noted differences between PPI and shallow-well farmers and others did not. Among the differences mentioned in Sbeitla were that PPI farmers had all the apples to sell while surface-well farmers raised more vegetables, and that farmers working with CTDA had better vegetables because of the advice they got, especially those on the PPI who, one informant felt, were visited more often than those with surface wells. The vegetable merchants, when asked how their businesses had changed in the period CTDA had been in the area, were among the most enthusiastic. "Business is much better. I used to import apples and melons, but in the last two years I've bought apples from CTDA farmers. I make more profit; although I sell them for less, I sell a larger quantity." (And more people are able to buy apples.) "I sell more now. There are more people in town, and more produce because there are more farmers. Before I had to truck things in from far away and they looked wilted and old. Now things are fresh and look it, and I think that makes more people buy. . . . After CTDA came, there are more vegetables

for me to buy, and they're better quality because of the fertilizer and pesticides. They are also available all year because of the greenhouses, even things that weren't available on the coast before."

While it is difficult to calculate in numbers, the assistance that CTDA gives to farmers certainly appears to have positive effects in terms of generating employment indirectly in several parts of the community. It also appears from several of the comments above that irrigated farmers make more varied produce available both to their families and for others in these smaller towns, and thus improve the diet of rural people.

#### RECOMMENDATIONS

Most of the following recommendations will focus on aspects of irrigated farming, since it has been shown to have great potential in generating employment. We expect that projects which benefit farmers using irrigation will spread these benefits more broadly, for example making more employment in farm labor and construction available locally. Farmers will use more transport, employing drivers and creating more need for the garages and fuel stations that serve them. Successful farmers will have more to spend on food, construction materials, and such household furnishings

as television sets, tables and chairs, and refrigerators, and most of this money will be spent locally.

The reader will note that many of the suggestions here are formulated as experiments, which in effect allow the testing of an intervention in two (or more) possible forms in order to determine which would be most effective. This is done because, as noted in an AID project analysis manual, "Three decades of development assistance projects without adequate evaluation have left a legacy of uncertainty about which technical assistance and direct investment approaches work. In this environment, it is not easy to design projects around tested principles. . . ." (Daines et al., 1979:xxxvi). The experimental approach allows us to test two or more approaches at once in attempting to discover some "tested principles."

#### Aid for Different Types of Irrigated Farming

- 1) One recommendation is to increase the amount of aid to farmers who work in irrigation, especially those with surface wells.

Since all surface-well farmers hired a larger median amount of labor than did any working on PPIs, supporting the former more than the latter is a better way to generate employment. In terms of median total expenditures over several years, surface-well farmers

exceed those on PPIs except at Foussana. While the Foussana sample was probably unrepresentative in its success, it nevertheless demonstrates that in certain conditions PPI farmers can do very well. For this reason, as well as because of the political reasons cited by CTDA staff for continued support of PPIs, they should not be deprived of all support.

There are other reasons to give more irrigation support to shallow-well than to PPI farmers. One is that the cost of "creating" a hectare of irrigated land is probably greater, perhaps double, on a PPI, so funds spent there benefit fewer people. It is difficult to obtain precise figures (see Salem-Murdock for a fuller discussion), but several CTDA officials gave costs and all estimated that PPIs were a more expensive way to provide irrigated land. A second reason for greater support of shallow-well farmers is related to the recent expulsion of Tunisian migrant workers from Libya unless they would take Libyan citizenship. It was noted above that a common strategy for a farmer who wants to accumulate money for a well and motor is to work abroad to amass enough capital. It was shown in Table 4 that a larger proportion of shallow-well farmers had worked abroad than had PPI farmers. It should be noted that nearly all shallow-well farmers interviewed were receiving CTDA assistance of some sort, so it should not

be assumed that migration eliminated the need for assistance, or that assistance will be able to totally fill the need for extra funds that were earned by migration. However, now that an important source of funds for irrigated farming has been eliminated, CTDA's help is more important than ever. The importance of these funds was stressed by a large well supplier who said he extended short-term credit to returning migrants but not to salaried employees; the former could be trusted to amass enough to pay a lump sum, but the latter never could. Further, problems with Libya also affect PPI farmers. While they are more apt to have ongoing jobs in the area of their farms, a number do work abroad. One young man on PPI Perimeter B at Sbeitla had just returned from Libya and said that 30 men from that one PPI worked there. The whole PPI had 63 individuals with land, so an average of almost one in two families had some income from migration. Thus the lack of work in Libya and the lesser cost of establishing shallow-well irrigation are further arguments in favor of its support.

While the evidence above provides support for increased funding of shallow-well irrigation, there are also problems that must be carefully examined before moving ahead. One is the question of water supply. A specialist in hydrology recently working in the area

said that he felt shallow wells in the area were already near the limit of what the underground supply could provide. A second concern was voiced in the 1982 CTDA Annual Report on Foussana by the local chef; he noted that some of the irrigation water was saline at that time. Both these concerns must be investigated.

If it is found feasible to continue support of irrigation, this could be done using an experimental approach in some areas. For example, some merchants in Sbeitla said they felt CTDA farmers had better produce because of the advice and materials provided by the extension service. It has been suggested elsewhere (see Salem-Murdock) that extension work should be greatly expanded. One way to do this experimentally is to take two areas where farmers have spent a roughly equal amount of time working in irrigation. While CTDA has worked in Foussana longer than in Majen Bel Abbas, in both areas "new" well farmers could be located. One site could be assigned an extra extension agent and vehicle (perhaps Foussana, which has a large number of shallow wells) to concentrate on new farmers, while the new farmers at the other site would receive just the usual attention. After a two-year period, the productivity of the two sets of farmers (or a matched subset) could be compared, to look for effects of increased extension. Something similar could be done

using the new extension center located outside Sbeitla. Farmers using those services for 2-3 years could be compared to a matched sample at another site.

Another interesting experiment might shed some light on the question of whether farmers on PPIs are less industrious than those with shallow wells or if a lack of water is the main cause of their lower productivity. This can take the form of a "natural experiment" because some PPI farmers have shallow wells on their PPI land. Although strictly speaking this is "illegal", it was in fact allowed in certain areas if the water was judged insufficient to farm. There are four or five farmers on a Majen Bel Abbas PPI in this situation. After farming using their wells for 2-3 years, they could be matched with PPI farmers at the same site and their productivity evaluated. If it is much higher than their PPI-only neighbors, we can assume that water is the problem, since all began irrigated farming on a PPI and had a chance to get used to the "something-for-nothing" mentality that some agents feel is a big problem.

