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CROP PRODUCTION IN SINAI

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CROP PRODUCTION IN SINAI

1.0 INTRODUCTION

The largest concentration of crop production in Sinai is near El Arish, where irrigated farming has been practiced for several decades. Some rainfed crop farming also exists near El Arish, particularly east of El Arish toward Raffaa.

A second fairly large area of intensive crop production is in the early stages of development, east of Bitter Lakes, using Nile water for irrigation. Total production in 1981 is less significant than is that near El Arish, but potential production within five years could be several times that of El Arish.

Aside from these two concentrated areas, there are many small, almost garden-like, plots scattered throughout Sinai which, in total, may produce as much as the area near El Arish.

This staff paper describes the existing agriculture of Sinai in terms of the above classification.

Together with Working Paper (No. 11) on livestock, and a staff paper on supporting institutions, the descriptions are intended to serve as a base point for analyzing the future potential for agricultural development in Sinai.

It is hoped that reviewers will point out shortcomings in these papers, so that in the final report the descriptions of the existing agriculture will be as accurate as possible.

2.0 AGRICULTURE NEAR EL ARISH

More agricultural cultivation exists near El Arish, including the area between El Arish and Raffaa, than in any other region of Sinai. The area immediately surrounding El Arish is lower than the surrounding desert and probably has been formed over centuries by silt deposits from water discharging from Wadi El Arish. All irrigation water comes from shallow wells.

For purposes of describing the agriculture near El Arish, the following classification is used:

(a) Traditionally irrigated areas.

(b) Cooperative vegetable production.

(c) Rainfed cultivated crops.

(d) Rainfed tree crops.

(e) New reclamation (1200 feddans).

(f) Planned new reclamation (2500 feddans).

2.1 TRADITIONALLY IRRIGATED AREAS

Roughly 2100 feddans of area in and immediately surrounding El Arish have been farmed by irrigation for many years. Until recently, it was irrigated by the basin technique. Olives dominate in the cropping patterns, with exports of olive oil to Cairo being a major element. Several farmers have been using drip irrigation for four years or more, and where they have their own wells they are experiencing virtually no problems. Many of the farms look well-managed, especially among those whose operators were not displaced during the 1967-1979 period. The trees are bigger and crops are healthier than are those on farms in the 320 feddan area from which farmers were displaced during the period.

Something over 400 feddans of the area immediately surrounding El Arish is in vegetable production. In addition, vegetables and some barley are intercropped among olive trees, particularly among the young trees. This practice stops when the trees mature. In areas where only vegetables are grown, some portions may lie fallow for one crop cycle or two. For example, one or two feddans of tomatoes may be grown on the east side of the main line of a drip irrigation system for a winter crop and the west side of the main line may lie vacant. Then, the drip system is flipped to the west side of the main line and a crop is grown there in summer. There does not appear to be any one single established cropping pattern. Intercropped systems include: potato-olives, squash-olives, grain-olives, berseem-olives, tomato-olives and tomato-squash.

Altogether, in this area, there is roughly 1700 feddans of tree crops, mostly olives. Olive production appears to be profitable. Some of the trees on one farm produce up to 500 kilograms each, although average production is probably closer to 50 kilograms per tree. 1000 kilograms of fruit will produce 250 litres of oil worth LE 1.50 per litre. 60 trees per feddan would gross 11,250 LE per feddan per year at 500 kilograms per tree, or 2,125 LE at 50 kilograms per tree. New plantings are mostly 100 to 110 trees per feddan.

Two locally owned olive processors are located in El Arish. Each farmer's olives are processed individually. Oil is then sold by the farmer to buyers from Cairo.

One of the olive oil processing plants has a capacity of ½ ton per hour, or 200 tons of olives per year, producing 40 to 50 tons of oil per year. The other has only half that capacity. It appears that present crushing capacity is inadequate to meet current needs and as young trees come to maturity at least a doubling of capacity will be required to meet needs of trees already in the field. Should average yields per tree be increased only modestly to 100 Kg., then a quadrupling of capacity could be required.

Intercropping young olive trees with vegetables is apparently profitable. However, when the olive trees near maturity, the vegetables are gradually phased out because of shading and complications of olive harvest. Partly because of this, and partly because of the lack of water to irrigate larger areas of vegetables, 40 percent of the vegetables that are consumed in El Arish are imported from the Delta. They come into El Arish through two or three wholesale markets there, at a 6% commission. Local vegetable producers sell to the same buyers.

It appears that farmers perceive olives to be a more attractive crop than vegetables over the longer run. Several reasons might be offered:

(a) Olives are long-lived, and are relatively disease free.

