

PN ABY-982
91312

**AGRICULTURAL MARKETING DEVELOPMENT PROJECT
AND
AGRICULTURAL MARKETING ORGANIZATION**

USAID PROJECT NO. 278-0274
CONTRACT NO. 278-0274-C-00-9012-00
AMMAN, JORDAN

SHORT-TERM CONSULTANCY

TRIAL SHIPMENTS BY SEA

AN ATTEMPT TO DEVELOP NEW EXPORT MARKET
IN INDONESIA

PREPARED BY
Y. ILKER, PH.D.
POSTHARVEST AND MARKETING EXPERT

TABLE OF CONTENTS

	<u>PAGES</u>	
I.	SUMMARY AND RECOMMENDATIONS	1
	Summary	1
	Recommendations	4
II.	INTRODUCTION	7
	Scope of Work	7
III.	DISCUSSION	9
	Trial Shipments	9
	Pre-Cooler	16
	Cold Storage at Queen Alia Airport	18
	Trial Shipment to the Gulf and Europe	18
	Thoughts on the Vertical View of Export in Jordan	20
	Miscellaneous Consultancies	24
IV.	APPENDIX	
	IV. 1 SCOPE OF WORK	
	IV.2 TABLES 1 & 2 FIGURES 1, 2, 3, 4 PLATES A, B	
	IV.3 TRIP REPORTS	
	IV.4 LIST OF CONTACTS	

I. SUMMARY AND RECOMMENDATIONS

Summary

1. The consultant, a former Postharvest and Marketing Advisor to the AMDP, worked with the Project from November 9, 1993, to January 31, 1994.
2. (a) Despite the opening of a "virtually unlimited" market for Jordanian fruit in Indonesia, Jordanian exporters were unable to supply the importer, Pt. Serrenita Mitra Abadi (PSMA) with any products. The intended trial shipments by AMDP in cooperation with Jordanian exporters also could not materialize, mainly because of a lack of sufficient export quality produce.

(b) The consultant and AMO counterparts met with the importers, exporters, growers, transporters and other interested parties over a 2.5 month period. These meetings clarified that:
 - o The importer has specific commodity requirements. These are:
Early and late season grapes
Apples-- preferably red
Oranges-- Navel, 'Valencia' 'Shamouti' for test marketing
Mandarins-- long shelf-life varieties
Stone fruit-- cherries, nectarines, peaches
 - o The importer's quality standards are high, similar to those of the OECD countries, both with respect to fruit and packaging.
 - o The quantities required are between 300 and 3,000 metric tons.
 - o The commodities sourced by PSMA between November 1993 and April 1994, are from Lebanon (12 sourcings) Turkey (8) Gaza (3) Australia (2) France (1) Jordan (1) Syria (1) Uruguay (1).
 - o Most of the Middle-East shipments will be exported via the Port of Aqaba.

(c) The consultant visited the Aqaba Port facility and determined that:

- Fruit of Lebanese origin had already sustained some postharvest deterioration, due to faulty postharvest management
- Packages were not strong enough for long-distance transport
- Maersk Line refrigerated containers are modern, state-of-the-art
- Port facility does not provide reefer chassis, and reefers are stored directly on heat radiating concrete floors. This practice is inadequate
- Workers at Aqaba are not trained in perishables handling and are careless during these export activities.

(d) The consultant introduced the importer to the Shurrab Bros. Co. of Jordan, who have a complete Citrus packing line, in the hope it could be used at some stage.

3. The consultant submitted two publications on Forced-Air Cooler Systems to Project Management, for the modification of AMO's newly constructed mobile "Room-Cooler," in order to improve its efficiency.

His discussions with Petra Engineering Co. led to the modifications which have now been completed. The use of the unit has been demonstrated to AMO's Postharvest Group. The unit can perform efficiently down to 7 C, which is suitable for all chilling sensitive crops.

4. The consultant participated in the activities of the Cold Storage Consultant by sharing background information and ideas.

5. Responding to a memo by Mr. R. Peters, Sr. Technical Representative, Sigma One Corp., on a "production component to AMDP," the consultant with AMO counterparts set out to demonstrate that below threshold temperatures and wide day/night temperature fluctuations occur commonly in the plastic houses of the Jordan Valley, and that they represent one of the main limitations for obtaining sufficient export volumes of high-quality crops during the winter. This work, considered fruitful but

It is recommended that

2

- Below chilling threshold temperatures occur commonly, and are more severe at the higher elevations (more Northern regions) in the valley.
 - Heating plastic houses for 4 - 6 hours every night eliminates all chilling stress, and leads to healthier plants, earlier and higher yields.
 - Heat stress (i.e., $T > 35$ C) also is frequent, and the need for better ventilation during the noon hours is emphasized.
 - New multi-span houses in the valley may create more moderate environments because of their larger air volumes, without the need for heating. Plants so far this season, respond with high quantities of high quality produce.
4. The consultant with AMO counterparts visited exporters to the Gulf, the EC, and to the newly emerging markets of Eastern Europe. He determined that currently the Gulf and the East European importers are satisfied with the out-turn of produce from Jordan, despite transit times of 7 to 11 days. Apparently both regions have market niches that accept what Jordan currently offers. Both regions need careful watching for any changes occurring in their produce markets. Higher quality products, if available, might address more upscale households, and might earn higher profits.
 5. The consultant provided advice and information to a number of Jordanian public and private sector groups, on request.
 6. Finally, the consultant thanks Mr. R. Peters, AMDP, and AMO management and counterparts for the privilege to work with them.

Recommendations

The recommendation given here are not new, but are a reiteration of what has been said in the past by many advisors, including myself. What is new however, is a more experienced AMO and perishables industry on the one hand, and on the other new demands, challenges and invitations to supply traditional and emerging markets with good quality produce, that is perceived as wholesome. While Jordanians have the prerequisite climatic conditions on their side, they still must overcome all other production and marketing challenges by innovative work.

These recommendations are mostly general, without technical details.

Concerning Policy Issues:

- Develop a solid and dependable production base, which can satisfy the domestic and export markets, as well as the potentially emerging processing industries.
- Abolish/phase out retail price controls, in order to stimulate the production of quality produce.
- Implement a reliable inspection service for the use of grading standards, in certain markets.
- Implement a reliable inspection scheme for pesticide residues.
- Urge the adherence by produce transporters (RJ) to international perishable cargo handling procedures. Search ways for insuring perishables during transport, in order to lower the risks of poor out turn.
- Foster the exporters association and urge for membership by all exporters. Promote Jordanian produce through the association.

Concerning Production Issues:

- Encourage continued crop diversification to market-oriented types and varieties of tree fruit and vegetables, that are suitable for export.
- Encourage staggered production for prolonging the period of supply throughout the early mid and late seasons.

- Train farmers in the production of quality crops through appropriate cultivation methods, which include the rational (economic) use of water, fertilizer, integrated pest management and supplemental heating and cooling of green houses, as needed.
- Train farmers in the preservation of their horticultural environment.
- Create a knowledge base of yields and crop qualities obtained in heated vs. unheated houses during the winter.
- Experiment with other heating systems, including natural gas, solar and more.

Concerning Postharvest Handling

- Postharvest handling technology is the key to the delivery of good quality produce at distant markets, and to the avoidance of perishables losses. Trained postharvest workers are not a luxury, but a necessity of the perishables industry.

For this reason, train and retrain AMO extension and the private sector in the "why" and "how" of all postharvest handling procedures. This includes harvesting indices, harvesting methods, sorting, grading, postharvest chemical applications, packing, packaging, cooling, storage, transportation, standards for grades, inspection, markets, and more.

- Promote the vertical integration of the horticultural industry. Urge contract growing with well defined agreements of responsibilities. Vertical integration should be the goal for export as well as potential processing industries.
- Conduct observation tours which include participants of AMO, exporters and growers in a good balance. Include promising newcomers from the private sector.

Conduct trial shipments to explore new markets or to solve problems in existing markets. When exhibiting produce at international shows or in

trial shipments make sure they are available for purchase in satisfactory quantities.

- Demonstrate and use the mobile pre-cooling unit to the fullest, and urge private sector exporters to invest in additional pre-coolers, individually or as part of the association. Also use the unit as a promotional tool. Use the proposed cold storage room at the airport similarly. Work towards the "cold-chain" process in export marketing
- Urge the "duty-free" import of chassis on which to store the reefers marine transport at the Port of Aqaba. Storage on chassis also will benefit product out-turn at distant markets, and promote the Port of Aqaba.

Concerning Marketing Processes

- Conduct marketing surveys and marketing intelligence on a continuing basis. Monitor traditional and emerging markets as to new trends. Train new talent, as needed.
- Gather price information in traditional and potential markets and publicize it among the exporters and growers.
- Survey the quality of competitors, and urge domestic growers and exporters to match it.
- Promote Jordan realistically.
- Provide specific "how to" marketing guidelines for specific markets, to exporters, with brochures and videos.

II. INTRODUCTION

Scope of Work

In October 1993 the management of the Agricultural Marketing Development Project (AMDP) and the Agricultural Marketing Organization of Jordan (AMO) asked for my services as a short-term consultant. The scope of work of the assignment consisted of four parts: (1) the design and implementation of a series of trial shipments of produce from Jordan to Jakarta, Indonesia, (2) the monitoring of pre-cooler trials prior to the implementation of the trial shipments; (3) the sharing of ideas with the cold storage consultant regarding the building of a cold storage facility at the Queen Alia Airport; and (4) the design of further trial shipments to the Gulf, Eastern and Western Europe, as time permitted.

