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Consultancy Report

Post Harvest and Marketing Study

Egypt: Farmer-to-Farmer Project
Contract Number: 263-0102-G-00-0066

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Conducted under:
Egypt Farmer-to-Farmer Program
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Submitted to:
USAID/CAIRO

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List of Acronyms

Acronym	Description
ACDI	Agricultural Cooperative Development Internatonal
ADS	Agricultural Development Systems Project
ARC	Agriculture Research Center, Ministry of Agriculture
FtF	Farmer-to-Farmer Project
MOA	Ministry of Agriculture - Egypt
USA	United States of America
USAID	United States Agency for International Development
VOCA	Volunteers in Overseas Cooperative Association

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I. EXECUTIVE SUMMARY

The primary objectives of ACDI's Egypt FtF Program are to improve farmer economic well-being and to increase food production. The FtF effort in Egypt has concentrated on fruit and vegetable production, dairy and livestock activities, and bee keeping. The FtF's geographical area of activity has been restricted to twelve governorates, including areas in the Delta, some of the New Lands areas, and Fayoum.

FtF technical assistance is targeted to a broad spectrum of farms, from the larger, more technically sophisticated operations to very small holdings of 5-10 acres. Having targeted this spectrum of farms and commodities, however, the program's strategy is "demand-driven": it aims to respond directly to farmers' own requests for technical assistance rather than pre-determining the technical assistance to be provided.

According to a USAID evaluation conducted in May of 1992, the FtF project has been an effective agent in providing new and appropriate technologies to Egyptian farmers. There is clear evidence of technology transfer and adaptation of improved farming practices, leading to increased productivity and income for the Egyptian farmer.

One of the recommendations of the evaluation was to include post harvest handling and marketing in the program's scope of technical assistance to be providing, complementing the technical assistance already being provided in the areas of production techniques and farm systems management. Based on this recommendation, and with approval from USAID and the MOA, ACDI contracted a four-person team to:

- Identify the problems, constraints and opportunities within the existing fruit and vegetable post harvest handling and marketing system in Egypt; and
- Provide recommendations for how best to use the Farmer-to-Farmer program to resolve these problems and to exploit new opportunities.

In addition, this study is designed to provide a reference guide for Farmer-to-Farmer staff and future volunteers.

OBSERVATIONS OF CURRENT PRACTICES AND FTF POTENTIAL

COMPONENTS	DOMESTIC MARKET	EXPORT MARKET	FARMER TO FARMER SUPPORT
Harvesting and handling to the shed	• area of weakness • picking of soft ripe or immature fruit • harvest methods cause damage • long exposure to sunlight • poor handling from picking to shed	• area of weakness • picking of soft ripe or immature fruit • harvest methods cause damage • long exposure to sunlight • poor handling from picking to shed.	• volunteer technical assistance can be highly effective.
Pre-cooling	• doubtful economic value in Lower Egypt, due to proximity of markets • May apply for some crops in Upper Egypt, given longer transit times • limited in-country knowledge	• essential for some crops • limited in-country knowledge	• volunteer technical assistance can be highly effective.
Packing	• state of the art packing lines for potatoes, citrus and some tomatoes • management of operations is weak • other crops hand packed in field or sheds	• same situation as domestic • As exports expand will require: better organized and/or mechanized lines and stronger packing house management	• volunteer technical assistance can be highly effective in supporting expanded exports.
Grading	• grading takes place at farm, broker/agent, wholesaler or retailer levels • loose standardization of grades	• grading to pre-established standards for the targeted market • grading by grower, most often by exporter • learning required for meeting standards for new crops	• demonstrate profits of grower grading • formalize standards through organization • assist in defining formal standards • assist in meeting standards for new export crops
Packaging	• using inexpensive palm crates with limited standardization • crates sold by weight because size not standardized • product is damaged by over-filling • standardization of boxes by product is required	• precisely described package for almost every fruit and vegetable in the export market • overall quality of Egyptian manufactured cartons is poor so exporters import expensive packaging	• association for standardizing and improving packaging for domestic market • assist in designing and evaluating packaging standards and improved packaging • assist manufacturers to improve carton quality for export
Cold storage	• substantial cold storage available for potatoes • installed capacity at many large corporate fruit farms • value must be calculated on a product by product basis • may be of value with products of low perishability, alleviating gluts and extending season • may be of use in Upper Egypt where transit time is longer • weak management and engineering of existing cold storage systems	• essential part of export system • a packing-house must have cold storage on premises • necessary facilities at the airport do not exist for highly perishable air exports	• assist in joint activity for smaller growers and air exporters to establish cold storage • perceived risk too high to interest outside investors • assist in assessing the financial viability of the facilities • assist in organizing owner groups • provide engineering and management guidance
Ripening	• banana ripening common • some work with persimmon • tomatoes have potential	not applicable	• provide information on tomatoes and bananas • provide technical background information for persimmon and other crops

COMPONENTS	DOMESTIC MARKET	EXPORT MARKET	FARMER TO FARMER SUPPORT
Transport to market	• primarily pick-up trucks operated by entrepreneurs who charge per trip, but also by broker/agents, wholesalers and growers • in Lower Egypt - service adequate except to certain communities in the Western Desert - could be improved by providing shade • in Upper Egypt, lorries are used to deliver produce because of the distance	• transportation to Europe is totally inadequate for fruits and vegetables other than potatoes and onions • critical to establish bi-weekly reefer service to a central re-distribution point in Europe • air shipment requires: - a complete cold chain - a workable air-charter system • overland reefer truck service to the Gulf States is adequate	• assist in the organization of groups to review options for transport • for export, assist implementing groups in product identification production development, packing and shipping requirements, and organization of shipping
Selling	• in general, open competitive market • growers reasonably satisfied • corporate growers plan to have representatives at the new Cairo market • communities in the New Lands have poor access to market resulting in depressed selling prices • formal retail farmers' markets do not exist • new Cairo market expected to benefit farmer income	• product sold in Europe primarily on open consignment, with some fixed price transactions • priority for shipper to establish relationships with trustworthy and financially sound brokers	• assist in organizing groups in the New Lands and other remote areas to promote "shipping point" markets • assist in forming groups to sponsor retail farmers markets • provide assistance in wholesale market management techniques
Market information	• includes prices, volume and new product/variety possibilities • growers have no problem getting prices • excellent results with new items: broccoli and head lettuce • information on new products and varieties easy to get	• prices, volume and varieties in European market widely published and easily accessed	• assist developing association for disseminating information
Production planning and marketing orders	• lack of information results in over production • need for mechanism to avoid over production	• market windows must be identified to avoid over production for small volume, niche markets	• planting intentions and data collection most suited to the MOA, with its nationwide coverage • form an association to assist in accomplishing these goals
Technical information	• need for easier access to technical information and quick answers to technical questions	• need for easier access to technical information and quick answers to technical questions	• the FtF program as a whole, including outreach and linkages
Government laws, rules & regulations	No complaints were expressed by growers interviewed	• cumbersome procedures and regulations • need to continue negotiating for better access to E.C. markets	• need organization to act as a liaison/lobby to the government on matters of interest to growers and exporters

COMPONENTS	DOMESTIC MARKET	EXPORT MARKET	FARMER TO FARMER SUPPORT
Processing	(see specific observations below)	(see specific observations below)	Areas where volunteers can play a particularly useful role are in: • good manufacturing practices (safety and sanitation) • food technology • organization of production flow • variety selection • cultural practices for contract growers
Processing culls and over production of vegetables	• vegetable processors need dependable supplies of good quality raw materials, of varieties that are suitable for processing • in some instances culls are usable • processing is not a dependable outlet for irregular supplies of fresh market over production • possibilities for home canning, pickling, drying and preserving	• same situation as domestic market • varietal questions even more important	• integration of certain crops into existing processing operations by managers of processing plants - no need for outside assistance, given existing knowledge and linkages • provide advice to village women on home canning, pickling, drying and preserving
Processing culls and over production of fruit	• need for dependable supplies of good quality raw materials • options for use of culls in manufacture of juices and/or pulps • processors' ability to absorb erratic supplies of fresh market over production is limited • possibilities for home canning, pickling drying and preserving	• same situation as domestic market • varietal questions even more important	• integration of certain crops into existing processing operations by managers of processing plants - no need for outside assistance, given existing knowledge and linkages • provide advice to village women on home canning, pickling, drying and preserving
Processing dedicated production-frozen fruits and vegetables	• established capacity for frozen french fries and vegetables for domestic and regional markets • no analysis was conducted of growth potential of this market • finished product not of sufficient quality for the European market	• European market has excellent potential for labor intensive products • these products do not carry the profit margins of fresh product • frozen fruits and vegetables will be more attractive option once fresh market potential is reached	• assist in variety selection and cultural practices for the grower • better plant processing yields should allow higher grower prices
Processing fresh precut fruits and vegetables	• market believed to have limited potential	• sales of precut-fruits and vegetables high in Europe • Egypt has excellent potential for processing labor intensive vegetables • much more difficult management challenge than fresh exports • not realistic to consider entering this business until a vegetable export system is in place	

COMPONENTS	DOMESTIC MARKET	EXPORT MARKET	FARMER TO FARMER SUPPORT
Tomato Processing	• at least two tomato processing plants serve the domestic and regional markets and contract tomato production	• worldwide over capacity for tomato processing • competitive advantages for Egypt because of its relatively long growing season and low labor costs for some products • depressed world market • better to focus on other products for now	
Fruit juices, pulps and concentrate	• local bottlers reconstitute imported concentrates for the local and regional markets • rapidly growing business • question of whether local growers can compete with imported concentrates • possible use of culls • little interest in processing on the part of growers because of excellent local market for fresh	• little interest in exports because of strong local market	
Dried fruits and vegetables	• active vegetable drying business exists	• Egypt successfully exports dried vegetables (has 16% share of European onion market)	
Pickles	• commercial pickling for local market • no market analysis has been conducted.	• the large market for small, labor intensive cornichons pickles is glutted but may provide future opportunities	

SUMMARY OF KEY AREAS FOR FARMER TO FARMER ASSISTANCE IN POST HARVEST HANDLING AND MARKETING

- **Harvesting and handling to the shed**
  - Assist with decision on when to harvest.
  - Assist in management of process.

- **Grading**
  - Demonstrate profitability of grower grading.
  - Assist in the definition and implementation of more formal grades and standards.

- **Pre cooling**
  - Analyze requirements.
  - Provide assistance in design and management.

- **Packing shed management**
  - Assist with equipment and shed layout.
  - Provide guidance in personnel utilization.

- **Cold storage**
  - Provide guidance in engineering and management of cold storage facilities.
  - Help evaluate economic viability for a range of new crops.
  - Assist with financial and operational evaluation of central cold storage facilities.

- **Ripening**
  - Share banana and tomato ripening experiences.
  - Provide general technical background information.

- **Packaging**
  - Provide assistance to carton manufacturers to improve the quality of their product.
  - Assist in the design and implementation of more cost effective packaging for the domestic market

- **Transport to market**
  - Make a comprehensive evaluation and an operation plan that include product identification, production development, packing and shipping requirements and the organization of shippers. As the key to a successful export development operation, transport to market must be part of this plan.
  - For the domestic market, review transport options for remote communities.

- **Processing**
  - Introduce good manufacturing practices (safety and sanitation issues).
  - Introduce food technology.
  - Assist in the organization of production flow.
  - Assist in variety selection
  - Provide information on cultural practices for contract growers.
  - Help with new product development.

- **Associations**
  - Assist farmers to organize around common needs.

- **Miscellaneous**
  - Provide technical assistance for the operation of the new Cairo market and the design of the planned Ismailia market.
  - Provide assistance to village women in home canning, pickling and preserves

SUMMARY OF RECOMMENDATIONS

1. Establish an office to assist growers from Minya in Middle Egypt, to Aswan, where there are special post harvest handling and marketing problems because of the distance from principal markets.

2. Establish an office to assist farmers in the area from Giza, south to Minya. This office, together with the office in Upper Egypt (1. above), and the two existing FtF offices, will give the FtF Project national coverage.

3. Conduct a series of workshops/seminars to accomplish the following:

   - In-service training for FtF staff
   - Education of participating farmers including post harvest handling techniques and marketing options, with particular emphasis on economic benefits to the farmer
   - Provide information on appropriate post harvest handling techniques to exporters.

4. Assist farmers to organize around common needs -- this process will start with the workshop/seminars (3. above).

5. Based on the requirements that emerge from the workshop/seminars, assist in conducting demonstration projects. These may be:

   - Product based -- for highly perishable products where there are high post harvest losses, such as tomatoes, bananas, and strawberries.
   - Geographically based -- such as a comprehensive assistance program for one of the Graduate program villages in the New Lands or assisting in the establishment of "shipping point" markets.
   - Activity based -- such as assistance to exporters; assistance in establishing farmers retail markets; assistance to processors/contract growers; or assistance in home canning, drying, pickling, and preparing preserves in the villages.

6. Provide assistance in wholesale market management. The smooth functioning of the market is of great importance to all growers and the FtF Project can provide volunteers experienced in managing USA wholesale markets. Many of the problems will be similar.

II. INTRODUCTION

A. PURPOSE OF THE STUDY

The May, 1992, mid-term evaluation of the Farmer-to-Farmer Program (FtF) and Agricultural Cooperative Development International's (ACDI) own assessment, which was based on discussions with participating farmers, have indicated a need to provide technical assistance in post harvest handling and marketing.

The purpose of this study is to :

- Identify the problems, constraints, and opportunities within the existing fruit and vegetable post harvest handling and marketing system, and

- Provide recommendations as how the FtF program can best be used to resolve these problems and to exploit new opportunities.

In addition, this study is designed to provide resource material for FtF staff and volunteers.

B. METHODOLOGY

The team was composed of two expatriates and two Egyptian nationals. Scopes of work for the expatriate team members can be found in Appendix A. Team members were:

- Harold J. Mannion, fruit and vegetable marketing specialist -- Mr. Mannion is a USA fruit and vegetable shipping point broker and importer of Central American fresh fruit and vegetables.

- Don Braden, PhD, post harvest handling specialist -- Dr. Braden is a USA fresh produce grower and shipper and a former Central American producer and exporter of various cucurbit crops.

- Bahia Fahmi, PhD, post harvest physiologist -- Dr. Fahmi is Director of the Fruit Section of the Department of Horticulture at the Agricultural Research Center (ARC) of the Egyptian Ministry of Agriculture (MOA).

- Emam El Gamassy, PhD, agricultural economist -- Dr. El Gamassy is Professor of Agricultural Economics at the Agricultural Economics Research Institute, ARC, MOA.

After arrival in Egypt, expatriate team members reviewed available literature and documents pertinent to this consultancy, and then participated in field trips to the following production areas:

1. New Lands on the Cairo -- Ismailia Road -- km 80

2. New Lands on the Cairo -- Alexandria Road -- km 75

3. An apple/pear grower and shipper located in the Old Lands in the Delta, just east of Alexandria

4. Areas in the Delta around and south of Mansoura

5. Farming areas in the Fayoum production area, south of Cairo (Dr. Braden only)

6. Agricultural areas near the city of Ismailia

These field trips provided team members with a good exposure and orientation to Egypt, Egyptian agriculture, post harvest handling systems, export and domestic marketing, and the FtF Project.

In the different locations, the team visited MOA offices, markets, packinghouses, processing facilities, farms and farming areas. The team attended meetings to discuss post harvest handling and marketing systems and associated problems with producers, marketers, exporters, and government officials. Actual post harvest handling operations of some commodities were observed in the field, although -- as with any season -- only a portion of Egypt's wide variety of fruits and vegetables was being harvested at that time. During visits to markets, the team observed domestic wholesale and retail marketing operations, and several fresh produce packinghouses and export operations were visited. The team visited food processing plants, most of which were "canning" fruit juices while one operation with freezing capability was in the process of freezing green beans and carrots.

In addition to the field trips, the team:

- Conducted interviews in Cairo with a cross section of exporters and businessmen who had investments in farming operations throughout Egypt. (See Appendix B for a complete contact list.)

  The interviews included: growers of fruit and vegetables for the domestic and export market; exporters to Europe and The Gulf; exporters, packers and shippers of potatoes and oranges; international trade promoters; international donor agencies; wholesale marketers; managers of service and marketing cooperatives; cold storage operators for potatoes, apples and pears; international freight companies; MOA extension field managers and officers; vegetable transplant producers; pesticide suppliers and dealers; and MOA/ARC and university post harvest specialists.

- Conducted interviews with representatives of the Trade Development Center and the Egyptian Businessmen's Association.

- Made field trips to both the old and new Cairo wholesale markets.

- Attended a workshop, sponsored by the American Chamber of Commerce, on the export of agricultural products.

- Attended the "Egyptian Production For Export" trade fair, sponsored by the Ministry of Agriculture.

- Participated in a round table discussion with interested parties at USAID, designed to elicit their insights.

- Participated in three workshops with the FtF staff, in which options and procedures were discussed.

C. OVERVIEW OF AGRICULTURE IN EGYPT

The team's first impression of Egyptian agriculture included the following:

- There are good soils.

- There is an abundant supply of water for irrigation.

- The product mix includes a variety of fruits and vegetables.

- The climatic conditions allow agricultural activity for 12 months of the year.
- Some farmers are progressive and open to new ideas.
- Some New Lands areas have tremendous agronomic potential.
- A large quantity of pesticide is used.
- Egypt has great potential for expanding fresh fruit and vegetable exports.
- Land is intensely cultivated, particularly, in the Delta.

1. **Soils**

In the agricultural areas in Northern Egypt, soils are productive, and textural variation from area to area was noted. Soils in the Delta are heavier than soils in the New Lands areas, and while soil texture varies within the Delta, more textural variation occurs in the different New Lands areas.

2. **Irrigation water**

Water for irrigation is available in the production areas visited, and supplies seem to be abundant in some areas, particularly, in the Delta. A full evaluation of this important agricultural production resource however, should include an in depth investigation of the following: water quality - - chemical and biotic content; suitability for drip irrigation uses; reliability and frequency of supply; economic and other factors.

In most areas of the world, agricultural production is limited by the availability of irrigation water. Egypt enjoys the position of having an abundant supply of irrigation water, which not only places Egypt in a unique position in the region, but also will help the country to compete in foreign markets.

3. **Product mix**

In Egypt, some apple varieties that require less "chilling" than the predominant varieties grown in the major USA apple production areas have been introduced. These apples are sold locally and exported to The Gulf, but would have little acceptance in other export markets. However, the local production of apples has eliminated the need for imported apples in the Egyptian marketplace. The case is similar with bananas. Local bananas may be well received in the domestic market and some may be exported to The Gulf, but it is unlikely that the Egyptian banana can compete in the world banana market because climatic conditions are not optimal for good production.

In the Delta, it is not unusual to find apples and/or pears, oranges, and bananas planted on the same farm. This represents a problem, as these crops require different climates for optimum growth and production. For example, apples require "chilling" for good production. "Chill damage" of bananas will occur if temperatures drop below 4°C (40°F). Citrus requires low temperatures to develop good color and high sugar levels in the fruit; yet, a frost will ruin any fruit on the tree and a "hard" freeze can kill established trees. A list of fruits and vegetables grown in Egypt can be found in Appendix C.

4. **Climatic conditions**

Climatic conditions in Egypt allow farmers to produce three to four crops per year. This gives Egypt a competitive advantage in fruits and vegetables for the European market. However, in order to use this advantage, detailed information about climatic conditions is needed.

Some climatic information is available in Egypt and has been included in Appendix D, but more detailed information would be useful. More comprehensive statistics would include data for two sites in Upper and Middle Egypt, and Ismailia, Mansoura, Alexandria, Fayoum and Cairo in Lower Egypt. Needed information includes ten year averages of: minimum monthly temperature, average maximum monthly temperature, average lowest temperature by month, and average daily pan evaporation by month.

Additional climatic information is important for post harvest handling and marketing, as it would aid exporters and growers to complete the following tasks:

- Compare minimum temperatures in Upper and Lower Egypt and determine which area has better climatic conditions for possible export production.
- Examine temperatures in Upper and Lower Egypt to determine market window lengths in the two areas.
- Compare climatic conditions in Egypt with those of competing producers in Northern Africa and the Middle East.
- Determine refrigeration requirements for storage of fresh fruits and vegetables.

5. Egyptian farmers

During field trips, the team was able to visit different types of farmers involved with horticultural endeavors. They can be classified as follows:

Farmer	Feddans
Small	Less than 5
Medium	5-50
Large	More than 50
Corporate	More than 100

Egyptian farmers are interested in making the needed financial and technical investments in their crops. Some farmers are putting as much as LE 1,500/feddan into their tomato crops in the Delta. In most agricultural activities in the USA, this level of investment would be considered substantial. The younger farmers we met were well-educated, open to suggestions, and actively looking for technical solutions to identified problems. Older farmers were typically more conservative. All of the farmers we met expressed interest in forming an association or in joining an association as one method of alleviating some of their problems. In one case, this interest in associations was the result of a favorable impression an Egyptian farmer received on an FtF participant training tour to the USA.

In the New Lands, there are several types of farmers. There are some corporate farms which use imported technology and have large university trained, technical staffs. Also, there are some transplanted Delta farmers who sold their few feddans in the Delta and, for the same money, bought many feddans in the New Lands. New Lands farmers also include farmers from the Graduates Program, through which high school and university graduates have been provided 5 feddans of land, a small house, an animal or two, and an opportunity.

6. Agronomic potential in the New Lands

The New Lands have excellent potential for agricultural development, if the supply of irrigation water is reliable, irrigation costs are reasonable, and water quality is acceptable. There are great differences between New Lands areas in relation to acceptable characteristics and irrigation concerns. The area around Nubaria is different from the area around Salhia, and both are different from the

area closer to Ismailia. Areas in the New Lands must be carefully selected, but disease and insect problems in all New Lands areas are less than in the Old Lands. Nevertheless, even experienced farmers from the Delta must learn how to manage their production efforts under the new conditions they will encounter in the New Lands. They should expect things to be different from what they encountered in the Old Lands.

7. Pesticide use

Pesticides are used in large quantities in Egypt, but often, the wrong pesticide is used, and users do not follow the correct application procedures. Users do not know generic or common names of pesticides and are not aware of proper pesticide safety and use. Egyptian farmers are not aware of integrated pest control and management concerns or procedures. Perhaps chemical companies and dealers have concentrated on selling without providing training in pesticide use along with the product. Whatever the reason for the current situation, training in pesticide use and safety is drastically needed. Pesticide use has marketing implications, as the European Community accepts only fruits and vegetables which meet its standards for pesticide use This is an area where training must begin today because it will take years to bring farmers up to date.

8. Export potential

There is tremendous export potential for fresh fruits and vegetables. Exports would be of three types:

Winter - fresh vegetables in the winter months

Windows - fruits and vegetables during two to three week market windows in the spring and fall

Workers - crops requiring intensive farm labor.

The team met farmers and agro-businessmen who are interested in exports and imports. Some expressed an interest in learning more about exporting and how they might participate either individually or in association with other farmers. There are currently large quantities of traditional products, like potatoes and oranges, being exported and there are companies investing in the expansion of these exports. There are numerous and substantial investments being made in New Lands areas with the

idea of exporting the new products. There are many indications that the fresh fruit and vegetable business in Egypt is ready for rapid expansion. (See Appendix E for statistics on Egyptian fruit and vegetable exports.)

9. Multiple plantings and intense cultivation

Since the beginning of recorded history, Egypt's agricultural productivity has been lauded. There are a number of reasons for this. Although Egyptian farms are small, farmers are able to get more than one crop in a single year. Some farmers boast that they get four crops a year. The climatic conditions, land productivity, and water availability enhance Egyptian agricultural productivity. For these reasons, a farmer that owns 5 feddans of farm land in Egypt may be as productive as a farmer of 15 to 20 feddans in other parts of the world.

In the Delta, every inch of arable land is used for some type of agricultural endeavor. Buildings in villages are crowded together so that land is not taken out of production. In villages and on farms, structures are built tall rather than wide, to the extent that four storied chicken houses

could be unique to Egypt. The above points reflect the fact that land in the Delta is productive which makes it very expensive.