Finally, it should be noted that farmers and their families are very enthusiastic about being able to stay in their home areas and practice irrigated agriculture. I saw one example in Ali, a very poor farmer in Majen Bel Abbas. He was in his forties and lived with his

wife and six children on 24 hectares of dryland. Last year he harvested 12 qantars of wheat, but says 20 are necessary to feed his family for a year. He has 200 olive trees on his land but says they are only ten years old and too young to bear good olives. His hand is permanently injured, so he cannot do regular agricultural labor. It was very hard to see how he survived. He had gone to Libya once in the 1970s and worked for one year, but did not like it and never returned. He does not like to be away from his children, and said even in his desperate situation he would not consider migrant labor. If he runs out of wheat, he will borrow from his relatives. Another farmer made the same point. When asked how things had changed since CTDA came into his area, he did not give the usual answer, pointing out loans and extension advice. Instead, he said "Now we don't have to migrate any more. In the past, on dryland, if there was a bad year we had to leave and could only come back and see our families every three or four months. Now we can stay here."

#### Improvement in Marketing of Produce

2) Co-operative marketing should be tried on a small-scale, experimental basis.

One problem often cited by farmers is that merchants make an unfair profit compared to that of the

farmer. Although there is a governmental ceiling of 20% profit over the price paid to the farmer (so peppers bought for 100 millemes should be sold for no more than 120), many farmers said this is often violated. When a merchant has six farmers wanting to sell him tomatoes and he only needs half, he can usually name his price, since the alternative is often to let them rot. If a group of farmers could sell together at a market stall, they could avoid giving any of their profits to a sometimes exploitative intermediary.

The main difficulty I see in this experiment is in finding a group of farmers who trust each other enough to work together. Some CTDA officials said there would be no problem, but others disagreed; in my experience with co-ops in North Africa, trust is a crucial element. One way to counter this is to have the co-op group be a fairly small number of relatives who get on well with each other. Salem-Murdock has described the elastic boundaries of many households; a group that is already sharing many resources successfully could be recruited. These people should also be good farmers, both so they will have much produce to market and so their success will motivate other farmers to follow their example in the future. This will probably mean choosing well-off rather than very needy farmers, but in

this case it is important that the odds be "stacked" in favor of their success.

CTDA could assist the group by subsidizing a stall at the market and a truck to haul produce, providing advice on operation, and monitoring progress. At Sbeitla there is an experimental program to help small businessmen; a co-op might fit into this category, although it would probably need more funds. Ideally, one co-op could be set up at each of the three sites discussed here, and their progress could be followed and compared.

3) Truck loans should be given to needy and "average" farmers and their success as truckers monitored.

Working as a trucker is a relatively new way to be able to live in a rural area even if one has no land. Usually the wealthiest farmers can afford to buy trucks, monopolizing this source of income. One farmer noted a further discrimination against poorer farmers: harvest time is when it is hardest to find transport to market, partly because wealthy farmers with trucks are too busy on their own farms. While development projects aspire to reach the very poor, often they are overlooked. Sometimes it is argued that they need at least some resources to benefit from aid. In this case, we can test this assertion by giving truck loans to very needy and average farmers and comparing their success after two or three years. The needy do not need a certain

amount of land as a prerequisite; they can haul for richer farmers. The nature of trucking, where one is paid immediately, means that there will be cash to buy fuel and pay for repairs. One might object that farmers in this general income range have a poor record for loan repayment. However, with a truck, one can repossess it if payments are not made in a reasonable time. Also, if truckers see that banks are serious about repayment and all are required to pay, I expect they will. Finally, trucking may appeal to the relatively educated young men who no longer want to work in farming, giving them a way to remain in the area and contribute to their families.

4) Facilitate contact between farmers who need transport and truckers who want work.

Farmers usually found trucks to take their crops to market and seldom had produce rot for lack of transport, but they spent considerable time and energy to do so. They usually looked for trucks passing on a nearby road and asked them to pass by later, but often they found none. This would mean a bicycle or motorbike ride or even a seven to ten kilometer walk into the market town to make a request. If there were some way to communicate between the PPI or shallow-well area and town, it would make life much easier. I am not familiar enough with the technology or costs to make a specific suggestion, but perhaps something like a citizen's band radio or radiotelephone could be used. One receiver

could be located in a store or even at a "truck stand" in town, and the other in a shop or "stand" in the rural area. Farmers and truckers could each pay a small amount for each call, to be used for maintenance.

- 5) Create a stable demand for certain produce by building a processing plant in the area.

A common problem mentioned by farmers was that prices of crops varied greatly depending on how available they were locally; an early crop might sell for double the price of a later one. Many farmers had heard about the tomato processing plant at Sidi Bouzid, and a few sold to it. (Most were too far away.) There are no other such plants in the area; evidently one was planned for Sbeitla but private backers could not be located and the plan failed. Canned tomato paste is used widely in Tunisian cooking, and bottled fruit juices and canned vegetables are sold. The market for these products and the feasibility of a local factory should be explored.

#### Livestock

- 6) Give a small number of sheep, chickens, or rabbits to needy farmers, both male and female, and monitor their progress.

In fact, chickens and rabbits raised on a small scale are usually women's domain, but sheep are less so. Yet during interviews I found women who had their own sheep, either from their fathers at their marriage

or bought with their own money. Profit from the sheep belonged to the woman; one bought a television set and another a gold bracelet. Giving loans for or grants of these animals would thus especially benefit women. Three or five men and women of comparable economic status could be given animal loans at each of the three sites, and their situation followed by visits two to four times a year. In fact, Majen Bel Abbes has already begun such a program for males, and they could be followed and females added. Loans would be especially interesting because we could compare the sexes on their success with the animals, how they used the profits, and on their repayment rates. Since sheep reproduce annually, repayment should be expected, and relatively easy in the spring. Small numbers of chickens and rabbits would probably not lead to large profits, but might improve the nutrition of the family and perhaps neighbors.

#### Credit

- 7) Make moderate levels of cash credit available to farmers and try different strategies to encourage repayment.

Many farmers complained that they lacked the capital to farm really effectively. CTDA is appreciated by the farmers for the credit it extends for new trees and agricultural inputs like seed and fertilizer, but

farmers feel they need help beyond this. An experimental fund could be established that allowed farmers to borrow up to 500 Dinars, and alternate means of collection could be tried with farmers who are comparable in other ways. Several farmers said they had received few or no notices to repay their well motor loans, so they may have felt these efforts were not serious. In the future one strategy would involve putting more pressure on farmers to repay. Another approach could break payments into several small sums rather than one large one.

In conclusion, it should be appreciated that CTDA projects in agriculture generate a good deal of employment, both in agriculture and in other parts of the rural sector. Thus the benefits of CTDA projects are broad, and this agency should be supported in its important and beneficial work.