Trial Shipments

The purpose of these trial shipments was (and is) to demonstrate the existence of a market for fresh produce from Jordan in Indonesia, the feasibility of delivering a high quality product at competitive prices, and of opening up a new market for the Jordanian growers of fresh produce in Southeast Asia. Because of the perceived risk factors involved in delivering produce to this long-distance markets, some exporters had approached the Project with requests for assistance.

I agreed to design complete quality assurance and handling practices for the products shipped long-distance to Jakarta by sea or air. This meant to be working on every aspect of the shipments, including identification of potential products with the importer/exporters, determination of the risks for the project and the exporters, the technical assistance that each trial shipment requires, i.e., harvesting methods, field handling, long-distance market preparation practices, commodity specific sea and air transport requirements, and the testing of the market performance/acceptance of the Jordanian produce in Jakarta.

Monitor Pre-Cooler Trials

AMDP/AMO has a new, locally-manufactured, mobile pre-cooling unit built into a 40 ft (12 M) insulated truck container on chassis. The design of the unit and its performance as a pre-cooler have yet to be tested. I agreed to

1

Participate in the Activities of the Cold Storage Consultant

The idea of installing a cold storage facility at the airport, was conceived during the first phase of the project. It is needed to avoid fresh produce deterioration prior to departure on aircraft to the export markets in Europe, especially when delays occur. The plans for this cold storage unit have not yet been finalized. There was a real need to revisit the idea, and to bring all interested parties together for the quick and appropriate implementation of this needed facility.

As a former member of the Project team, my role was to assist the cold storage consultant in terms of sharing ideas.

Trial Shipments to the Gulf and Europe

Before the Gulf crisis Jordan was one of the major produce exporters to Saudi Arabia, Kuwait, UAE, Qatar and other Gulf states. Unfortunately as a consequence of the Gulf war, Jordan has lost a large share of this market. Exports to Kuwait have stopped, and those to other Gulf countries, particularly Saudi Arabia, are at a much slower pace.

In contrast, after the "Cold War Thaw" a number of East European countries, including Russia, Rumania, Bulgaria, the Ukraine, and others have opened their borders for trading. Since the end of the first Project phase, Jordan has become a regular produce exporter to these new markets. All of the shipments occur by overland truck (the feasibility of overland transport to Europe was first demonstrated by the project in 1990).

Along this line, my work was to evaluate whether any produce trial shipments are needed, or would be beneficial in increasing Jordanian produce exports to these countries, or to develop a competitive edge for Jordan in the East European Markets.

III. DISCUSSION

Trial Shipments

Designing and conducting a series of produce trial shipments by either sea or air from Jordan to Indonesia is a new concept for the AMD Project. Trial shipments are a very important step in the process of market exploration and are necessary if produce exports from Jordan to Southeast Asia are to become a successful reality. Even with one ready and willing buyer at hand, as is the case now, trial shipments will bring to light what kind of returns are possible in this market, whether there are needs for changes in packing and transport arrangements, quality control, or any other measures.

Despite our efforts, it was not possible during this consultancy to implement a trial shipment to Jakarta. Work should however continue, because Southeast Asian markets will continue to expand, and have the potential to be supplied by marine transport from the Port of Aqaba.

a. Pt. Serennita Mitra Abadi

I started to work with the Project on November 9, 1994. In accordance with the Scope of Work, my AMO counterparts and I immediately set out to initiate a trial shipment. In order to obtain some background of the task at hand, we established contacts with the major Jordanian produce exporters, the Indonesian fruit importer, Pt. Serennita Mitra Abadi, (whose representatives were in and out of Jordan and neighboring countries for product sourcing) the Asia Star Establishment, a Jordanian firm associated with the importer, the Eastern Services Freight Forwarding Co., Maersk and American President shipping lines, as well as with Jordanian growers.

Between October 9, 1993 and January 10, 1994, we had many meetings and discussions with major produce exporters, (names are attached in the Appendix) Mr. Salameh, General Manager of Pt. Serennita Mitra Abadi, (PSMA) Mr. Qtash, of Asia Star Est., and representatives of Eastern Freight Services Co. for the purpose of learning what fresh products the Jakarta firm wished to purchase from Jordanian growers, the quantities, desired quality for each product shipped, and the availability of the desired fresh products in Jordan.

We learned that PSMA is strictly a fruit importer, interested in the purchase of certain fruits, such as common varieties of red apples, early and late season grapes, stone fruit (cherries, peaches, nectarines) citrus, normally Navel and 'Valencia' oranges, and certain varieties of mandarins and clementines, that ship well, i.e., 'Fremont' and 'Murcott.' They said that they are not interested in importing vegetables, primarily because the Indonesian government does not routinely allow it.

Table I shows the produce shipping schedule of PSMA by sea to Jakarta via the Port of Aqaba from November 1993 through April 1994. The table indicates that only one sourcing from Jordan is included in their 6-month program. According to Mr. Salameh, the reason for this is that Jordan at present does neither have the desired quantities nor the required quality classes of fruit that PSMA is very much interested in. He indicated that their customers demand high quality fruit, uniform in size, firm, clean, free from physical injuries and diseases, and showing the colors that are characteristics of the variety. In addition, they demand good presentation and packaging. Card board boxes having excellent handling and stacking strength to allow stowing for long-distance transport are preferred over plastic or any other type of packaging materials. Mr. Salameh specified that they could buy fruit of Quality Classes #1 or #2, but that the classes must be packed separately and the grades clearly indicated on the package label. He said his company is looking for consistency in quality and quantity shipments, and that the produce market in Jakarta is at its peak between December and March.

Apparently, since May 1993, Mr. Salameh and his associates Messrs. Amad Saleh and Naief Qutash (of Asia Star Est.) have met the major produce exporters and fruit growers in Jordan, and discussed with them whether they could supply PSMA with several varieties of fruit that they need in quantities larger than 300-500 metric tons per season. They furthermore specified the quality grades they could accept. They said that they found no exporter in Jordan who was willing to commit himself for such shipments. According to the importer, PSMA only went to Lebanon after thoroughly exploring the Jordanian export situation. In Lebanon, Mr. Salameh indicated, they found exporters who were able to source the fruit the company needs throughout the season.

One reason for the inability of the importers to find an exporter who is willing to supply them throughout the season with the type, quantity and quality of fruit desired, is stated simply and clearly in the Project scope of work: "--- Because of a long reliance on the gulf market, many of the Jordanian producers and exporters are extremely hesitant about taking the risk of shipping to a new, relatively unknown market." While this reason could easily be eliminated through immediate Project assistance, a second and more serious constraint is that the Jordanian produce industry is still mostly growing the traditional fruit and vegetables without any significant diversification to the cash crops asked for in the more developed markets. They supply the local market and then export any surplus to their traditional partners in the Gulf. So far the Gulf has accepted the types of vegetables (currently 44% are tomatoes) and the quality Jordan offers. However, there are some signs in the Gulf that their consumers are becoming more demanding, with regard to both quality and product type.

In the course of our work, I introduced Mr. Qutash to Mr. Naser Shurabb, President, Shurrab Bros. Co. They have a complete citrus grading line in their packinghouse. Asia Star wants to ship 'Shamouti' oranges to Jakarta, somewhere around 300 metric tons, for the purpose of test-marketing. Mr. Shurrab offered small-size 'Shamoutis,' washed, sorted, graded, waxed and packed into cardboard boxes in Gaza, for a price of \$295 per metric ton, FOB Amman. Medium size 'Shamoutis' were offered for \$310 per metric ton. When asked whether he could supply 'Shamouti' oranges grown in Jordan, Mr. Shurrab said the price per metric ton for this variety is \$350 at the orchard gate, and after including all needed export handling procedures, the FOB Amman price would come to about \$450-500. This is because 'Shamouti' production in Jordan is very limited and prices in the local market are correspondingly high for this premium variety. A similar situation exists for all other export varieties of citrus, i.e., 'Washington Navel' oranges, and export mandarin/clementine varieties such as 'Satsuma,' 'Murcott,' or 'Fremont.'

According to the importer, his company pays \$250 per metric ton, FOB, in Lebanon for small 'Washington Navels,' that are sorted, graded, waxed, and boxed to their specifications. They also have been offered a price of \$250 per metric ton for 'Shamouti,' packed according to importer specifications, FOB delivery in Egypt. Because the production season is very short in Egypt,

interested in purchasing from countries where fruit harvests last over a longer period of time. They said that Jordan could/should be one of them. For March 1994, they have committed to import 100 forty-foot refrigerated marine containers (reefers) of 'Valencia' oranges from Gaza, via the Port of Aqaba.

Since November, PSMA and Asia Star have shipped late season grapes, cv. 'Halewani,' varieties of red apples, and 'Washington Navel' oranges in the amount of 4 - 8 refrigerated truck loads every week from Lebanon. The fruits are packed and loaded into the refrigerated trucks at their source, trucked overland to the Port of Aqaba and transferred into the reefers. Their long journey of 3.5 to 4 weeks to Jakarta is on board vessels of the Maersk Line. The cost of marine transport in refrigerated containers is very reasonable.