In Lower Egypt, patches of cultivated land are located in the middle of urban areas in vacant lots between tall buildings. There are many irrigation and drainage canals, and small areas on one or both sides of every canal are cultivated with various vegetables. Even the sides of irrigation ditches in the fields are planted with onions, garlic, or other vegetables. Produce from these small plantings are for the farmer's family consumption rather than for resale. It would be interesting to know how many feddans are actually cultivated if the area planted along irrigation ditches, in vacant lots in cities and towns, and along the banks of canals could be included. It is likely that the total area involved in these activities, in all parts of the country, would be considerable. The following assumptions and calculations were used to estimate these areas:

- Ditch Plantings

Ditch-	0.45 m wide; 50% effective planting area.
Feddan-	Width: 45 m; Length: 93 m;
	93 linear m of ditch/feddan
Therefore-	93 linear m X 0.45 m X 0.50 = 21 m^2/feddan
	21 m^2/feddan = 0.5 feddans per 100 feddans

- Vacant Lot Plantings

City Block-	100 m wide X 100 m long = 10,000 m^2/Block
Vacant Lot-	25% of Block; approximately 2,100 m^2
Therefore-	1 Vacant Lot = 0.5 feddans

- Canal Plantings

Planting-	1 side -	Width:	4.2 m (14 feet)
	2 sides -	Width:	8.4 m (28 feet)
Canal- Length -	1 km = 1,000 m		
Therefore-	1 side -	4.2 m X 1 km = 4,200 m^2 = 1 feddan/km	
	2 sided -	8.4 m X 1 km = 8,400 m^2 = 2 feddan/km	

10. Summary

In Egypt, soils are good, water for irrigation is abundant and land for future development is readily available. Climatic conditions are satisfactory for many different crops and some crops can be produced during the cooler months with reasonable cost. Farm labor is abundant and not costly. Many workers are inexperienced but trainable. All of these factors suggest that Egypt can compete successfully with countries in Africa and the Middle East for a share of the fresh fruit and vegetable market in Europe. The concept of Egypt as the "Garden of Europe" is an appropriate one and, a possible one.

III. BACKGROUND: THE FARMER TO FARMER PROJECT

A. OVERVIEW

The current Egypt Farmer-to-Farmer Program (FtF) is part of a larger worldwide FtF program begun in 1987 under a Congressional initiative financed from USDA PL-480 funds and channeled through USAID/Washington's Bureau for Food for Peace and Voluntary Assistance. The program administered by the Volunteers in Overseas Cooperative Assistance (VOCA), has provided an avenue for USA farmers to share their expertise with farmers in USAID-assisted developing countries, worldwide.

The primary objectives of ACDI's FtF Program in Egypt are to improve farmer economic well-being and to increase food production. The FtF effort in Egypt has concentrated on fruit and vegetable production, dairy and livestock activities, and bee keeping. Also, the FtF Program has directed some attention to the ornamental plant nursery sector. The FtF's geographical area of activity has focused on twelve governorates, including certain areas in the Delta, some of the New Lands areas, and Fayoum.

FtF technical assistance is targeted at a broad spectrum of farms, from the larger, more technically sophisticated operations to very small holdings of 5-10 acres. The most direct beneficiaries are the 600 "core group" farmers from medium to large farms participating through the two FtF field offices. The inclusion of medium to large farms in the FtF program is based on the premise that such farmers are the potential leaders in their areas, and have the means to both implement and disseminate the recommendations emerging from the program.

Having targeted this spectrum of farms and commodities, however, the program's strategy is "demand-driven," i.e., it aims to respond directly to farmers' requests for technical assistance rather than pre-determining the technical assistance to be provided. This grass roots approach is manifested in FtF procedures for identifying volunteers and developing their assignments as well as the procedures for selecting participants and sub-projects.

In response to farmers' requests, the FtF Program provides on-farm technical assistance to Egyptian farmers through USA volunteer agriculturalists. These volunteers spend four or more weeks in Egypt working with Egyptian farmers and MOA extension officers through the FtF field staff. These volunteers spend most of their time in Egypt making on-farm visits to assess and discuss agricultural problems, compare experiences, and usually make recommendations. Also, volunteers prepare and present seminars and participate in field days and farmer meetings.

The FtF Program includes a training component which allows selected Egyptian farmers to participate in month-long agricultural training tours in the USA. FtF staff select participants with similar professional interests to travel as a training group. After participant selection, training tours are designed to fit the agricultural interests of these Egyptian farmer trainees. Each training group includes an MOA extension officer.

The FtF Program has established a "core group" of farmers through which on-farm technical assistance has been channeled and, from which, Egyptian farmers are selected for USA training. The technical assistance provided, however, is not limited to "core group" members only. Farmers outside the "core group", MOA extension officers, and other agriculturally oriented parties benefit from the FtF Program by being present during field visits and attending on-farm demonstrations and seminars prepared and presented by USA experts and the FtF staff.

B. TECHNICAL ASSISTANCE VOLUNTEERS

After a request for technical assistance is presented by Egyptian farmers, the FtF Program will process the request, resulting in the identification and recruitment of a specific volunteer qualified in the area of interest. Volunteers are selected from a large list of potential USA volunteers with varied areas of expertise. This list is maintained by Volunteers in Overseas Cooperative Association (VOCA), which is responsible for providing volunteers for the FtF Program through their Washington, DC offices. The assignment of a USA volunteer to the FtF Program is the result of the following steps:

1. Egyptian farmers request technical assistance.

2. FtF staff evaluate the request for technical assistance.

3. FtF asks VOCA to locate a volunteer with expertise in the specific area identified.

4. VOCA completes Volunteer identification and recruitment.

5. Assignment travel schedule and in-country program preparation is completed.

6. Volunteer is briefed upon arrival and de-briefed upon departure.

Following an orientation in the Cairo office (which includes an overview of agriculture in Egypt, specifics on the Egyptian context for the volunteer's area of expertise, logistics, etc.), the volunteer moves to the field, providing technical assistance in the form of farm visits, village meetings, and seminars. Opportunities to meet with university and research institute staff are also scheduled as appropriate. For fruits and vegetables, topics covered during the assignment may include seed selection, planting methods, irrigation, application of fertilizers and pesticides, identification and treatment of viruses and pests, pruning, harvesting, post harvest handling, and general farm management.

After each farm visit, the volunteer prepares a brief report regarding recommendations and observations. FtF staff translate this report, which is filed in the field office and given to the farmer for his on-farm files. These files, copies of which are also maintained in the FtF field offices, serve as a useful foundation for follow-up and assessment of progress. In addition, every volunteer provides an overview of his/her assignment by participating in an oral debriefing in Cairo with FtF and in Washington, DC with VOCA, and by writing a final report which is distributed to the field offices, the MOA, USAID, and subsequent volunteers in the same field.

There are some volunteers that have completed as many as four volunteer assignments in Egypt since the FtF Program began. These USA experts have returned to Egypt for different reasons. Repeat assignments of specific volunteers have been requested by Egyptian farmers, by the FtF staff, or by both. Some USA volunteers have participated in the USA with the different training tours for Egyptian farmers. Repeat volunteer assignments in Egypt and/or participation in USA training programs allows for the development of personal and professional relationships between Egyptian farmers and FtF field staff members and USA volunteers. This close relationship increases the effectiveness of the volunteer and of the FtF Program

Volunteers on repeat assignments return with a previously gained knowledge of Egypt, and are familiar with the FtF Program and staff. More important, these volunteers return to Egypt with personal and professional opinions of what is important and what they think Egyptian farmers and the FtF Program need. With each successive assignment, USA volunteers are able to better prepare for the assignment and to address specific agronomic problems.

C. FtF STAFF

The function of the FtF office staff in Cairo is mainly managerial and administrative. Due to the nature of the FtF Program and some innate characteristics within the Egyptian culture, management is required to invest a great deal of time in intra-organizational matters and public relations. The FtF Cairo office is involved with the final selection, processing, and preparation of participant trainees for USA training. The office staff is responsible for receiving, briefing, and de-briefing volunteers on their arrival and departure, respectively. Cairo personnel support volunteers and FtF field staff, administratively and logistically.

As requests are received, FtF staff categorize them according to commodity, and according to the time frame appropriate for the technical assistance. Requests are often seasonal, and thus similar requests from a number of farmers are apt to surface at the same time. For example, grape farmers often seek advice on pruning in December/January.

The efforts of the FtF Program field staff have greatly contributed to the success the Program has achieved to date. FtF field offices comprise managerial, secretarial, administrative, technical, logistical, and supervisory concerns and activities. Also, these activities must operate in a bi-cultural and bi-lingual atmosphere.

The field staff is involved in many different tasks. The field staff must work with "core group" and other farmers, MOA personnel, and USA volunteers. They are involved with the selection and preparation of Egyptian farmers for USA participant training. Usually, an FtF field staff member travels with each training group to serve as a translator during the USA tour. Work schedules and programs for each volunteer are prepared and the FtF field staff visits and works with "core group" members prior to the arrival of the USA experts to arrange the different farm visits. Field staff travel with volunteers on field visits and to meetings to serve as translators and coordinators of these activities. After each on-farm visit from FtF volunteers, field staff make follow-up visits to evaluate the effectiveness of the visit and to assess its impact.

Farmers in Lower Egypt are increasingly aware of the FtF Program as a result of ACDI publicity and public relations which include: extensive contacts with extension agents, cooperatives, emerging linkages with universities and other research institutes, field staff's efforts, newspaper and radio coverage, and, most importantly, farmers' word of mouth.

D. U.S. PARTICIPANT TRAINING

As with the development of volunteer assignments, the need for USA participant training is identified at the grass roots level rather than predetermined through a top-down plan that targets specific study tours to be conducted over a three-year period.
Active involvement in the FtF program is a key criterion for participating in a USA study tour. This involvement is measured primarily by the farmer's willingness and ability to implement volunteer recommendations and by attendance at village meetings and seminars. Participant candidates either submit their own request for inclusion in a study tour, or they are nominated by volunteers, FtF field staff, and extension agents. A Selection Committee, comprised of ACDI, MOA, and USAID representatives, then screens the candidates and selects the finalists.

Upon returning from the USA, participants write a trip report which is provided to the MOA, and participate in a debriefing with FtF and MOA staff in Cairo. Once they return to their homes, FtF field staff follow up to monitor the farm visits and seminars which the participants are required to conduct.

E. SUB-PROJECTS

Sub-projects are developed based on volunteer recommendations. ACDI thus has not predetermined the sub-projects; instead, they have emerged out of needs identified by the volunteers, FtF staff, and farmers themselves. In other words, sub-projects are developed based on the same "demand-driven" philosophy that guides volunteer assignments and participant selection.

F. EFFECTIVENESS OF THE PROGRAM

The project has met its two major objectives. There is clear evidence of technology transfer and adaptation of improved farming practices which can lead to: increased income for the Egyptian farmer, the first objective; and increased productivity, the second objective. In addition, the USA volunteers and Egyptian farmers and extension agents have developed enduring friendships and have continued to exchange information and technologies after the volunteer assignments were completed.

According to an evaluation conducted in May of 1992, the FtF project has been an effective agent in providing new and appropriate technologies to Egyptian farmers. Working with a "core group" of leader farmers through intensive education and technical assistance activities, the project has constructed the basis and potential for an extensive outreach program. The principal output of the project has been the creation of this group of core farmers as outreach agents. The evaluation strongly recommended that remaining project resources be focussed on facilitating the outreach capability of this "core group" of farmers. The approach of using a composite of education and technical assistance strategies to build a foundation of leader farmers is working, and is complimentary to the MOA extension service. The evaluation found this to be a positive influence on the agricultural sector and recommends that it to be tied, at the program level, with the new regional ARC/extension strategy and, that the FtF program be expanded to include additional governorates. The same evaluation recommended expanding the program to cover post harvest and marketing.

IV. POST HARVEST HANDLING AND MARKETING IN EGYPT

A. POST HARVEST HANDLING IN EGYPT

1. Definition of Post Harvest Handling

Through interviews and field visits, it became apparent that the subject of post harvest handling, with its various components and disciplines, is little understood.

The post harvest handling of fresh fruits and vegetables includes activities occurring at or after harvesting and continuing until the fruit is marketed. In some cases we can broaden this definition to include the period from harvest through sale to the consumer. With post harvest handling, concerns include: how to determine when fruit is ready for harvest; how produce is picked and handled immediately after harvest; the grading and sizing of fruit; usage of packinghouse and refrigeration equipment; types and performance of containers; and transportation of fruit in-field, from the field, and to the market. Post harvest handling is not an isolated event or a single point in time, and it can be greatly affected by what happens before the commodity is harvested. Also, the prescription for correct post harvest handling of a certain fruit or vegetable is dependent upon its market. There are many scientific disciplines that have active roles in the area of post harvest handling: horticulturalists, who produce and harvest the fruit; physiologists, who study it; pathologists, who protect it; and engineers, who design and build packinghouses and packing and refrigeration equipment.

Post harvest handling is thus a complex system involving different aspects of several disciplines. Fruits and vegetables are living tissue and are usually delicate in nature. The principle objectives of all phases of post harvest handling operations should be: first, to maximize the shelf-life of the product and; second, to operate in a manner to preserve the appearance and quality of the item being handled.

The following are components of post harvest handling of fresh produce.

1. Harvest
   a. Criteria - size, color, sugar content, or maturity
   b. Aids - knives, clippers, ladders, sacks, buckets, bins, crates
   c. Equipment - diggers, tractors, wagons

2. Field Packing - grade, size, trim, wrap

3. In-field Transport

4. Field Collection Areas
   a. Grade and/or size
   b. Equipment - tables, conveyors, cooling

5. Transport from the Field

6. Packinghouse
   a. Equipment - wash, dry, wax, size
   b. Grade and/or size
   c. Fruit treatment or application of protectants

7. Refrigeration
   a. Equipment
   b. Conditions - cooling half-time, humidity, temperature, ventilation, controlled atmosphere

8. Ripening Room
   a. Equipment
   b. Conditions - ripening agents, temperature, relative humidity, safety

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considerations

9. Container
   a. Type
   b. Weight and volume
   c. Quality, strength, appearance, and ease of cooling

10. Transportation to the Market
   a. Equipment - type of trucks
   b. Other - temperature control, loading and unloading, stacking, palletization, ventilation

2. Definition of Post Harvest Losses

In the 1980's, USAID and the MOA's Agricultural Development Systems Project (ADS) conducted considerable research to identify and quantify post harvest losses in Egypt. Even today, results from these earlier studies are cited, and they state that average post harvest losses for fruits and vegetables in Egypt are 20% and 30%, respectively. One should note that ADS scientists stated that these were average losses and that post harvest losses of highly perishable vegetables, like tomatoes, can be as high as 50% including retail losses. However, during field visits with tomato farmers, the team observed that post harvest handling losses for tomatoes was probably closer to 30%, and was not significantly higher than losses for tomatoes in other parts of the world. Also, the large percentage of loss occurring at the wholesale and retail levels is due to the fact that farmers in Egypt harvest almost every tomato instead of leaving less suitable fruit on the vine.

Post harvest loss can be defined as reduced economic return resulting from improper handling or treatment of fruits and vegetables during the period from harvest until the product is sold. Reduced economic return incurred during marketing operations can be defined as market losses. In Egypt, there are several different interpretations and definitions of post harvest losses. One technician expressed the opinion that farmers incurred "post harvest loss" when farmers left crops in the field because low market prices did not justify the harvest of the crop. One should not confuse post harvest losses with problems related to over-production or market glut.

3. Post Harvest Handling System Description Form

To characterize common post harvest handling operations in Egypt, a Post Harvest Handling System Description Form was prepared. This form was designed for two uses: first, to describe in a consistent manner post harvest methods in operation today in Egypt; and second, to provide a "check list" for FtF staff to analyze and/or report post harvest operations in the field. A copy of the "Post Harvest Handling System Form" and a completed form describing post harvest handling procedures at a greenhouse cucumber operation in Salhia, Ismailia are attached in Appendix F.

To complete this form, the following headings must be understood:

Farm	:	Name of farm being visited
Date	:	Date of observation
Location	:	Location of farm
Market	:	Domestic or export - in Egypt, there are exports to Arab and European markets and exports are handled and packed differently depending on the market and differently from products for the domestic market.

Crop/Culture :	The crop to be observed - the term "culture" allows one to denote if the crop is being cultivated in the open field, greenhouse, tunnel, or hydroponically.
Harvesting Aids :	Tools used in harvest operations, such as knives, ladders, sacks, field bins
Grading :	The rating of produce by quality
Sizing :	The separation of produce by size
Field Packed :	Some produce, like leaf crops in the USA, are packed in the field in cartons for shipping.
Collection Area :	Area in or near to field used to accumulate fruit Equipment can include tables, conveyors, or cooling equipment may be used.
Packinghouse :	A structure, even temporary, where fruit is prepared for market Equipment may include any machinery such as washers, waxers, and/or mechanical sorters but may just contain tables and/or a conveyor.
Refrigeration :	Used to remove field heat and maintain optimum temperatures to maximize shelf-life of fresh produce Equipment may include forced-air cooler, cold room, hydro-cooler, humidifier
Container :	Structure (box) in which the produce is marketed, could include sacks, palm crate, or carton
Transportation :	Means of moving produce to market - reefer, truck

There may be unique operations for different products that warrant description, but groups of products will be handled in a similar manner at some point in the post harvest handling operation.

4. Common Post Harvest Handling Systems in Egypt

Large quantities of fruits and vegetables are grown in Egypt. The way these products are being handled is influenced by the market to which they are being directed. As a result of these two points, there are a number of different handling systems. Team members concentrating upon post harvest handling concerns attempted to describe the normal or common post harvest handling operations of some of the fresh fruits and vegetables presently being grown in Egypt. A table including information from the "Post Harvest Handling System Forms" completed for 28 selected crops can be found in the Appendix F. Additional post harvest handling information can be found in Appendix G.

In the USA, the post harvest handling system for fresh market oranges is complex and can be described in a flow chart as follows:

1. Field
   - a. Harvesting with clippers and using ladders
   - b. Placing fruit into bags
   - c. Dumping into bulk bins
   - d. Transporting to packinghouse

2. Packinghouse
   a. Dumping onto line
   b. Eliminating bad fruit
   c. Soaking tank with soap and fungicide
   d. Washing and brushing with soap and fungicide
   e. Rinsing with water
   f. Drying - water elimination from fruit surface
   g. Waxing with wax plus fungicide
   h. Grading for quality
   i. Sizing
   j. Packing in cartons
   k. Palletizing

3. Refrigeration
   a. Forced air cooler -- half-cooling time of 1 hour
   b. Cold storage -- (4-6°C) until shipped

4. Transportation
   a. Refrigerated trucks
   b. Exported fruit in refrigerated containers

Surprisingly, oranges for export from Egypt are handled in a very similar manner using similar equipment, except: bulk bins are not used; cartons are not palletized; and there are no forced air coolers.

When the "Post Harvest Handling System Form" was completed for different crops, there were more similarities than differences. Consistently, harvest was aided with sacks and palm or plastic crates. In the case of mango fruit and taro, special local tools were used. Crops are almost always harvested manually. There are some tractor drawn potato diggers in-country, but normally this crop is hand-dug. Generally, harvested fruits and vegetables are brought to a centralized collection area near the production field. There, produce is processed and packed. For orchard crops, the collection area is moved from place to place within the orchard. The fruit from several trees is prepared for the domestic market at one site; and then the site is moved to a shady spot near the next group of trees.

a) Field

On most of the farm visits, it was observed that fresh produce could be better and/or more efficiently handled. Often fruit was thrown about and treated harshly. Crates were often over-filled and were too heavy to be gently handled by young women. Fruit was left in the sun, rather than placed in shaded areas. Fruit that should have been left in the field, was picked, handled, sorted, packed, and shipped. It is likely that some of this fruit was later discarded. Poor handling practices were found to be the rule, instead of the exception.

During field trips, it was observed that farmers were not harvesting tomato fruit at the "best" stage of maturity. Usually, tomatoes are picked at the "pink" stage to minimize post harvest losses as fruit at this stage of maturity is more resistant to handling damage and will provide a maximum shelf-life for wholesalers and retailers. In general, we found farmers were consistently harvesting tomatoes in the "red ripe" stage.

At one cucumber greenhouse operation, harvesters were tearing fruit from the vine instead of using a knife and they were dragging sacks of harvested cucumbers through the greenhouse. This operation was marketing production in the domestic market but will soon start their export operations. In this case, management is teaching harvesters "bad habits" and is missing the opportunity to train harvesters in correct harvesting methods for export operations. It takes many years of effort and supervision to train field crews to harvest correctly. It will probably take even more time and effort

to overcome bad habits. Also, tearing fruit from the vine can damage the vine as much as the individual fruit. Damaged vines will reduce yields. Dragging fruit on the ground will damage fruit and could bring dirt and possibly, disease into the packinghouse. Harvesting costs are not likely to be different whether the fruit is harvested correctly or not, but improper harvesting can have a considerable negative effect on an export business, and the presence post harvest disease will ruin the business.

The palm crate is used universally for fresh fruits and vegetables in the domestic market. This container, if lined, closed, and packed properly is adequate and probably the best and most economical container available. The problem lies in the fact that crate size is not uniform and they are not properly used. Jute or plastic fertilizer sacks are used for eggplants, peppers, potatoes, onions and other commodities. Some attractive and sturdy carton containers made in Egypt are used for exported items. It is possible that the existing industry could support expansion of export activities. Some of the containers being used for fresh produce exports to The Gulf are less than satisfactory.

Not long ago, the bulk of USA produce was shipped in the "universal" crate. The "universal" crate, not very different from the palm crate, is a wooden shipping container which was used for many different products. The palm crate is economical, and adequate for the domestic market if it is lined, covered properly, not over-filled, and is of a standard size. However, currently in Egypt, almost all produce that goes through the wholesale markets is sold by weight. Because the wholesalers own the scales, they have control of a part of the market. Uniform crate size in the USA and in Central America for some products allows items to be sold by the crate. Everyone in the business knows what the average weight of a specific crop in a specific container is supposed to be. With a standardized crate, the need for a scale was eliminated and complications were reduced. Also, farmers do not over-fill standard crates, as they are not paid by weight but by the crate.

b) **Packinghouse**

Packinghouses are scarce and are usually found only where produce is being exported. Potato, citrus, and some vegetable export operations have packing machinery and cold rooms. Some of the packing operations are very modern and have large capacities. Some growers have sheds where wholesalers and exporters will grade, sort, and pack to prepare produce for domestic and export markets. Cold storage facilities are hard to find. Even large-scale fresh produce exporters seem to be lagging in the acquisition of this kind of equipment relative to their advancements in the area of packing line machinery. Cold storage usually can be found where there are potato operations. Potato concerns use cold storage facilities for different phases of their potato businesses. They store imported and locally produced seed potatoes, and mature potatoes to extend the domestic marketing season. Sometimes cold storage space will be rented for other products. Some apple/pear producer have cold storage facilities to be able to extend their domestic marketing season. There are ripening rooms for bananas, and some persimmon farmers in the Delta have ripening rooms next to their orchards. They will build small fires in the sealed room for heat and ethylene generation.

In the team's brief time in Egypt, a few, fairly large packinghouse operations were visited. Some of these businesses are facing or will face serious constraints when or if, their volumes reach the capacity of their packing lines. One operation has erected a beautiful facade on the packinghouse, but it only allows one truck, maybe two, to unload at the same time. These trucks transport fruit in field crates (about 25 kg in each) and they are handled and unloaded by hand. The citrus packing line at this operation could easily support a large, bulk bin (about 500 kg each) operation. When they start packing, supplying the packing line will be difficult and will require a great deal of manpower.

Another exporter has a split-level packinghouse. In this case, produce is lifted by hand from level to level, as it moves through the packing operation. Although labor costs in Egypt are relatively low, the required number of workers for the job could not fit inside the packinghouse. At this operation, there are approximately 400 feddans and at least six different crops. A 100 acre cucumber operation will produce literally rivers of cucumbers. Each different crop brings its own specific production, harvest, packing, cooling, shipping requirements, and headaches. To say the least, this

project is a bit ambitious.

c) **Refrigerated storage**

Total refrigerated storage capacity in Egypt is approximately 360 units, which include 180,000 tons cooling room capacity and 220,000 tons freezing storage capacity. Of these, the public sector (Ministry of Supply) owns 45 units, the private sector 200 units and the investment sector and cooperatives own 115 units. Refrigerated storage equipment is used for a variety of purposes. In general, the cooling facilities are for fruits and vegetables, and almost all of them are used for potatoes.

The largest number of refrigerated storage units is in Alexandria, where there are 55 units with a total capacity of 83,000 tons. Other units are located in Kalyubia, Gharbia, and Behera. Smaller numbers of refrigerated storage units are found in Fayoum, Beni Souef, and Qena. The governorates in Upper Egypt lack refrigerated storage capacity despite the fact that the weather there is very hot, especially in the Summer.

One technician involved with export promotion suggested that the construction of four, regionally placed, cold storage facilities should be considered. This idea requires some serious thought and planning regarding operations. Each crop has its own specific optimum temperature and relative humidity requirements. Also, not all crops can be stored in the same room, and this must be considered. Experience has shown that if cold storage is a critical part of a fresh produce operation, then cold storage construction must be part of its business plan. It may be feasible to rent storage but, then the packinghouse manager will have difficulty managing in two places, and a decision must be made about whether the lessor or the lessee will run the room.