## BIBLIOGRAPHY

Attia, Habib, Mutations de la Societe et de l'Espace Steppes, These de 3eme cycle (Polycopie).

Daines, Samuel; Bryant Smith, and William Rodgers, Agribusiness and Rural Enterprise Project Analysis Manual, prepared for AID, preliminary version, March 1979.

Hopkins, Nicholas, Social Soundness Analysis of the Drylands and Irrigation Components of the Proposed Central Tunisia Rural Development Program (CTRD), 1978.

Salem-Murdock, Muneera, Household Dynamics and the Organization of Production in Central Tunisia. IDA, 1985.

APPENDIX A

FARMER QUESTIONNAIRE (version 3+)

Location \_\_\_\_\_ Delegation \_\_\_\_\_  
Date \_\_\_\_\_ Interviewer(s) \_\_\_\_\_  
Project type: PPI Shallow Well Other \_\_\_\_\_  
Time begun \_\_\_\_\_

1. What is your name?  
How old are you?
2. How long have you worked on irrigated land?  
What did you do before?
3. Who lives in your house with you?  
(nuclear family) Others:  
What are the ages of the : boys?  
girls?
4. Does your family work with you here? Yes No  
How do they help you?
5. Do you have children who are not here?
  - a. how many married daughters? #1 #2
  - b. others who aren't here? where are they?
  - c. what are they doing?
  - d. when did they leave here?
  - e. how much money do they bring or send back?
  - f. what do you use the money for?
  - g. when do they come back here?
  - h. will they come back to stay?
6. How much land do you have: #Ha
  - a. in the PPI
  - b. with a private well
  - c. in drylanddid you buy it?  
do you have a title or not?  
how many times do you irrigate in the summer? .
7. What did you plant this year in. What trees  
do you have now on:
  - a. PPI d.
  - b. a shallow well e.
  - c. dryland f.

8. Did you plant the same crops as last year? Yes No  
(if no) how and why did you change?  
a. PPI  
b. shallow well  
c. dryland
9. Did you bring anyone to work with you on:  
irrigated land                      dryland  
a. from inside or outside the family?  
b. how long did they work with you?  
c. how much did you pay them?  
d. what did they do?
10. Do you ever work with another farmer here, for  
either money or a share of the crop?  
Does anyone in your family?  
a. what do you/they do?  
b. how much are you/they paid?  
c. how long do you/they work?

11. Last year (or this year, if crops are in), did you sell any of your farm or animal production?  
 what did you sell? for how much? how many times? truck rental? sold where? to whom?

at market	1.	_____		_____		_____		_____		_____		_____
	2.	_____		_____		_____		_____		_____		_____
	3.	_____		_____		_____		_____		_____		_____
	4.	_____		_____		_____		_____		_____		_____
	5.	_____		_____		_____		_____		_____		_____
to be	6.	_____		_____		_____		_____		_____		_____
picked	7.	_____		_____		_____		_____		_____		_____
	8.	_____		_____		_____		_____		_____		_____
to the	9.	_____		_____		_____		_____		_____		_____
ll press	10.	_____		_____		_____		_____		_____		_____
at the	11.	_____		_____		_____		_____		_____		_____
arm gate	12.	_____		_____		_____		_____		_____		_____

12. a. When you want to sell produce, how do you go about finding transport?  
 b. Did you ever have produce rot because you couldn't find transport?

13. Do you have income from something besides farming?

What?

14. Did you or any of your brothers ever work outside this area?

- a. where?
- b. when?
- c. what did you/they do?

15. In the last 3 or 5 (based on CTDA presence) years, have you built on: #1 your house #2 your well

- a. what?
- b. what materials did you buy?
- c. where did you buy them?
- d. from whom?
- e. for how much?
- f. how much was transport?
- g. did you buy on credit?
- h. who built with you?
- i. where are he/they from?
- j. how long did he/they work?
- k. how much did you pay them?



20. Do you have animals? cows sheep goats horses  
other

- a. now?
- b. 3/5 years ago?
- c. how many have you bought in these 3/5 years?
- d. how many have you sold in these 3/5 years?

21. Did you buy anything else?

- a. what?
- b. where?
- c. did you buy or sell or pawn gold? Yes No
- d. What did you do with the money?

22. Did you buy or rent land? Yes No

- a. how many hectares?
- c. what was the price?
- b. irrigated or dryland?
- d. where?

23. How often do you eat meat?

where is the meat from?

- a butcher
- your own
- a neighbor slaughters
- other\_\_\_\_\_

24. Do you have children in school? Yes No  
How old are they and in what class?  
a. boys \_\_\_\_\_ girls \_\_\_\_\_  
b. (if some never went) why didn't they go to school?
25. Did you buy school supplies? Yes No  
a. how much did they cost?  
b. where did you buy them?
26. Do you have any children who attend private school?  
Yes No  
a. how many children?  
b. how much does it cost?
27. Did you circumcize your sons? Yes No  
How much did it cost (the party)?
28. Did any of your children get married? Yes No  
daughter? son?  
how much did it cost?

CTDA began work in this area 3 (or 5) years ago

29. a. For you, how has your work or your financial condition changed since CTDA began work here?
- b. What ministries have given you help? How?
- c. Do you have any loans? From whom?
30. How has CTDA helped you in the last 3/5 years?
31. How would you like CTDA to help you?
32. What do you hope to do in the future?
33. What are the problems you have?  
time ended \_\_\_\_\_

MERCHANT AND SERVICE QUESTIONNAIRE (version 2)

Location \_\_\_\_\_ Delegation \_\_\_\_\_

Date \_\_\_\_\_ Interviewer(s) \_\_\_\_\_

Type of enterprise \_\_\_\_\_

Time begun \_\_\_\_\_

1. What is your name?
  
2. Is this your business? yes no  
(if not) a. Whose is it?  
b. Where is he? c. What is he doing there?
  
3. a. When did this business begin?  
b. What did you/the owner do before that?
  
4. How long has this business been at this location?  
a. Where was it before?  
b. Why was it moved here?
  
5. In the last \_\_\_\_ years (CTDA period in area), has  
business changed a little? yes no  
a. Has it gotten better? Worse?  
b. (if yes) How? And why?

6. How many workers do you employ in this business?
- a. who are they?
  - b. are they related to you? how?
  - c. how long has each worked with you?
  - d. how many hours a day does each work?
  - e. what did each do before?
  - f. how much do you pay each one?
  - g. do they have other jobs? what?
7. a. When is your busy season?
- c. What is your busy day?
  - b. When is your slow season?
  - d. What is your slow day?