Maersk ships call at Aqaba once every 7-10 days to pick up loads for Southeast Asia. American President Line has similar schedules. Together with the importers, I observed the Port Terminal operation at Aqaba in terms of fruit quality upon arrival from Lebanon, the unloading of the fresh produce from the truck vans and their transfer into the reefers, and other related activities. There is certainly a lot of room for improvement as far as these marine export shipments are concerned. My trip report of December 12, 1993 is attached, but its Summary and Conclusions are repeated here: "--- The apples and grapes from Lebanon, observed by us on December 7, 1993, during transfer into marine containers, were of good horticultural quality. However, there were some postharvest management deficiencies, which for domestic or regional markets, might have only minor consequences. For the international trade and especially for long-distance transit by ocean carrier, these deficiencies are magnified and may become the cause of significant qualitative and quantitative losses. Postharvest problems observed were as follows:

Apples:	loss of firmness cuts, bruises, scars and mold-infected scars
Grapes:	damaged berries, not removed during packing cuts, crushed berries, acquired during handling some shatter, some loss of bloom some mold infection

Packages: good design, but not strong enough for long-distance sea transport

Handling at Aqaba Port : reefer units are state-of-the art, but there are no chassis or other supports at the reefer yard; reefers are stored unprotected on the heat radiating concrete floor; crew not trained in perishables handling, not careful, and causing needless damages to packages and their contents"

My suggestions for needed postharvest and transportation training are also attached to the report.

b. Other South East Asian Importers

Besides PSMA, other Southeast Asian Importers seem to be calling on the region. According to one Gulf States exporter, (Assad and Akram Abu Amer Co.) they had a request to ship 1,000 metric tons of apples and 4,000 of citrus to Malaysia by sea. Again, due to a lack of fresh products this request could not be fulfilled.

c. Conclusions

After meeting and discussion with the representatives of PSMA and its affiliated Jordanian company Asia Star Est. it became clear, that for a number of reasons, they came to Jordan first, to find a new and reliable source for supplying their produce wholesale business in Jakarta. Their firm is strictly a fruit importer. They are interested in purchasing specific fruits that are in high demand in their market. Vegetables are not now in demand, because the Government of Indonesia does not allow their importation.

The fruits they wish to buy are mainly temperate and subtropical fruit that ship and store well. Among these are grapes, apples, certain types of citrus and later in the year, early grapes, cherries, peaches and nectarines. These latter are however more highly perishable and will need air transport, pre-cooling, and cold-storage in case of any delay at Queen Alia airport.

They are interested in finding sources ready to supply the fruit in season continuously, in quantities from 300 to 3000 metric tons, and with specific quality attributes. It seems that good quality fruit, attractively presented,

and already known and established in the Jakarta market is in high demand, especially from December through March. Since last May, the firm's representatives have met most of the major produce exporters and growers in Jordan, searching for sources of the fruit that they want to import, and the exporters who can make commitments for such a sizable operation. Their efforts in Jordan so far were without positive results.

Lebanese exporters were able to source the fresh fruit they wanted to buy, and were ready to do business. My own past experience, and current review of the situation here in Jordan, supports the importers' findings. Jordan's most serious problem in promoting, maintaining, and expanding produce export markets is the lack of available produce during the winter months, be it fruit or vegetables. At this time the lack of produce is due to the reliance on the traditional markets, which until now have only been mildly market driven, and have accepted more or less what was provided by the Jordanian growers.

Export statistics from some of the regional countries indicate however, that their market-driven fruit and vegetable export industries reap much higher benefits. For example the Turkish Exporters Association reports that they have increased citrus exports by 10 - 15% every year since 1980. Besides lemons, their main exports consist of 'Washington Navel' and 'Shamouti' oranges, 'Satsuma,' 'Fremont, 'Robinson' (rapidly expanding because of its superiority) and 'Minneola' mandarins. Clementines are exported only to neighboring countries in the Middle East. None of the above mandarin varieties are grown on a commercial scale in Jordan. 'Washington Navel' and 'Shamouti' are also not grown on large acreages, even though the famous 'Shamouti,' which apparently is very demanding as to ecological conditions, was obtained from a natural mutation in Palestine.

Citrus production is considered among the largest tree fruit industries in Jordan. It dedicates 50% of its entire production to clementines, and 'Baladi' mandarins. These varieties are not suitable for long-term storage, or long-distance shipments. They have at the most 2 1/2 to 3 weeks of shelf-life after harvest under optimal storage and transit conditions. In addition the loose-skin 'Baladi' is extremely susceptible to injuries during harvest and handling.

Both apples and grapes can easily be shipped by sea, employing the proper postharvest handling know-how. Since, with the possible exception of early grapes, there is not enough production of these fruit to even satisfy the local market, diversifying production and developing the export market will take some time, even if there is the willingness to do so.

It must be noted that in recent years Jordanian growers have planted large areas with pome and stone fruits as well as early-season grapes both in the Jordan Valley and in the highlands. It is possible that the crops of these new plantations will exceed national demand and can find external markets, in and outside of the European Union.

Since the last week of November, the Jakarta importers have shipped 48 forty-foot marine reefer loads of grapes and apples from Lebanon to Indonesia. Since each reefer carries about 20 metric tons, this amounts to roughly 960 metric tons. For a small country such as Lebanon, the foreign exchange earned during about two months from only one importer is quite substantial. It is fairly safe to say that Southeast Asian markets will continue to expand, because of their still rapidly increasing populations and the fast expansion of their economies. Other importers will want to source the region for temperate and subtropical fruit that are not grown to any extent at home. Market research into this area, either by the newly formed Exporters Association, AMO, or other entities are needed and might be rewarding.

Regarding vegetables, several recent breakthroughs by the private sector, such as heated and novel, multi-span houses should be noted, and are described below.

In general however, off-season vegetable availability for export, is almost similar to that of fruit. I remember vividly when, in February 1990, we were not able to find even one-half truck load of export quality tomatoes for a trial test to Europe, despite a search in the entire Jordan Valley, including Ghor Safi. The following month we decided to use Capsicums as the main product for another overland trial shipment to Europe. We again faced a serious quality problem, because more than 50% of the peppers brought to the packing house for the shipment had to be rejected due to their lack of quality regarding EC market specifications. At the time we

growers to plant what is wanted in Europe. After the Gulf war (and at the end of the first phase of the Project) we were able to persuade at least one grower to dedicate some 600 dunums of land to green beans for export, which he sold in Europe and locally within a very short period of time.

While changing vegetable production is relatively easy, more work will be involved in planting new varieties of tree fruit and grapes. Modern methods of citrus propagation and standard export varieties are available in regional countries, and can be checked. Late grape varieties may be available locally, through the government nurseries in North Shuneh.

Finally the Exporters' Association needs encouragement, and must be urged to really work together for the mutual benefit of the entire export industry.

Pre-Cooler

Mr. D. Cayton, Cayton Associates, Mr. Osama Najdawi, AMO, and I examined the pre-cooling unit during the first few days of this consultancy. We found that the unit was designed and built according to the specification given to the Petra Engineering Industries Co. of Jordan. However, these specifications were not for a "pre-cooler" but rather for a powerful "room cooler." [Note (from Kader 1992): Room cooling is the stacking of products in a refrigerated room and to sweep cold air around the containers; it is a slow cooling method, where most of the cooling is by heat conduction to the container surface. Forced air cooling is very versatile, and provides for cold air movement through, rather than around the containers. It is rapid, because of the intimate contact between the cold air and the warm product.] The design engineers of Petra Engineering did not have prior experience with the specifics that are the essence of rapid pre-cooling. They never had seen or even heard of a pre-cooler for fresh produce before, and the specifications provided to them were incomplete in this respect.

Mr. Cayton, Mr. Jamil Zureigat, Project Director, Mr. Najdawi and I met with the design engineers of Petra Engineering to discuss the modifications needed to change the current system into a forced-air pre-cooler, operating within the specified temperature range with minimal or no additional cost to the Project. My correspondence to the Project, regarding the pre-cooling unit, is attached in the Appendix.

Petra Engineering has just completed the modifications we have asked for. On January 23, my counterparts Messrs. Atif Shunnaq, Iyman Salim and Jalal Hammad and I met with Mr. Farouq Natour of Petra Engineering Co. to examine and test the modified unit at the Petra plant in Muwaggar.

The unit has now an air tunnel, plenum, a curtain and a powerful centrifugal suction fan installed in the opening at the front of the air-tunnel. In addition, the cold air discharge chute has been modified in order to allow the cold air to enter into the container on the product side, rather than through the entire ceiling. There is also a removable wall at the end of the air-tunnel.

Because of the cold weather in Amman on January 23, the ambient air as well as product pulp temperatures were relatively low, varying between, 9.0 and 12.5 C and 8.5 to 10 C. respectively. Therefore, it was not possible on that day to test the performance of the modified unit. However, we demonstrated the arrangement of the (plastic) boxes of tomatoes, stacked four rows wide, and 12 boxes high along the air tunnel and observed the air discharge, air flow and suction through the openings of the boxes packed with produce. Petra Engineering will increase the suction capacity of the centrifugal fan, close a few discharge openings on the ceiling for better cold air discharge, distribution and make slight modifications on the curtain. This modified cooling unit can now function as a pre-cooler down to between 7 C in the desired period of time, if the vent holes on the stacked boxes are properly aligned or "registered."

It must be emphasized here that even with this modification the unit is not a typical forced air pre-cooler, due to the limited capacity of the refrigeration system. It will however perform well on those fruit and vegetables which require pre-cooling down to temperatures of about 7 C. This is adequate for many of Jordan's fruit and vegetables, which are chilling sensitive and are injured at temperatures below about 10-12 C.

Conclusions

With the present design modifications, the unit cannot be used as a pre-cooler for those products which require very low optimal storage temperatures, for example grapes or apples, which are usually cooled to 0-2 C before storage or refrigerated transport. The major design changes

described by Mr. Ralph Tator, Advanced Refrigeration Concepts, Inc. which was addressed to Mr. Richard Peters, on December 9, 1993.