The problem of the lack of refrigerated transport is different and is like the case of the "chicken or the egg": there are no trucks because we have no freight and we have no freight because we have no trucks (see Appendix H for refrigerated storage available). There are some refrigerated trucks and some service for exports to The Gulf, but the future of exports to Europe will depend upon refrigerated container ocean service. Utilization of this type of service has begun and will increase rapidly when exports increase. It can be expected that part of this service in the future will include the placement of a trailer at the packinghouse.

d) **Transportation**

Fruit is moved by hand from production fields to collection areas and from collection areas to the roadside for loading and transport to market. Usually, fruit is carried on the heads of people but sometimes animals are used. For the domestic market, trucks with capacities of one ton (pickups) and three-five tons (lorries) are the main means of transportation from the farm to wholesale markets and from wholesale markets to retail outlets. For short distances, produce is sometimes transported by animal-drawn wagon to and from markets. Cairo is full of animal-drawn wagons transporting produce and other materials. Often, cargoes of fresh produce will be covered to protect the items from exposure to the sun. Except in some of the New Lands, transportation can be readily obtained. Trucks can be rented or transportation can be contracted. Wholesalers and their agents, if they do not have their own transportation, will have access to transportation.

The problems of poor post harvest handling seem to be aggravated by the following situations or conditions:

- Except in the New Lands and at certain times of the year, farmers are able to readily sell all of their produce. Because of this, farmers have not had to worry about quality.

- The apparent economic returns to the farmer from their production and marketing efforts do not reflect any premium for quality. Farmers are indirectly paying for losses

that are incurred in the marketing system, but they do not realize it.

In summary, improvements within the system could be easily affected and would be extremely low-cost. A carefully designed agricultural extension program could successfully address and alleviate most of the problems in the system.

5. Production as it Relates to Post Harvest Handling

Production concerns can greatly affect fruit during post harvest and marketing operations, and the area of production is always of concern when studying harvest and post harvest activities. For example, the literature indicates that high levels of nitrogen or not enough potassium or calcium, greatly reduces the shelf-life of different crops. Improper pesticide use could result in a crop being refused in some export markets, or production of uniform transplants could make export markets for some fruits more accessible. A recent practical example is that of a new hybrid cantaloupe variety that was becoming very popular in the USA market. This variety was introduced in Central America and achieved better production improvement than in the USA. However, fruit of this variety does not ship well, and while cantaloupe shipped in the USA travels over good roads, for short hauls, and with good equipment, shipping conditions for Central American cantaloupes are more difficult and the new variety did not hold up.

Fresh fruits and vegetables destined for export markets must meet market demands and meet informal and, possibly, formal, grades and standards and/or pass phytosanitary inspections. Also, exported fruit will be exposed to extended shipping times and additional handling. This implies that specific agricultural practices will be required to produce export quality fruit and usually the growing operation is export motivated. There is another type of export operation, which is quite common in Egypt, where exporters will source material, export the "cream" of the crop, and sell the rejects in the local market. This type of operation is problematic because the exporter can insure neither quality nor quantity and, with export items are highly perishable, will have trouble competing, in the long run, with export dedicated operations.

Export operations require that the right varieties are planted, approved pesticides are used, the fruit is harvested when ready, and handled in the correct manner. The fruit must be graded, sized, packed, and refrigerated. Export operations are exacting and complicated, and export is not for every farmer. Fresh produce exporting can be profitable but there are other benefits which will follow, as exports expend. Along with the export quality fruit, there will be a supply of non-exportable fruit which is of high quality and will go to the domestic market. The presence of this fruit will force farmers to improve their quality. One way farmers will improve the quality will be to improve post harvest handling methods. As soon as an export operation appears to be successful, nearby farmers will begin copying those agricultural practices and post harvest techniques which they think are applicable to their own farming operations.

6. Conclusions

There is much confusion about post harvest handling and post harvest loss in Egypt. Too many people equate post harvest problems with the lack of refrigerated storage and transport. Post harvest losses are difficult to define and quantify and it can be more difficult to identify the causes. Egyptian farmers sell nearly all of the tomatoes that grow on a plant as they leave few in the field and lose few in packing. The ADS Project indicated that tomato economic losses are as high as 50% with major losses at the retail level. Although post harvest losses at the farm are much lower than would be expected, the incorrect practices of the farmer result in poor arrivals and subsequent losses. The FtF Project should consider the best ways to educate farmers about this problem and its economic significance to farmers. Wholesalers, exporters and their agents harvest and pack a large amount of fruit in Egypt. The education and training of these people would not be attempted directly by the FtF Project but wholesalers could be invited to attend seminars as agents of farmers.

If Egyptian tomato losses through wholesale are actually 30 %, with proper harvesting,

handling, and packing, we would expect the following if less fruit were harvested:

1.	Change in cost				
	a.	Harvesting cost-		15%	less
	b.	Packing cost-	15%	less	
	c.	Cost of crates-	30%	less	
	d.	Cost for freight-		30%	less
2.	Selling price of fruit-		30%	more	

It can be a difficult lesson to learn, but a farmer must produce for his market and meet the demands of that market. The most widely used tomato variety in Egypt is a "processing" rather than a "fresh market" tomato variety. Processing tomatoes are bred for a specific purpose and the conditions normally related to that purpose. Processing varieties are usually small in size and have low water content and tough peels. These are favorable characteristics for processing tomatoes, as fruit is harvested when fully mature. In Egypt, tomatoes for the domestic market are harvested when they are fully mature. If fresh market varieties of tomatoes were used here and harvested at the same stage of maturity, the tomatoes arriving at the market would be so damaged that none could be sold. It is unclear why tomatoes are harvested at such an advanced stage of maturity, but the assumption is that it is due to market preference. The team is certain that tomatoes could be harvested at a lesser stage of maturity, fruit would handle and transport better, and it is unlikely that consumers would notice the difference when the fruit was made available for purchase. The biggest boon would be that tomato shelf-life for retail operations would double or triple.

B. MARKETING OF FRESH FRUITS AND VEGETABLES

1. Domestic Marketing

The domestic marketing system for fresh fruits and vegetables is open, has a large number of competing players and is functioning fairly well overall. Although in some areas smaller growers do not have good market access, this is usually due to small volumes, isolated locations and often the poor quality that does not attract the interest of competing brokers. This is the case in some of the communities in the New Lands.

There is a recurring question regarding the degree of control over national fruit and vegetable prices that is exercised by a small group of large dealers in the Rod El Farag market in Cairo. This question was addressed by the ADS project in 1981. At that time, it was estimated that the Rod El Farag market handled 60% to 70% of the fruit and vegetables in Cairo through over 100 dealers, with the top nine dealers conducting 50% of the business. The ADS team then did a statistical study of price behavior, and found that it was consistent with price behavior in free competitive situations.

In this survey, there was no evidence that the situation has deteriorated. Growers interviewed did not perceive this as a problem, and had generally good knowledge of market prices and activities.

Given the volatile nature of the business and the large and diverse number of players, it is highly doubtful if these large dealers could be unduly influencing prices paid to growers. What is more seriously affecting the spread between retail and grower prices are the large losses which must be accommodated because of products that are thrown out, or prices that are reduced due to quality degradation. In most cases, the causes of these problems are the growers themselves.

Apart from this marketing perspective it should be noted that the large dealers are frequently the financing source for the grower. What impact this may have was beyond the scope of our work.

a. Market Losses

The ADS horticultural research project that ended in 1983 conducted an economic evaluation of post harvest losses. These findings remain consistent with observations of the team today. The project used two approaches to study economic losses in the marketing system. The first involved administering a questionnaire through which respondents were asked questions concerning losses, damaged products with no value which were thrown away, and damaged products sold at reduced prices. The questionnaire was used at the farm, wholesale, and retail level. The second approach involved a case study which followed a sample of each commodity (potatoes, tomatoes, and grapes) from the grower to the retailer. The impact of various containers on average losses was also considered.

The study confirmed the wide differential between losses of a highly perishable crop, such as tomatoes, and less perishable crops, such as potatoes and grapes. The significance of this from a FtF implementation standpoint is that it re-enforces the need to target specific commodities in providing technical assistance.

The survey results revealed significant economic losses for tomatoes. Physical losses at the farm level averaged 10.8%. Average physical losses (no value) at the wholesale and retail levels were 5.2% and 11.6%, respectively. Damaged tomatoes sold at reduced prices averaged 13.8% at an average discount of 36.8% at the wholesale level, and 3.9% at an average discount of 35.5% at the retail level. Total economic losses for tomatoes averaged 10.8% at the farm level, 11.4% at the wholesale level and 13.0% at the retail level.

Summary of losses for the survey

Level	Percentage loss of commodity		
	Potatoes	Tomatoes	Grapes
Farm	5.2	10.8	4.5
Wholesale	2.8	11.4	2.5
Retail	3.6	13.0	10.0
Total	11.16	35.2	10.0

The case study indicated even higher losses, and was believed by the researchers to be more accurate.

Summary of losses for the case study

Level	Percentage loss of commodity		
	Potatoes	Tomatoes	Grapes
Farm	11.89	8.96	15.10
Wholesale	21.47	17.89	6.90
Retail	4.18	16.3	6.00
Total	17.54	43.15	28.00

Despite the fact that the greatest portion of total losses is at the wholesale and retail level, (34%), these losses did not occur because of the handling at the wholesale and retail levels. At these levels, although lack of facilities does contribute to losses, the root is handling at the farm and to market. This was discussed in detail in the post harvest handling section.

Interestingly enough, the much maligned date palm box, did not result in significantly more damage than alternates tried by the project.

Affect of Containers on Marketable Fruit

Container	Percent Marketable Not Sorted	Sorted
Palm Rib Crates	70.6	81.1
Lined Palm Rob Crates	71.8	81.3
Blue Plastic Boxes (20 Kg)	71.6	82.5
Green Plastic Boxes (25 Kg)	65.9	85.1

b) Types of Fruit and Vegetable Markets

A variety of markets exist in Egypt. (See Appendix I for fruit and vegetable marketing channels.)

Farmer Markets

At farmer markets, consumers buy directly from the producers, usually on their farm. However, this type of market is not widespread. Small farmers are particularly interested in this type of market because it brings them maximum possible income. No middlemen are involved, no transport costs are paid, and sales are at or close to retail prices. Recently, large farms and big agricultural companies, such as Salhia, have started selling their vegetables and fruits in this manner through a network of selling points.

Village Market

This is the retail market where village people shop, but it is not, economically, very important due to the small quantities traded. Most village people are farmers and produce their own needs. The market has no facilities or infrastructure, with retailers displaying goods on the ground or in hand carts.

District Market

The district and village markets are similar, but at the district market, some retailers have permanent shops or stores, while the rest sell from hand carts. There are no facilities at this market.

Road Side Market

Some farmers or dealers sell their vegetables and fruits on the main roads. The Cairo-Alexandria and Cairo-Ismailia roads in particular attract a large number of dealers selling to travellers, consumers and others.

Governorate Market

There are both wholesale and retail markets at the governorate level. The wholesale markets sell to retailers, distributors, and food service operators exclusively, and not to consumers. There are some facilities, but in most cases they are not adequate, especially the cold storage facilities. The main wholesale markets in Egypt are Rod El Farag and El Nozha in Cairo and Alexandria respectively.

c) Grower Sales Methods

Growers now sell their products to the domestic market in the following ways:

- A dealer comes to the farm and buys either: an entire field and takes responsibility for harvesting and packing; ungraded packed crates, that he grades and repacks into his own crates on the farm; or less frequently, graded packed product.

- The grower sends product to a wholesale market: sometimes graded, sometimes not; either in

his own truck, on a trip rental or via a broker/agent truck.

At the wholesale market, product is sold either: at a fixed price, predetermined by telephone contact; or on open consignment through a wholesaler, paying a 6% to 8% commission. Any broker/agents involved are paid by wholesalers.

- Wholesalers frequently finance grower production, with the grower committed to supply the produce to the wholesaler, under open consignment.

- With permanent crops, some growers rent the land for the season to one of the local merchants or wholesalers (or another grower) for a specific amount of money. The renter is responsible for all production operations and marketing.

- With another method called "kelala", a fruit grower sells all of his orchard's production to a local merchant or exporter after the fruit setting period, or when the trees are bearing but before harvest time.

- Auctions at the wholesale markets are the dominant method at which prices are set. The merchant begins the auction at a specific price, and then it rises through bidding until it reaches the maximum price a grower can receive.

- In addition, growers will sometimes sell to consumers at retail, usually through a road-side stand; directly to retailers, by-passing the wholesaler; and/or directly to distributors or food service operators.

d) Participants in the Marketing System

The Egyptian produce marketing system is organized in classic form. Most produce is sold by the grower through a wholesaler located at a central market, to a retailer or food service operator. The wholesaler usually charges an 8% commission. Frequently, the wholesaler will use an agent/broker to act as an intermediary, between himself and the grower. The intermediary is paid out of the wholesalers commissions, usually 2%. In addition there are distributors who buy from the wholesalers and resell and deliver to retailers and food service operators. This is the structure that accounts for most of the volume. However, in practice, there is a wide range of permutations of this basic structure that can occur as was discussed in c).

The following is a glossary of Egyptian terms for market participants :

The musallim, in his shop in Rod El Farag or elsewhere, is the mysterious "tajir" or trader manipulating his capital.

The amil, is the agent of the wholesaler, arranges for purchase and delivery, and may distribute advance money.

A qammat, is a type of arbitrager who seeks out advantageous deals, especially at the beginning of the season when the price is high, by speculating on the difference in price levels between markets. The qammat can also be a retailer who buys directly from farmers. The success of the Qammat in dealing with farmers is often disruptive to carefully constructed deals of wholesale commission merchants and their agents.

The simsar/broker, brings merchants and farmers together.

The mutaahhad contracts to supply large institutions such as schools or hospitals with vegetables and fruits.

The tajir and qumisyongi is a merchant and commission-taker.

e) **Marketing Institutions for Vegetables and Fruits**

Marketing Cooperatives

Marketing cooperatives are a type of specialized cooperatives. These cooperatives differ from cooperatives for agrarian reform, land reclamation and multipurpose in one important respect; they are managed by self-appointed managers, and not by government appointees.

Furthermore, the farmer voluntarily joins specialized cooperatives, while he must join the multipurpose cooperatives to which he belongs. Farmers must be active to maintain their membership.

There are nine specialized cooperatives covering the following commodities : (1) potatoes (2) sugar cane (3) onions and garlic (4) rice (5) oil crops (6) vegetables and fruits (7) flowers, nursery and aromatic plants (8) cotton and linen products and (9) livestock and its products. Most specialized cooperatives are organized at the national level. Some, like the Specialized Cooperative for Potato Producers, have branches at the governorate level. These, in turn, draw members from the village level. The typical specialized cooperative is composed of a board of directors, an executive committee, a project implementation committee, a general manager and units of planning, accounting and sales. No more than one specialized cooperative is set up in a governorate, and the decision to allow a specialized cooperative is made by the governor. If the working area of the cooperative includes more than one governorate, then its authority is determined by the Ministry of Agriculture.

In 1978 the members and board of directors of specialized cooperatives from Alexandria, Behera, Gharbia and Menufia voted to unite and form a central cooperative marketing society to market members' fruits and vegetables. This action resulted in the legal formation of the United Cooperative Society (UCS). The UCS is a unique conglomeration which adds considerable economic strength to the marketing of fruits and vegetables for the four governorates.

In general, specialized cooperatives provide services in the following areas :

1. Input supplies (credit for) - seeds, insecticides, sacks, miscellaneous equipment and other supplies

2. Processing and storage - storage is supplied for vegetable seeds including potatoes and some other vegetables until sold and processing facilities for vegetables and fruits

3. Product sales - determination of conformance to standards and goods, operation of collection station, transportation from collection station to processing centers and to both domestic and export markets

4. Technical assistance - providing specialized skills and resources to combat climatic and biological problems and to advise on sales and marketing

5. Potato Seeds - Until 1959 anyone could import potato seed for production, but in that year a decision was made limiting importation to the Specialized Cooperative for Potatoes. (Ministerial decree No. 96, 1959). Potato seed imports are allowed to be made only by the Potato Cooperative. The imported seeds are distributed by the general specialized cooperative to: (1) the export union which handles potato seed for private producers, and (2) the governorate branches of Potato Cooperatives, which in turn, deliver the seed to village farmer members.

Government Institutions

Some government companies are working in marketing vegetables, fruits and other commodities. El Neel and El Ahram companies belong to the Ministry of Supply and are involved in retail sales. They purchase from the Rod El Farag or El Nozha wholesale markets in Cairo and Alexandria respectively, as well as from government, public and private production units. They deal with relatively small quantities.

The Ministry of Agriculture also has small retail establishments spread out in some governorates that also market small quantities of vegetables and fruits.

The General Union of Vegetable and Fruit Producers

This self financing union was established in 1973 as a result of the early open-door policy. The union helps its members to export horticultural crops, especially potatoes, green beans and watermelon. The union has its own marketing facilities, and its members comprise approximately five thousand vegetable and fruit producers.

2. Export Marketing

a) The Export System [1]

Egyptian fruit and vegetable exports are produced and sold through two different systems with very different sets of firm-level constraints. The two systems are the traditional system, which includes the parastatal/cooperative system for potatoes and private exporters, who essentially buy surplus production for sale to foreign markets; and a new emerging class of producers and exporters which grow and/or export products targeted specifically to the European and Gulf winter markets.

Currently, most fresh fruit and vegetable exports are produced and exported through the traditional export system. According to an ACDI/NCBA study, exporters in this system are characterized by an avoidance of risk, avoidance of market competition, and reliance on simple and known technologies. This system has failed to lead to diversification into new markets, and has created for Egypt a reputation in both the European Community and the Middle East as an inconsistent and poor quality exporter. Accordingly, the ACDI/NCBA study concluded that the potential for increased exports through the traditional system is extremely low.

The new export entrepreneurs include New Lands corporate farms and cooperatives, private exporters and integrated agricultural service companies. Unlike exporters in the traditional system, leaders in this group have demonstrated a willingness to compete on the basis of quality and price, to take risks, to invest in new facilities and infrastructure, to learn and adopt new technologies and to manage complex businesses.

The principal constraint for increased exports from this group is the inadequate transportation system for marketing perishables.

Other problems identified were :

- Export entrepreneurs have insufficient information on European Community markets, especially regarding prices and demand trends, and on marketing connections.
- There is relatively little technical experience or expertise, as many producers have been involved in farming for only three to five years.

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[1] Principal source : The Technical Analysis of the Export Enterprise Development Project.

- There is a limited production base. If fresh fruit and vegetable exports are to expand rapidly, farmers working under contract to producer/exporters or exporters must be included in the "modern" export system;

- The industry is not organized. To overcome some of the most important constraints, "modern exporters" require some collective organization.

EGYPTIAN FRESH FRUITS AND VEGETABLE EXPORTS [2]
($ Millions)

	1986	1987	1988	1989
TOTAL	34.4	36.1	114.1	97.4
Vegetables	31.1	34.6	113.5	96.5
Potatoes	11.8	16.4	74.6	61.8
Onions	3.5	8.2	22.3	2.0
Tomatoes	3.3	3.3	6.8	5.8
Green Beans	4.3	2.3	4.5	4.1
Other	7.8	4.5	5.2	4.6
Fruits (excluding citrus)	3.3	1.5	0.6	1.9

SOURCE: Fruits and vegetables (FAV Export Production and Marketing Project) Draft Proposal, ACDI, NCBA, CAPMAS.

The specific marketing procedures used by growers are:

- Exporters come to the farm and buys produce for export, calling in advance to order and set a fixed price. Either the exporter will store cartons at farm, or deliver boxes in advance and the farmer will pack and grade; or the exporter will pack and grade his own product on the farm site.

- Exporter will contract with a grower either under a fixed minimum price contract with bonus payments contingent upon market conditions; or under contract for quantity, with the price fixed at the time of shipment.

- The grower packs and exports his own product and sometimes supplements this by purchases from other growers under same conditions as the exporter in b) above or on the open market with no guarantees as to price or quantity until purchased. In this case, purchase is at a fixed price.

- Exporter sales in Europe are made both with fixed prices and through open consignment.

1991 EXPORTS OF PRINCIPAL
FRUITS AND VEGETABLES BY DESTINATION
IN METRIC TONS

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[2] NOTE: CAPMAS statistics reveal that about 85 percent to 90 percent of these exports go to Western Europe and the Middle East, with remainder going to Eastern Europe and the USSR.

Also, citrus exports are not included, because, although they represent over 90 percent of Egypt's current fruit exports, AID is legally proscribed from assisting citrus growing activities, and also because the vast majority of citrus processing and marketing is conducted by public enterprises.

	Fresh potatoes	Onions	Tomatoes	Haricot beans	Garlic	Peaches * (1992)
Saudi Arabia	29,000	39,500	21,300	300	800	1,100
Other Gulf States	1,500	600	1,000	600	300	200
Libya	13,400	6,100	500	-	-	-
United Kingdom	95,600	300	-	400	-	-
Germany	4,000	-	-	300	100	-
France	11,100	800	-	100	100	-
The Netherlands	1,000	-	-	2,800	-	-
Greece	54,500	500	-	-	100	-
Other	7,600	13,600	600	1,800	700	-
Total	217,700	61,400	23,400	5,400	2,100	1,300

Source: CAPMAS
* 1992 figures increased from 600 mts in 1991.

b) Products

Egypt, along with other Mediterranean countries, pays a sharply reduced duty on fresh fruits and vegetables to the EC compared to the Common External Tariff. For some products, the duty is higher during the peak growing seasons in Europe to protect the EC producers. However, under the current agreement between the EC and Mediterranean producers, the duty for most products is scheduled to be eliminated by 1996. For a few products, such as citrus, onions and garlic, a small duty will remain for exports above a quota level.

The ACDI and NCBA study, recommends that Egypt focus on the EC winter market. The Middle East market is relatively small, and the authors also explain that if Egypt can meet the quality and reliability requirements of Western Europe, they will also be able to compete effectively in the Middle East. A sharply increased Middle East market share will be a bonus to efforts to compete in Europe, while success in the Middle East would not necessarily have positive spill over effects in Europe due the current traditional nature of trade within the region.

c) Transportation/Infrastructure

The current transportation system is totally inadequate to support any meaningful expansion of the fruit and vegetable export business, other than for the low perishable items such as potatoes and onions. Potatoes and onions are high volume, low perishability items, for which it is possible to hire break-bulk ships as needed. These vessels are in ample supply (see Appendix J). However, Egypt has excellent potential to export a wide range of more perishable high value horticultural crops. Achievement of this potential is being frustrated by the inadequate transportation system.

There is little space available for the expansion of exports by air to Europe. Based on a survey of service to selected markets, (see Appendix J) air exports are estimated at a maximum of perhaps 60 mts per week and much of that is going to secondary markets. With the expected expansion of Egypt's garment business, which traditionally uses air, this available space is apt to shrink, rather than expand, in the future. Another important factor is that most of the available space is on Egypt Air, which has a reputation among exporters for unreliability.

To significantly expand air exports, it will become necessary to use charters. With charters

to Europe it is necessary to carry a minimum of 40 mt's, and, without back-hauls, at a very high price. (The availability of back-hauls is very limited.) This means the charter must go to market with a product that has a very high selling price to cover the charter cost, as well as to a big enough market to absorb this quantity at a sufficiently high price. Product perishability will require at least two charter flights per week. Exporters interviewed who have experimented with air charters found that the negative impact on price was so great with the quantities they shipped that it was not worthwhile. The products and markets that will fit the necessary criteria are very limited.

Sea container service out of Egypt is summarized in Appendix G. Currently, outgoing shipments are limited to using those containers that arrived in Egypt carrying refrigerated cargo. During the citrus season, November through May, all of these containers are used by orange exporters, and even if containers were available, the long transit time to port for most lines would limit the use of these containers for most fruits and vegetables. Before Egypt can begin to realize its fruit and vegetable potential, there must be non-stop, bi-weekly, reefer service to one fixed re-distribution point in Southern Europe. Most lines that now serve Egypt, do not have the reefer container capacity to support this expansion. One line though, Sealand, could deploy 200 containers here, which would be sufficient to start.

However, reefer container service is not the only option. Use of ships with refrigerated holds, as used in Chile would also be possible. These are readily available and cheaper to use, but would require a greater investment in Egyptian infra-structure to support.

Generally, infra-structure such as refrigerated storage, per-cooling equipment, and packing lines, though not now present in any great quantity in Egypt, is not a constraint. To participate effectively, a business must be of sufficient size to economically operate this equipment on site. The business is profitable enough to make this investment feasible. Smaller growers who wish to export directly, would must band together in some form, to create an economically viable unit. Public investment in these types of facilities does not seem to be warranted, with the possible exception of cold storage facilities at the airport.

C. PROCESSING

The Egyptian fruit and vegetable processing industry is involved in freezing french fries and other vegetables; tomato processing; fruit juice manufacturing; the manufacture of jams and jellies; canning; pickling; and vegetable dehydration. It serves the domestic and regional market, and except for dehydrated onions, where Egypt reportedly had a 16% share, very little is shipped to Western Europe.