FOR BUTCHERS, LARGE STORES, GROCERS AND MECHANICS

8. a. who [persons in what jobs] buys from you?
- b. who buys the most from you?
- c. do you know some farmers you deal with who are  
aided by CTDA?        yes    no  
who told you?
- d. can you tell me the percent of your business  
that is with farmers who practice irrigation?  
on PPIs        with shallow wells

9. Do you sell things on credit?
- a. how do you know whether people will repay you promptly?
  - b. what type of farmers buy from you on credit most often?
  - c. do farmers who have irrigated land pay you promptly or not, or are there good and poor risks among them?
  - d. could you tell me about how many people you deal with on credit? how many of those are farmers with irrigation?

FOR GREENGROCERS AND BUTCHERS

10. a. how do you obtain the produce/meat you sell?
- b. who do you buy it from?
- c. do you know someone you buy from who is helped by CTDA?
- d. what percent of your goods are from farmers who are helped by CTDA?
- e. are there other farmers you deal with? yes no  
who?
- f. do you sell these products at another place?  
yes no
- 1. where?
  - 2. wholesale or piecemeal?

3. what percent of your work is at another location?
  4. how do you transport the products to another place? by whom?
  5. how often do you do it?
  6. how much does the transport cost?
- g. In your opinion, after CTDA began work in this area \_\_\_ years ago, did the percentage of the produce you bought increase or decrease:
1. from PPIs
  2. from shallow-well farmers

### TRUCKERS

11. What kind of truck do you have?
  - a. how many qantars [100 kilo loads] can it hold?
  - b. where and when did you buy it?
  - c. did you buy it on credit? yes no  
how did you get the money?
  - d. where do you usually buy gas or diesel fuel?
  - e. where do you have the truck repaired when it breaks? about how often does it need repair?
  - f. what areas do you work in? which place do you work in most?

- g. do you know some produce sellers who are helped by CTDA?
- h. do you know farmers with shallow wells? or on PPIs?
- i. what percent of the farmers you work with have shallow wells? what percent are on PPIs? or the two together?
- j. how many trips do you make a day? how many trips do you make a week?
- k. how much does it cost to carry produce from

\_\_\_\_\_ (here) to:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

l. is it the same price from \_\_\_\_\_ (irrigated area)?

If not, how much is it?

m. do you sometimes buy things from the farm and sell them yourself?

1. yes    no                    3. why?

2. how often?

12. Could you tell me what you did yesterday, from morning until night? (write on reverse)

Time end \_\_\_\_\_

**APPENDIX B**

## REPORT ON DELEGATION OF SBEITLA

### ODTC PROJECTS

#### The Local ODTC Office

The Sbeitla office has a professional staff of five people plus two drivers, one for cars and the other for a tractor. There is also a guardian. Thus the office employs eight people full-time.

#### Irrigation

##### PPIs (Périmètres Publics Irrigués)

There are four PPIs in the area, but one administratively follows the new delegation of Hassi el Ferid, so is not dealt with from Sbeitla.

##### Sbeitla A and Sbeitla B

Sbeitla A contains 92 hectares distributed among 15 beneficiaries and is located very close to the town of Sbeitla. (It also includes a plot of almost 48 hectares that is farmed by the Office des Terres Domaniales.) Irrigation here began in 1954, although the ODTC took it over in 1970. The farmers here are said to be in general richer than those in Sbeitla B; two of the farmers have plots of 30 hectares and one has 13. It is easy for them to get into town to market their produce and this has influenced some of the crops they grow. For example, they grow parsley and sometimes lettuce at

Sbeitla A but not at B, which is further away; the more "fragile" crops require easy and economical access to market. Sbeitla B is located about five kilometers from the town and contains about 110 hectares divided among 63 beneficiaries. It is the Sbeitla PPI that was last to become irrigated, but this occurred in 1971, eight years before the ODTIC came into existence. The farmers of Sbeitla B are less wealthy than those of Zone A; two-thirds own plots of 1/2 to 2 hectares, and only one has 10 hectares.

Although the wells of these two PPIs pump 50 liters of water a second and the new wells can pump 90 liters a second, this is still not enough to provide all the water necessary, even though the motors are run 12 to 16 hours a day.

#### The PPI at Chraya

This PPI, which is about 5 km from Sbeitla, contains 60 hectares divided among 30 beneficiaries, nearly all of whom have between 1-1/2 and 2-1/2 hectares. The area is said to have enough water to meet its needs.

The three PPIs employ twelve men, five as pump maintenance men and seven as water distributors. Their pay begins at the agricultural minimum wage of 2.640 Dinars a day and increases with seniority. The money is

provided by the administration; the farmers are unwilling to pay themselves.

In addition, PPIs have led to employment for men who work to create deep wells and the rehabilitation of broken canals and so on. The ODTC has dug and equipped one new deep well since 1980. These wells average 150 to 200 meters deep, and take a team of at least six men 1-1/2 months to dig, thus generating 9 person/months of work.

#### Shallow Wells

Sbeitla has a large number of privately owned shallow wells; the local office gives the current number as 310, of which 275 are equipped with motors and thus fully functioning. This is an area where the ODTC, with AID help, has been very active; there were only 45 shallow wells in the area before ODTC intervention. There are shallow wells in nine of the eleven aymadat or subdelegations of Sbeitla, representing a wider distribution of water than in Majel bel Abbes. The distribution in 1984 was: Sbeitla 9 wells; Chraya 50; Garaa Hamra 66; Rakhmat 46; Mzara 2; Machrek Echames 10; Elgouna 4; Elathar 45; Semmama 3. In 1985, there are plans to equip 50 more wells and to dig 20 new ones. An official report lists each well as irrigating 5 hectares, but local officials said it was unlikely each

could irrigate 4 hectares and that the average area covered was three hectares.

Employment generated indirectly by ODTC help for shallow-well farmers will be discussed later, but a good deal of work grows directly from shallow well construction and improvement. The following figures must be viewed as approximate, but they will give a general idea of direct employment engendered by the ODTC projects. Most of the information was provided by Mr. Ali Ajlani, part of whose job is to oversee the construction of Sbeitla's projects.

Three types of ODTC projects dealing with shallow wells could lead to a good deal of employment. They will be described in some detail below to give the reader an idea of exactly what such projects involve, since they are allocated a large part of the ODTC budget. The Sbeitla office, for example, spent about one-third of its total project budget from 1981 to 1984 to create and equip surface wells. This is even more notable when one observes that these are only two of the 27 types of projects undertaken at Sbeitla.

#### 1.) Creation of Shallow Wells

The ODTC helps farmers to dig shallow wells by assisting them to obtain loans and by providing some of the financing. Of the total cost, 75% is provided as a loan, 15% as a grant, and 10% is to be paid by the

farmer as self-help, although the ODTIC will also help with this by providing 150 Dinars or 10% of the cost, whichever is less.