(b) Olives require relatively little labor--a small amount of pruning, occasional watering and harvesting.

(c) Successful vegetable production requires heavy labor and management; diseases are a constant threat.

(d) Vegetables are perishable, while olive oil is less so.

(e) The market for vegetables is considerably more volatile than for olive oil.

2.2 COOPERATIVE VEGETABLE PRODUCTION

During the Israeli occupation, about 320 feddans of olive trees were cleared at El Arish to form a Kibutz for vegetable production. Most of the farmers that were displaced in the process moved west of the Suez Canal. The Israelis introduced drip irrigation to the El Arish area.

Beginning in 1979, after the Israelis left the area, many of the former farmers returned. They have organized into a cooperative and are being provided

technical assistance by the Mennonite Central Committee (MCC). They are concentrating on vegetable production, although a number of them are planting olive trees and intercropping with vegetables. Most of these farmers are installing drip irrigation systems as rapidly as they can get the equipment. Besides the technical assistance provided by the MCC, four government extension officers and the Green Revolution Society are available to assist farmers with production problems and to help arrange for fertilizers and pesticides. Shallow, hand-dug wells which are probably low in capacity are the source of irrigation water. Since this land is adjacent to El Arish which is not serviced by a central sewerage system, some wells may be contaminated by human waste. The land appears to be well-suited to vegetable production. However, there is great variation in crop appearance and productivity. In the older traditionally irrigated area where most farmers were not displaced, crop conditions appear more uniform and production is judged to be higher.

Approximately 76 farmers till this area. Six wells provide the irrigation water. A major problem is lack of farmer control over operation of the pumps. The pump operators come to work at about seven or eight in the morning and leave at about 2 p.m. Maintenance is poor and when breakdowns occur, irrigation schedules are severely disrupted. Among the crops grown are potatoes, tomatoes, cucumbers, squash, okra, eggplant, lettuce, peppers, onions, and some figs, in addition to the young olive trees. Small grain, usually barley, is grown; only a small amount of this is irrigated. Some manure is used for fertilizer. Urea and potassium sulfate are sometimes injected into the drip irrigation system. Phosphate is spread on the surface.

Three obvious problems in this cooperative are: (a) insufficient water, (b) poor quality of water (high salt content), and (c) uncertainty of water supply. In addition, the extension service (technical assistance) is inadequate to the many problems posed by such a diverse number of crops being grown, especially with the introduction of drip irrigation which is new to the farmers.

A study of the El Arish area carried out by Dan Goldberg and others in 1971 showed that increased production of selected vegetables (muskmellon, cucumbers, tomatoes, and sweet corn) was possible even with the salty water, using drip irrigation rather than sprinkler of furrow (basin) irrigation. (They credited the increased production to the better availability of water and fertilizer to the plants. However, it is probable that the most important reason was the better placement of water through drip irrigation, so that salts were leached rapidly through the sandy loam soils with minimum effect on plant growth.)

2.3 RAINFED CULTIVATED CROPS

In the Bir El Abd area, about 1800 feddans of barley and 1600 feddans of watermelons are grown under rainfed conditions.

In the El Arish area, about 225 feddans of rainfed barley and 200 feddans of watermelons are grown.

A reported 15,000 feddans are being cultivated in the "Raffaa Strip." Besides grain, the rainfed crops include castor beans, almonds, olives, sisal, melons, citrus, dates, and figs. Since this area is outside the intensive study area, first-hand observations were not made by the agricultural team. It is understood that a portion of this area is irrigated from shallow wells.

Before 1967, a factory existed in El Arish for extracting oil from castor beans. The Israelis removed it. Apparently, they shipped the castor beans to Raffaa or Tel Aviv for processing. Now, some of the farmers east of El Arish in the non repatriated area are given permission by Egyptian authorities to ship their castor beans to Cairo, where they are sold and where processing facilities exist. Question: would it be more efficient to have a mill in El Arish? It is likely that this somewhat salt and drought-tolerant crop will grow in importance in Sinai.

2.4 RAINFED TREE CROPS

Rainfed tree crops include olives, citrus, dates, almonds, and figs. Particularly for dates, and perhaps for some of the other trees, productivity is low because trees have been grown from seedlings rather than from grafted stock. A program to upgrade productivity by introducing grafted stock and vegetative propagation of highly productive clones seems worth considering.