The key interest in processing among the farmers interviewed, was in using a processing plant as an outlet in times when over-production has glutted the fresh market. Unfortunately, this is not practical. The processor must make a substantial investment in buildings and equipment in order to process. He needs a competent, trained staff to run the plant. In order to pay for the investment, and retain his staff, he must run the plant as close to capacity as possible. With marketing, it is not possible to jump in and out of the market, without having to sell at an exorbitant discount. A major component of marketing processed food is long term relationships, and being able to supply a dependable amount of product, at a consistent level of quality. To be successful, a processor must have a reasonably assured market, and based on that, sufficient contracted production to assure his supply.

Within this framework, a processor may have a certain amount of flexibility, to increase his production to take advantage of a glut situation in a particular fruit or vegetable crop. The economic return to the grower under such circumstances will be marginal.

Another issue discussed in the interviews was the use of culls by the processor. Culls are those fruits and vegetables that are of insufficient quality to be sold in the fresh market. At the present time, culls do not exist in Egypt, but they may in the future. In most instances, fruit and vegetable

processors need dependable supplies of high quality raw materials, of particular varieties that are suitable for processing. These varieties are not always acceptable on the fresh market. In some instances, culls are usable. There are more options available for use of culls in the manufacture of juices and/or pulps.

In summary, integration of certain crops into existing processing operations may be possible to a limited extent. However, the managers of processing plants in Egypt are fairly sophisticated businessmen and this is an obvious option for them. To the extent that it works, they will proceed with it themselves. There will be no special need for volunteers. Possibilities for home canning, pickling and preserves exist.

The following are observations on the export potential for certain types of processed fruits and vegetables :

Frozen fruits and vegetables

There is established capacity for frozen french fries and vegetables. These are sold domestically and on the regional market. The team visited one plant that was processing carrots. They were not using a processing variety, which resulted in relatively poor yields of finished product, and was probably the cause of the poor color. The finished product had too many chips and pieces for the European market but, was acceptable for domestic and regional markets. If the plant visited was representative, volunteers can be of assistance in variety selection and cultural practices for the grower. Better plant processing yields should allow higher grower prices.

The European market has excellent potential for labor intensive frozen products such as cauliflower and broccoli florets, brussels sprouts, okra, melon balls, sliced and diced peppers, whole spinach leaves, fine green beans, and berries. However, these products traditionally do not carry the profit margins of fresh product. Frozen fruits and vegetables will become a more attractive option, once the fresh market potential is reached.

Fresh precut fruits and vegetables

Over the past few years sales of precut-fruits and vegetables have been booming in Europe. Egypt has excellent potential for processing those that are labor intensive such as broccoli, and cauliflower florets and fruit segments. However, these present a much more difficult management challenge than fresh exports. It would not be realistic to consider entering this business until a vegetable export system is in place and functioning.

Tomato Processing

There are at least two tomato processing plants in Egypt, serving the domestic and regional markets. One is partially owned by Heinz.

There is now substantial worldwide over capacity for tomato processing. There may be some competitive advantages for Egypt because of its relatively long growing season and, to a limited extent for certain products, because of its low labor cost. However given the depressed world market, energies and money might be better directed towards other products at this time.

Pickles

Commercial pickling is conducted in-country for the local market. Also, there is a large market, particularly in France, for small labor intensive cornichone pickles. It is currently being served by Morocco, Turkey and Sri-Lanka. The market is now glutted but may provide future opportunities.

Fruit juices, pulps and concentrate

Local bottlers now reconstitute imported concentrates and sell the juices on the local market and, to a limited extent, regionally. Bottlers interviewed see this as a rapidly growing business. There is a question as to whether local growers can compete with imported concentrates, and currently there is little interest in processing on the part of growers due to an excellent local market for fresh.

In summary, food processing is a low unit margin, high volume business. Historically, fresh exports have tended to provide much higher rates of return, and afford easier access by a larger number of people. Given that Egypt has excellent prospects for fresh market exports and that the market for processed product is highly competitive, energies are best concentrated in the fresh produce export area at this time.

D. THE EGYPTIAN AGRICULTURAL EXPORT AGENCIES

1. Planning Agencies

a) High Council of Foreign Trade

This agency is at the top of the structure. The Council was formed by Presidential decree 339 in 1979. It is headed by the Minister of the Economy. Ministers of related ministries are members of this council. Its functions include:

- determining objectives and principal policies for Egyptian foreign trade, and provide long run planning
- directing foreign trade studies according to national production, family and government consumption, and their impact on size and type of export or import
- suggesting Egyptian strategies to deal with economic cartels and other international groups
- studying the planned foreign trade projects prepared by technical committees
- monitoring and evaluating the results of the implementation of foreign trade plans, and suggesting ways of solving problems

b) Ministry of Economy and Foreign Trade

Formed by Presidential decree 338 of 1982, this Ministry is responsible for planning the different activities of foreign trade and following up the implementation of its plans. Its responsibilities also include the design of credit and financing policies, including exchange rate policy, and to prepare commodity studies.

2. Agricultural Marketing and Export Finance Supporting Agencies

a) Trade Representative Sector

This sector is responsible for supervising all economic and trade relations between Egypt and other countries and international organizations or agencies. The role of the sector in developing exports includes:

- studying the foreign markets for Egyptian commodities
- studying the constraints facing Egyptian exports as related to changes in markets of developed countries
- offering technical assistance to trade official and public and private companies

b) **Export Development Center**

This center was established at 1979. It is one of agencies that belongs to the Ministry of Economy and Foreign Trade. Development of Egyptian exports is its main task. Its responsibilities include:

- managing the market information system
- preparing studies related to domestic production possibilities and export capacities for foreign markets
- preparing the technical recommendations for export products
- conducting training to upgrade capabilities of personnel dealing with exports
- supporting agencies conducting export studies

c) **General Agency of Exhibitions**

This agency is responsible for preparing exhibitions inside and outside Egypt.

d) **Branches of Foreign Trade Companies** (such as agricultural and trade banks)

The bank of Export Development was established in 1983 to:

- offer credit facilities and loans to finance export operations
- conduct studies of outside demand for Egyptian products
- build an information center related to exports and foreign markets
- set up an insurance system for exporters
- finance import operations of capital commodities, or production of inputs for export agencies

3. **Quality Control Agencies**

The General Agency for quality control of exports and imports is the most important one for agricultural commodities, its tasks include:

- controlling the agricultural export commodity quality through the determination of export standards
- supervising exporters, importers, trade agents, and scientific and consultancy offices
- sorting and judging the commodities cooperatively marketed
- issuing export licenses

4. Implementation Agencies

A variety of agencies are involved in export operations including:

- Agricultural foreign trade companies such as El Neel and El Wadi for Agricultural Commodities Export

  El Wadi and El Neel companies, which belong to the Ministry of Economy, are exporting some horticultural crops such as onions, garlic, green beans, and watermelon. El Wadi specializes in exporting oranges. These companies own marketing facilities such as sorting, grading and packing stations, and collection centers to carry out the marketing operations needed for exporting. The quantity of produce which does not meet export standards will be sold on the domestic market.

- Cotton export companies such as Misr Company for Cotton Export, Port Said, Eastern Company, and Alex Trade Company

- General companies for foreign trade such as Misr Company for Foreign Trade, El Nasr Company for Export and Import, Arabian Company for Foreign Trade, and Misr Company for Import and Export

- Coop Agencies, the most important of which is The General Union of Vegetable and Fruit Producers

  This union was established in 1973 as an early result of the open-door policy. This union is self financing its projects and helps its members to export horticultural crops, especially potatoes, green beans and watermelon. The union has its own marketing facilities especially for the purpose of exporting. The members include approximately 5,000 specialized producers in vegetables and fruits.

- The investment and joint sectors

  This includes the companies established according to Law 43 of 1974 under which companies may export only their own products.

V. RECOMMENDATIONS

A. THE ENVIRONMENT FOR EFFECTING CHANGE

Post harvest handling and marketing for the domestic market and for export pose distinct problems.

1. Domestic Market

The key problem in effecting meaningful improvements in post harvest handling and marketing procedures is implementation.

There are anywhere from 25 to 48 Egyptian post harvest specialists with PHD's working in country. In addition, the Agricultural Development Systems-Egypt project that ended in 1983, did extensive work in post harvest handling and marketing of fruits and vegetables. They surveyed methods used in picking, handling, packing and marketing. Some 13 different fruits and vegetables were reviewed and the main problems causing high losses were identified. Modifications and improvements were suggested. New models of containers were designed and their advantages to producers and wholesalers demonstrated. And an up-to-date post harvest laboratory at the Central Laboratory, Cairo University, Giza was established. It was equipped with 10 modern cold storage rooms, a demonstration packing line, and all the equipment needed for applied post harvest research. The project also organized and carried out a very large extension program in various producing and marketing districts throughout Egypt.

Today, the packing line and lab established by the project no longer exist. And, despite the project's work and the intellectual resources available through a large body of trained Egyptians, little has changed. One answer has been that we are dealing with some irrational resistance to change, based in Egyptian culture. However, there has been widespread interest in and acceptance by growers of improved production methods. The difference seems to be that the improvement in production systems provides clearly demonstrable, immediate economic benefits. Those for post harvest handling are less clear.

The question of grading at the farm level is a known quotient and is generally considered now by the farmer, but in very rudimentary form. However, graded or not, the farmer sells everything now, at a price, and has little concern for what happens later. Broker/agents and wholesalers sell whatever comes in, and take their commission. There is no economic pressure on them to effect changes, and they rarely hold product for more than 24 hours. In instances where broker/agents and wholesalers buy and re-sell the product, and in the case of retailers, a judgement is made not only as to how much he can get when reselling salable product, but how much he is apt to throw out or sell at reduced prices due to degradation of the product. His tendency will be to err on the conservative side, to assure his profit margin. The net affect is lower than necessary grower prices and high consumer prices.

However, to the grower, this identification of loss is a theoretical exercise and, in any event, frequently beyond his ability to control. For example, while better picking and handling of fruit in the field may increase the quality of the grower's product, he will not be able to realize the full benefits without a marketing system with standardized, clearly delineated grades, that provide the buyer with assurances as to the level of quality he is buying. To do that effectively would require a critical mass of product.

The grower would have to be part of a large marketing group which could define grades and standards. Despite isolated examples of successful direct marketing, it is difficult for individual growers to implement changes that will make any real difference.

Two preconditions must exist for successful implementation of post harvest and marketing improvements.

1) There must be clearly demonstrated, understood, economic benefits.

2) There must be some organizing entity that reflects growers views and has credibility as representing growers interests.

Implementation, therefore must address questions of organization, analysis and education.

2. The Export Market

With exports, there is a totally different environment. This is a rapidly growing business with increasingly sophisticated players and a heightened awareness of the critical importance of good harvesting and post- harvest handling procedures. Other factors that must be considered are :

- What constitutes good practices, and the repercussions from poor practices are at this stage not clear to entrepreneurs involved in exports.
- There is a willingness to invest in the necessary infrastructure, but design and management are weak.

In addition, there has been a substantial amount of research done in recent years in Europe and the U.S. on extending the life of fresh fruits and vegetables, and a profusion of new products and techniques are beginning to enter the market. The exporters must be kept abreast of the latest developments.

The difference from the situation in the domestic market is that there is a receptive audience, prepared to act quickly to implement recommendations once they are clearly understood.

B. RECOMMENDATIONS

1. Summary of Recommendations

a) Establish an office to assist growers from Minya in Middle Egypt to Aswan. This area has special post harvest handling and marketing problems due to distance from principal markets.

b) Establish an office to cover farmers in Giza south to Minya. This together with the office in upper Egypt (a above) will give the project national coverage.

c) Conduct a series of workshops/ seminars to accomplish the following:

- In service training for FtF staff.
- Education of participating farmers. This will emphasize the economic benefits.
- Provide information to exporters on appropriate post harvest handling techniques and marketing options.

d) Assist Farmers to organize around common needs. This process will start with the workshop/ seminars in c) above.

e) Based on the requirements that emerge from the workshop/ seminars in c) above, assist in conducting demonstration projects. These may be:

- Product based, for highly perishable products where there has been high rates of post harvest losses, such as tomatoes, bananas, and strawberries.
- Geographically based, such as a comprehensive assistance program for one of the university graduate communities in the western desert; or assisting in the establishment of "shipping point" markets.
- Activity based, such as assistance to exporters; assistance in establishing farmers retail markets; Assistance to processors/ contract growers; or assistance in home canning, drying, pickling, and preserves in the villages.

f) Provide assistance in wholesale market management. The smooth functioning of the market is of importance to all growers and the FtF Project can provide volunteers experienced in managing U.S. wholesale markets. Many of the problems will be similar.

2. Detailed recommendations

a) Establish an office to assist growers from Minya to Aswan

An office should be considered to support the fruit and vegetable industry along the Nile Valley from Minya (in Middle Egypt) to Aswan. According to MOA statistics, this area in 1989 included over 87,000 feddans in fruit production and 133,000 feddans in vegetable production. It supplies 33% of the country's onions, and 41% of the bananas. Since 1989, irrigation has been extended to 65,000 feddans of new lands in the El Nakra valley of Aswan, although it is unclear how much of this is actually under cultivation.

The following factors also influenced this recommendation :

- This area is supplying the tourist trade in Luxor and along the Red Sea and must be prepared to meet increasing demands for better quality produce.

- The area is an increasingly important supplier of winter produce to Cairo and

Northern Egypt. This results in the post harvest problems being exacerbated by the long distances and difficult conditions under which the product must be shipped. And, with the expensive transportation cost that must be invested in the product, merchants can not afford to throw product out upon arrival. It is also prohibitively expensive to send product of poor quality that will not get full market price.

- Upper Egypt has excellent potential for supplying certain export crops that cannot be grown in the north during the cooler months, such as late and early melons (see Appendix E for Temperature Data.)

- Some agriculturists believe that Upper Egypt is the best growing area for onions and garlic. It does not have the severe onion fly and white rot problems that exist in other areas. Technical assistance is needed to bring these products to their full potential.

Due to the problems inherent in shipping long distances to market, there is likely to be a greater receptivity to more rapid improvements in post harvest handling in Upper Egypt, particularly for bananas. Upper Egypt is the major banana producing area in the country, and although there are no studies documenting banana losses, the team observed an apparently high level of loss. Also due to the distances involved, expansion of the "shipping point market" concept, already in limited use there, may be useful.

The approach in Upper Egypt could be a demonstration project working with a group of interested growers in a geographically cohesive area, with comprehensive, integrated support from volunteers.

b) Establish an office to cover farmers in Giza to Minya

National representation of the FtF program will provide the opportunity for greatly enhanced impact through coordinated programs. The major areas not now served by Farmer to Farmer, other than those included above are Giza and Beni Souef. Between them, they included 224,000 feddans under fruit and vegetable cultivation in 1989. We recommend that an additional office be established to serve these governorates, as well as Fayoum, (130,000 feddans) which is now served by the Mansoura Office.

This will help relieve the pressure placed on the Mansoura Office by the spectacular growth taking place in the Ismailia governorate. Ismailia is evolving as a prime fruit and vegetable growing area, and an additional 150,000 feddans are anticipated to begin production over the next seven years, with most of this area cultivated in fruits and vegetables.

c) Conduct a series of workshops/seminars

These workshops would have four objectives :

1) To educate growers on the negative impact on their income of poor post harvest handling and marketing practices

2) To educate growers about improvements they can make as individuals that will increase their income

3) To heighten awareness of the FtF program as an important resource

4) To provide forums that will allow growers to identify common needs and grower leadership to emerge

The workshop/seminars will address some of the following problems and issues:

In-Service Training

The FtF Program is providing a unique type of technical assistance in Egypt and the effectiveness of this program is determined by how well the FtF staff performs, in the field and the office. An in-service training program on utilizing post harvest handling and marketing volunteers should be developed for the FtF staff. This training is needed for new and old members of the field and office staff. FtF personnel must appreciate fully that the success of FtF depends upon the effectiveness of the USA volunteers depends upon the FtF staff and how they get their jobs done.

When feasible and practical, volunteers should be used to train FtF staff. One would not expect FtF staff to become plant pathologists or communication specialists but the volunteers that pass through Egypt carry a wealth of knowledge along with them, and it is very likely some of it would be of use to the FtF Program or its staff. Upon arriving at each FtF office, each volunteer should meet, briefly and semi-formally, with the entire field staff to discuss the volunteer's areas of expertise and interest and the FtF staff's expectations for the volunteer and his assignment.

Post Harvest Handling, and Marketing issues

Using a team of USA volunteers specialists, FtF should conduct workshops for FtF staff and seminars and post harvest handling demonstrations for farmers and MOA extension agents. A team of volunteers with the following expertise should be identified and recruited:

1) Post harvest specialist
2) Agricultural marketing specialist
3) Agricultural association formation specialist

The scope of work for this team of specialists would include the preparation and presentation of seminars in their specific field of expertise. Seminars would be basic in nature and appropriate for Egyptian agriculture. Specialists would lead discussions and entertain questions related to their specialties. One or more of these specialists should have prior experience as a FtF volunteer.

Presentations would be made to farmers, MOA extension officers, and FtF staff members. Individual presentations would be approximately 1.5 hours in length and three to six presentations will be made during the assignment period. The post harvest handling and the marketing specialists would be expected to conduct workshops to demonstrate proper packing and handling procedures. The more highly perishable products will be chosen to demonstrate proper handling procedures. The post harvest handling and marketing presentations would include a practical demonstration of harvesting, handling, and/or packing. One example of a suitable demonstration would be to bring a crate of two-day old tomatoes directly from the wholesale market to the meeting and sort it in front of the farmers. Then ask them how much they would pay for the fruit. This activity, the presentation and the demonstration, would require about two days per meeting and volunteers and FtF management would decide if both the presentation and the demonstration would be attempted on the same day, at the same time, or on successive days.

The presentations should contain slides and handouts, if necessary, and should be suitable for the FtF staff workshop, farmer meetings, and MOA extension training. Specialists should be prepared to address fresh produce export aspects as related to their individual fields of expertise. Each presentation to farmers and MOA extension officers should include a brief discussion on the following:

1) Post harvest handling for export
2) Export agricultural marketing
3) Farmer export organization

These specialists should have prior experience that is relative to conditions in Egypt and other parts of the world. The principle objectives of this FtF volunteer assignment include the following:

1) Familiarize the FtF staff with post harvest handling, agricultural marketing technologies and farmer association formation techniques so that they can better

support farmers in these areas.

2) Initiate an in-service training program for FtF staff.

3) Expose farmers and MOA extension officers to post harvest handling, agricultural marketing, and fresh produce export technologies, and farmer association formation techniques.

4) Demonstrate appropriate post harvest handling techniques to farmers and MOA extension officers.

Specialists will participate in one-day workshop/training courses to be held in the two cities where FtF field offices are located. The agricultural association formation specialist would be expected to help organize and conduct the FtF staff workshops. These workshops should not be held in FtF offices. One-half of the Cairo FtF staff should attend one meeting and remaining half should attend the other meeting. The meeting would occupy a full day and attendees from Cairo should be expected to spend the full day at the workshop. This would suggest, that work shop attendees from Cairo would be required to over-night the day of the workshop. The agendas for the two staff meetings would be identical and could include the following presentations and topics:

1) Presentations-
   a. Post Harvest Handling
   b. Agricultural Marketing
   c. Agricultural Association Formation
   d. Export Post Ha[illegible] Handling & Marketing Forum

2) Topics
   a. Organizing farmer meetings and conducting field days
   b. Supporting volunteers in the field
   c. Cross-cultural training
   d. Identifying a farmer's real needs

An example of a work schedule for this volunteer assignment is suggested, as follows:

Week	Location and Activities	
1	USA-	Assignment preparation, VOCA briefing, and travel
2	Cairo-	Team works with FtF management and staff- a training exercise a. Organize and coordinate effort. b. Plan and prepare FtF staff workshops. c. Plan farmer seminars and demonstrations.
3	Egypt-	Two FtF field areas a. Travel- 0.5 days b. Planning with Field supervisor- 0.5 days c. Staff Workshop- 1.0 days d. Evaluation/report preparation- 0.5 days
4	Egypt-	Seminars and demonstrations a. Travel- 0.5 days b. Seminar presentation- 1.0 days c. Evaluation/report preparation- 0.5 days
5	Egypt- Cairo- USA-	Seminars and demonstrations Evaluation, de-briefing, and travel De-briefing with VOCA and travel

4. Assist Farmers to organize around common needs

Farmers everywhere ask about associations and their formation. Farmers feel that associating with other farmers will assist them in their farming activities. Interest in this area has been stimulated by Egyptian farmers who have had participant training in the USA and saw how

associations were fulfilling certain needs for the USA farmers.

The starting point for helping Egyptian farmers form associations is the workshop/seminars discussed in c) above. These will provide the forum for growers to identify the common needs that will form the basis for their associations as well as allow grower leadership to emerge.

Some form of organization is needed to:

- Define and implement formal grading standards
- Introduce new, cost effective packaging
- Establish standardized packing for each product
- Organize and/or support the establishment of cold storage facilities
- Develop additional more cost effective outbound freight capacity for exports
- Help remote communities develop better access to market
- Sponsor retail farmers markets
- Act as a conduit for market and technical information and provide linkages to other providing institutions
- Sponsor various information dissemination activities such as press releases and dedicated radio programs or news letters
- Review potential for voluntary production controls(marketing orders)
- Sponsor quality assurance programs for exporters
- Act as a liaison between farmers and the Egyptian Government in matters of interest to members
- Lobby E.C. for improvement in access for exporters

The above list indicates a need for two unrelated organizations: one for fruit and vegetable growers and one for fruit and vegetable exporters.

If technical assistance were channeled through farmer associations, rather than individual farmers, it would be better able to reach more farmers. The "core group" farmers would be the logical center of organization. These individuals could be requested to select 10 or more farmers to form an association of farmers with mutual interests. FtF on-farm visits would still be conducted as before. Changes would be affected so that the farmer association would select one farm of one member to be visited and all members of the association would participate in the field visit.

ACDI is world famous in the area of farmer cooperative and association development. Volunteer technical assistance can help to develop this. In the interim, local legal ramifications should be investigated and a local law office should provide information to ascertain how difficult, complicated, and costly it would be to form an association. If necessary, farmer associations could be formed in an informal, rather than a formal manner, though the legalization of a farmer association would prove of more benefit.

e) **Assist in conducting demonstration projects**

Based on the requirements that emerge from the workshop/seminars in c) above, FtF would assist in conducting demonstration projects. These may be:

- Product based, for highly perishable products where there have been high rates of post harvest loss, such as tomatoes, bananas, and strawberries.

- Geographically based, such as a comprehensive assistance program for one of the university graduate communities in the western desert; or assisting in the establishment of "shipping point" markets.

- Activity based, such as assistance to exporters; assistance in establishing farmers retail markets; assistance to processors/contract growers; or assistance in home canning, drying, pickling, and preserves in the villages.

Demonstration projects will be useful to educate and train farmers in the area of post harvest handling. Aspects of certain agricultural practices such as pesticide use and production of transplants, stage of maturity, harvesting tools and techniques, grading, sizing, packing, and transportation will be addressed.

FtF efforts should be as follows:

- FtF should begin with a pilot project in a specific area such as Fayoum.

- FtF should begin this pilot project with a farmer association or a group of growers.

- FtF should begin by concentrating on one of the more perishable crops such as tomatoes.

The object of this farmer training program would be demonstrate to farmers that a "premium" price can be obtained for their produce by providing uniformly mature produce, properly graded, sized, and packed, in a "standardized" and identifiable crate.

Another product that may emerge for a demonstration project is strawberries. Virtually the entire country's production is now centered in Ismailia, which should enhance the prospects for a successful demonstration. There is no data available on strawberry losses, but strawberries are highly perishable and losses are believed to be significant.

Another possible demonstration project could address the problem stemming from the isolation of some of the communities in the Western Desert. In one of the more promising communities, a demonstration project can be set up to address the full range of problems there, from cultural practices through marketing. It would be concerned with developing the critical mass of quality produce needed for effective marketing and would evaluate transportation options, as well as feasibility of establishing a "shipping point" market, and introduction of new, products for which the market is less competitive.

Farmers from the Graduate program in the New Lands are often new to agriculture and are working in desert areas which are different from the Old Lands of the Delta. There are some MOA extension officers in the region but their effectiveness is limited by the lack of transportation and/or the lack of experience. The farmers in the Graduate program are located in newly constructed villages, they are well-educated, relatively young, and they are interested in improving their agricultural operations. Because most of these farmers are new to farming, it is likely that they would benefit from a basic approach. To be able to this, FtF should help organize the farmers of each village into a single group. FtF cooperation with villages where farmers cannot get organized should be limited until they are able to organize. Once the farmers are organized, FtF should attempt to establish a demonstration of good farming techniques. A systematic approach should be used so that all farming skills including proper business planning and management, choosing the right varieties, and to using the correct post harvest handling methods are employed.

As a village group, farmers with guidance from USA volunteers, would help each other prepare a business plan and a planting schedule for each plot of land. Hopefully, farmers would design their production efforts so that marketing could be done as a group. Farmers would be provided with technical assistance through the FtF Program to develop their farming and business skills, individually

and as a group. The FtF Program should direct their work with the Graduate farmer village units so that this activity would serve as a show case for USA technology, inputs, and products and that other villages and farmers would adapt the techniques put to use here.