To apply for funding, a farmer must first have papers indicating the depth of water on his land. In the Sbeitla area, this averages from 15 to 35 meters, although the range is 6 to 40 meters. To simplify, we will assume an average depth of 20 meters, and an average diameter of 2-1/2 meters.

The average cost of digging and building (e.g., lining with concrete blocks) a well in this area is 180 Dinars per meter. Thus, to dig and build a 20 meter well would cost about 3,600 Dinars, quite a sum for a small farmer. Even considering that he has 4 or 5 years to pay off the 75% or 2,700 Dinars loan, that is still 675 Dinars a year.

The wells are dug and built simultaneously, and all work is by hand. The work force varies before and after running into the water table. At first, one needs two to dig, one mason to build and two other helpers, or about five workers minimum. After hitting water, you need the same group plus one to work the pump and one to pull up water. Overall, it is estimated that to dig and build one meter takes 10 person/days, so a 20 meter well would require 200 days. Dividing this by a 26 day month, creating the well would generate 7.7

person/months of employment in construction. There are currently 43 wells in the area that have been built by the ODTC. This adds up to 331 person/months or 26 person/years of employment: this does not include labor to haul materials to the well site or merchants who sell the building materials.

## 2.) Equipment of Shallow Wells

Loans are also available to help farmers equip their wells, which involves buying and installing a motor. The terms of the loan are the same as those for creation of a well: 75% loan, 15% grant, and 10% self-help, of which the ODTC will pay up to 150 Dinars. In Sbeitla, the maximum for a new motor and installation was said to be 3,600 Dinars. Between 1981 and 1984, 163 new motors were installed at a cost of 323,000 Dinars, making an average of almost 2,000 Dinars per farmer.

Relatively little direct employment is generated by well installation. It takes 2 men 2 days to install the motor and pump. With each of the 163 wells generating 4 work days, there is a total of 652 days or two person/years of labor. The cost of this labor is quite high--the charge for installation is 120 to 180 Dinars--not just because of the labor, it is said, but the responsibility involved. This money is paid to the supplier who provides the motor, so it is not clear

whether an installer actually receives over 30 Dinars a day, as the price suggests.

Sbeitla farmers buy their motors from one of four suppliers, three in Kasserine and one in Sbeitla. In the past, there was also a supplier in Sidi Bouzid, but the local ODTC felt he was not reliable and stopped dealing with him.

### 3.) Improvement of Shallow Wells

This is a program of grants to the farmer, not loans to be repaid. A farmer with a functioning well can apply for 300 Dinars to build a motor shelter or a reservoir. Only 100 Dinars is given in cash to pay workers or the farmer himself. The other 200 is given as a purchase order for cement and iron. Currently, these are purchased from one merchant in Sbeitla.

It is estimated that one man could build a reservoir in 10 days and that a motor shelter would take one person 5 days with a helper, although the helper could be a child. If we average the two together for 8 work days per project times 76 beneficiaries, there are 608 days or 23 months of employment generated. Since this work can be done by one person, the farmer may do it himself, but he still has received the income.

The remaining Sbeitla ODTC projects will be described according to the categories into which they are placed by the local office. All the projects

above fall into the classification of hydroagriculture, which includes one additional project.

#### 4.) Improvement of Springs

A mountain spring at Semmama had a quite weak flow, so a reservoir was added to accumulate water, as well as a watering trough and a new pipe. Two masons, one chef, and four workers spent about two months on the project, which adds up to 14 person/months of work.

#### Plant Production

##### Credit en nature (for agricultural inputs)

This program provides credit to purchase fertilizer, insecticides, herbicides, and seeds. The farmers pay 30% to get the materials and have one or two years to repay the 70% loan for the rest; no interest is charged. Fertilizer is most frequently bought, and it is spread by hand by the farmer. Possible indirect work may arise if a truck or cart is hired to transport the products from the office to the farm. It is estimated that about 200 farmers a year in Sbeitla participate in this project.

##### Irrigated Plantings

This popular program provides farmers with fruit trees (apples, pears, and peaches) which they can buy with a 30% down payment and a 70% loan payable over one or two years with no interest charged. The trees cost

from 0.700 to 1.200 Dinars each, and the average farmer who wants them buys about 200, for about 200 Dinars. These tree crops are potentially more profitable and less labor intensive than vegetables; this year a Majel bel Abbas farmer sold his tomatoes for 0.050 Dinars a kilo, his peppers for 0.130, and peaches for 0.300. Golden Delicious apples may get up to 1.200 Dinars a kilo. Thus, although a farmer must wait about three years after planting trees (which are already one or two years old) to get a salable yield, many farmers in Kasserine state are very enthusiastic about planting trees. They also have the advantage of needing water less often than vegetables (at least after the first few months, and some agents claim in general), so are less subject to be harmed by the vagaries of the PPI water supplies. Visible evidence of this interest shows in the groves of young trees on PPIs and near shallow wells, and in the records of the ODTC: in Sbeitla, ODTC sold over 37,000 trees between 1982 and 1984. One wonders if the market prices will stay high when all these trees start producing, but one knowledgeable ODTC chef saw no problem. He said internal demand is rising, and there are also external markets like Algeria and the Middle East.

These tree plantings also have the potential of generating a good deal of employment. In terms of

transportation to the farm, probably only one trip is required. The trees, about a meter tall, arrive in bunches of 10 with one root ball. In this form, 100 can be carried on a motorbike and 1,500 in an Isuzu pickup. More jobs are generated in terms of planting the trees. Each tree requires a hole of one cubic meter; depending on the soil, a person can dig from two to six holes a day. A farmer may dig his own holes, or hire workers at 0.500 to 0.700 millemes a hole. If we take an average of 0.600 mm per hole and 4 holes a day, that is 2.400 DT a day, near the agricultural minimum wage. For the 37,000 trees planted in Sbeitla to date, this means 9,250 days or 29.6 person/years of work. These trees also need to be trimmed every year by a certified tree trimmer; at least some farmers are qualified. The rate of work is determined by the size of the tree; data from farmers who have mostly young trees suggest a trimmer can do 15-20 trees a day, and one reported paying 4 DT a day wages. If we divide the 37,000 new Sbeitla trees by an average of 17 trimmed in a day, there are 2,176 days or 7 person/years of work generated on an annual basis.

#### Dryland Plantings

This program provided free almond trees plus 150 DT cash to be used to dig holes for the trees and to transport water to irrigate them. Three hundred

hectares were planted at a cost of 45,000 DT, but the Sbeitla office feels this program did not succeed and it was not repeated after 1981. Many farmers did not use the cash to water the trees and many trees died.