2.5 NEW RECLAMATION (1200 FEDDANS)

A block of land of approximately 1200 feddans exists between the area presently irrigated and the El Arish airport, south of El Arish. This block is in early stages of development. The Green Revolution Society has drilled 16 wells and more are planned. All wells are approximately 60 metres in depth. They tap the superficial "fresh" water lens above the normal saline basin from the sea and the south eastern brine drainage which flows in a northerly direction

toward El Arish. The soil appears to be suited to a number of agricultural crops including vegetables and olives.

With assistance of the Green Revolution Society, 50 feddans of this area have been planted to olives, apricots, apples, guava, and grape vines. Drip irrigation is being used. Water for this installation comes from one of the 16 wells. Apparently it is planned that most of the 1200 feddan area will go into olives. In addition, there will be some apples, apricots, grapes, and guava, all irrigated by the drip system.

2.6 PLANNED NEW RECLAMATION (2500 FEDDANS)

South of the El Arish airport is a block of land approximately 1½ - 2 kilometres wide by 20 kilometres long, stretching from north to south, containing roughly 2500 feddans suitable for cultivation. The land, similar to the nearby 1200 feddan block, is a sandy loam, probably several metres in depth and with good texture (sandy loam.) Surface drainage is to the north, moderately undulating, which will require sectional land leveling.

The biggest question about this area is whether sufficient water will be available to irrigate it without jeopardizing the municipal water supply and presently irrigated areas of El Arish. If sufficient water is available, this appears to be a feasible area for development. However, this requires confirmation through detailed drilling, pumping and water analysis in the entire El Arish area.

Tentative plans are that the area would be used for additional vegetable, forage, olive, and citrus production.

TABLE 1

Estimated Crop Production in North Sinai, 1981

Crop	Number of trees or plants	Estimated area (feddans)	Yield per feddan (tons)	Yield Total (tons)
IRRIGATED				
Olive	69,783	700		2,500
Grapes	2,072			2.5
Pomegranate	1,512			1.5
Almonds	468	4		0.3
Orange-Lemon	3,395	30		6
Guava	973			3
Figs	1,198			0.75
Vegetables				
Tomato		180	15	
Cucumber		80	6	
Squash		80	8	
Peppers		50	3	
Eggplant		40	5	
Potatoes		7	8	
Watermelon		3	15	
Okra		3	5	
Hot Chili (Green Peppers)		3	7	
NON-IRRIGATED				
Small grains		2,052		
El Arish				
Beans		300		
Watermelon		200		
North Coast				
Beans		180		
Watermelon		1,600		
Palm Trees (dates)	347,425			10,400

Source: Officials of North Sinai Governorate, the Ministry of Agriculture and the Green Revolution Society.

3.0 LAND RECLAMATION EAST OF BITTER LAKES

In the late 1950's or early 1960's, a plan was laid out to reclaim 20,000 feddans east of Bitter Lakes. The first installations were completed about 1963, and perhaps 1,000 feddans were under irrigation by 1967. There was essentially no activity between 1967 and 1980. Water is from the Nile, moved through the Ismailia Canal and then under the Suez Canal in a system of inverted syphon tubes to a canal on the east bank. The syphons cross the Suez Canal about 25 kilometres south of the bridge (#6) from Ismailia to Sinai. From the syphons, the water runs through a canal for about 2½ kilometres east to a pumping station, where it is lifted about 6 metres to a series of canals that conduct the water to reclamation projects. Originally, the pump station was designed to have been run by a series of six 350 horsepower electric motors.

The syphons that were used prior to 1967 are being replaced by a new system, with capacity to irrigate 30,000 feddans. One reason that the syphons had to be replaced is that the Suez Canal was widened at that location. Six syphons about 2 metres each in diameter are being installed. One syphon was operating in August 1981. The system is designed so that water flowing from the lift station can go to any of four project areas. One area lies to the north and is designated in future years. An area to the east named "Hero Village" is designated for reclamation by military forces. To the south is an area known as "Youth Farms" that is being reclaimed from land that had been farmed prior to 1967, and south beyond that is a new reclamation area called "New Mit Abou El Kom Village". Each of these last three reclamation areas will be discussed in turn.

3.1 HERO VILLAGE

The executing agent for this project is the Akkaria Company. In the winter of 1980-81, they had planted some small grain and some windbreaks and nursery stock. These were irrigated by gravity surface methods: furrow and basin. They propose to irrigate 1,000 feddans during the summer of 1981 by movable sprinkler irrigation, and an additional 2,000 feddans by the winter of 1981-82, by center pivot sprinkler system. They expect to grow berseem clover, barley, peas, horse beans, ground nuts, watermelon, cucumber, beans, tomatoes, and other vegetables.