The unit is a good step toward proper postharvest handling and marketing practices on perishables in Jordan and could go a long way towards maintaining product quality and reduce losses after harvest. It is hoped that this innovation will generate interest and increased inputs from the industry. Its use should be publicized among all exporters. Exports to the Gulf especially during the warmer months could greatly benefit from pre-cooling produce before refrigerated transport.

Cold Storage at Queen Alia Airport

I participated in the activities of Mr. D. Cayton, on a "as needed" basis. As a former member of the Project team my participation was along the line of supporting the concept and assisting Mr. Cayton to develop a more complete picture of the perishables handling and operation practices for the EU markets in Jordan, at the packinghouses, during shipment to the airport, and at the airport cargo facility. Hopefully, this might help him in proposing and designing the most appropriate cold storage facility for operation within the cargo-handling system.

Conclusions

Upon completion, the cold storage room at the cargo handling area of the airport will be another important link in the marketing chain for the delivery of good quality products at foreign destination markets. It will also serve as a marketing tool, creating a positive attitude towards Jordan's produce export activities. In Jordan, it will positively affect the development of proper handling practices from harvest to air-craft expedition, and it should help in maintaining product quality, cut losses and reduce claims.

Trial Shipment to the Gulf, Eastern and Western Europe.

While I devoted much of my time to set up a series of trial shipments to Southeast Asia, I was also able to look into whether there is a need for produce trial shipments to the Gulf and to Europe.

a. Gulf States

As in the past, fresh fruit and vegetables are being shipped in refrigerated
to the Gulf States and to Europe. Climate conditions

United Arab Emirates, Saudi Arabia, Qatar, Bahrain and Oman. The number of truck loads or the volume that is shipped presently is less than before the Gulf conflict, but is again showing an upward trend. There are no major complaints of poor out-turn at the destination markets. For this reason, I believe that a produce trial shipment to the Gulf at this time may not provide any additional shipping or marketing information other than that generated in the trial shipment of the Ilker and Haddadin report of August 1989. I believe however that the Gulf markets should be visited, in order to observe any new trends or new competitors. I also think that pre-cooling the produce during the Spring and Summer months would be beneficial, since the refrigeration systems of the trucks are only built to maintain produce temperature after cooling, and not to initially pre-cool the produce.

b. Eastern Europe

Produce shipments overland, by refrigerated trucks, to such East European countries as Rumania, Bulgaria, the Ukraine or Russia represent new endeavors for Jordan. According to the AMO Studies Division, Jordan's produce export to these newly gained markets has increased by 224% since 1991. Table II lists the exporters involved and the quantities of fresh produce that each firm has shipped to East European countries during the month of December, 1993. Since the produce quality and packaging requirements are not as strict as in Western Europe, the exporters either load the trucks with fruit and vegetables in the field or in their packinghouses, or directly at the wholesale market, with minimal or no grading. The packages used are similar to those for produce exports to the Gulf. They consist mainly of the ubiquitous polystyrene boxes. The total transit time for overland shipment to these countries is from 7 to 11 days. The commodities exported are lemons, clementines, oranges, tomatoes, cucumbers and Capsicums. Loads are either mixed or single product.

According to my discussions with the exporters, their importers are not asking them to prepare each product according to the quality and packaging standards that are the norm in Western Europe. It appears then that Jordanian produce exporters are presently shipping fresh fruit and vegetables overland to the East European Countries successfully without major problems, because product quality, types of packages, presentation of the

Although, I believe that these emerging markets should be very carefully observed, it appears that this year at least, there is no serious problem that could be investigated and solved by a trial shipment. However, in my opinion, careful monitoring for any changes is warranted.

"Thoughts on the Vertical View from Production to Export in Jordan"

During the course of this consultancy, Mr. Richard Peters, Senior Technical Representative of Sigma One, and I, discussed the ongoing problem regarding the lack of export-quality produce from the Jordan Valley during the winter (his memo of December 2, 1993, and my reply are attached). It is true that quantities satisfying the local demands first and that of the Gulf States next are usually more than sufficient, even to the point that prices in these traditional markets are exceedingly depressed. However, supplying the EU with off-season produce grown mainly under plastic represents a real problem. One reason is that the night temperatures between December and March regularly fall below a threshold that these chilling sensitive crops can safely tolerate for normal growth. The result is that yields and crop quality are significantly reduced.

This problem has been with us since the beginning of the AMD Project, but Project staff had no ready solution because we effectively worked with Jordanian growers and exporters during only one Fall/Winter season. It is true that the Jordan Valley's location, 200-400 m below sea level represents a uniquely protected environment for the production of high value cash crops at relatively close distances from major markets. Nevertheless, the Jordan valley is not a frost-free environment and winter temperatures during the night are always quite cool. I believe that low temperature environments are one of the major constraints in increasing off-season vegetable exports to the EU.

To prove the point that low night temperatures, and large day/night temperature fluctuations are occurring at various locations in the Jordan valley, my AMO colleagues Messrs. Usama Najdawi and Abdallah Mosallin and I placed self recording Ryan thermometers into several plastic houses. Three locations at cooperating farms were chosen:

<u>Site</u>	<u>Farm Owner</u>	<u>Type of Plastic HousePlants</u>	
Al Mashara	Bashir Al Gazawi Farm	heated and unheated cucumbers regular height	
Kibed	Al Masri	low height	hot peppers
Al Karame	Al Masri	regular height	Bell peppers

In all three locations the recorders were installed on December 15, and removed on December 30, 1993.

The heating of the Al Gazawi houses started on December 21, 1993. The 20 plastic houses at this farm are the first heated houses under vegetable production in the Jordan Valley, installed by a forward looking farmer/entrepreneur. They are heated by diesel oil, and are currently under cucumber production. The seeds had been sown on November 19, and on the day of our first visit the plants were 27 days old; they appeared similar in all respects, i.e., plant height, leaf sizes, general development. Figures 1 to 2 show the temperatures recorded between December 15 and December 30. Temperatures below the chilling threshold amounted to 60-65 hours in the heated (all received before the onset of heating) and over 100 hours in the unheated houses. Plates A and B are photographs recorded on December 30. After only 9 days of supplemental heating at a rate of 4-6 hours each night, the plants in the heated houses were taller, more developed, and had numerous flowers and young fruit. The plants in the unheated house were significantly less developed, and had as yet very few flowers.

Figures 3 and 4 show the ambient air temperatures recorded in the unheated plastic houses located in the Kibed and Al Karame areas, between December 15 and December 30, 1993. It is interesting to note that the daily temperature drop below the 12.5 C chilling threshold was much more pronounced in the Kibed houses throughout the monitoring period. Kibed is about 15-20 km North of Al-Karame. The plastic houses in Kibed are a lower-height type, (about 2 m) whereas those at Al Karame were the standard (>3m) structures.

On January 18, 1994, a field trip to the Jordan Valley was arranged by the Project. AMO and Project staff, a group of farmers from the Mid Ghor and

Ghor Al Safi, and one representative from a plastic house manufacturing company participated. The groups visited the plastic houses in the two areas where temperatures had been recorded. At Al Mashare, the grower had started to heat the formerly unheated house on January 10. He said that when he saw the big difference in performance between the cucumbers in the heated vs. unheated houses, he was afraid of losing the plants in the unheated house because of their stunted growth. In spite of eight days of supplemental heat the plants still showed the stress conditions to which they were exposed before January 10. They were much shorter, their leaves were small, rough surfaced, and had few flowers and developing fruits. The plants under the supplemental heat regime since December 21, were two to three times taller, with well developed, smooth surfaced leaves; they had many flowers and fruit at different stages of development, and had already been harvested twice. At time of our visit, there were no harvestable cucumber yet in the previously unheated house. Plate B are photographs of these plants.

As we have noted, all plastic-house vegetables grown during the winter months are chilling sensitive, due to their origin in tropical and subtropical climates. They sustain chilling stresses when grown at temperatures below a certain threshold. These stresses are cumulative, depending both on time and temperature below threshold.

Irreversible injury can result if plants are weakened beyond their stress tolerances. The cucumber plants at Al Mashare clearly exhibit this principle. Before the onset of heating on December 21, all cucumbers had experienced below threshold temperatures, but responded positively to heat supplements, and injury was not apparent. However after an additional 3 weeks of cold exposure in the unheated house, the response to the onset of heating on January 10 was very slow, and the plants still appeared highly stressed on January 18.

The rule of thumb is that most chilling-sensitive plants can grow best, produce the most satisfactory yield and the highest quality produce when the ambient temperature in their environment remains constantly between about 15 and 35 C.

What we have shown with these temperature recordings is preliminary and superficial. First of all the current off-season is the warm to hot 1:30

years (Jordan Times, January 31, 1994) and is atypically mild with respect to temperatures. Second, as illustrated by the temperature recordings from the Masri plastic houses in Kibed and Al Karame, microclimates vary in the Jordan Valley, with temperatures fluctuating, but generally becoming warmer, going from North to South, due to the greater depression below sea level. Third, the heating of the houses does not necessarily have to be by diesel fuel, and other means of heating, such as propane, infrared radiant, and solar heating can be investigated. Regarding solar heating, Nelson (1985) writes that --"A greenhouse itself is a solar collector. Some of its collected heat is stored in the soil, plants, greenhouse frame, walks etc. The remaining heat can be excessive for plant growth and is therefore vented to the outside. The excess vented heat could just as well be directed to a rock bed for storage and subsequent use during a period of heating. Heat derived in this manner could provide up to half of the total heat requirement for greenhouses in the southern United States."

Fourth, Figures 1-4 clearly illustrate that temperatures above 35 C are also common in the plastic houses, but the actual temperatures reached can not be recorded with Ryan thermometers. For the best environmental growing conditions, this excessive heat has to be vented from the houses.