If we assume that half the money was used to dig holes for the trees (and the rest kept for irrigation), it would pay for 36 person/years of work. This may have been hired out, the farmer may have done it himself, or it may not have been done to a large extent, but the numbers indicate the upper limit of work that may have been generated.

#### Demonstration Parcels

Between 1981 and 1984, 126 farmers had part of their land plowed and were supplied with seed, fertilizer and pesticides by the ODTC; the farmer provided only the labor. The goal was to improve production by teaching the farmer better methods. However, because the local ODTC staff felt that the farmers' main goal was to get inputs "without", or free, the program was gradually cut back and then discontinued in 1985. When it operated, about 100 DT were spent on each plot. It is assumed that the farmer worked it himself, so it did not generate jobs for paid laborers, but did occupy more of the farmer's time; the precise amount is difficult to specify.

### Greenhouses

To date, the Sbeitla ODTIC has given credit to allow 51 farmers to put up greenhouses; each costs 1,350 DT. In addition, the plastic must be replaced every year or two because of sun and wind damage, and this costs about 300 DT. The initial loan is to be repaid in 2 or 3 years, but so far few are repaid. The local staff feels about half of the new greenhouses are a success because their owners are willing to work very hard.

In terms of work generated directly, a greenhouse can be put up by three people in two days; most farmers do this themselves. Greenhouse crops require more intensive labor than others: plants must be tied up, and are usually fertilized and watered often. In addition, diseases are common and spread easily in greenhouses, so products to control them are used more frequently than in other plantings. There is a potential here to hire more labor, but the farmers I met who had greenhouses used family labor.

### Agricultural Extension Centers

A house and an office for an extension agent have been built at Chraya, about 7 km from Sbeitla, to make the extension program more accessible to farmers. There will not be a demonstration plot, but the agent will be on the spot to offer advice to both shallow well and PPI

farms. ODTF funds were used for construction; an agent will be added to the staff, but from other funds.

The construction employed about seven people over a three-month period, creating 21 person/months of work. The contractor provided a supervisor, guard, and mason from his permanent staff, and four laborers were hired locally.

### Animal Production

#### Cactus Groundcover

Prickly pear cactus, in both prickly and spineless varieties, was planted in this program. About 160 beneficiaries received 100 Dinars each to encourage them to buy and plant cactus on one hectare each. The cactus is helpful in preventing erosion and as animal fodder for sheep, goats, and camels. The latter two will eat it with the spikes, while sheep must have the spikes burned off or eat the spineless variety. The cactus is especially good as an emergency fodder in times of drought because of its high water content. I was surprised that farmers would take the time to pick the cactus, roast off the spines and cut it up for the animals, but several told me they did so.

It is relatively easy to plant the cactus, so farmers probably do it themselves. They may hire a cart

(if they don't own one) to transport the cactus they buy.

#### Stable Construction

In 1981 and 1982, eighteen people received money to build stables; each was given about 800 DT worth of materials. Two people could build each stable, and farmers probably did it themselves. Some work was generated for cement sellers and truckers to transport the materials, but it is difficult to estimate the amount. We will see examples of this in the data collected from farmers.

#### Modification of Sheep and Cow Stock

This program operated only in 1981, when 16 farmers were given either one male sheep or two cows to be used in breeding.

Little work was generated; farmers might rent a truck to take their animals home.

#### Sheep Dips

Sheep dips were built at three sites in Sbeitla delegation, and a veterinarian instructed sheep owners in their use.

No workers were hired to dip the sheep; farmers ran their own sheep through. However, the baths took about two months each to build with about five workers, so generated about 30 person/months of work.

### Veterinary Clinic

A clinic for the treatment of animals was built in Sbeitla in 1984. The construction took about six months with six people working, including a supervisor, a mason and four workers. The first two were from Sidi Bouzid, and the workers from Sbeitla. Thus, the clinic generated 36 months or three person/years of work.

### Basic Infrastructure and Improvement of Standard of Living

#### Construction of Agricultural Roads

This project improved rural roads by reinforcing them at the points where rivers often washed them out in the rainy season. While the general idea is good, one official said he felt this was one of the least useful programs because the reinforcements were done on different roads (to spread the benefits around), while often the same road would need two or three reinforcements. Reinforcing a road at only one place would be useless because the road would still be cut.

Although figures are not available for workers involved in this project, we can get a general idea by extrapolating from the number involved in road-building. It takes about 22 workers (both equipment operators and general workers) about 5 days to build a kilometer of rural road. These reinforcements covered 930 meters at

a total of six sites, so probably involved as much labor as a kilometer of road, or 4.2 person/months of work.

#### Electrification

The ODTC paid the national electric company (STEG) to put electric lines into new neighborhoods in the town of Sbeitla. Figures on the number of people working on this project are unavailable, but it did generate employment.

#### Rural Health

One hospital and two dispensaries (at Mzara and Douleb Hommar) are being built.

At least ten workers, including seven laborers, one mason and two supervisors, worked on the hospital for a total of about six months. (As everywhere, construction delays are common because of weather, supply shortages, etc.) In addition, a day or night guard is always at the site. Thus, the hospital will generate about six person/years of work.

The two dispensaries are smaller and can be built by about five people working for two and one-half months at each site, generating a total of about 25 person/months of work.

### Water Points

The money in this program is officially allocated for potable water and is used to build and improve private wells, including the construction of motor shelters and reservoirs. In fact, this is much the same as the projects involving shallow wells in the category of hydro-agricultural projects above. Since shallow wells are used to provide water both for drinking and for irrigation, they fit into both categories. One hundred twenty-six people benefited from this project, receiving about 250 DT in materials or 100 DT to pay for labor, or 150 DT to pay off the first 10% of their loans for motors.

Figures are not available for how much of the money went into the various categories above, so we cannot estimate figures for work created. However, the money given for labor could be used to hire workers or to help support the farmer and his family as they worked. The materials would be bought in the nearest large town and transported to the site by rented truck, and builders or farmers would use them in construction.

### Deep Wells

Five deep wells were drilled to provide drinking water. The process is the same as for drilling deep

wells for irrigation, and employs a team of about five people for 1.5 months to drill a 150-200 meter well.

In drilling these five wells, about 37.5 months or 3.1 person/years of employment were generated.

#### Deep Surface Wells

These wells are deeper than the usual surface wells (about 35 vs. 20 meters) and are to be used to provide potable water to the public. However, they are on the land of private farmers who will probably also use them for irrigation.

Using the figures derived earlier for digging a shallow well and extending it to cover an average depth of 35 meters, each well would generate 350 person/days of work. Five wells would mean 1,750 days, 67.3 months or 5.6 person/years of work.