An example of an activity based demonstration project would be one involving exports. Fresh fruit and vegetable exporting is an exacting operation. Production and post harvest activities for the export market are more exacting and complicated than those for the domestic market and some export markets are more quality oriented than others. Farmers and farming operations will require experienced and specialized technical assistance to successfully compete in these new areas.

As FtF works with an array of farmer types, FtF is already working with some large farming operations that are exporting mostly to the Gulf. These farms are, at present, using USA volunteer technology supplied through FtF to assist in their export operations. The development of non-traditional exports, other than potatoes, to Europe will be different. European markets are more exacting than Gulf markets, so the need for production and post harvest technical assistance will increase and more specific experience will be needed.

The current and future requirement of export operations is technical assistance from private sector experts who have hands-on experience with specific crops. It is possible that this technical assistance can be supplied through the FtF Program.

f) Wholesale Market Management

Of central importance to growers is the effective functioning of the new Cairo wholesale market. The experience there will affect the planning for the new Ismailia market, as well as any future improvements to any other markets. FtF cannot play a key role in this area, but it can provide highly useful ideas through volunteers with management experience in some of the newer (Jessup, MD) or larger (Hunts Pt. N.Y.) markets in the USA.

APPENDICES

APPENDIX A

SCOPE OF WORK
MARKETING SPECIALIST AND TEAM LEADER
HAROLD J. MANNION

A. Working as the Team Leader, you will be responsible for providing overall guidance on the study, coordinating the team members' work, and producing the final report with input from other team members.

B. Working with other members of the project team, your scope of work is as follows:

1. Become familiar with current marketing practices among farmers in the Delta and New Lands in the following commodities: tomatoes, potatoes, cucumbers, apples, pears, grapes, melons, citrus, livestock, and dairy.

2. Identify new marketing opportunities in local, regional and export (Europe and Gulf) markets.

3. Analyze transportation, regulatory, and processing requirements for accessing these markets, and assess the accompanying cost factors.

4. Design and field–test guidelines for assisting farmers with the development of marketing plans.

5. Assess training and/or TA needs of farmers in accessing new markets, and develop a training program and/or FtF volunteer TA scopes of work accordingly, so that these needs can be addressed with additional resources following this consultancy.

6. Assess the feasibility of forming marketing associations and if such associations are deemed feasible, draft guidelines for their formation.

7. Produce a detailed draft technical report which presents the following information to farmers, extension agents, and others: overview of findings, mechanisms for accessing market information, and marketing plan guidelines.

8. Other duties as may be assigned by the Regional Vice President which are consistent with the overall scope of this assignment.

SCOPE OF WORK
POST–HARVEST HANDLING SPECIALIST
DONALD A. BRADEN

Working with other members of the project team, your scope of work is as follows:

1. Become familiar with current post–harvest handling practices among farmers in the Delta and New Lands in the following commodities: tomatoes, potatoes, cucumbers, apples, pears, grapes, melons, citrus, livestock, and dairy.

2. Identify feasible changes in current practices, including quality control options and processing opportunities, and develop guidelines for farmers wishing to implement those changes.

3. Recommend changes, if needed, in variety selection and production schedules to optimize post–harvest handling modifications.

4. Identify, in conjunction with other team members, new and more profitable sales opportunities for farmers, either through the addition of processing techniques or through modifications in post–harvest handling and quality control.

5. Assess training and/or TA needs of farmers in accessing new post–harvest handling and processing techniques, and develop a training program and/or FtF volunteer TA scopes of work accordingly, so that these needs can be addressed with additional resources following this consultancy.

6. Assess the feasibility of forming farmers associations to work collectively in implementing improvement in post–harvest handling, including procession and storage options. If such associations are deemed feasible, develop guidelines for farmers wishing to form them.

7. Produce a detailed draft technical report which presents the following information to farmers, extension agents, and others: overview of findings, mechanisms for post–harvest handling; post–harvest plan guidelines.

8. Other duties as may be assigned by the Regional Vice President which are consistent with the overall scope of this assignment.

APPENDIX B

CONTACT LIST

Name	Company	Title	Location
Abdel Hamid Khater	Aga District	District Manager	Mansoura
Abdel Latif Shabaan	Aga District	Pest Control Director	Mansoura
Adel Abdel Tawab	Sayed Darwish Village	Cooperative Chief of Board	Nubaria
Ahmed Amer	Amer Export and & Import	Accountant	Cairo
Ahmed Nassar	Plant Production Company	Chairman	Giza
Alaa Diab	PICO		Cairo
A. Maher Ali	Aradis S.A.E.	President	Giza
A.R. Mohamed Gamal	El Salmia Company	Vice manager	Cairo
Awad Hussein	Faculty of Agriculture	Ph.D.	Alexandria
Bahia Abdel Raouf	Sayed Darwish Village	Farmer	Nubaria
Bassiouni Abul Ata	Best Factory	Factory manager	Mansoura
Beshir El–Sharoud	Aga	General manager	Cairo
Dalia Anwar	ICI Chemicals		Cairo
Eissa El Ashmawi	Aga District	Extension Director	Mansoura
Emad Abdel Razek	TDC –Egypt	Executive Director	Giza
Fathi M. Saafan	Salhia Agricultural Export Office	Agricultural Engineer	Cairo
Fawzy Abdel Aty	Potato Marketing Cooperative	Potato Cold Storage Manager	Gharbia
Gamal El Awady	Sahrat El Kobra Village	Farmer	Mansoura
Gamal Yousef	Bin Khalfan Farms Egypt	Technical Manager	Ismailia
Hamdy Mabrouk	International Transport and Maritime Services	Marketing Department	Cairo
Hamed A. El Shiaty	ICI Agrochemicals	Consultant	Cairo
Hamza Nour El Din	El Salmia Company	Production Manager	Cairo
Hatem Mostafa	Nimos Group	Chairman	Cairo
Hisham El Habbal	Potato Marketing Cooperative	Potato Producer	Gharbia
Hisham El Naggar	Daltex Station	Assistant Manager	K. El Zayat
Hussein Dabbous	Consulting Group for Development	Chairman	Cairo
Ismail Sabry	AICE	President	Cairo
Magdy El Awady	Sahrat El Kobra Village	Farmer	Mansoura
Maher Higazy	Higazy Farm	Private Broker	Cairo
Mahmoud Hammad	NIMOS		Cairo

CONTACT LIST

Mamdouh El Shenawi	Eissa Company for Fruit/Vegetable	Marketing Cooperative Manager	Menufia
Marwan Kotb	Potato marketing Cooperative	Potato Producer	Gharbia
Mohamed El Awady	Sahrat El Kobra Village	Farmer	Mansoura
Mohamed El Deeb	MABA	Assistant General Manager	Cairo
Mohamed El Dib	Potato Marketing Cooperative	Assistant Manager	Gharbia
Mohamed El Dfrawi	El Dfrawi Company	General Manager	Cairo
Mohamed Gawish	El Roda Company	Field Manager	Alexandria
Mohamed El Gewely	Ismailia Governorate	Governor	Ismailia
Mohamed El Gioshi	Eissa Company for Fruit/Vegetable	Marketing Manager cooperative	Menufia
Mohamed Saad	Sayed Darwish Village	Farmer	Nubaria
Mohamed Wahsh	Beshla Village	Farmer	Mansoura
Mostafa El Azzouni	American Chamber of Commerce	Chairman	Cairo
Nadia Mostafa	American Chamber of Commerce	Vice Chairman	Cairo
Ron Verdonk	United States Department of Agriculture	Agricultural Attache	Cairo
Saied El Gindy	West Shiwa	Farmer	Mansoura
Saied Mahmoud	El Nozha Wholesale Market	Marketing Manager Cooperative	Cairo
Sami M. Ali	El Roda Company	Department Head	Cairo
Samir El Naggar	Daltex Station	Assistant Manager	K. El Zayat
Sayed Haragy	Sayed Darwish Village	Cooperative Manager	Nubaria

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APPENDIX C

Fruits and Vegetables Grown In Egypt

Fruit

1. Apple
2. Apricot
3. Avocado
4. Banana
5. Date
6. Fig
7. Grape
8. Grapefruit
9. Guava
10. Lemon
11. Lime
12. Mandarin
13. Mango
14. Olive
15. Orange
16. Peach
17. Pear
18. Persimmon
19. Plums
20. Pomegranate
21. Prickly pear
22. Sapota
23. Strawberry

Vegetable

1. Artichoke
2. Asparagus, Green
3. Asparagus, White
4. Bean, Broad
5. Bean, Green
6. Fig
7. Beet
8. Broccoli
9. Brussels Sprouts
10. Cabbage, Chinese
11. Cantaloupe
12. Carrot
13. Cauliflower
14. Celery
15. Chicory
16. Corn, Sweet
17. Cow Pea
18. Cucumber
19. Eggplant
20. Garlic
21. Leek
22. Lettuce
23. Melon
24. Mushroom
25. Okra
26. Onion
27. Onion, Green
28. Parsley
29. Pea, Green
30. Pea, Snow
31. Pea, Sugar
32. Pepper, Bell
33. Potato
34. Potato, New
35. Radish
36. Spinach
37. Squash,Mallow
38. Squash,Summer
39. Squash,Zucchini
40. Sweet Potato
41. Taro
42. Tomato
43. Turnip
44. Watermelon
45. Yam

APPENDIX D

Climatological Data –1991

The data include average maximum, minimum, night, and day temperatures (C) and relative humidity (% for different sites in Egypt in 1991).

1. The first section includes average temperatures by 10 day increments for the following sites:

	Site	Governorate	Location
1.	Alexandria	Alexandria	Lower Egypt, Delta
2.	Assiout	Assiout	Middle Egypt, South
3.	Aswan	Aswan	Upper Egypt, Nile
4.	Cairo	Cairo	Lower Egypt, Delta
5.	El Arish	North Sinai	Sinai
6.	El Dakhla	New Valley	Oasis, West
7.	El Kharga	New Valley	Oasis, West
8.	Giza	Giza	Lower Egypt, Delta
9.	Luxor	Kena	Upper Egypt, Nile
10.	Mersa Matrouh	Mersa Matrouh	Northwest Egypt
11.	Port Said	Port Said	Northeast Egypt
12.	Siwa	Mersa Matrouh	Northwest Egypt

2. The second section includes average monthly temperatures for the following sites:

	Site	Governorate	Location
1.	Banha	Kalyubia	Middle Delta
2.	Beni Souef	Beni Souef	South of Giza
3.	Damanhour	Behera	Middle Delta
4.	Damietta	Damietta	Northeast Delta
5.	Fayoum	Fayoum	South of Cairo
6.	Hurghada	Red Sea	Red Sea Coast
7.	Kafr El Sheikh	Kafr El Sheikh	Delta
8.	Mansoura	Dakahlia	Middle Delta
9.	Minya	Beni Souef	South of Giza
10.	New Valley	New Valley	Oasis, West
11.	Shebin El Kom	Menufia	Middle Delta
12.	Sohag	Kena	Upper Egypt
13.	Suez	Suez	Red Sea
14.	Tanta	Gharbia	Lower Egypt, Delta
15.	Zagazig	Sharkia	East Delta

Climatological data was supplied by the Meteorological Department, Central Administration, Weather Forecasting Department.

Temperature Conversion Table

C	F	C	F	C	F	F	C	F	C	F	C
−2	28	13	55	28	82	0	−18	45	7	90	32
−1	30	14	57	29	84	3	−16	48	9	93	34
0	32	15	59	30	86	6	−14	51	11	96	36
1	34	16	61	31	88	9	−13	54	12	99	37
2	36	17	63	32	90	12	−11	57	14	102	39
3	37	18	64	33	91	15	−9	60	16	105	41
4	39	19	66	34	93	18	−8	63	17	108	42
5	41	20	68	35	95	21	−6	66	19	111	44
6	43	21	70	36	97	24	−4	69	21	114	46
7	45	22	72	37	99	27	−3	72	22	117	47
8	46	23	73	38	100	30	−1	75	24	120	49
9	48	24	75	39	102	33	1	78	26	123	51
10	50	25	77	40	104	36	2	81	27	126	52
11	52	26	79	41	106	39	4	84	29	129	54
12	54	27	81	42	108	42	6	87	31	132	56

AREA: ALEXANDRIA

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	17.6	10.2	12.2	15.9	69.0
JANUARY	18.6	9.6	12.4	15.2	76.0
	17.4	11.3	13.5	15.3	78.0
	16.4	9.6	14.2	13.9	68.0
FEBRUARY	20.8	11.4	14.4	17.3	66.0
	19.1	10.9	13.8	16.4	75.0
	20.6	10.2	12.9	17.0	66.0
MARCH	21.8	14.6	16.0	19.0	69.0
	22.1	15.2	16.7	19.8	75.0
	22.2	14.6	16.2	19.3	66.0
APRIL	23.9	15.4	17.2	20.6	62.0
	25.9	17.4	18.8	21.9	69.0
	20.5	15.9	18.1	22.1	67.0
MAY	28.9	19.9	21.4	24.0	61.0
	23.5	17.3	18.5	20.7	67.0
	29.4	19.5	21.3	25.0	61.0
JUNE	26.8	20.6	21.7	24.3	74.0
	28.2	21.9	13.4	25.7	69.0
	27.4	22.8	23.2	25.7	69.0
JULY	29.0	23.1	24.0	27.1	75.0
	28.7	22.7	24.1	27.0	76.0
AUGUST	29.9	22.2	24.8	27.6	74.0
	29.1	24.1	25.0	27.4	66.0
	27.9	22.7	23.8	27.4	64.0
SEPTEMBER	27.4	23.0	24.0	26.2	70.0
	28.0	21.3	23.3	26.6	70.0
	27.4	19.4	22.1	25.2	70.0
OCTOBER	29.7	19.3	22.1	24.9	71.0
	27.7	18.5	20.5	24.5	71.0
	23.0	15.2	17.4	20.5	73.0
NOVEMBER	22.6	16.2	18.1	20.4	72.0
	21.2	15.8	17.3	19.4	76.0
	17.8	11.9	13.8	15.1	72.0
DECEMBER	16.3	9.8	11.0	13.8	75.0
	16.6	8.1	10.1	12.7	76.0

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AREA: ASSIOUT

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	16.3	7.1	10.9	15.2	
JANUARY	17.9	4.8	9.0	13.9	
	19.0	5.3	9.7	14.7	
	18.2	4.8	9.1	13.9	
FEBRUARY	24.1	9.2	13.1	19.3	
	23.3	9.7	9.7	19.0	
	22.0	7.5	12.3	16.6	
MARCH	30.0	15.3	19.4	25.2	
	28.8	14.2	19.2	24.1	
	29.6	14.2	19.5	23.9	
APRIL	30.7	15.5	20.2	26.0	
	38.0	23.1	27.5	32.3	24.0
	35.8	18.5	24.2	28.7	22.0
MAY	38.8	23.5	28.2	32.8	22.0
	30.9	18.6	22.9	25.5	33.0
	27.6	21.7	26.6	31.1	26.0
JUNE	36.0	22.0	26.9	30.2	30.0
	36.2	21.8	27.2	30.5	34.0
	33.6	21.3	25.7	29.9	40.0
JULY	36.5	22.4	27.0	32.4	32.0
	27.3	23.6	28.1	33.5	28.0
AUGUST	36.6	23.6	28.0	32.8	35.0
	33.7	21.3	25.6	30.0	37.0
	31.3	19.2	22.9	27.8	43.0
SEPTEMBER	33.7	20.0	24.0	29.1	35.0
	33.0	19.2	23.4	28.5	34.0
OCTOBER					
NOVEMBER					
	23.8	11.2	13.4	19.5	58.0
	20.6	7.8	11.1	16.2	43.0
DECEMBER					

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Departmen

AREA: ASWAN

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	20.4	11.4	13.8	17.2	60.0
JANUARY	20.2	10.8	14.2	17.0	45.0
	21.2	9.9	13.0	16.9	50.0
	20.6	9.9	13.3	17.1	39.0
FEBRUARY	26.8	13.5	17.4	17.4	30.0
	25.5	15.0	18.4	21.9	32.0
	24.7	12.4	16.2	20.7	31.0
MARCH	32.2	19.1	23.3	28.1	25.0
	31.2	18.8	22.8	27.4	28.0
	34.3	21.3	25.8	29.7	21.0
APRIL	33.9	18.9	23.2	28.5	22.0
	42.5	27.1	32.1	37.0	19.0
	38.8	24.8	29.3	33.0	17.0
MAY	40.6	28.3	32.8	36.2	14.0
	35.9	24.6	28.4	31.0	19.0
	40.5	25.1	29.6	34.2	17.0
JUNE	39.9	26.3	30.3	34.4	18.0
	39.8	26.5	30.6	34.3	20.0
	38.2	25.3	29.3	34.3	25.0
JULY	39.7	27.2	31.0	36.4	21.0
	39.8	27.9	31.7	36.2	20.0
AUGUST	39.4	27.4	31.0	35.6	24.0
	37.3	22.5	27.1	32.8	24.0
	36.1	22.7	27.4	32.0	28.0
SEPTEMBER	38.3	24.1	28.4	34.1	22.0
	38.0	24.1	27.8	33.1	27.0
	36.0	23.3	27.3	31.5	24.0
OCTOBER	34.0	21.3	25.0	30.1	27.0
	28.6	16.4	20.1	24.8	34.0
NOVEMBER	29.0	16.4	19.7	25.2	40.0
	27.8	15.4	19.1	23.6	36.0
	31.3	10.2	14.1	17.8	45.0
DECEMBER	18.2	8.8	10.7	14.9	45.0
	18.3	8.4	11.5	15.2	46.0

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AREA: CAIRO

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	19.9	10.2	13.0	16.5	70.0
JANUARY	19.1	9.6	12.2	15.9	66.0
	18.5	9.0	12.0	15.4	72.0
	17.5	7.8	10.9	14.3	65.0
FEBRUARY	22.7	11.5	14.7	19.8	52.0
	21.9	11.8	14.8	18.7	56.0
	21.1	10.6	13.4	17.9	58.0
MARCH	26.6	15.2	18.3	22.8	51.0
	25.6	15.0	17.4	20.8	67.0
	26.6	15.5	18.0	22.3	48.0
APRIL	28.8	16.1	18.9	23.7	43.0
	31.4	18.9	22.2	26.3	47.0
	32.5	17.3	20.4	25.9	44.0
MAY	35.0	21.1	22.8	28.6	41.0
	28.3	17.0	19.8	23.4	50.0
	34.6	20.3	23.9	28.6	43.0
JUNE	34.2	20.3	24.0	28.1	51.0
	34.5	21.8	24.7	28.9	52.0
	31.8	21.0	23.7	28.0	60.0
JULY	34.4	22.8	26.0	31.6	56.0
	34.0	22.7	25.8	30.2	58.0
AUGUST	34.5	23.0	26.3	30.4	61.0
	32.9	21.9	24.7	29.2	59.0
	31.6	20.1	22.7	27.4	57.0
SEPTEMBER	32.4	20.8	23.6	28.6	61.0
	32.3	19.4	22.6	28.0	60.0
	31.2	19.5	22.2	26.2	58.0
OCTOBER	30.1	18.9	21.4	26.2	65.0
	24.8	15.7	18.2	21.7	62.0
NOVEMBER	24.6	14.2	17.1	21.5	68.0
	22.6	14.0	16.4	19.4	71.0
	18.8	11.4	13.8	16.1	59.0
DECEMBER	17.1	8.3	10.7	13.9	65.0
	15.9	9.6	11.7	13.3	60.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Departmen

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AREA: EL ARISH

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	20.0	8.4	11.3	16.2	72.0
JANUARY	19.7	5.8	9.1	15.1	72.0
	18.2	8.0	11.0	14.8	75.0
	17.5	7.1	9.3	13.7	72.0
FEBRUARY	22.1	8.8	11.2	14.1	71.0
	22.0	9.8	12.1	18.1	64.0
	19.4	8.9	11.1	16.2	74.0
MARCH	23.6	12.6	14.7	20.0	69.0
	22.9	13.4	18.2	19.9	80.0
	24.4	12.2	14.8	19.8	66.0
APRIL	25.7	12.6	14.9	20.8	60.0
	27.8	15.7	18.0	22.8	70.0
	27.9	13.6	18.4	19.9	67.0
MAY	31.7	17.0	19.2	24.5	57.0
	25.2	24.3	17.2	21.2	65.0
	29.2	15.8	18.4	23.6	65.0
JUNE	30.0	17.7	20.6	25.1	73.0
	30.5	19.7	21.8	26.0	71.0
	29.7	19.6	21.6	26.5	70.0
JULY	33.0	19.6	22.0	28.3	71.0
	31.7	20.8	23.2	28.4	71.0
AUGUST	31.9	21.3	23.5	28.6	72.0
	31.0	20.5	22.6	27.7	72.0
	29.8	18.8	21.4	27.1	64.0
SEPTEMBER	30.0	18.4	20.8	26.9	72.0
	29.5	18.0	20.8	26.7	74.0
	29.8	18.0	20.8	26.4	70.0
OCTOBER	29.3	15.5	19.7	25.9	71.0
	29.8	15.8	18.8	25.3	66.0
	25.8	14.7	16.0	21.9	70.0
NOVEMBER	25.2	12.1	14.6	21.5	75.0
	24.5	12.1	14.3	20.6	72.0
	20.0	11.0	11.4	16.7	60.0
DECEMBER	18.0	6.2	8.9	14.1	63.0
	17.7	7.1	9.2	14.2	61.0

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AREA: EL DAKHLA

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	21.9	6.9	10.1	17.2	54.0
JANUARY	21.7	5.2	9.5	16.1	52.0
	23.1	4.3	9.2	17.1	52.0
	22.0	4.8	9.3	16.4	45.0
FEBRUARY	28.4	7.7	13.2	21.7	42.0
	25.9	9.5	13.7	20.9	38.0
	26.0	6.3	11.0	19.9	37.0
MARCH	32.8	13.4	17.8	27.0	29.0
	32.3	13.1	18.4	26.7	36.0
	33.4	14.2	19.6	26.2	25.0
APRIL	34.6	22.7	19.2	27.5	30.0
	41.4	22.8	27.3	33.9	31.0
	38.1	18.6	24.1	30.4	28.0
MAY	41.2	24.2	28.3	34.0	28.0
	34.4	19.0	23.7	28.2	36.0
	40.4	20.6	26.5	33.0	31.0
JUNE	38.5	20.5	25.1	31.9	33.0
	39.8	22.2	27.0	32.8	30.0
	37.7	21.4	26.2	33.3	34.0
JULY	39.8	22.1	26.6	35.0	32.0
	40.8	22.6	27.9	35.9	31.0
AUGUST	40.2	22.2	27.1	35.4	30.0
	37.0	20.9	25.3	32.4	32.0
	35.0	19.2	23.5	30.9	37.0
SEPTEMBER	37.6	21.0	25.5	33.4	35.0
	36.5	19.5	23.6	36.7	37.0
	34.8	18.9	23.1	30.4	37.0
OCTOBER	33.9	17.9	21.7	29.6	40.0
	27.6	11.6		23.1	45.0
NOVEMBER	27.4	11.3		23.2	50.0
	27.7	11.0		21.5	47.0
	22.8	5.8		17.3	49.0
DECEMBER	19.6	4.4		14.7	50.0
	19.2	4.8		14.3	49.0

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AREA: EL KHARGA

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	21.8	7.1	11.8	17.3	55.0
JANUARY	22.0	5.9	11.1	17.0	48.0
	22.6	4.0	10.5	17.6	51.0
	21.9	6.2	11.3	17.1	38.0
FEBRUARY	27.7	9.4	14.8	21.7	38.0
	26.3	9.9	15.2	21.5	41.0
	25.5	7.5	13.3	20.7	40.0
MARCH	32.7	14.0	18.6	27.1	36.0
	31.7	15.4	20.2	26.8	36.0
	33.1	16.4	21.6	27.4	24.0
APRIL	35.0	16.7	21.0	28.3	27.0
	44.0	23.9	28.8	36.2	22.0
	39.3	21.6	26.7	31.6	22.0
MAY	42.3	25.6	30.1	35.3	16.0
	35.0	21.2	25.6	29.0	29.0
	41.2	24.5	29.2	34.7	25.0
JUNE	39.3	23.5	28.4	33.2	21.0
	40.3	24.4	29.2	33.8	25.0
	38.2	24.2	28.4	33.6	30.0
JULY	40.1	23.1	28.1	35.6	27.0
	41.7	23.4	29.4	36.8	25.0
AUGUST	40.4	24.1	29.3	36.0	26.0
	37.8	21.2	26.6	33.1	30.0
	35.9	21.1	25.2	31.8	36.0
SEPTEMBER	38.4	23.4	27.7	34.1	32.0
	37.5	21.7	26.0	32.5	37.0
	35.9	20.9	25.3	31.6	31.0
OCTOBER	34.8	20.6	24.2	30.6	35.0
	28.8	13.0	17.4	24.3	40.0
NOVEMBER	28.3	12.4	17.1	24.0	52.0
	27.4	13.8	17.7	23.1	48.0
	22.8	5.8	10.4	17.8	51.0
DECEMBER	19.4	6.6	9.8	15.0	50.0
	19.8	2.9	7.2	14.1	51.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Departmen