On the January 18 field trip, the group, by pure coincidence, visited the farm of Mr. Mazen Odeh. His plastic houses are also a novel type of operation, which is another "first" in the valley. The multi-span houses cover 1.5 - 2 dunum each, which is 3 or 4 times larger and almost twice as high as the standard single spans. For this reason, they contain a very large volume of air. The group observed that the tomatoes, cucumbers and pole beans displayed luxuriant growth and appeared exceptionally healthy. The cucumber fruit and green beans that were harvested from these houses satisfied the OECD standards for grades, and could be successfully exported to any market. The large air space in these multi-span houses allows for the gradual warming of the ambient air during the day, and the maintenance of a significantly warmer environment at night, well above the critical temperatures that cause the chilling stress. In addition, the relative humidity inside the houses can be regulated effectively by rolling on and off the sides of the plastic walls, which present screened openings to the outside. These

any supplemental heat. However, this fact needs verification, especially in view of this year's unusually mild winter.

Conclusions

When it comes to certain fruit and vegetables which may be termed "traditional," Jordan can be considered one of the major producers in the region. Jordanian farmers are well experienced in applying certain production techniques, such as drip irrigation, plastic culture (mulching, tunnels, plastic houses) or fertilization. They can produce large quantities of fruit and vegetables, particularly during the Spring and Summer months. During the winter months this picture changes. In spite of the precautionary steps taken, such as using plastic tunnels and houses to protect the plants from the cold, off-season production suffers significantly both in quantity and quality, just at the time when there is a peak need in Europe. The major problem is that the plants are constantly exposed to more or less severe low temperature stress, which depends on the particular microclimate of their environment. Generally more Southern locations in the valley are more favorable, simply because they are at lower elevations.

This temperature survey by my colleagues and myself is sketchy. However, it clearly indicates the direction that should be taken, and has already been taken by some innovative growers. The Project can assist in this area through further technology transfer and training. Jordan has to improve its current off-season vegetable production through innovation, and a search for optimizing the favorable conditions that it naturally enjoys.

Because of lack of time, this consultancy has not explored the serious pest management problems that exist and that must also be addressed, if Jordan is to become a strong competitor in developed international markets.

Finally, new 60-day Ryan temperature recorders have been purchased and are used by AMO staff to monitor the plastic houses under study.

Miscellaneous Consultancies

Several visits were made to private sector growers, well known to us since the first phase of the project. One visit was to a major flower grower, where together with my AMO counterparts, I evaluated *Gypsophylla* production under plastic in the Jordan Valley and in the highland area. My

thoughts comments and recommendations in regard to these *Gypsophylla* production problems are attached in the Appendix.

The Jordan Venture Projects Co., which was assisted by the Project during its first phase, regarding the development of export oriented asparagus production in Jordan, requested my assistance related to postharvest handling, i.e., the quick pre-cooling of harvested asparagus spears, which I provided.

Another private sector company, Salim O. Naber and Sons, Transport Co. recently has developed a large size date plantation in Wadi Rum. This is also a new agribusiness operation. Through Mr. Peters, I met with Mr. Salim Naber, President, and provided him with some ideas on what other high-value produce could be grown as inter crops in his plantation. I suggested seedless grapes, or Galia melons, both of which are in high demand in the European markets.

AMO's newly established Fruit and Vegetable Processing Department and the Studies Division asked me during the last days of this consultancy on how to expand the processing industry in Jordan. I suggested that the first thing to do was to become fully acquainted with the present processing operations in Jordan, the type of products both frozen and non-frozen that are being produced, and to conduct a market feasibility analysis of local needs and potential exports.

In addition, I suggested that it is also crucial to establish the availability of the types of raw products i.e., fruit and vegetables, that are available locally and are of reasonable cost, in order to support diversified processing over a considerable timespan during the year.

Literature Cited

Kader, A.A. Postharvest Technology of Horticultural Crops, University of California, Division of Agriculture and Natural Resources, 1992, Publication 3311.

Nelson, P.V. Greenhouse Operation and Management, third edition. Reston Publishing Company, Inc. Reston Virginia, 1985 ISBN 0-8359-2583-8.

25

IV. 1 SCOPE OF WORK



AGRICULTURAL MARKETING DEVELOPMENT PROJECT

AGRICULTURAL MARKETING ORGANIZATION

مؤسسة تنمية التسويق الزراعي
مشرقية عمان

SOW.002

October 31, 1993

FROM: Jamil Zureigat, Director, AMDP *J. Zureigat*

RE: Scope of Work (SOW) for a series of trial shipments to Indonesia

TO: Munther Azar, USAID Project Officer

I. INTRODUCTION

Recently, an Indonesian firm (Pt. Serennita Mitra Abadi) owned by two brothers (One brother is Khalid Salameh), has stirred interest in Jordan for exports of fruit, and possibly vegetables, to Indonesia. The market, they say, is virtually unlimited with regard to quantities that Jordan can or could export.

The firm representatives indicate that their biggest problem is obtaining quality product for shipment. Because of a long reliance on the Gulf market, many of the Jordanian producers and exporters are extremely hesitant about taking the risk of shipping to a new, relatively unknown market.

They indicated that they are willing to buy quality product delivered to Aqaba, but, so far, they have had few takers.

The firm has made trial shipments by air and by sea of citrus and grapes. They are also interested in shipping Syrian produce that could be selected and graded in one of Jordan's free zones.

AMDP has the capability to diminish the risk for entities that are interested in the possibility of shipping produce to Indonesia and other points in the Far East.

II. SCOPE OF WORK

AMDP and the proposed Agricultural Exporters Association will work in conjunction with the Indonesian Company and selected Jordanian companies to develop a series of trial shipments to Indonesia which will demonstrate the existence of the market and the feasibility of providing top quality produce from Jordan at competitive prices.

The trials will work with every aspect of the process from pre-harvest use of pesticides; harvest, sorting and selection; pre-cooling; atmosphere controlled shipping and final wholesale marketing.

The first step in the planning process will be the identification of technical assistance that the trials will require. The Indonesian company already has a wide capability, and that, coupled with Jordanian companies, may mean that sufficient technical

capability is already available without project assistance, but that decision should be made in the planning process.

The second step will be the clear determination of risk. How much risk should AMDP undertake, and how much risk should the commercial participants undertake? Once that is decided, the project will provide the guarantee to cover that portion of the risk it will assume, but care must be taken to carefully audit the process so that participating companies do not experience a windfall profit at the expense of the project.

Once started, the trial shipments should continue for an agreed upon number of air and sea shipment over an agreed amount of time.

III. CONCLUSIONS

A series of trial shipments to the Far East are clearly justified because of the tremendous potential market, and the unknown risks involved in such shipments. Once agreed the AMDP will require a full-time manager who can devote the needed hours to work hand in hand with private sector entities and individuals.

IV. SCOPE OF WORK FOR DESIGN AND QUALITY CONTROL

An individual is required as soon as possible to design a complete system for assurance of quality of the product shipped either by sea or by air to the South East Asian Market. Activities undertaken by the consultant will include the following (suggested starting date November 1 continuing to approximately January 31, 1994):

1. Final design of the trial shipment concept.
 - a. Identification of domestic or international expertise required with scopes of work;
 - b. Parameters of risk undertaken by the project will be restricted to quality upon arrival at destination (risk will not include marketing);
 - c. Incorporate all technical components of shipping, including packaging to ensure quality;
 - d. Fully describe the above process.
2. Monitor pre-cooler trials prior to implementation of trial shipment;
3. Participate with the cold storage consultant in terms of sharing ideas;
4. Design further trial shipments for the Gulf, Eastern Europe, Russia, Western Europe, etc. as time permits.

IV.2 TABLES 1 & 2
 FIGURES 1, 2, 3, 4
 PLATES A, B

TABLE 1: SERENNITA MITRAS' FRUIT IMPORTING PROGRAM
FROM THE MIDDLE EAST TO JAKARTA, INDONESIA
BETWEEN NOVEMBER, 1993 AND APRIL, 1994

SHIPPING DATE	FRUITS	/	COUNTRY OF ORIGIN
NOVEMBER	-	APPLES	- LEBANON
	-	APPLES	- FRANCE
	-	ORANGES	- URUGUAY
	-	LEMONS	- TURKEY
	-	POMEGRANATES	- SYRIA
DECEMBER	-	GRAPES	- LEBANON
	-	APPLES	- LEBANON
	-	ORANGES	- LEBANON
	-	MANDARINS	- LEBANON
JANUARY	-	APPLES	- LEBANON
	-	GRAPES	- LEBANON
	-	MANDARINS	- LEBANON
	-	ORANGES	- LEBANON
	-	APPLES	- TURKEY
	-	ORANGES	- GAZA
FEBRUARY	-	MANDARIN (CV. MURCOTT)	- SOURCE NOT IDENTIFIED
	-	GRAPES	- LEBANON
	-	ORANGES	- LEBANON
	-	APPLES	- TURKEY
	-	ORANGES	- TURKEY
	-	CLEMENTINES (CV. FREMONT)	- TURKEY
	-	MANDARINS	- TURKEY
MARCH	-	ORANGES	- GAZA
	-	ORANGES	- LEBANON
	-	APPLES	- TURKEY
	-	MANDARINS	- TURKEY
	-	GRAPES	- AUSTRALIA
APRIL	-	ORANGES	- GAZA
	-	GRAPES	- AUSTRALIA
	-	STONE FRUITS	- JORDAN
	-	GRAPES (CV. THOMPSON SEEDLESS)	- SOURCE NOT IDENTIFIED

TABLE 2:

PRODUCE EXPORT SHIPMENT TO EASTERN EUROPE
COUNTRIES FROM JORDAN IN DECEMBER, 1993

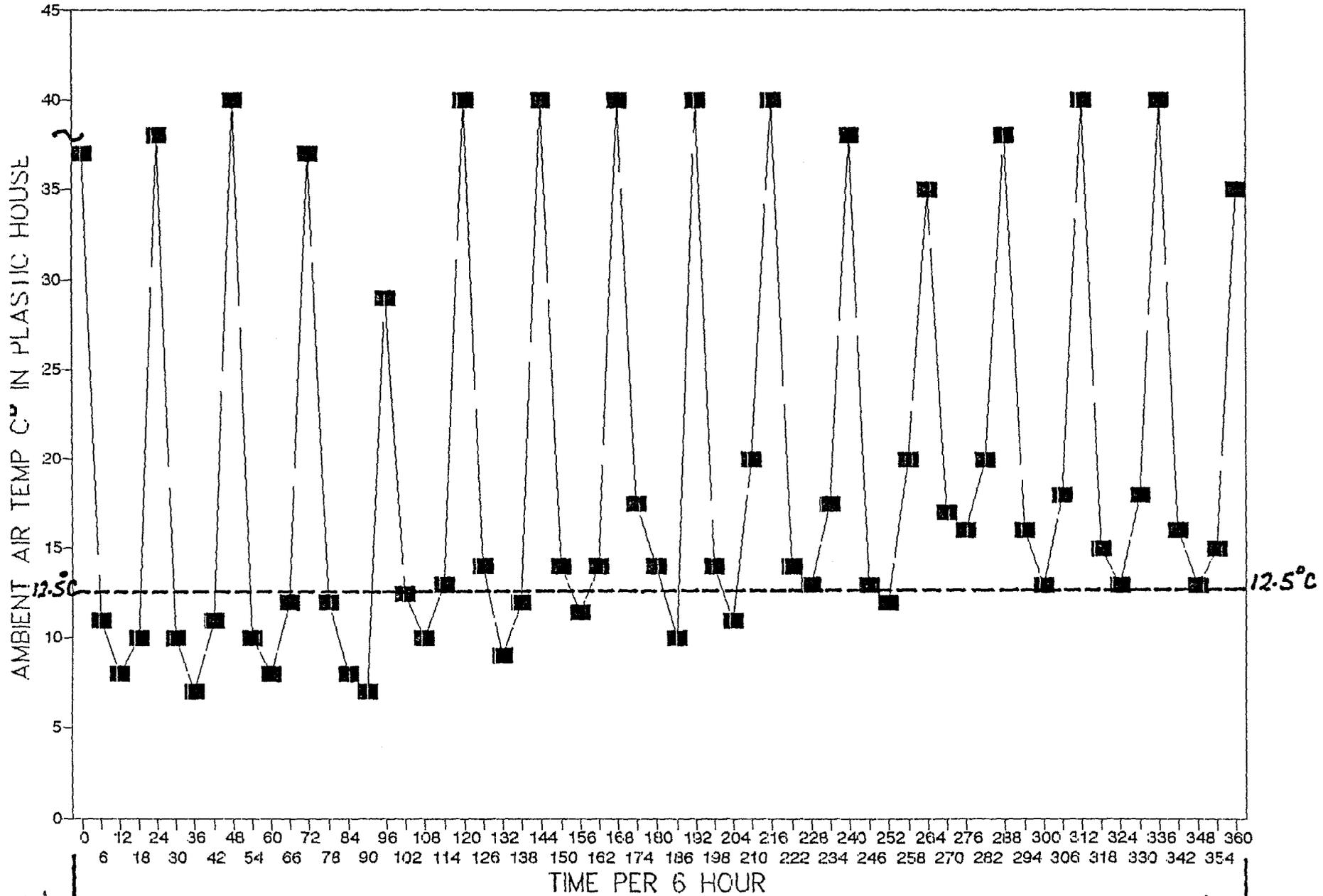
JORDANIAN EXPORT COMPANIES	QUANTITY EXPORTED IN M/TONS	DESTINATION MARKETS
Humam Al-Shawa	18.0	Romania
Humam Al-Shawa	14.0	Bulgaria
Humam Al-Shawa	74.0	Ukraine
Salman Abed Al-Mawla	36.0	Ukraine
Isamil Al-Fakih	66.0	Ukraine
Ibrahim Arabiat	17.0	Ukraine
Osama Abu Dalw	16.0	Russia
Jordanian Chem. Company	34.0	Bulgaria
Khadisia Establishment	15.0	Romania
Mustafa Wishah	36.0	Russia
Ragab Badwan	51.0	Romania
Basam Ahmad Khaid	34.0	Ukraine
Al Nukhba Land Est.	14.0	Bulgaria
Mohammad J. Khashan	29.0	Romania
Waleed Al-Dalky	16.5	Ukraine
Doug mush Bros. Co.	31.66	Russia
TOTAL	488.16	

=====

BROKEN LINE (12.5°C) REPRESENTS THE THRESHOLD BELOW WHICH STRESS OR CHILLING INJURY OCCURS IN CHILLING SENSITIVE PLANTS

FIG. 1.

BASHIR AL GAZZAWI FARM, AL-MASHARE
HEATED PLASTIC HOUSE-CUCUMBER



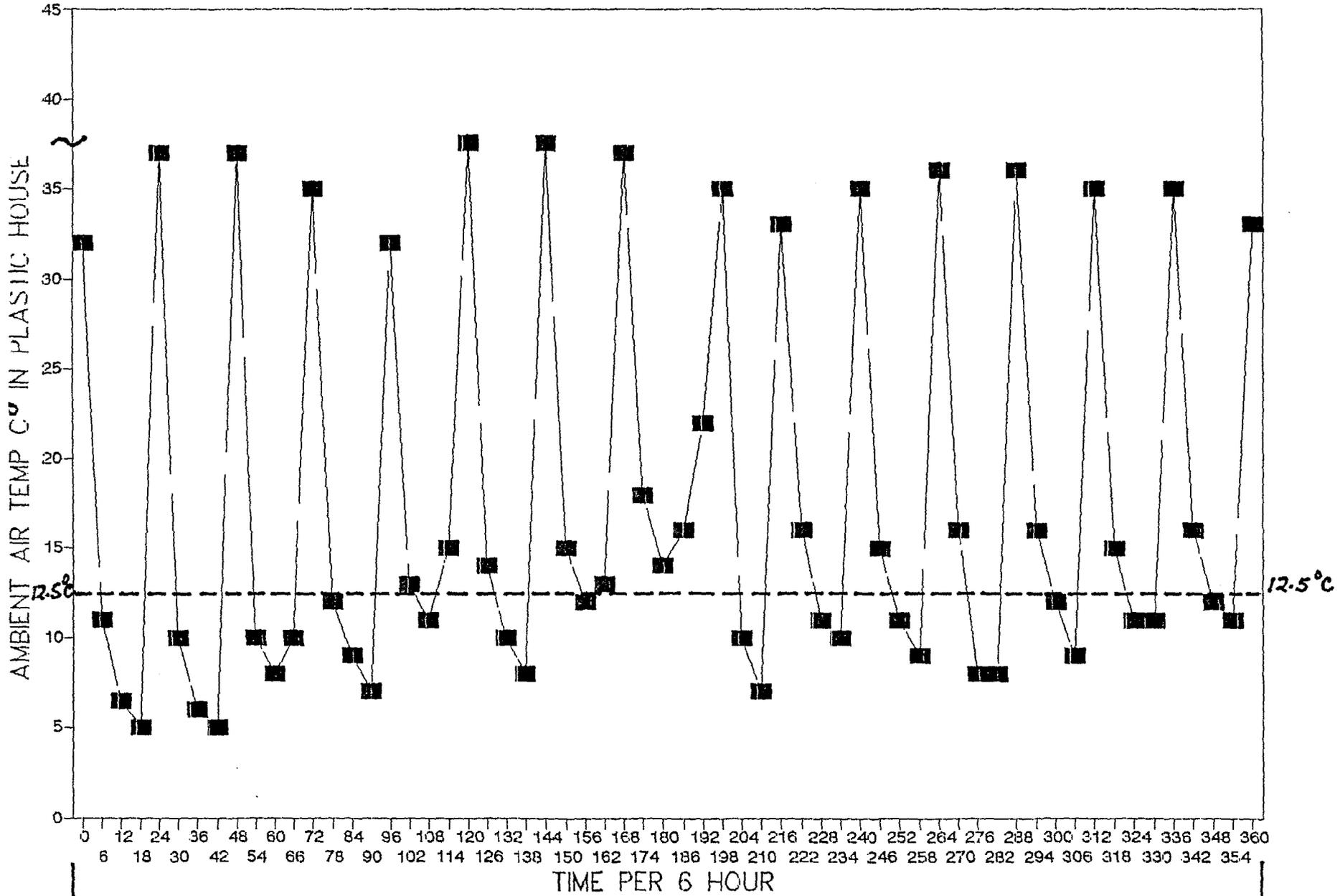
15/12/93

30/12/93

FIG. 2.