#### Improvement of Springs

One spring was improved for use as drinking water, creating about 15 person/months of work.

#### Rural Road Using Oil-Press Waste

Financed by the experimental funds, this project used crushed olives and pits as the basis for a 3.5 km piste or rural road outside Sbeitla. It worked very well as a road surface, and the local staff hope the idea will be used elsewhere. The contractor mentioned that the one problem he encountered was that the olive

mash (marqine) needs to be used soon after it is produced so it does not spoil.

Four laborers, three tractor and bulldozer operators, and two engineering interns worked on this road for about 1.5 months, creating 10.5 person/months of employment (excluding the engineers).

#### Small Business Aid

In the works since 1982, this program was about to start up in the late summer of 1985. It is focused on the town of Sbeitla, and will divide 25,450 Dinars among 10 local entrepreneurs to make their businesses more productive; one goal is that they will hire more workers. To give an idea of the types of businesses involved, they are listed below.

#### Type of Business, Amount of Support Given, Purpose, Current Workers/May Add

Restaurant: 2,220 DT for chicken rotisserie and french frier, 4/1.

Printer and bindery: 5,000 DT for stamping machine, 5/1.

Photographer: 3,700 DT, photocopier, light, instant photo, self/1.

Photographer: 2,500 DT, photocopier, camera, flash, 1/1.

Tailor: 3,150 DT, 2 plain and 1 embroidering sewing machines, 4/1.

Seamstress: 1,000 DT to buy fabric, 9/1 .

General mechanic: 2,900 DT, tire balance, sharpener, wrench set, 5/3.

Tire repair: 3,000 DT, tire balance, sharpener, hydraulic jack, 2/1.

Radio/TV repair: 1,000 DT, video, oscilloscope, light, tweezers, 1/0.

Small rug factory: 1,000 DT, wool, 9/21 (the latter figure was given but seems high).

It might be noted that only one of the recipients is a female, and she was just recently added to the list. The reason was not given, but it seems there may be more of an effort to include women as beneficiaries. They are difficult to find in this sort of project; the directors are to be congratulated for including this one. The participants hope to add 10 (excluding the 21 rug workers) full-time employees.

#### Total Employment Generated

Keeping in mind that the above figures are approximate, and that in some cases work was generated but it was impossible to estimate the amount, we can say that about 132.7 person/years of work were provided by Sbeitla ODTG projects. It should be noted that most of this work was short term, so a large number of people were involved.

## REPORT ON DELEGATION OF MAJEL (OR MAJEN) BEL ABBES

### BACKGROUND

The delegation of Majel bel Abbes, located in the southwestern part of the 1985 operating area of L'Office de Developpement de Tunisie Centrale, was chosen as a site for investigation for several reasons. First, it has only recently come under the influence of the ODTC, and can be used as a contrast to areas that have experienced a longer period of ODTC intervention, like Sbeitla. Second, several officials listed it as one of the most disadvantaged of the ODTC delegations. One study put unemployment there at 51.4% in 1985; the next highest figure was for neighboring Hassi el Ferid, with 37.5%. It is important to assess jobs provided in areas like this where they are really needed. Third, this work may serve as a baseline for the evaluation of ODTC intervention after several more years.

Majel bel Abbes was within the delegation of Feriane until 1980, which meant that it received a much smaller budget. The area of the current delegation is 110,000 square hectares, and it has a population of 15,311. Only about 700 of these people live in "agglomerations", or clustered in towns and villages; the rest are dispersed. The largest town is the center, Majel bel Abbes, with about 900 people. The economically active population is about 3,000; this

figure includes only the household head for farm families (thus excluding women's agricultural activity). Of these, most are farmers. The delegation has 16 primary schools, a hospital and 4 health centers (none of which is in operation yet), 2 public irrigated perimeters, and about 60 functioning private surface wells.

While the ODTC became officially involved in the area in 1982, it did not begin operations until January 1983. Mr. ben Othman, the local head of ODTC, has been in his post since July 1983, so has been involved with nearly all the local projects.

#### ODTC PROJECTS

##### The local ODTC office

While the office is not a project per se, it does provide full-time jobs for five people.

##### Irrigation

###### PPIs (Perimètres Publics Irrigués)

There are two PPIs in the area, named for the aymada or sub-delegation in which they are located.

###### Oom el Aqsab

Oom el Aqsab is located twelve km west of Majel bel Abbas, near the Algerian border. It is near a river, from which it is said to have been irrigated for a long time, perhaps from Roman times. Water from the river, which was channeled to the land in a saqia or

irrigation channel without the aid of a pump, watered about 12-15 hectares.

In 1970, three surface wells were drilled in an attempt to expand the irrigated area to 90 hectares. However, the motors' combined output was only 10 liters/second, insufficient for 90 hectares.

In 1983, the ODTC entered the area and provided improvements to the wells and canals. They now pump 23 liters/second, but although this is more than double the past flow, it is only enough to irrigate 50 of the perimeter's 90 hectares. On my visit, local people said they would like to see a deep well to augment the flow. Mr. ben Othman suggested that adding a surface well for about 5,000 Dinars would be much more economical; he estimated a deep well might cost 100,000 DT.

A list of PPI farmers shows 87.2 hectares divided among 43 beneficiaries. Local officials state there are only 30 beneficiaries, because some of the 43 people named are holding plots that are really under the control of their fathers; this is said to be true for the only two female beneficiaries listed.

One man has a full-time job as pompiste, running and maintaining the pumps as well as arranging the distribution of water to farmers.

### Ouled Merzoog

The PPI at Ouled Merzoog, 30 km from the town of Majel bel Abbas, has 60 hectares divided among 22 farmers. The water flow is currently insufficient, so there is very little activity at this time.

### Shallow Wells

Shallow wells are located in both the sectors above, but in no other part of the delegation, because of the depth one must drill to find water. There are 10 in operation and 5 that need motors at Ouled Merzoog, and a total of 65 at Oum el Aqsab. In these two areas, drillers reach water at a depth of 7 to 10 meters, while in the other sectors water is much deeper; one test found water at a depth of 406 meters.

### Oum el Aqsab

In this sector there are currently 50 private wells that ODTIC has helped to equip or improve since 1983, and 15 more that are dug but not yet equipped. Each of these wells can irrigate two to three hectares. The local officials felt that shallow-well farmers were in general more successful than those on the PPI, mainly because they had more control over water; it seemed the supply on PPIs, especially in the summer, was often insufficient. For example, at the time of this research

(late July 1985), some PPIs were irrigating once every 10-15 days, while some shallow-well owners irrigated daily. Some PPI farmers at Oom el Aqsab said they had planted few or no vegetables this year, in order to use the limited water for their trees.