3.2 YOUTH FARMS

A few young farmers have resettled this area and are farming perhaps 300-500 feddans of the original 1,000-1,200 feddans, with surface irrigation. Neither the irrigation ditches nor the drains are well maintained. Irrigation is by gravity surface methods: small basin, furrow, furrow-basin combination, and short furrow.

The crops, mainly vegetables and some olive trees, do not look promising.

3.3 NEW MIT ABOU EL KOM VILLAGE

This area was planned and designed by Misr Consultant Engineers and is being implemented by Arab Contractors. Of the three areas, this is the most impressive at this early stage of development. The design calls for reclaiming 6,000 feddans in phase 1 (1981-82) with an additional 5,000 feddans to be reclaimed later. Equipment for the first 1,000 feddans of phase 1 has been installed and is in operation. The equipment includes five center pivot irrigation systems, each covering 150 feddans, plus another 250 feddans of drip irrigation in between the centers.

Following installation of the center pivots in October 1980, the area under pivots was planted to barley. The crop was chissled down, rather than harvested, to put organic matter in the soil. Following this, alfalfa was planted under pivots number 1 and 3; peanuts under pivots number 4 and 5; the area under pivot number 2 was planted to sorghum, beans and sunflower. The young alfalfa stand looked promising in June 1981.

In this project area, the Government finances the social infrastructure: roads, electricity, water, etc. The Government provides low interest loans for the productive infrastructure. Misr Engineers has prepared a feasibility study to justify these low interest loans. The study included soil analyses, water studies related to the proposed irrigation systems, cropping programs, marketing, implementation of the project, agricultural industries needed, possible livestock enterprises, and the need for secondary infrastructure.

Soil analyses have been completed only for the first 1,000 feddans. They are awaiting soil classification for the additional 5,000 feddans before proceeding further. A commercial firm was hired to clear the area of mines.

Misr Engineers designed the 6,000 feddan area to include 3 villages: one central service center, with schools and other service institutions, plus two satellite villages. About one third of the farmers would live in each of the three villages.

Plans apparently include turning the land over to settlers at some point in the future, although the timing for this has not yet been determined. Neither have the details of what the land allocation pattern and procedures would be.

3.4 IRRIGATION INFRASTRUCTURE

In general, the lift station and the original set of canals and drains are in a very poor state of repair. Weeds and grass are growing in the canals and there are signs of considerable leakage from the main canal.

The original electric motors were replaced many years ago by Mercedes-Benz diesel engines to drive the pumps. Although five are in place, only four of them were functioning. Maintenance looked very poor.

4.0 CROP PRODUCTION IN SCATTERED PLOTS

Excluding the two reclamation areas previously described--near El Arish and east of Bitter Lakes--the most important existing crops are:

(a) date palms, mostly along the northern coast

(b) vegetables and fruits for local consumption, where supplemental irrigation water is available

(c) small grains, mostly barley.

There is an increasing trend for the Bedouin to practice agriculture, especially where sufficient rainfall, or perhaps some irrigation water, is available. In some wadis in central Sinai, water spreading terraces have been built to slow the runoff of rainwater. The land is cleared prior to the rainy season and after enough rainfall to provide some moisture in the soil, a grain crop--usually barley--may be planted. Whether or not the crop matures to produce grain depends on the amount of rainfall. Occasionally, the land will be fenced, or show some other indentifcation to indicate ownership. Whereas the Bedouin historically have shunned sedentary agriculture, it is becoming more important in their lives.

Water is the lifeblood of agriculture throughout Sinai. Water sources include direct rainfall, runoff water from rainfall in the wadis, wells and springs. Water from springs and wells is scarce, is affected by fluctuations of rainfall and generally is salty. There is some evidence to suggest that the microcatchment irrigation system and the runoff system of capturing rainfall were used more successfully for agriculture centuries ago than they are today.

4.1 DATE PALMS

Officials of the North Sinai governorate estimate that approximately 350,000 date plam trees are growing along the north coast. Even with low rainfall, the trees appear to be hardy. Date palms also grow in other parts of Sinai, in selected areas along the coast of the Gulf of Suez and the Gulf of Aqaba. In total, it has been estimated that a million palm trees grow in Sinai. Most of the dates are consumed locally.

In comparison with date palms in other countries, the productivity of date palms in Sinai is low. Some of the factors that may be responsible for low production are:

(a) nearly all of the trees grow at random from seeds, without regard to the quality and productivity of the trees from which the seeds came,

(b) pollenization is very poor; pollenization is left to nature rather than using the techniques of improved husbandry,

(c) diseases may be a factor, although these are not likely as important as the first two considerations.