BASHIR AL GAZZAWI FARM, AL-MASHARE
UNHEATED PLASTIC HOUSE-CUCUMBER

BROKEN LINE (12.5°C) REPRESENTS
THE THRESHOLD BELOW WHICH
STRESS OR CHILLING INJURY
OCCURS IN CHILLING SENSITIVE PLANTS



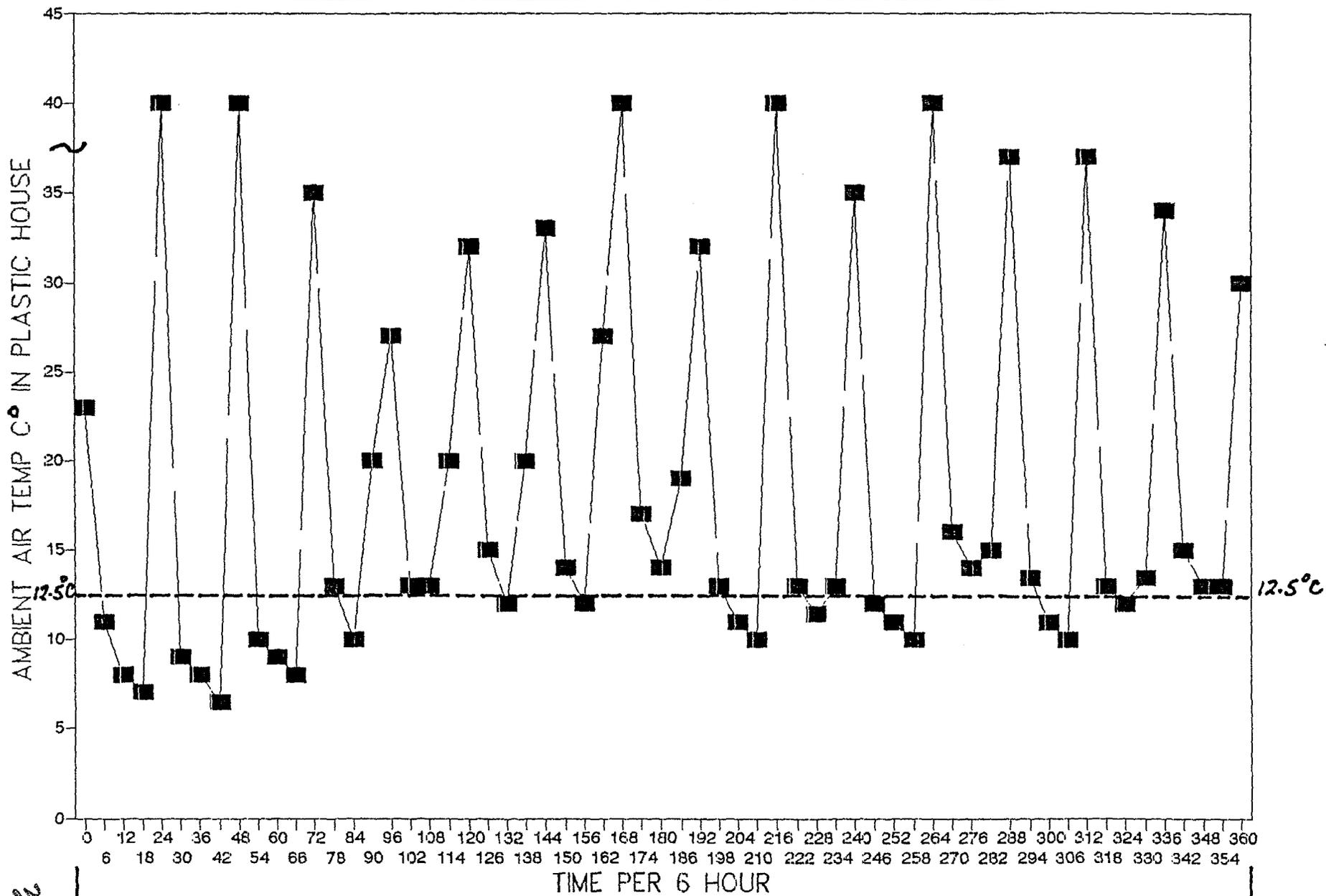
15/12/93

30/12/93

FIG. 3.

SAID MASRI FARM 1-KIBED, MID-GHOR
UNHEATED LOW-HEIGHT PLAST. HOUSE-PEPPER

BROKEN LINE (12.5°C) REPRESENTS
THE THRESHOLD BELOW WHICH
STRESS OR CHILLING INJURY
OCCURS IN CHILLING SENSITIVE PLANTS



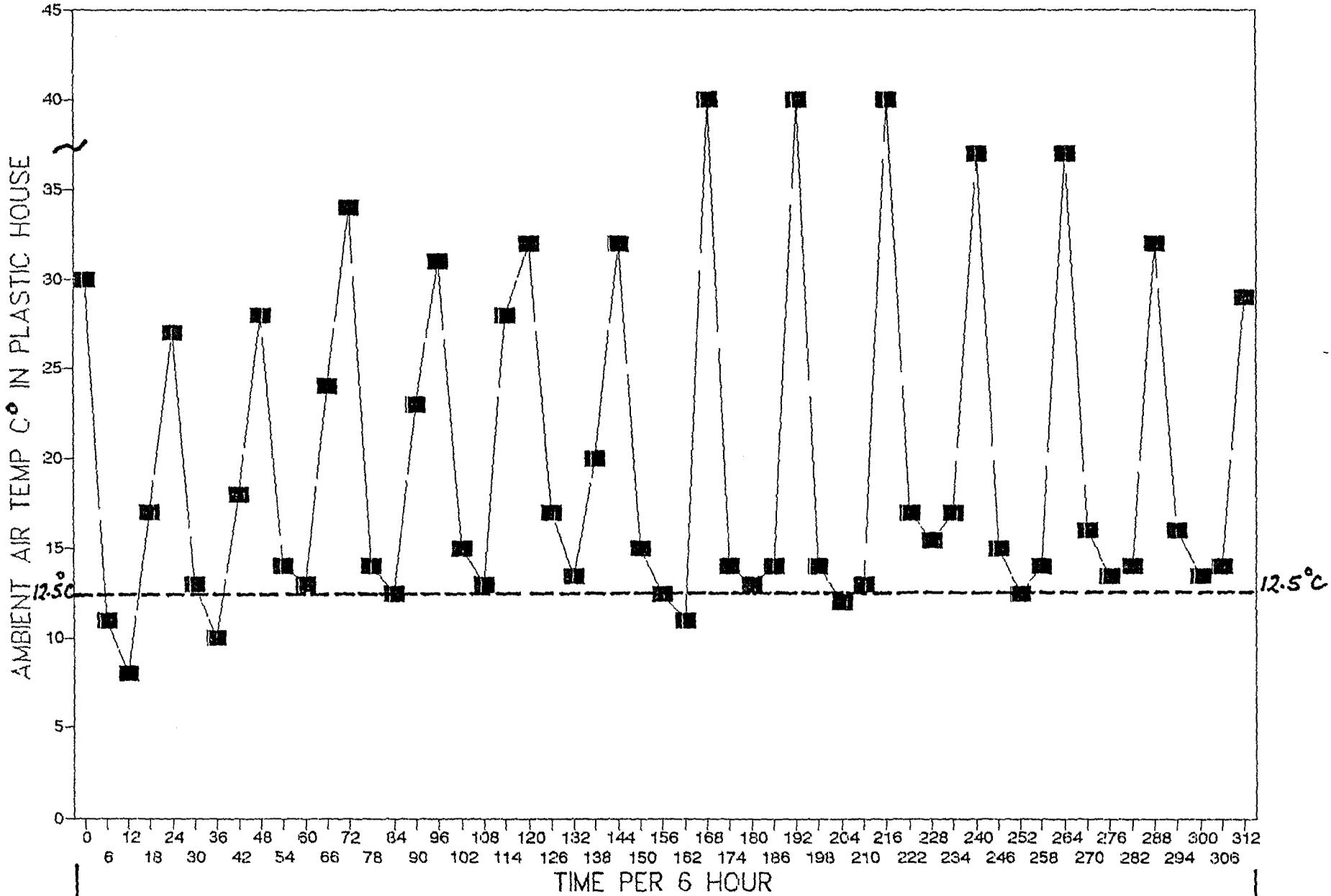
15/12/93

30/12/93

FIG. 4.

SAID MASRI FARM 2-AL-KARAME
UNHEATED PLASTIC HOUSE- CAPSI CUM

BROKEN LINE (12.5°C) REPRESENTS
THE THRESHOLD BELOW WHICH
STRESS OR CHILLING INJURY
OCCURS IN CHILLING SENSITIVE PLANTS



50
17/12/93

30/12/93

PLATE A: CUCUMBER PLANTS DISPLAYING
GOOD GROWTH AND DEVELOPMENT
WITH SUPPLEMENTAL HEATING
DURING WINTER IN THE JORDAN
VALLEY.