AREA: GIZAH

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	20.5	9.5	12.6	16.4	72.0
JANUARY	19.9	8.0	11.0	15.6	72.0
	17.5	6.6	10.1	14.0	66.0
	18.2	6.0	9.3	14.4	67.0
FEBRUARY	23.2	9.8	14.1	18.9	57.0
	22.8	11.0	14.3	19.3	56.0
	22.1	9.6	13.3	18.5	58.0
MARCH	27.2	14.6	18.0	23.1	53.0
	26.2	14.7	17.8	22.3	56.0
	27.8	14.1	18.4	23.5	48.0
APRIL	29.5	15.0	19.3	24.0	46.0
	31.5	18.8	22.2	26.1	50.0
	32.9	17.8	21.2	26.2	45.0
MAY	34.8	21.1	24.1	28.8	43.0
	28.8	17.4	20.2	23.7	51.0
	34.6	20.3	24.2	28.7	45.0
JUNE	34.1	20.6	24.2	28.2	54.0
	34.5	21.7	24.6	28.8	55.0
	32.1	21.5	23.9	28.2	62.0
JULY	35.0	22.6	25.6	30.7	59.0
	34.7	22.9	25.8	30.4	60.0
AUGUST	35.2	23.4	26.3	30.9	61.0
	33.3	22.1	24.9	29.3	58.0
	32.1	20.2	23.2	28.6	58.0
SEPTEMBER	33.0	21.3	23.9	29.2	61.0
	32.5	20.2	23.2	28.3	61.0
	31.8	19.3	22.5	27.8	58.0
OCTOBER	30.5	18.4	21.6	26.5	64.0
	25.5	14.0	17.4	21.9	62.0
NOVEMBER	25.0	14.2	17.1	29.5	68.0
	23.4	14.2	16.4	19.8	71.0
	19.4	10.3	12.9	16.3	59.0
DECEMBER	17.6	7.1	10.0	14.0	69.0
	16.3	8.5	11.0	13.0	63.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Departmen

AREA: LUXOR

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	22.8	9.2	12.6	13.2	69.0
JANUARY	22.3	7.4	11.8	17.5	68.0
	22.8	7.0	11.2	17.6	59.0
	22.6	6.1	10.6	17.3	62.0
FEBRUARY	28.4	9.5	15.4	22.7	53.0
	25.9	11.2	15.0	21.3	45.0
	26.4	8.7	13.7	21.0	48.0
MARCH	33.2	14.8	19.3	27.6	44.0
	32.6	15.4	20.1	27.2	40.0
	35.2	16.9	22.2	28.2	43.0
APRIL	32.1	15.9	20.8	28.2	31.0
	43.9	22.7	27.9	36.0	32.0
	40.5	20.5	29.0	33.2	28.0
MAY	43.0	23.0	30.2	35.6	27.0
	38.1	21.9	26.4	30.2	24.0
					28.0
JUNE					
JULY	40.0	24.2	28.6	35.4	31.0
	40.4	24.9	29.1	35.9	30.0
AUGUST	39.5	25.2	29.2	35.1	33.0
	37.3	22.5	27.1	32.8	36.0
	36.8	20.4	25.0	32.0	40.0
SEPTEMBER	38.6	21.4	26.3	33.6	36.0
	38.1	20.8	25.8	32.8	39.0
	36.0	18.6	24.1	30.9	37.0
OCTOBER	34.2	17.9	22.7	29.7	41.0
	29.3	16.4	20.1	24.8	49.0
NOVEMBER	29.1	12.4	17.1	24.1	53.0
	27.8	11.7	16.7	22.9	53.0
	21.9	6.7	11.4	17.4	53.0
DECEMBER	19.7	5.3	9.2	15.2	56.0
	19.4	3.9	8.2	14.6	60.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Departmen

AREA: MERSA MATROUH

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	17.6	10.2	12.2	15.9	69.0
JANUARY	18.0	10.2	12.9	15.3	71.0
	17.4	10.0	12.1	14.6	76.0
	16.3	8.1	10.0	13.2	70.0
FEBRUARY	21.5	10.0	12.1	13.1	65.0
	18.7	10.6	13.2	15.9	67.0
	20.7	9.7	12.4	15.1	64.0
MARCH	20.7	12.4	15.0	18.0	72.0
	22.6	13.7	15.7	19.8	71.0
	21.6	13.1	15.3	18.4	64.0
APRIL	24.6	13.4	15.5	20.0	69.0
	24.4	15.6	17.3	20.2	70.0
	27.8	15.0	17.2	21.7	60.0
MAY	27.6	17.8	19.4	22.4	63.0
	22.4	15.2	17.1	19.7	70.0
	28.6	18.0	19.6	23.3	67.0
JUNE	27.6	17.5	19.8	23.2	76.0
	29.3	20.0	22.3	25.3	70.0
	26.6	20.0	21.8	24.8	68.0
JULY	28.6	20.8	23.0	26.5	74.0
	29.5	21.1	23.3	27.2	74.0
AUGUST	29.8	22.2	24.8	27.6	72.0
	28.6	20.8	23.4	26.7	68.0
	27.9	20.6	22.7	26.0	62.0
SEPTEMBER	27.5	19.9	22.3	25.8	72.0
	27.5	18.1	21.3	25.4	74.0
	27.8	18.0	20.6	24.7	64.0
OCTOBER	26.8	17.6	20.5	24.5	72.0
	27.9	17.6	20.1	24.4	62.0
	23.0	14.8	17.3	20.1	67.0
NOVEMBER	22.6	13.2	16.2	19.9	67.0
	20.7	12.4	14.9	18.1	67.0
	17.8	10.2	12.6	15.1	63.0
DECEMBER	15.7	9.0	11.1	13.3	72.0
	16.0	8.7	10.9	13.5	74.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Departmen

AREA: PORT SAID

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	19.5	15.0	16.4	17.8	69.0
JANUARY	19.2	14.1	15.9	17.2	67.0
	18.7	12.1	14.2	16.1	79.0
	16.6	10.7	12.6	14.3	68.0
FEBRUARY	18.6	13.8	15.6	17.2	74.0
	21.0	10.9	13.8	15.4	85.0
	18.7	12.8	14.7	16.7	71.0
MARCH	20.8	15.9	17.0	18.5	73.0
	20.3	16.7	16.9	18.4	80.0
	21.4	15.5	16.8	18.8	72.0
APRIL	21.6	16.1	17.5	19.2	63.0
	23.2	19.1	18.8	21.9	77.0
	24.8	18.8	19.6	21.6	68.0
MAY	26.1	20.6	21.5	23.1	68.0
	22.7	17.9	19.0	20.2	68.0
	25.3	20.8	21.7	23.1	73.0
JUNE	27.0	22.0	23.2	24.4	76.0
	28.7	23.0	24.5	25.8	73.0
	26.9	22.9	23.9	25.2	70.0
JULY	29.3	23.7	25.2	26.9	74.0
	28.7	23.5	24.8	26.6	72.0
AUGUST	30.0	24.5	25.8	27.7	71.0
	28.9	23.9	25.4	27.0	67.0
	27.7	23.2	24.4	26.1	66.0
SEPTEMBER	27.6	22.7	24.3	25.9	71.0
	27.2	23.2	24.3	25.8	76.0
	27.1	22.3	23.6	25.2	69.0
OCTOBER	26.3	21.9	23.4	24.6	77.0
	26.4	21.5	23.0	24.4	71.0
	23.5	18.2	19.8	21.4	68.0
NOVEMBER	23.3	18.4	20.3	21.7	67.0
	21.6	17.0	17.5	19.5	72.0
	18.4	12.3	14.3	15.7	64.0
DECEMBER	16.3	10.4	12.1	13.9	74.0
	21.6	17.0	17.5	19.5	72.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Departmen

AREA: SIWA

MONTH	TEMP (C)				
	AVG MAX	AVG MIN	NIGHT	DAY	AVG R.H. (%)
	20.0	7.2	10.8	15.2	65.0
JANUARY	19.1	7.9	11.4	14.8	66.0
	20.9	8.0	10.9	15.6	65.0
	19.5	5.7	10.3	14.5	53.0
FEBRUARY	23.8	8.8	13.5	16.0	48.0
	22.0	10.4	14.6	17.5	57.0
	23.5	8.2	12.5	17.6	44.0
MARCH	27.6	14.1	18.7	23.0	44.0
	27.6	14.2	18.0	23.1	50.0
	27.7	14.5	18.9	22.3	40.0
APRIL	31.5	15.4	19.4	25.1	36.0
	32.6	19.3	23.8	26.8	42.0
	33.4	17.1	21.8	26.4	36.0
MAY	34.6	20.8	25.7	28.8	36.0
	31.0	17.5	21.7	25.0	40.0
	39.9	21.6	27.1	31.7	31.0
JUNE	37.7	20.1	26.1	30.1	31.0
	39.4	21.9	28.0	32.2	32.0
	36.0	21.1	26.6	30.7	39.0
JULY					
AUGUST	38.3	23.4	28.8	33.2	42.0
	35.5	21.5	26.3	30.5	44.0
	34.6	19.8	24.3	29.6	42.0
SEPTEMBER	35.1	20.1	24.7	30.0	43.0
	35.3	18.4	23.8	30.2	40.0
	35.6	18.5	23.5	28.2	43.0
OCTOBER	32.0	16.9	21.7	27.6	48.0
	25.6	12.1	15.5	20.7	55.0
NOVEMBER	29.5	10.6	14.6	20.6	65.0
	22.8	10.7	14.1	18.9	65.0
	16.1	8.2	11.3	15.7	57.0
DECEMBER	18.0	5.9	9.5	13.2	64.0
	16.6	7.6	10.4	12.9	69.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Departmen

AREA : BANHA

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	20.6	7.4	70.0
FEBRUARY	21.4	7.7	65.0
MARCH	24.7	12.2	67.0
APRIL	28.9	15.6	56.0
MAY	31.9	18.6	53.0
JUNE	33.2	19.7	59.0
JULY	35.4	22.4	63.0
AUGUST	34.3	22.5	65.0
SEPTEMBER	33.1	20.1	60.0
OCTOBER	31.2	18.6	62.0
NOVEMBER	24.0	13.7	64.0
DECEMBER	17.3	8.2	63.0

AREA : BENI SOUEF

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	20.3	5.3	55.0
FEBRUARY	21.6	6.4	57.0
MARCH	25.2	11.2	58.0
APRIL	29.0	16.1	56.0
MAY	35.0	19.2	51.0
JUNE	36.4	20.5	48.0
JULY	38.2	22.6	45.0
AUGUST	36.7	21.3	41.0
SEPTEMBER	32.5	21.1	47.0
OCTOBER	31.6	18.8	52.0
NOVEMBER	25.6	13.1	57.0
DECEMBER	18.2	7.1	59.0

AREA : DAMANHOUR

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	18.6	6.4	72.0
FEBRUARY	19.4	7.1	69.0
MARCH	22.5	10.4	71.0
APRIL	24.3	12.4	68.0
MAY	28.8	16.6	69.0
JUNE	31.6	19.2	72.0
JULY	34.7	21.6	74.0
SEPTEMBER	29.2	18.6	70.0
OCTOBER	27.1	17.4	71.0
NOVEMBER	24.2	14.3	72.0
DECEMBER	21.4	11.1	75.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Department

AREA : DAMIETTA

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	17.1	8.6	74.0
FEBRUARY	19.2	7.7	70.0
MARCH	22.3	8.9	68.0
APRIL	24.1	11.6	71.0
MAY	25.6	19.7	72.0
JUNE	26.2	21.4	74.0
JULY	28.4	23.1	75.0
AUGUST	27.2	22.2	74.0
SEPTEMBER	26.7	19.3	73.0
OCTOBER	25.6	17.2	72.0
NOVEMBER	24.6	16.0	73.0
DECEMBER	20.6	9.3	76.0

AREA : FAYOUM

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	19.2	9.2	68.0
FEBRUARY	22.6	11.0	58.0
MARCH	25.6	13.3	56.0
APRIL	30.0	16.0	47.0
MAY	33.0	19.7	45.0
JUNE	33.8	21.2	46.0
JULY	35.2	21.7	51.0
AUGUST	31.6	20.6	49.0
SEPTEMBER	33.0	20.1	51.0
OCTOBER	33.5	19.4	52.0
NOVEMBER	26.3	13.2	67.0
DECEMBER	17.7	5.9	63.0

AREA : HURGHADA

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	.19.6	9.3	54.0
FEBRUARY	20.5	10.7	47.0
MARCH	25.5	13.8	65.0
APRIL	30.4	18.4	62.0
MAY	34.0	22.7	5[illegible].0
JUNE	34.7	22.7	4[illegible].0
JULY	35.1	24.8	49.0
AUGUST	35.7	25.7	43.0
SEPTEMBER	33.1	22.0	63.0
OCTOBER	33.3	21.0	62.0
NOVEMBER	27.6	18.0	61.0
DECEMBER	19.0	10.4	52.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Department

AREA : KAFR EL SHEIKH

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	17.1	6.2	70.0
FEBRUARY	19.2	6.6	68.0
MARCH	20.1	8.6	63.0
APRIL	23.6	12.7	62.0
MAY	29.6	17.1	60.0
JUNE	32.0	21.2	63.0
JULY	36.6	23.4	67.0
AUGUST	33.2	22.6	65.0
SEPTEMBER	30.4	20.7	64.0
OCTOBER	27.2	18.1	66.0
NOVEMBER	23.0	15.0	65.0
DECEMBER	22.2	10.7	67.0

AREA : MANSOURA

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	20.3	6.2	75.0
FEBRUARY	17.4	7.1	72.0
MARCH	19.6	8.6	69.0
APRIL	22.7	11.2	68.0
MAY	29.4	16.6	66.0
JUNE	34.3	19.2	67.0
JULY	37.1	22.4	69.0
AUGUST	35.2	20.6	65.0
SEPTEMBER	33.7	19.0	66.0
OCTOBER	27.7	18.2	70.0
NOVEMBER	24.6	14.0	71.0
DECEMBER	21.2	8.3	73.0

AREA : MINYA

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	18.5	5.9	58.0
FEBRUARY	21.1	6.0	56.0
MARCH	24.9	10.5	57.0
APRIL	30.4	12.7	42.0
MAY	35.1	18.6	40.0
JUNE	36.5	20.4	41.0
JULY	35.4	21.0	46.0
AUGUST	35.3	21.3	49.0
SEPTEMBER	29.9	17.3	59.0
OCTOBER	34.2	18.3	61.0
NOVEMBER	26.9	12.7	67.0
DECEMBER	18.7	5.6	60.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Department

AREA : NEW VALLEY

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	20.8	5.6	39.0
FEBRUARY	23.3	6.6	34.0
MARCH	28.2	11.1	32.0
APRIL	34.9	17.4	27.0
MAY	39.3	22.6	25.0
JUNE	38.9	21.3	23.0
JULY	39.5	23.1	21.0
AUGUST	42.4	22.1	22.0
SEPTEMBER	36.2	20.9	24.0
OCTOBER	37.2	21.0	27.0
NOVEMBER	29.6	13.7	30.0
DECEMBER	20.2	5.3	36.0

AREA : SHEBIN EL KOM

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	19.8	5.9	71.0
FEBRUARY	21.1	6.6	72.0
MARCH	23.8	11.2	68.0
APRIL	27.4	14.8	61.0
MAY	28.9	15.2	58.0
JUNE	24.6	18.6	65.0
JULY	25.4	20.4	67.0
AUGUST	27.1	21.6	69.0
SEPTEMBER	25.8	18.1	65.0
OCTOBER	23.7	17.0	66.0
NOVEMBER	24.6	16.7	68.0
DECEMBER	17.6	7.4	69.0

AREA : SOHAG

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	21.9	7.4	56.0
FEBRUARY	21.8	7.0	58.0
MARCH	27.7	11.2	51.0
APRIL	33.3	16.0	42.0
MAY	37.0	20.5	33.0
JUNE	37.7	22.3	35.0
JULY	37.8	22.8	38.0
AUGUST	37.2	23.0	41.0
SEPTEMBER	34.8	20.8	40.0
OCTOBER	35.5	19.7	42.0
NOVEMBER	28.6	13.6	46.0
DECEMBER	19.3	5.0	52.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Department

AREA : SUEZ

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	18.0	8.1	57.0
FEBRUARY	20.3	9.5	55.0
MARCH	27.1	12.5	60.3
APRIL	29.2	15.7	47.0
MAY	32.9	19.3	44.0
JUNE	35.1	21.5	47.0
JULY	35.0	22.8	52.0
AUGUST	35.1	22.0	55.0
SEPTEMBER	29.8	19.3	62.3
OCTOBER	33.3	20.4	65.5
NOVEMBER	26.4	15.6	67.7
DECEMBER	17.9	8.9	53.0

AREA : TANTA

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	18.6	5.8	73.0
FEBRUARY	19.8	6.2	75.0
MARCH	23.4	13.2	77.0
APRIL	27.6	16.7	62.0
MAY	30.1	18.6	60.0
JUNE	31.4	18.7	65.0
JULY	35.5	19.6	68.0
AUGUST	33.3	20.0	70.0
SEPTEMBER	32.6	19.7	65.0
OCTOBER	31.8	17.6	67.0
NOVEMBER	24.6	15.0	68.0
DECEMBER	17.4	7.0	69.0

AREA : ZAGAZIG

MONTH	TEMP (C)		
	AVG MAX	AVG MIN	AVG R.H. (%)
JANUARY	20.4	6.4	71.0
FEBRUARY	21.3	7.1	65.0
MARCH	25.0	14.0	60.0
APRIL	29.1	15.4	51.0
MAY	31.6	18.8	49.0
JUNE	33.3	21.4	60.0
JULY	35.6	22.6	62.0
AUGUST	34.4	23.1	63.0
SEPTEMBER	32.2	20.7	58.0
OCTOBER	30.7	19.4	61.0
NOVEMBER	24.6	13.8	62.0
DECEMBER	18.1	7.2	63.0

Data supplied by the Meteorological Department. Central Administration. Weather Forecasting Department

APPENDIX E

	Production			Exports	
	Fruit	Feddans	Total MT	MT	Market
1.	Apple	18,019	61,719	14	Gulf; ships
2.	Banana	34,812	415,495	4	Gulf*; ships
3.	Citrus				
	Grapefruit	265	4,149	461	Gulf, Europe, Africa; ships
	Lemon	474	2,429	4,160	Gulf, Europe, Africa; ships
	Lime	43,027	405,249	4,160	Gulf, Europe, Africa; ships
	Mandarine	48,014	257,420	46	Gulf, Europe, Africa; ships
	Orange	206,802	1,574,287	144,587	Gulf, Europe, Africa; ships
	Sweet Lemon	356	2,028	1,047	Gulf, Europe
	Other	11	61	461	Gulf, Europe, Africa; ships
4.	Date	5,373,722	475,818	7	Libya (Middle East)*
5.	Figs	3,850	13,475	0	
6.	Grape	90,325	584,694	1	Gulf, Europe; ships*
7.	Guava	28,946	289,460	2	Gulf, Europe; ships*
8.	Mango	45,440	144,451	2	Gulf, Europe, Scandinavia; planes ships
9.	Olive	4,522	18,088	22	Gulf, Europe; ships
10.	Pear	16,623	47,459	5	Middle East (Libya); ships, planes
11.	Persimmon	784		0	
12.	Pomegranate	4,098	27,866	3	Gulf, Europe, USA, Scandinavia*
13.	Prickly Pear	1,975			
14.	Sapota				
15.	Strawberry	4,146	43,000	0	Gulf, Europe, Scandinavia; ships
16.	Stone Fruit				
	Apricot	5,684	28,420	29	Gulf, Europe; ships
	Peach	3,448	24,136	306	Gulf, Europe; ships
	Plums	7,531	54,976	159	Gulf, Europe; ships
	Others			221	Gulf, Europe, Canada

* Ministry of Agriculture, Economics and Statistics Department
* Some fruit exports, Economics and Statistics Department
Exports: Export Promotion Center, Ministry of Economics

From Dr. B. Fahmi

	Production			Exports	
	Vegetables	Feddans	Total MT	MT	Market
1.	Artichoke	7	74	3407.5	Gulf, Europe, Canada, USA; ships
2.	Beans	29	1,165 T	9,256.3	Gulf, Europe
	Haricot			9,256	Gulf, Europe, Scandinavia; ships
	String			9,256	
3.	Cabbage	33	381	13.5	Gulf, Europe; ships
4.	Carrot	9	92	40.9	Gulf, Europe; ships
5.	Cauliflower	10	86	7.2	Gulf, Europe; ships
6.	Garden	6	49		
	Rouquette				
7.	Green Pepper.	38	271	430.2	
8.	Kidney Beans	3	15	2.8	
9.	Lettuce	13	121		
10.	Marrow	51	347		
11.	Melons	49	418 T	23.9	
	Cantilope			1	Gulf, Europe; ships
	Yellow			22	Gulf, Italy; ships
	Others				
12.	Okra	11	64	102.5	Gulf, Europe, USA; ships
13.	Aubergine	41	385	159.3	Gulf, Europe, USA; ships
14.	Parsely	5	65		
15.	Peas, Green	21	100	851.3	Gulf, Europe, Scandinavia; Ships
16.	Radish	3	15		
17.	Snake	34	267	346.4	Gulf, Europe, Africa, USA, Canada; ships
	Cucumber				
18.	Spinach	6	39		
19.	Strawberry	6	43	162.8	Gulf, Europe, Scandinavia; ships
20.	Swest Potato	9	102	2,400.0	Gulf, Europe; ships
21.	Taro	7	99	893.0	Gulf, Europe; ships
22.	Tomatoes	371	4,234	20,438.1	Gulf, Europe, Africa; ships
23.	Turnip	6	49	5.8	Gulf, Europe; ships
24.	Watermelon	117	1,007	5,219.7	Gulf, Europe, Scandinavia, USA; ships
25.	Potatoes	189	1,635	135,571.2	Gulf, Europe, USA; ships
26.	Onion	25	577	59,845.3	Gulf, Europe, Scandinavia; ships
27.	Garlic	15	185	135,555.9	Gulf, Europe, USA; ships
28.	Squash	50	865	985.2	Gulf, Europe; ships
	Courgettes			405	
	Zucchini			580	
	Others			1	
29.	Other vegetables	21	210	4,029.4	Gulf, Europe; ships, planes

* Ministry of Agriculture, Economics and Statistics Department
Exports: Export Promotion Center, Ministry of Economics

From: Dr. B. Fahmi

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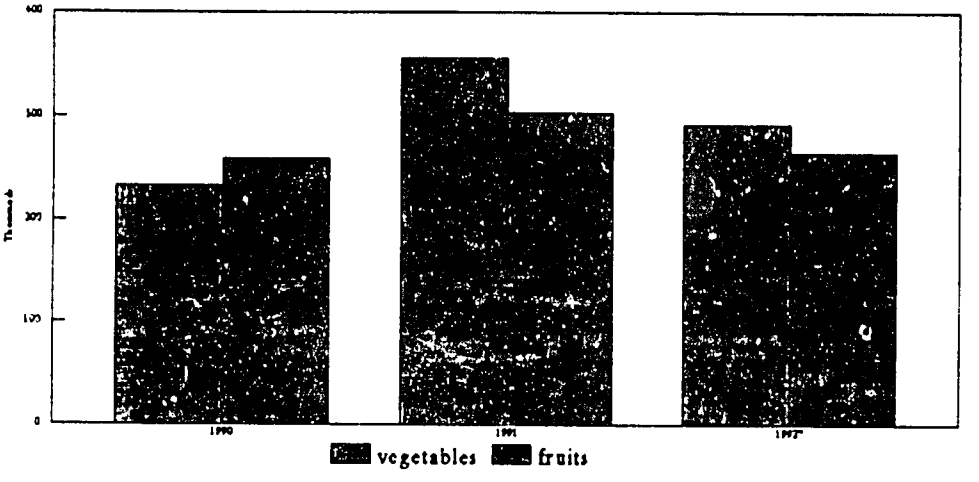
Egyptian Vegetable and Fruit Exports
Vegetables

	1990	1991	1992*	Class
Potatoes	140,543	204,128	226,333	I
Onion	79,873	64,890	31,795	II
Tomatoes	16,320	29,487	9,842	II
Green Beans	15,764	22,061	4,653	II
Total	111,957	116,438	46,290	II
Green Peppers	720	6,305	474	III
Garlic	6,594	5,315	3,024	III
Watermelon	6,292	4,880	2,310	III
Sweet Potatoes	2,400	3,443	26	III
Cantaloupe	1,493	2,380	2,859	III
Sweet Peas	1,147	1,734	1,291	III
Taro	893	1,374	790	III
Artichokes	2,635	1,061	1,722	III
Broad Beans	2,654	979	1,006	III
Total	24,828	27,471	13,502	III
Cucumber	414	718	638	IV
Green Mint	675	651	643	IV
Jew's Mallow	201	399	162	IV
Strawberry	441	390	340	IV
Eggplant	237	235	101	IV
Leek	168	232	264	IV
Zucchini	580	165	117	IV
Dill	122	137	63	IV
Okra	230	132	61	IV
Kidney Beans	17	118	17	IV
Vine Leaves	106	100	127	IV
Total	3,191	3,277	2,533	
Total Vegetables	280,519	351,314	288,658	

	1990	1991	1992*	Class
Fruits				
Citrus	231,653	281,937	254,840	I
Bananas	3,403	6,385	266	III
Pomegranate	2,782	3,907	11	III
Dates	1,747	3,471	431	III
Stone Fruits	1,037	2,959	2,285	III
Grapes	516	1,697	286	III
Guava	2,302	3,183	186	III
Total Fruits	243,440	303,539	258,305	



APPENDIX F

POST HARVEST HANDLING SYSTEM FORM

Farm: _____ Date: _____

Location: _____ Market: _____

Crop/Culture: _____ Variety: _____

Field– _____

Harvesting Aids: _____

Grading: _____ Sizing: _____

Field Packed: _____

Field Transport: _____

Comments/Other: _____

Collection Area–

Grading: _____ Sizing: _____

Equipment: _____

Comments/Other: _____

Packinghouse– ____

Grading: _____ Sizing: _____

Equipment: _____

Comments/Other: _____

Refrigeration– ___

Equipment: _____

Comments/Other: _____

container– _____

Type: _____

Avg Weight: _____

Transportation: _____

Comment/Other: _____

POST HARVEST HANDLING SYSTEM FORM

Farm: Bin Khalfan Farms Date: October 21, 1992

Location: Salhia, Ismailia Market: Domestic

Crop/Culture: Cucumber/ Grn Hs Variety: Alpha B

Field—

Harvesting Aids: Sacks and plastic crates

Grading: No Sizing: Min size harvested

Field Packed: No

Field Transport: open trailer and plastic crates in full sun

Comments/Other: Tear fruit from vine; drag sacks into greenhouse

Collection Area— None

Grading: ——— Sizing: ———

Equipment: ———

Comments/Other: ———

Packinghouse— Building

Grading: Visual Sizing: Limit maximum size

Equipment: Girls or men pack on concrete floor

Comments/Other: Graded and 'place packed' by wholesaler's personnel. Losses —one crate of rejects; crates packed

Refrigeration—

Equipment: None

Comments/Other: ———

container—

Type: Palm crate lined with newspaper

Avg Weight: about 15 kg

Transportation: Use small trucks to move fruit to Cairo markets

Comment/Other: Neat operation but need to train (prepare) workers for export endeavors while working the domestic market.