A very substantial increase in date production would seem to be possible over time. The international market for dates is strong. To realize the potential for increased production would require a concerted program including at least the following elements:

(a) studies to identify the most desirable and productive local plants, from which vegetative propagations could be made, thus providing uniformity in tree types and in the product,

(b) adaptive trials of promising varieties from other countries, to upgrade the productive potential per tree,

(c) schemes to enhance productivity, such as hand-fertilization and systematic use of bees for fertilization as well for production of honey,

(d) research on diseases and their control,

(e) effective extension and other nonformal education programs to make known the improved practices,

(f) perhaps eventually, with improved varieties and improved husbandry, it would be economical to establish date processing factories, to enhance the marketability of dates and to process the pits into animal feed.

4.2 VEGETABLES AND FRUITS

Most of the places where small, permanent settlements exist in Sinai are in wadis. From one or more sources of water--shallow wells, springs, or harvest of rainfall runoff--small plots of vegetables or fruits may be grown for local consumption. A large variety of vegetables and fruits may be grown, depending on the season, the altitude, water availability and other factors.

Some potential may exist for increasing production from these small plots through improved seeds, fertilizer and other improved practices. However, the possibility that these small scattered plots will contribute significantly to the total growth of the Sinai economy is quite remote.

4.3 SMALL GRAINS

Rainfall at Raffaa is higher than at other locations in North Sinai, and Raffaa is the most important grain-producing area in Sinai. Even here, rainfall averages only 200 to 250 mm per year. This compares with an average of 100 mm per year at El Arish, just a few kilometers west of Raffaa. The agricultural effect of the higher rainfall near Raffaa is much more than doubling, though, because a smaller percentage of the higher rainfall is lost through evaporation. The principal grain crops grown near Raffaa are wheat, barley and corn (maize). The area also produces watermelons, figs and other fruits in summer. The Raffaa region is reported to have eight wells that are used to irrigate 350 feddans of agricultural land.

Aside from the grains grown in the northeast of Sinai, some barley is grown in various wadis of Sinai--mainly wadi El Bruk and wadi El Arish--from harvesting runoff of rainfall. Production from year to year varies considerably depending on the amount of rainfall. Even in the best years, production per feddan is low.

The Bedouin who grow barley in the wadis consume it themselves.

4.4 OTHER CROPS

Before 1967, the northern coastal area produced significant quantities of castor beans, almonds, citrus and sisal.

Castor beans are discussed in section two of this report. With appropriate institutional support--research, extension and processing facilities--castor beans may offer a substantial possibility of contributing to the overall economy of Sinai.

Sisal is apparently acclimatized to the environment in North Sinai. It has not been grown since 1967, but may have potential. The international market for sisal may have changed significantly since 1967 and would be a factor that would have to be considered.

Several plants of medicinal value apparently grow in Sinai. It is possible that a small number of these might be identified for intensive cultivation with an economic return. However, it is rare that natural herbs can compete in commerce with chemically produced medicines. To estimate the potential for economic returns from growing medicinal plants will require a comprehensive study.

Indigenous and selected species of plants useful for paper pulp production are probably of greater long-term potential to agriculture and Sinai development than medicinal plants. Thymalaea Hirsuta is one of the most common native shrub species on the northern coast of Sinai. Its range extends approximately 70 kilometers inland from the Mediterranean--a broad coastal region of limited value to traditional agriculture due to shifting sand and brackish water supplies, especially in the western section. The plant has been studied intensively (1) and is considered to be one of the most promising economic wild fiber plants. It may be used to produce good quality paper. It can be mixed with bagasse and waste paper to produce products for common usage and containers.

Another Thymalaea species, Edgeworthia Papyrifera is currently in production in Japan. It provides a source of pulp for extremely high quality, strong paper and has pulp qualities similar to T. Hirsuta.

The northern coastal marshes and waterlogged El Tina Plain areas may also be utilized for production of Juncas Rigida, a source of lower quality pulp (2).

1. El Ghomeny, Wallace, El Din (1979). "Economic Potentiality of Thymelaea Hirsuta (Endle): A Perennial Shrub in Egyptian Desert Lands," in Advances in Desert and Arid Land Technology and Development, Vol. 1, Harwood Academic Publishers, New York.

2. M. Zohran, H. K. El Din and T. S. Boulos (1972). "Potentialities of the Fiber Plants of the Egyptian Flora in National Economy: I. Juncas Rigidus and Paper Industry" Bull., Inst. Des. D'Egypt.