Several programs to aid shallow-well farmers are available; the two last are also available to PPI farmers:

- 1). auto-financing, in which the farmer and the ODTC each pay some of the cost of the well motor. At present, a motor costs 1,500 DT, of which the ODTC pays the first 300 DT (in effect, they make the down-payment), and the farmer pays the rest over 5 years;

- 2). improvements, such as funds to help build a water reservoir or pump shelter;

- 3). demonstration parcels, in which the farmer supplies the land and labor and receives free materials and the harvest;

- 4). a program in which the farmer is supplied new improved varieties of trees (pear and apple trees are imported from Spain and France; the apples include red and golden Delicious). The farmers pay only 30% of the cost and ODTC the remaining 70%.

It is interesting that four or five of the shallow wells at Oom el Aqsab are located within the PPI; this

was also true in other areas we visited. In all cases, the local officials said this was "illegal", but allowed if water for the PPI was insufficient, which is often the case. Such wells receive the same ODTG benefits as wells outside the PPI.

#### Potable Water

There are three deep wells drilled by ODTG to provide potable water, located at Akrouit, Ellouza and Soula. At all three of these sites, a new scheme had been in effect since May 1985 (two months before this writing), in which water users pay 150 millemes (currently about US \$0.18) to fill a 500 liter cistern, or water tank on wheels. At each site, a committee of three local people collects the money and uses it to pay for fuel and repairs. Mr. ben Othman felt the system was working very well.

#### Jobs

At each site, there is a guard/pump maintenance man who is paid from the funds collected locally. The salary was estimated to be 50 DT a month. In addition, a private company was hired to drill the wells. These companies and their specialized equipment are understandably not local, but still provide jobs. It is reported that 6 people worked for about one and one-half

months to construct each of these three wells, for a total of 27 person/months of construction.

The necessary construction materials were transported from more central areas to these rural sites, generating further employment. Since this is difficult to estimate, it will not be added into the total, but should be kept in mind.

#### Animal Shelters

This program, which operated in 1984, gave 20 farmers each 200 DT to build shelters for their cows and/or sheep. The money is not given directly to the farmer, but to one of three shops in Majel bel Abbes to pay for the iron and cement used in construction.

#### Jobs

Farmers usually build these shelters themselves, so no construction jobs are created. However, 4,000 DT were spent at three shops in Majel bel Abbes. This alone did not create new jobs, but the general impact of ODTC projects on local business will be discussed later.

#### Cactus Planting

In 1985, the ODTC will spend 5,000 DT to help farmers plant spineless cactus for their sheep to eat. Each of about 30 farmers will receive 150 DT, with

which they will buy the cactus from other farmers and plant it.

#### Jobs

It is estimated that 312 person/days of work were generated in transporting and planting the cactus for cash (if not done with the farmer's own labor).

#### Greenhouses

Eight farmers in the irrigated areas (four in PPIs, four with private wells) were loaned money to build greenhouses; it is to be repaid over a five-year period.

#### Jobs

It was estimated that a farmer could put up a greenhouse with the help of his family and 4 extra workers in 3 days, which would generate 12 person/days of paid labor, or 3.7 person/months for 8 greenhouses.

#### Locally-Designed Projects

In this program, which seems to encourage local initiative and area-specific projects, the ODTG has given 4,000 DT to be used in each delegation. In Majel bel Abbes, part of the money will be used to buy 5 sheep each for 9 farmers (at a cost of 60 DT per sheep or 2,700 DT); the rest will be used to help 6 farmers

improve their houses (about 200 DT each). In both cases, these should be very poor farmers, and the beneficiaries are to be chosen by the omda and other local dignitaries at a meeting.

#### Jobs

Since the beneficiaries are among the very poor, it is likely that they will work on their houses themselves. The transportation of construction materials and sheep to the rural sites, however, will generate some work.

#### Construction of Health Facilities

In 1983, the ODTC allotted 30,000 DT for the construction of a hospital in Majel bel Abbas and two health centers, at Ouled Merzoog and Nathour. The buildings are now finished but unfortunately not in operation because they are not yet equipped.

#### Jobs

When these facilities are staffed, it will be by the Ministry of Health, not the ODTC. However, the construction provided several construction jobs. An ODTC official estimated that the hospital construction occupied 15 workers a day for 18 months, although he noted there were interruptions in this period, so we can assume workers were only paid for about 9 months. He suggested that the dispensaries employed 10 men at each

site over a period of 9 months, again with interruptions so that only 4.5 months of actual work were involved for each. The workers included both laborers (paid 3 DT a day) and masons (paid 6 DT a day). In all, it is estimated that this project provided 15 person/years of work.

#### Training to Make Scourtins

In 1984, the ODTC budgeted 10,000 DT of its experimental funds to teach people in two delegations to make scourtins (in French; in Arabic shwamiy), or baskets of alfa grass, that are used to hold olives in traditional oil presses. Of the 84 trainees, 68 were in Majel bel Abbes; 55 were females and 13 males. They received one and one-half months of training from three experts brought in from eastern Tunisia.

To date, people have been trained but are not actively working (partly due to the season), but this may soon change. On a recent visit to Majel bel Abbes, I encountered a man from Sbiba who has an oil press and wants to buy 1,500 scourtins for use this winter. He had heard by word of mouth that they were now made at Majel. He discussed the price he was willing to pay with the ODTC head, who said he would contact the local makers and see if it was acceptable. If so, he would contact the buyer and have him submit a written order.

The price offered was 550 millemes per scourtin, and one can make two or three a day. That means a person could make between 1,100 and 1,650 DT a day. This is well below the reported pay of 2,500 to 3,000 DT a day for agricultural labor, but in this depressed area, people are apparently willing to accept it. Another factor is that the majority of the trainees were female, and in this area women work only in the family fields, not as wage labor. Thus this may be one of the few sources of cash income available. It is probably also attractive in that it requires little or no capital (one can pick the grass), and can be done when other tasks are finished.

#### Jobs

During the training in Majel, three people worked for 1-1/2 months each, generating 4-1/2 person/months of employment. If the current order for scourting is accepted, it will generate 23 person/months of employment. (That figure is based on 2.5 scourtings a day with a 26 day month, the usual calculation for full-time employment. While these calculations were used to arrive at standard figures, it is unlikely that the work will be done on a full-time basis. This will in fact provide work and income for a larger number of people.)

### Construction of New ODTC Office

The ODTC is presently housed in a rented building, but in 1985, 18,000 DT were allocated to build a permanent office. The building is now finished and will be occupied as soon as the water and electricity are connected.

### Jobs

It is estimated that it took six workers a total of six months to complete the building, for a total of three person/years of labor.