Postharvest Handling System Form Summary

Crop/Culture: Tomato/Open		Variety:		Market: Domestic	
Field		**Collection**		**Packinghouse**	
Harvest Aids	plastic or palm crates	Grading	yes	Grading	none
Grading	by color	Sizing		Sizing	
Sizing	yes	Equipment	on ground	Equipment	
Field packed		Comments/ Other	shady area near field	Comments/ Other	
Comments/ Other	hand harvest				

Refrigeration		**Container**	
Equipment	none	Type	palm crate
		Avg. Wt. (kilos)	10,15,20
Comments/ Other		Transportation	1-5 ton truck; at night
		Comments/ Other	

Crop/Culture: Cucumber/GH		Variety:		Market: Domestic	
Field		**Collection**		**Packinghouse**	
Harvest Aids	knives, sacks, plastic crates	Grading		Grading	yes
Grading		Sizing		Sizing	two: 10-15 and 15-20 cm
Sizing	minimum size	Equipment		Equipment	table or floor
Field packed		Comments/ Other		Comments/ Other	place pack
Comments/ Other	hand harvest; field transport by hand with sacks to crates				

Refrigeration		**Container**	
Equipment	none	Type	palm crate
		Avg. Wt. (kilos)	15-20
Comments/ Other		Transportation	1-5 ton truck; at night
		Comments/Other	

Crop/Culture: Potato/Field		Variety:		Market: Domestic	
Field		**Collection**		**Packinghouse**	
Harvest Aids	sacks and crates	Grading	yes	Grading	none
Grading		Sizing	yes	Sizing	
Sizing		Equipment		Equipment	
Field packed		Comments/ Other	on ground	Comments/ Other	
Comments/ Other	dug by hand				

Refrigeration		**Container**	
Equipment	none	Type	jute sacks
		Avg. Wt. (kilos)	20-25
Comments/Other		Transportation	1-5 ton truck; at night
		Comments/ Other	

Postharvest Handling System Form Summary

Crop/Culture: Potato/Field | **Variety: King Edward** | **Market: Export-England**

Field		Collection		Packinghouse		Refrigeration		Container	
Harvest Aids	sacks or plastic crates	Grading		Grading	yes	Equipment	cold storage 7 °C; 90-95% RH	Type	bags or boxes
Grading		Sizing		Sizing	yes			Avg. Wt. (kilos)	20-25
Sizing		Equipment		Equipment	packing line-wash, dry, sort, size, pack	Comments/Other	sanitation and ventilation is important	Transportation	1-5 ton truck; at night
Field packed		Comments/ Other		Comments/ Other				Comments/ Other	packed with peat moss
Comments/ Other	dug by hand								

Crop/Culture: Onion/Field | **Variety:** | **Market: Domestic**

Field		Collection		Packinghouse		Refrigeration		Container	
Harvest Aids		Grading		Grading		Equipment	none	Type	jute bags
Grading		Sizing		Sizing				Avg. Wt. (kilos)	20-25
Sizing		Equipment		Equipment		Comments/ Other		Transportation	1-5 ton truck; at night
Field packed		Comments/ Other	stored under straw with tops - months	Comments/ Other	packed in open or in shade			Comments/ Other	
Comments/ Other	dug by hand; field dry 5-10 days; prefer topping								

Crop/Culture: Cabbage | **Variety:** | **Market: Domestic**

Field		Collection		Packinghouse		Refrigeration		Container	
Harvest Aids	knife	Grading		Grading	none	Equipment	none	Type	none
Grading	yes - size	Sizing		Sizing				Avg. Wt. (kilos)	bulk
Sizing		Equipment		Equipment		Comments/ Other		Transportation	1-5 ton truck; at night
Field packed		Comments/ Other		Comments/ Other				Comments/ Other	produce loaded on trucks; sold by unit; same for cauliflower
Comments/ Other	hand harvest; selected for size/development trimmed								

Postharvest Handling System Form Summary

Crop/Culture: Green Bean/Field		Variety:		Market: Domestic	
Field		**Collection**	**Packinghouse**	**Refrigeration**	**Container**
Harvest Aids	palm or plastic crates	Grading	Grading none	Equipment none	Type palm crate
Grading		Sizing	Sizing		Avg. Wt. (kilos) 10 or more
Sizing		Equipment	Equipment	Comments/ Other	Transportation 1-5 ton truck; at night
Field packed	yes	Comments/ Other	Comments/ Other		Comments/ Other
Comments/ Other	hand harvest; selected for appearance				

Crop/Culture: Squash		Variety:		Market: Domestic	
Field		**Collection**	**Packinghouse**	**Refrigeration**	**Container**
Harvest Aids	palm or plastic crates	Grading	Grading none	Equipment none	Type palm crate
Grading		Sizing	Sizing		Avg. Wt. (kilos) 20-25
Sizing	minimum and maximum sizes	Equipment	Equipment	Comments/ Other	Transportation 1-5 ton truck; at night
Field packed		Comments/ Other	Comments/ Other		Comments/ Other summer squash-caserta type
Comments/Other	hand harvest				

Crop/Culture: Leaf Crops/Field		Variety:		Market: Domestic	
Field		**Collection**	**Packinghouse**	**Refrigeration**	**Container**
Harvest Aids	knives, palm or plastic crates	Grading	Grading none	Equipment none	Type palm crates or loose
Grading		Sizing	Sizing		Avg. Wt. (kilos)
Sizing		Equipment	Equipment	Comments/ Other	Transportation 1-5 ton truck; at night
Field packed		Comments/ Other	Comments/ Other		Comments/ Other
Comments/ Other	hand harvest; bundled and tied with fiber				

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Postharvest Handling System Form Summary

Crop/Culture: Okra | **Variety:** | **Market: Domestic**

Field		Collection	Packinghouse		Refrigeration		Container	
Harvest Aids	sacks or palm crates	Grading	Grading	none	Equipment	none	Type	sacks or crates
Grading	no	Sizing	Sizing				Avg. Wt. (kilos)	10-15
Sizing	yes	Equipment	Equipment		Comments/ Other		Transportation	1-5 ton truck; at night
Field packed		Comments/ Other	Comments/ Other				Comments/ Other	
Comments/ Other	hand harvest							

Crop/Culture: Garlic | **Variety:** | **Market: Domestic**

Field		Collection	Packinghouse		Refrigeration		Container	
Harvest Aids	sacks or crates, digger	Grading	Grading		Equipment	none	Type	sacks or crates
Grading	no	Sizing	Sizing				Avg. Wt. (kilos)	20-25
Sizing	no	Equipment	Equipment	shelves for curing	Comments/Other		Transportation	1-5 ton truck; at night
Field packed	yes	Comments/ Other	Comments/ Other	shed for drying			Comments/ Other	
Comments/ Other	hand harvest; 4-6 in bundle; dried in field							

Crop/Culture: Taro | **Variety:** | **Market: Domestic**

Field		Collection	Packinghouse		Refrigeration		Container	
Harvest Aids	sacks or crates, digger	Grading	Grading	none	Equipment	none	Type	sacks or crates
Grading	no	Sizing	Sizing				Avg. Wt. (kilos)	20-25
Sizing	two	Equipment	Equipment		Comments/Other		Transportation	1-5 ton truck; at night
Field packed	yes	Comments/ Other	Comments/ Other				Comments/ Other	
Comments/ Other	hand harvest; plants and reels cut, cleaned, cured 3-4 days							

Postharvest Handling System Form Summary

Crop/Culture: Pepper/Gen		Variety:			Market: Domestic	
Field		**Collection**	**Packinghouse**		**Refrigeration**	**Container**
Harvest Aids	knives, plastic or crate packages	Grading	Grading	none	Equipment none	Type: plastic boxes or palm crate
Grading	no	Sizing	Sizing			Avg. Wt. (kilos): 10-12
Sizing	yes	Equipment	Equipment		Comments/ Other	Transportation: 1-5 ton truck; at night
Field packed	yes	Comments/ Other	Comments/ Other			Comments/ Other
Comments/ Other	hand harvest					

Crop/Culture: Melon/Field		Variety:			Market: Domestic	
Field		**Collection**	**Packinghouse**		**Refrigeration**	**Container**
Harvest Aids	knives and bags	Grading	Grading	none	Equipment none	Type: bags
Grading		Sizing	Sizing			Avg. Wt. (kilos): 20-30
Sizing		Equipment	Equipment		Comments/ Other	Transportation: 1-5 ton truck; at night
Field packed		Comments/ Other	Comments/ Other			Comments/ Other
Comments/ Other	hand harvest					

Crop/Culture: Sweet Potato		Variety:			Market: Domestic	
Field		**Collection**	**Packinghouse**		**Refrigeration**	**Container**
Harvest Aids	sacks, diggers	Grading	Grading	none	Equipment none	Type: sacks
Grading	no	Sizing	Sizing			Avg. Wt. (kilos): 20-25
Sizing	no	Equipment	Equipment		Comments/ Other	Transportation: animal help, 1-5 ton truck; at night
Field packed	yes	Comments/ Other	Comments/ Other			Comments/Other
Comments/ Other	hand harvest, cured in field					

Postharvest Handling System Form Summary

Crop/Culture: Oranges/field | **Variety: Navel** | **Market: Export**

Field		Collection	Packinghouse		Refrigeration		Container	
Harvest Aids	scissors, bags, gloves, ladder	Grading	Grading	yes	Equipment	cold storage	Type	carton boxes
Grading		Sizing	Sizing				Avg. Wt. (kilos)	15-17
Sizing		Equipment	Equipment	packing lines-wash, wax, sort	Comments/Other	5°C	Transportation	1-5 ton truck; at night on reefer
Field packed		Comments/Other	Comments/Other	rejects go to domestic market			Comments/Other	
Comments/Other	hand harvest							

Crop/Culture: Orange/Field | **Variety: Navel** | **Market: Domestic**

Field		Collection	Packinghouse		Refrigeration		Container	
Harvest Aids	bags	Grading	Grading	none	Equipment	none	Type	palm crate with pads
Grading		Sizing	Sizing				Avg. Wt. (kilos)	20-30
Sizing		Equipment	Equipment		Comments/Other		Transportation	1-5 ton truck; at night
Field packed		Comments/Other	Comments/Other				Comments/Other	
Comments/Other	hand harvest; trees shaken, climbed	under trees						

Crop/Culture: Banana/Field | **Variety:** | **Market: Domestic**

Field		Collection	Packinghouse		Refrigeration		Container	
Harvest Aids	knives, padded trays	Grading	Grading	none	Equipment	ripening room-18°C	Type	in bunches
Grading		Sizing	Sizing				Avg. Wt. (kilos)	
Sizing		Equipment	Equipment		Comments/Other	Sometimes de-handed	Transportation	1-5 ton truck; at night
Field packed		Comments/Other	Comments/Other				Comments/Other	
Comments/Other	hand harvest; cut when mature but green							

Postharvest Handling System Form Summary

Crop/Culture: Grapes/Field		Variety:		Market: Export	
Field	**Collection**	**Packinghouse**	**Refrigeration**	**Container**	
Harvest Aids: scissors, clippers, plastic boxes, meshana	Grading	Grading: yes	Equipment: cold storage 0°C	Type: carton	
Grading	Sizing	Sizing: no		Avg. Wt. (kilos): 5-6	
Sizing	Equipment	Equipment	Comments/Other	Transportation: reefers	
Field packed	Comments/Other	Comments/Other: place packed		Comments/Other	
Comments/Other: hand harvest					

Crop/Culture: Grapes/Field		Variety:		Market: Domestic	
Field	**Collection**	**Packinghouse**	**Refrigeration**	**Container**	
Harvest Aids: clippers, shallow trays	Grading	Grading: none	Equipment: none	Type: palm crates	
Grading: no	Sizing	Sizing		Avg. Wt. (kilos): 5-20	
Sizing: no	Equipment	Equipment	Comments/Other	Transportation: 1-5 ton truck; at night	
Field packed	Comments/Other: in shade, fill crates, place pack	Comments/Other		Comments/Other	
Comments/Other: hand harvest					

Crop/Culture: Pear/Field		Variety:		Market: Domestic	
Field	**Collection**	**Packinghouse**	**Refrigeration**	**Container**	
Harvest Aids: plastic crates	Grading	Grading: none	Equipment: cold room 0°C and 90% RH	Type: palm crate	
Grading: yes	Sizing	Sizing		Avg. Wt. (kilos): 20-25	
Sizing: yes	Equipment	Equipment	Comments/Other: keep in cold storage for 3 months	Transportation: 1-5 ton truck; at night	
Field packed: yes	Comments/Other: fruit from several trees are handled	Comments/Other		Comments/Other	
Comments/Other: hand harvest					

Postharvest Handling System Form Summary

Crop/Culture: Apple/Field | **Variety: Anna** | **Market: Domestic**

Field		Collection		Packinghouse		Refrigeration		Container	
Harvest Aids	sacks and plastic crates	Grading		Grading	none	Equipment	cold room 4 °C and 90-95% RH	Type	carton boxes
Grading		Sizing		Sizing				Avg. Wt. (kilos)	3-5
Sizing		Equipment		Equipment		Comments/Other	2-3 months storage	Transportation	1-5 ton truck; at night
Field packed		Comments/Other	fruit collected from several trees in one area	Comments/Other				Comments/Other	
Comments/Other	hand harvest								

Crop/Culture: Stone Fruit/Field | **Variety:** | **Market: Domestic**

Field		Collection		Packinghouse		Refrigeration		Container	
Harvest Aids	plastic crates, bucket	Grading	yes	Grading	none	Equipment	cold room 0 °C	Type	palm crate
Grading	no	Sizing	no	Sizing				Avg. Wt. (kilos)	5, 10, 15
Sizing	no	Equipment		Equipment		Comments/Other		Transportation	1-5 ton truck; at night
Field packed		Comments/Other	table in shady area	Comments/Other				Comments/Other	
Comments/Other	hand harvest								

Crop/Culture: Mango/Field | **Variety:** | **Market: Domestic**

Field		Collection		Packinghouse		Refrigeration		Container	
Harvest Aids	poles with hooks, bags	Grading		Grading	none	Equipment	none	Type	palm crate with paper
Grading		Sizing		Sizing				Avg. Wt. (kilos)	15-20
Sizing		Equipment		Equipment		Comments/Other		Transportation	1-5 ton truck; at night
Field packed	yes	Comments/Other		Comments/Other				Comments/Other	
Comments/Other	hand harvest								

PostharvestHandlingSystemFormSummary

Crop/Culture: Date/Field		Variety:		Market: Domestic
Field	**Collection**	**Packinghouse**	**Refrigeration**	**Container**
Harvest Aids: knives, rope	Grading	Grading: none	Equipment: none	Type: palm crate
Grading: no	Sizing	Sizing		Avg. Wt. (kilos): 10-12
Sizing: no	Equipment	Equipment	Comments/Other	Transportation: 1-5 ton truck; at night
Field packed: yes	Comments/Other	Comments/Other		Comments/Other
Comments/Other: hand harvest; palm climbed, panicle lowered by rope				

Crop/Culture: Persimmon/Field		Variety:		Market: Domestic
Field	**Collection**	**Packinghouse**	**Refrigeration**	**Container**
Harvest Aids: knives, scissors, plastic or palm crates	Grading	Grading: none	Equipment: ripening room - rustic 1°C ?	Type: palm crate
Grading: yes-color	Sizing	Sizing		Avg. Wt. (kilos): 5, 10, 15
Sizing: yes	Equipment	Equipment	Comments/Other: room has heat and ethylene source	Transportation: 1-5 ton truck; at night
Field packed	Comments/Other	Comments/Other		Comments/Other: stored ant 10°C after ripened
Comments/Other: hand harvest				

Crop/Culture: Strawberry		Variety:		Market: Domestic
Field	**Collection**	**Packinghouse**	**Refrigeration**	**Container**
Harvest Aids: small crates	Grading	Grading: none	Equipment: cold storage sometimes	Type: carton
Grading: yes	Sizing	Sizing		Avg. Wt. (kilos): 6
Sizing	Equipment	Equipment	Comments/Other	Transportation: 1-5 ton truck; at night
Field packed: yes	Comments/Other	Comments/Other		Comments/Other
Comments/Other: hand harvest; graded at pick				

Postharvest Handling System Form Summary

Crop/Culture: Guava/Field		Variety:				Market: Domestic	
Field		**Collection**		**Packinghouse**		**Refrigeration**	**Container**
Harvest Aids	plastic or palm crates	Grading	yes	Grading	none	Equipment none	Type bar: crates
Grading	no	Sizing	yes	Sizing			Avg. Wt. (kilos) 10, 15, 20
Sizing	no	Equipment		Equipment		Comments/Other	Transportation 1-5 ton truck; at night
Field packed		Comments/Other	fruit graded and selected under trees	Comments/Other			Comments/Other
Comments/Other	hand harvest; fruit cleaned with cloth						

APPENDIX G

Common Shipping Containers in Egypt

Container	Size	kg	Crops
Jute sacks	Small	15–20	cantaloupe, beans, leafy crops, okra, pea, pepper
	Medium	30–50	bean, lime, okra, olive, onion, pea, pepper, potato, sweet potato, taro
	Large	60–80	okra, olive, onion, potato, sweet potato, taro
Palm crate	Smallest	5	grape, stone fruit, strawberry
	Small	10–15	bean, fig, grape, leafy crops, mango, stone fruit, strawberry, tomato
	Medium	20–40	(most vegetables) artichoke, date, garlic, guava, mango, onion
	Large 'Addaia'	40–60	citrus, garlic, pomegranate, watermelon
Plastic crate	Small	8–12	used by cooperatives and exporters for different fruit and vegetables
	Medium		
	Large		
Cartons	Smaller	3–6	used for high value crops such as apple, bean, grape, pear, pepper, strawberry
	Larger	10	banana, cantaloupe, grape

From: Dr. Bahia Fahmi, November 1992

Recommended Temperature, Relative Humidity and Approximate Shelf–lifeof Some Fresh Vegetables*

Vegetable	Storage Conditions: Temperature F	Temperature C	Relative Humidity (%)	Storage Life
Asparagus	33	1	95–100	2–3 weeks
Bean, Green	42	6	95	7–10 days
Broccoli	32	0	95–100	10–14 days
Cucumber	55	13	95	10–14 days
Eggplant	50	10	90–95	1 week
Garlic	32	0	65–70	6–7 months
Melon				
Casaba	50	10	90–95	3 weeks
Crenshaw	45	7	90–95	2 weeks
Honeydew	45	7	90–95	3 weeks
Cantaloupe	34	1	95	5–14 days
Watermelon	50	10	90	7–9 months
Onion, dry	32	0	65–70	1–8 months
Pea, snow	32	0	95–98	1–2 weeks**
Pepper, sweet	50	10	90–95	2–3 weeks
Potato, early	–1–		90–95	–1–
Potato, late	–2–		90–95	5–10 months
Squash, summer	50	10	95	1–2 weeks
Squash, winter	50	10	50–70	–3–
Taro	50	10	85–90	4–5 months
Tomato, mature green	55	13	90–95	4–7 days
Tomato, firm ripe	48	9	90–95	4–7 days

–1– 'Immature' potatoes are not usually stored; however, they can be held four to five months at 40°F (4°C) if cured before storage.

–2– 'Mature' potatoes should be cured prior to storage.

–3– 'Winter squash varieties differ in storage life.

** Best guess

* Adapted from O.A. Lorenz and D.N. Maynard *Knott's Handbook for Vegetable Growers*. Third Edition. John Wiley and Sons. New York

Grades of Tomato Maturity for the Fresh market

Class	Description
Immature	Seeds can be cut by sharp knife upon slicing. No jellylike material is present in any locules. Fruit is more than 10 days from 'breaker' stage.
Mature green 2	Seeds cannot be cut by sharp knife upon slicing. Jellylike material is present in at least one locule. Fruit is 6–10days from 'breaker' stage.
Mature green 3	Jellylike material is well developed in locules. Fruit is completely green. Fruit is 2–6days from 'breaker' stage.
Mature Green 4	Internal red coloration is present at blossom end, but fruit is still completely green. Fruit is 1–2days from 'breaker' stage.
Breaker	First external pink or yellow shows at the blossom end.
Turning	More than 10 but less than 30 percent of aggregate surface is tan–yellow, pink, red, or a combination of these.
Pink	More than 30 but less than 60 percent of aggregate surface shows pink or red color.
Light Red	More than 60 percent of the aggregate surface shows pink or red color, but less than 90 percent of the surface shows red color.
Red	More than 90 percent of the aggregate surface shows red color.

From: A.A. Kader. Postharvest Technology of Horticultural Crops. UC–Davis.

APPENDIX H

Refrigerated Storage Capacity in Egypt (tons)

SECTOR	NUMBER	COOLING	FREEZING	TOTAL
SUPPLY SECTOR	45	15,000	55,000	70,000
OTHER ORGANIZATIONS AND FOUNDATIONS	30	5,000	25,000	30,000
Subtotal	75	20,000	80,000	100,000
PRIVATE SECTOR	200	110,000	70,000	180,000
COOPERATIVE SECTOR	18	30,000		30,000
INVESTMENT SECTOR	17	10,000	60,000	70,000
OTHER SECTORS	50	10,000	10,000	20,000
Subtotal	285	160,000	140,000	300,000
Total	360	180,000	220,000	400,000

SOURCES:

a– Data from Supply and Domestic Trade Sector
b– CAPMAS (Central Agency for Public Mobilization and Statistics)
c– Data from the Master Plan that is currently undertaken by the Public Sector Organization for Food and Cooling

* These sectors include trade establishments for various markets as well as activities related to: exporting, tourism, manufacturing, medical and pharmaceutical.

** The number of refrigerators is constantly increasing as recommended by various plans, projects, and programs.

Refrigerated Storage Capacity in Egypt (tons)

GOVERNORATE	NUMBER OF REFRIGERATORS	CAPACITY IN TONS
CAIRO	40	18,500
ALEXANDRIA	55	83,500
Subtotal	95	102,000
PORT SAID	11	27,500
ISMAILIA	5	12,000
SUEZ	9	8,500
Subtotal	25	48,000
KALYUBIA	25	45,500
MENUFIA	24	20,000
SHARKIA	6	3,500
GHARBIA	20	35,250
DAKAHLIA	30	25,000
BEHERA	25	35,000
DAMIETTA	15	15,000
KAFR EL SHEIKH	5	750
Subtotal	150	180,000
GIZA	25	53,800
FAYOUM	3	200
BENI SOUEF	9	350
MINYA	8	8,600
ASSIOUT	3	2,400
SOHAG	3	700
KENA	14	500
ASWAN	5	1,350
Subtotal	70	68,000
DESERT GOVERNORATES	20	2,000
Total	360	400,000

Refrigerated Storage Capacity in Egypt (tons)

GOVERNORATES	NUMBER	COOLING	FREEZING	TOTAL
CAIRO	40	8,500	10,000	18,500
ALEXANDRIA	55	23,500	60,000	83,500
CANAL	25	8,000	40,000	48,000
LOWER EGYPT	150	100,000	80,000	180,000
UPPER EGYPT	70	40,000	28,000	68,000
DESERT	20		2,000	2,000
	360	180,000	220,000	400,000

SOURCES:

a– Data from Supply and Domestic Trade Sector
b– CAPMAS (Central Agency for Public Mobilization and Statistics)
c– Data from the Master Plan that is currently undertaken by the Public Sector Organization for Food and Cooling

Refrigerated Trucks used by Public Sector Companies

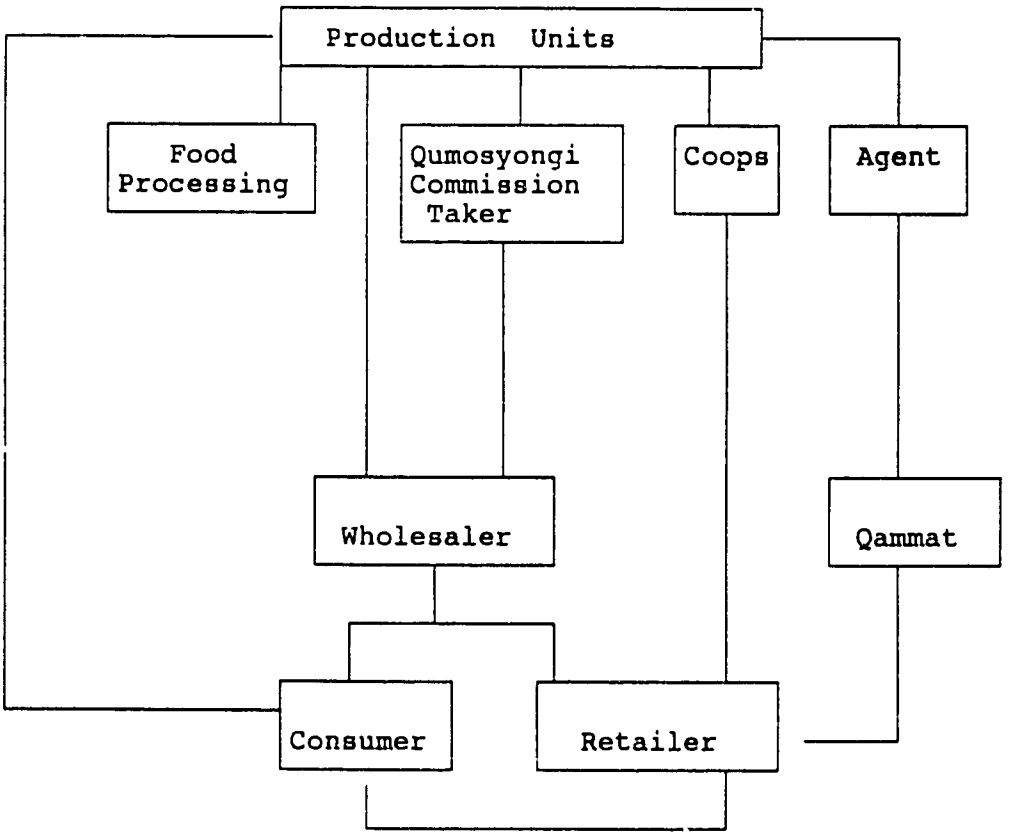
Company Name	Number of trucks	Total capacity (tons)
Gerco Co. for Cooling and Engineering	19	415.47
Al–Ahram Co. for Cooperative Societies	15	125.00
Cairo Co. for Cooling and Freezing	1	8.00
Nile Co. for Cooperative Societies	24	165.00
Total	59	713.47

* The table does not include trucks used by the Egyptian Co. for Meat & Poultry and the Egyptian Co. for Fish Marketing.

APPENDIX I

FRUIT AND VEGETABLE MARKETING CHANNELS

Fig (1) Domestic Marketing Channels



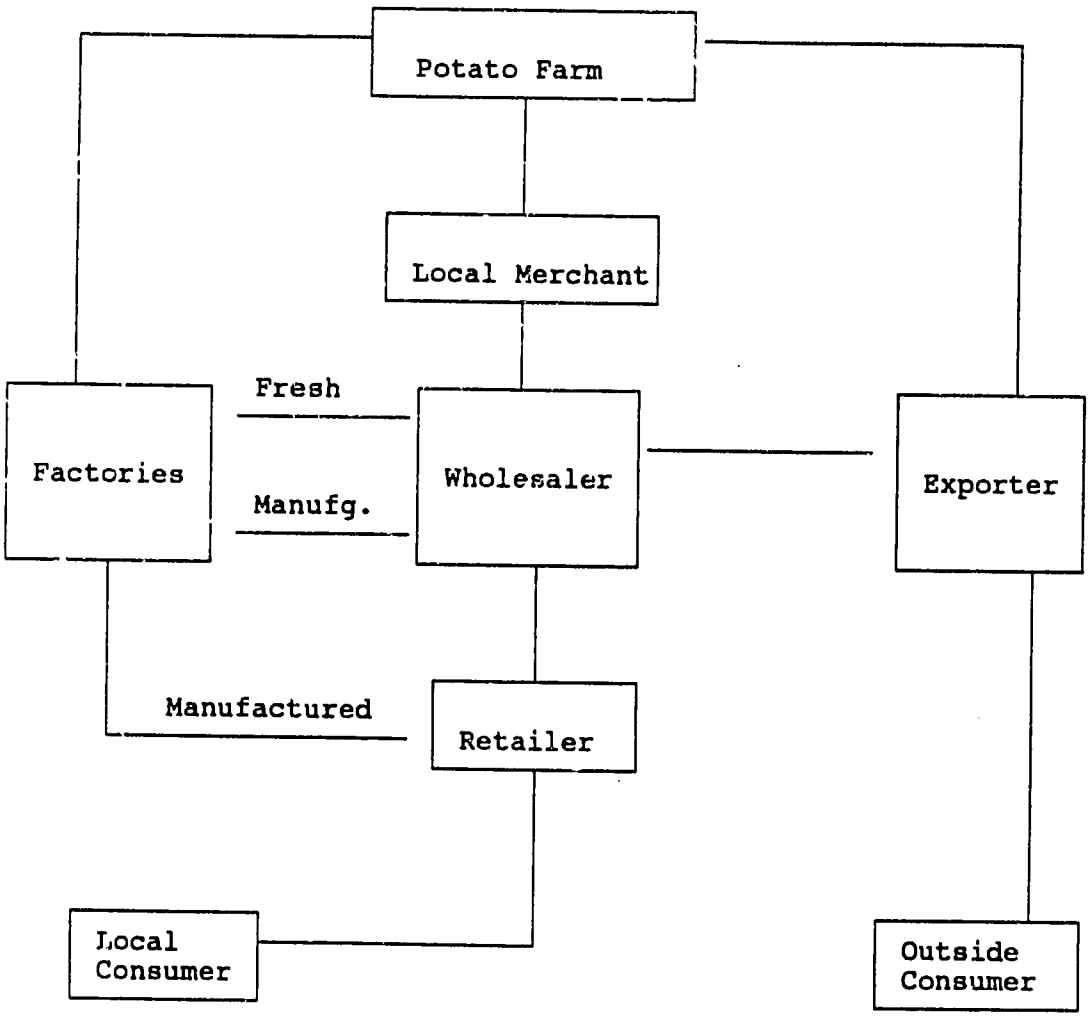
1—Potato Marketing Channels

Potatoes move from farm to consumer in a number of ways. Farmers may have contracts with exporters who supply them with potato seeds and other inputs. With this channel, the exporter is responsible for harvesting, grading, transporting and storing the potatoes.

Many farmers take their produce to the marketing cooperative which sells it at wholesale markets or exports it. In most cases these coops have cold storage facilities.

Some farmers sell their produce to a local merchant who takes it to wholesalers and/or retailers. Some growers also enter into direct contracts with processing factories.

Fig. (2) Potato Marketing Channels



2—Tomato Marketing Channels

Production conditions, production region, distance to markets, transportation facilities, and prices are among the factors influencing the farmer's decision about which channel to use for marketing tomatoes. There are three main links in the marketing chain for tomatoes.

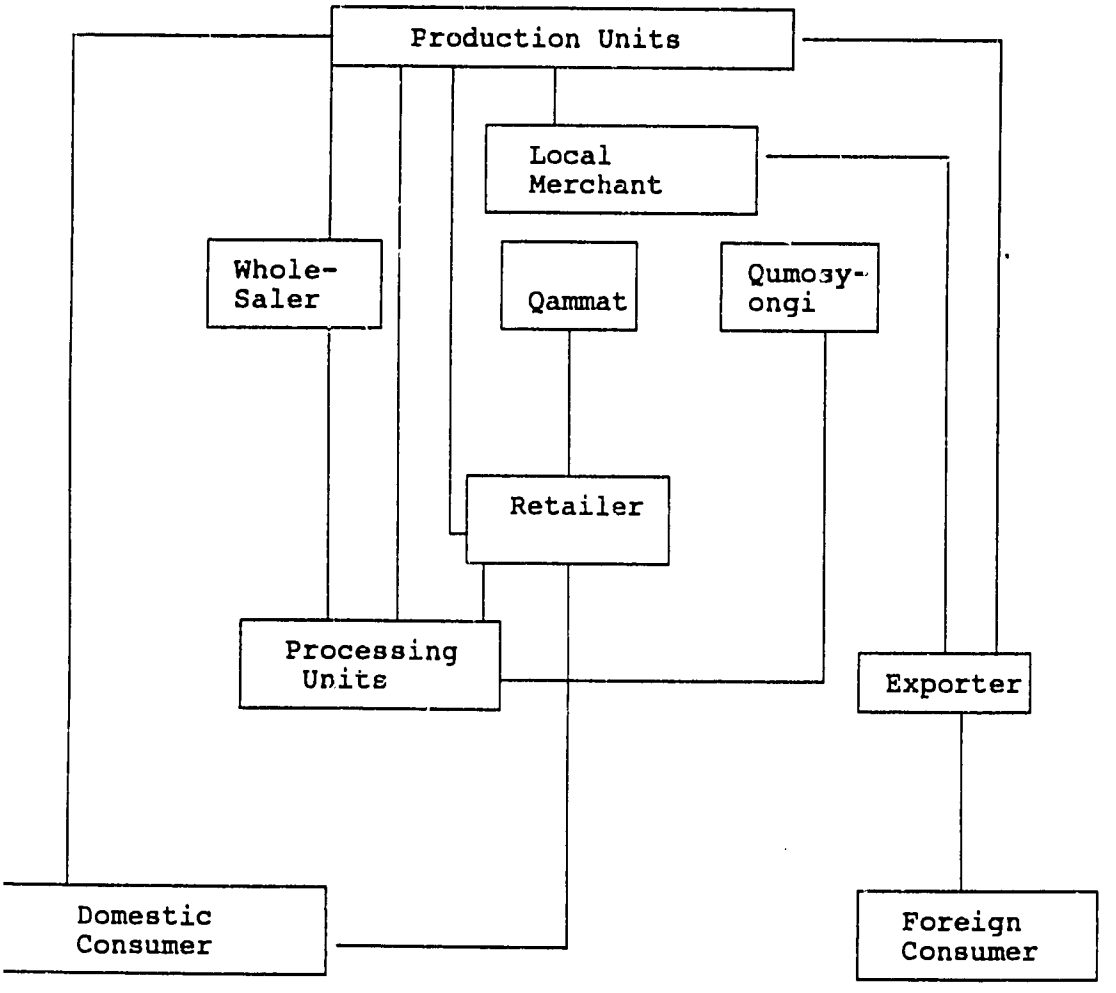
Production Areas Farmers harvest tomatoes when they are mature and red in color. There are a number of harvests per week according to climate, condition, variety,

distance to market, and marketing systems. Some farmers sort and grade their tomatoes. Tomatoes are packed in date palm crates, with the better quality tomatoes on the top and the poorer quality on the bottom.

Wholesale Markets Crates of tomatoes are transported to the wholesale market by lorries when the distance between farms and the market is far away, and pick-up trucks when the market is nearby. Wholesalers sell tomatoes to retailers, who in turn sell them to consumers.

Retail Markets are spread throughout Egyptian towns as well as consumer cooperatives, individual shops and hand carts. Retailers buy from wholesalers, qammat, or local merchants and sell to consumers. There are a large number of players in the retail market.

Fig. (3) Tomato Marketing Channel



APPENDIX J

Survey of Air—Service to Selected Cities

AMSTERDAM

KLM
Daily at DFl 1.70/kg
Reservations should be made one to two days in advance. Space available is 1–2T.

EGYPT AIR
Twice a week at us$ 0.80/kg
Reservations should be made three days in advance for Sunday flights, and two days in advance for other days.

BRUSSELS

EGYPT AIR
Twice a week at US$ 0.80/kg
Reservations should be made three days in advance for Sunday flights, and two days in advance for other days.

COPENHAGEN

EGYPT AIR
Twice a week at US$ 0.80/kg
Reservations should be made three days in advance for Sunday flights, and two days in advance for other days.

DUSSELDORF

EGYPT AIR
Once a week at US$ 0.80/kg
Reservations should be made three days in advance for Sunday flights, and two days in advance for other days.

FRANKFURT

LUFTHANSA
Daily at LE 2.80/kg
Reservations should be made three days to one week in advance with confirmation 24 hours in advance. Lufthansa deals with exporters via IATA agents only.

EGYPT AIR
Six times a week at US$ 0.80/kg
Reservations should be made three days in advance for Sunday flights, and two days in advance for other days.

GENEVA

EGYPT AIR
Twice a week at US$ 0.80/kg
Reservations should be made three days in advance for Sunday flights, and two days in advance for other days.

MUNICH

EGYPT AIR
Three times a week at US$ 0.80/kg
Reservations should be made three days in advance for Sunday flights, and two days in advance for other days.

NICE

AIR FRANCE
Once a week at FF 4.80/kg

STOCKHOLM

EGYPT AIR
Twice a week at US$ 0.80/kg
Reservations should be made three days in advance for Sunday flights, and two days in advance for other days.

VIENNA

AUSTRIAN AIRLINES
Three times a week at LE 2.75.
Little space is available. Priority is given to their old clients. Reservations should be made a few days in advance.

EGYPT AIR
Twice a week at US$ 0.80/kg
Reservations should be made three days in advance for Sunday flights, and two days in advance for other days.

SUMMARY OF REEFER CONTAINER SERVICE TO KEY PORTS

NAME OF STEAMSHIP LINE	FREQUENCY OF SERVICE	KEY PORTS	NUMBER OF DAYS	COST
SEALAND	Weekly	Rotterdam	14–18 days	$2500
	Weekly	Trieste	9–10 days	$3200
MERZARIO	Weekly	Felixstowe	17–20 days	$3400
	Twice a month	Laspizia	5,7,9,11 days	$3300
MSC (Mediterranean Shipping co.)	Twice a month	Rotterdam	13–16 days	$2500
DNOL	Every 8 or 10 days	Rotterdam	22 days	$2812
ELLERMAN	Every 10 days	Rotterdam	20 –22 days	$3437.5
ZIM	Every 10 days	Trieste	5 days	?
NORDANA	Every 10 days	Marseilles	18 –21 days	Given upon request

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Survey of Reefer Service from Egypt

NAME OF STEAMSHIP LINE: **SEALAND**
A.Hafez & Co.
12 Talaat Noaman Str.
Alexandria

Contact: Abdel Razek
482–6668/482–2775/808–941

1– Ports served:

2– Frequency of service and number of days until arrival:
Once a week.
Rotterdam: 14 to 18 days
Trieste, Venice: 9–10days

3– Size of reefers: 40 Ft.

4– Total cost to destination:

Rotterdam : DM 4000 ($2500)
Trieste, Venice: DM 3200 ($2000)

5– Restrictions on availability of reefers: Yes
The number of reefers varies from week to week from 3 to 5 reefers. However, if given 10 days notice they could bring up to 10 or 15 reefers from Malta, but these will have to be prepaid.

6– Spot containers throughout Egypt: No

NAME OF STEAMSHIP LINE: **MEDITERRANEAN SHIPPING CO. (MSC)**
MESCO,
5 Ahmad Orabi St,
Alexandria

Contact name: Sherif Taher El Wakil
Manager of MSC line
482–1173/482–9414/483–5158

1– Ports served:

Alexandria, Ashdod, Haifa, Limassol, Antwerp, Rotterdam, Bremenhaven, Hamburg, Felixstowe.

2– Frequency of service and number of days until arrival:

Twice a month

Ashdod: 2 days
Haifa: 2 days
Limassol: 1 day
Naples or Lisbon: 4 –7 days
Antwerp: 4 days
Rotterdam: 0 days
Bremenhaven: 5 days
Hamburg: 1 day

3– Size of reefers: 20 Ft and 40 Ft

4– Total cost to destination:

Rotterdam : 20 Ft – DM 2000 ($1250)
40 Ft – DM 4000 ($2500)

MESCO also provides customs clearing services

5– Restrictions on availability of reefers: Yes
During the month of November, they can supply between 10 and 15 reefers. From December till end of March, there is great demand for reefers but would provide up to 10 reefers if given two weeks notice.

6– Spot containers throughout Egypt: Yes
MESCO can provide inland transportation from any site to the Alexandria in refrigerated trucks.

* Awaiting total costs by fax

NAME OF STEAMSHIP LINE: DEUTSCHE NAH–OSTLINIEN GMBH & CO.(DNOL)
El Tabdol Shipping Co.
35 Shahid Salah Mostafa

Contact: Magdy El Bostany
482–3999/482–4557/483–7154

1– Ports served:

Alexandria, Port Said, Beirut, Lattakia, Mersin, Izmir, Salerno, Felixstowe, Hamburg, Bremenhaven, Rotterdam, Antwerp

2– Frequency of service and number of days until arrival:

Every 8 or 10 days

Alexandria
Port Said: 2 days
Beirut: 1 day
Lattakia: 1 day
Mersin: 2 days
Izmir : 3 days
Salerno: 3 or 4 days
Felixstowe: 7 days
Hamburg or Bremenhaven: 2 days
Rotterdam: 1 day

3– Size of reefers: 20 Ft and 40 Ft.

4– Total cost to destination:

Rotterdam	20 Ft	DM 2500	($1562)
	40 Ft	DM 4500	($2812)

5– Restrictions on availability of reefers : Yes
During November they received 8 reefers. Whenever reefers come in and are emptied, they inform their exporters about them.

6– Spot containers throughout Egypt: No

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NAME OF STEAMSHIP LINE: NORDANA LINE

Societe de Gestion EVGE
33 Kasr El Nil st.
Cairo

Contact: Ashraf Khalil
392–4409

1– Ports served:

Alexandria, Limassol, Beirut, Tartous, Latakia, Mersin, Piraeus, Istanbul,Izmir, Livorno, Marseilles

2– Frequency of service and number of days until arrival:

Once every 10 days

Limassol: 1 day
Beirut: 1 day
Tartous: 1 day
Latakia: 0 day
Mersin: 1 day
Piraeus: 2 –5 days
Istanbul: 2 days
Izmir: – 3 days
Livorno: 6 –14 days
Marseilles: 2 days

– Size of reefers: 40 Ft.

– Total cost to destination:

Unknown. Need a 2 week notice in order to provide reefers.

– Restrictions on availability of reefers: Yes

– Spot containers throughout Egypt: No

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NAME OF STEAMSHIP LINE: ELLERMAN KNSM

A Division of Andrew Weir Shipping Ltd
Head Office
17 Talaat Harb St.
Alexandria

Contact Name: Capt. Mohamed Said
482–7413

1– Ports served:

Alexandria, Port Said, Beirut, Tartous, Mersin, Izmir, Salerno, Felixstowe, Hamburg, Bremenhaven, Rotterdam, Antwerp

2– Frequency of service and number of days until arrival:

Once every 10 days

Port Said: 0 or 2 days
Beirut: 2 days
Tartous: 1 day
Mersin: 1 day
Izmir: 3 days
Salerno: 3 days
Felixstowe: 7 days
Hamburg or Bremenhaven : 0 or 2 days
Rotterdam: 3 to 6 days
Antwerp: 1 day

3– Size of reefers: 40 Ft.

4– Total cost to destination:

Rotterdam : DM 5500 (about $3437.5)

5– Restrictions on availability of containers: Yes

6– Spot containers throughout Egypt: No

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NAME OF STEAMSHIP LINE: MERZARIO

Itamco
16 Dr. Anwar El Mofty
Tiba Center 2000
Nasr City

Contact: Hamdy Mabrouk
261–3715/261–3718/260–4718

1– Ports served:
Alexandria, Beirut, Tartous, Mersin, Salerno, Felixstowe

2– Frequency of service and number of days until arrival:
Weekly to Felixstowe

Beirut: 2 days
Tartous or Mersin: 1 or 2 days
Salerno: 7 to 10 days
Felixstowe: 7 days

Twice a month to Laspizia

Mersin: 4 to 5 days
Laspizia: 5 or 6 days

Direct from Alexandria to Laspizia
Laspizia: 5 days or 7 days

3– Size of reefers: 40 Ft.

4– Total cost to destination:
Felixstowe: US$ 3400
Laspizia : US$ 3300

Customs Clearing formalities:
LE 450,– Fixed for each bill of lading +
LE 350,– For each 40' container

These rates include fees for customs clearing and exclude the official receipts. They also include customs, guarantee, deposit and unloading for Merzario containers stacked in A.C.T. area. Breakbulk rates include loading fees at Alexandria port but not stripping.

5– Restrictions on availability of containers: Yes

6– Spot containers throughout Egypt: No
They can provide transportation from site to Alexandria
LE 600 Transportation from Cairo to Alexandria

NAME OF STEAMSHIP LINE: ZIM

Arab Express Shipping Co.
59 Horreya St.
Alexandria

Contact : Ahmad Khairy (owner)
Zakaria Radwan
491–6409/492–9706/493–9142

1– Ports served:

Alexandria, Piraus, Trieste

2– Frequency of service and number of days until arrival:

Once every 10 days

Piraues: 3 days
Trieste: 2 days

3– Size of reefers: 20' and 40'

4- Total cost to destination:

5– Restrictions on availability of reefers: Yes
Since the availability of reefers is not very reliable, they would prefer notice one week or 10 days in advance.

6– Spot containers throughout Egypt: No

NAME OF STEAMSHIP LINE: MERZARIO

Itamco
16 Dr. Anwar El Mofty
Tiba Center 2000
Nasr City

Contact: Hamdy Mabrouk
261–3715/261–3718/260–4718

1– Ports served:

Alexandria, Beirut, Tartous, Mersin, Salerno, Felixstowe

2– Frequency of service and number of days until arrival:

Once every week

Beirut: 2 days
Tartous or Mersin: 1 or 2 days
Salerno: 7 to 10 days
Felixstowe: 7 days

3– Size of reefers: 40 Ft.

4– Total cost to destination:

Rotterdam : US$ 3400/40

Custom Clearing formalities:
LE 450,– Fixed for each bill of lading +
LE 350,– For each 40' container

These rates include fees for custom clearing and exclude the official receipts. They also include customs, guarantee, deposit and unloading for Merzario containers stacked in A.C.T. area. Breakbulk rates include loading fees at Alexandria port but not stripping.

LE 600 Transportation from Cairo to Alexandria

5– Restrictions on availability of containers: Yes

6– Spot containers throughout Egypt: No

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Notes:

- There is no depot in Alexandria for reef containers

- The shipping companies are limited to the number of reefers that are incoming. Availability of reefers is very unreliable.

- From December 1 through March 30, the high season for the export of fruits and vegetables, reefers are in great demand and companies book containers in advance.

- Reefers are not allowed to leave the port of Alexandria.

- Many shipping companies can send for reefers, provided that they are given notice (two weeks or 10 days) and that payment is made in advance.

- Many shipping lines do not transport fruits and vegetables from Alexandria to European ports, because in the past, many Egyptian products were rejected at the port of entry.

- Hurricanes and storms in Alexandria may occur any time from mid–December to late January, and the port may close for a few days.

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APPENDIX K

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