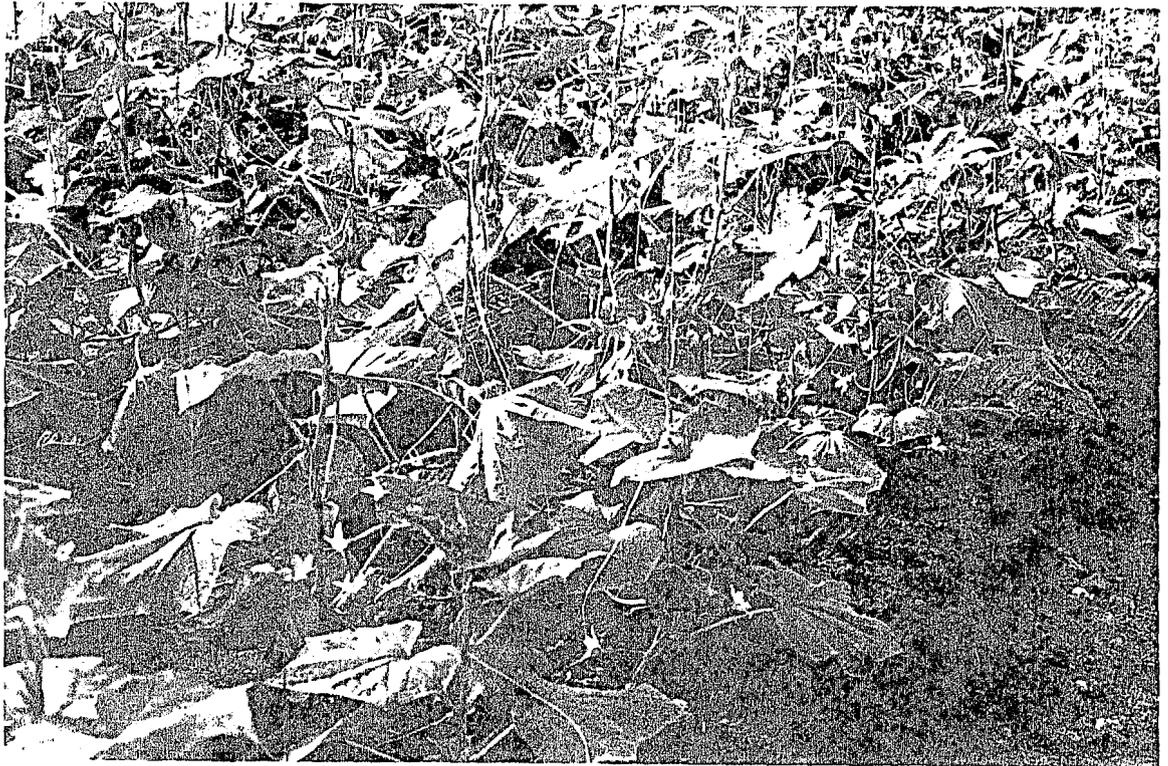
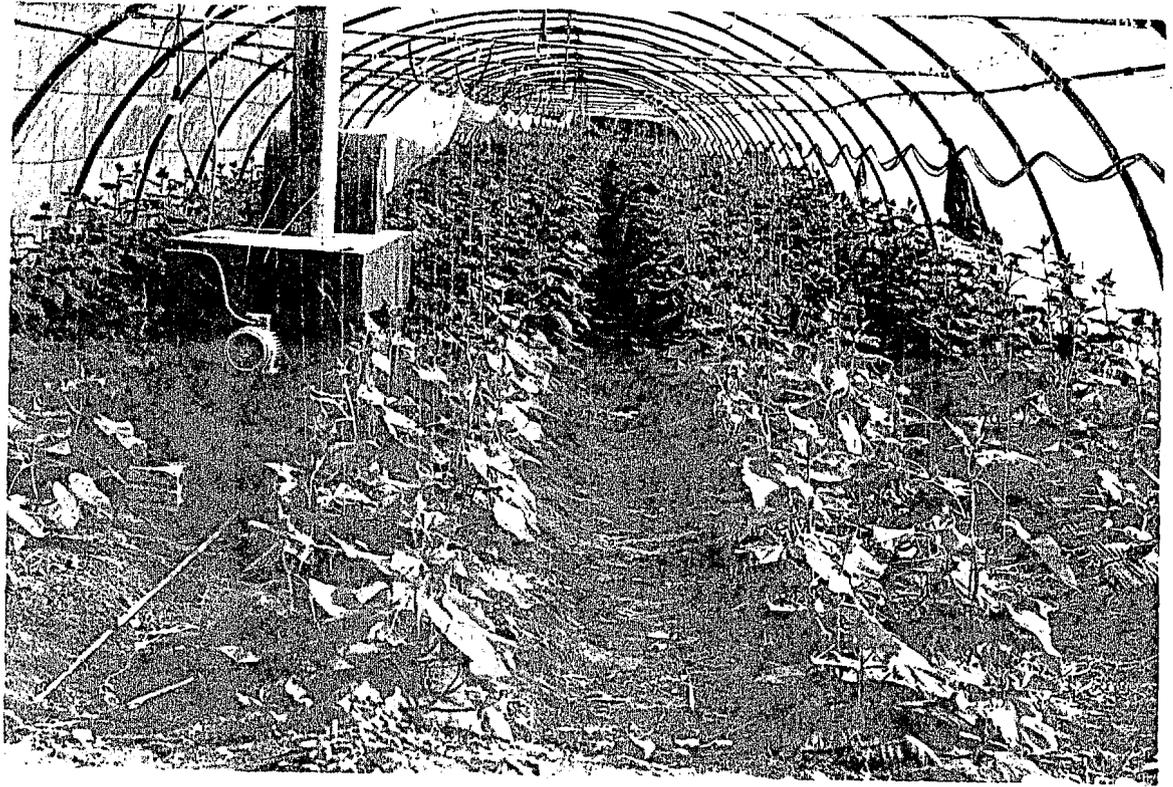


PLATE B: CUCUMBER PLANTS DISPLAYING
SLOW GROWTH AND DEVELOPMENT
WITHOUT SUPPLEMENTAL HEATING
DURING WINTER IN THE JORDAN
VALLEY.



IV.3

TRIP REPORTS

To: Mr. Richard Peters, Senior Technical Representative, Sigma One Corp.

From: Yilmaz Ilker, Consultant 

Re: Heating Plastic Houses during the Winter Month/Comments:
Fax of Mr. Mazen M. Kalbouneh, Managing Director, Farah Agr. Ind. Est.

Date: January 10, 1993

Most off-season vegetables, including cucumber, capsicums, chillies, eggplants, green beans and tomatoes, which are currently grown in plastic houses during the winter in the Jordan Valley, belong to low-temperature (chilling) sensitive plant species.

Chilling sensitive vegetables produce the best yields and the highest quality crops when the ambient air temperatures during the growing season remains between 15 and 32C. If temperatures inside the plastic houses drop below the critical temperature of 12.5 C for a number of times, then these plants will become stressed and sometimes will develop chilling injury, depending on the duration of the exposure and the degrees C below 12.5 C. In the Jordan Valley, ambient air temperatures during December, January, February and even March, repeatedly drop to 8-5 C (and lower) during the night, and particularly the early morning hours. Chilling stress is termed a "time-temperature" related syndrome, and its effects are cumulative. As a result, both crop quality and yield are reduced, depending on the amount of stress experienced. This is what actually is happening to vegetable plants during the winter in the Jordan valley.

Plastic houses of lower height, indeed, heat faster during the day than those that are higher. However, by the same token, it can be postulated that they also cool more quickly at night, because of the lesser air mass they hold. It also can be postulated that keeping these structures warm during the night by heating, is more economical, in view of their lesser air contents.



The ambient air temperature data obtained from one of Mr Said Masri's low-type houses indicate that during a two-week monitoring period, temperatures inside the house dropped 15 times below the threshold of 12.5 C. The data also show that the pepper plants grown in the house were exposed to about 90 hours of chilling stress during this short monitoring period (see attached graph; note that the space between each two dots represents 6 hours). In this context it is important to state that the current off-season is significantly milder than usual.

Regarding the cost-benefit relationship, only correct yield and price data can answer this question. Carefully collected data would be a great help in achieving this. The common sight of heated plastic houses (both low and normal height) in other regional countries seem to indicate that heating may be justified.

Diesel fuel has, of course, a freezing temperature well below 0 C. At 0 C or slightly below, all off-season vegetables receive chilling or freezing injury, which is extremely detrimental to all plants. Under such conditions, the plastic houses cannot provide sufficient protection to these plants, unless there is heating. As you know, the Jordan Valley is not an entirely frost-free environment during the winter.

It is safe to say that in order to obtain a continuous supply of high-quality off season vegetables, for both the domestic and export markets, the houses in which they are grown, should be heated. Heat supplementation can achieve a temperature-controlled environment above the chilling threshold. Together with sound cultivation practices, this may greatly enhance the effects of the favorable off-season climate with which Jordan and the Jordan Valley are blessed.



AGRICULTURAL MARKETING DEVELOPMENT PROJECT

AGRICULTURAL MARKETING ORGANIZATION

مشروع تطوير التسويق الزراعي
مؤسسة لتسويق المنتجات الزراعية

To : Mr. Richard J. Peters,
Senior Technical Representative, JAMDP

From : Y. Ilker,
Postharvest and Marketing Consultant

Subject : JAMDP/AMO Pre-Cooling Unit

Date : November 20, 1993

Following up on our meeting of November 18, 1993, with Mr. Farouq Natour, Petra Engineering Co., Mr. Jamil Zureigat, Project Manager, AMO, and Mr. Ousama Najdawi, Postharvest Technology, AMO, I am attaching two publications on Forced-Air Cooler Systems, which might be useful in making the mobile pre-cooling unit more efficient.

The unit functions currently as a powerful container/room cooler, however, with minor design changes, it could be modified into a forced-air cooler, with the effect of more uniform and faster pre-cooling of the perishable commodities.

For reference, attachment 1, are Engineering Specifications and sketches for a small scale forced-air cooling system, designed to be built into an existing cold-room, dimensions 5 x 10 x 2.5 m. Please note that the palletized boxes with appropriate vent holes are positioned against a "Product Wall" and face each other across the air-return tunnel. There is an opening at the product wall, which allows for the air to return to the cooling system. The aisle and the open end are covered with a curtain to create an air-tunnel, in order to force the cold discharge air through the vent holes of the boxes.

Attachment 2, shows another typical forced-air cooling facility (Fig. 5) and also explains how the system functions and why it is needed.

cc: Mr. Jamil Zureigat, Project Manager, AMO
Mr. Marwan Haddadin, Head, Postharvest Dept., AMO
Mr. O. Najdawi, Postharvest Dept., AMO

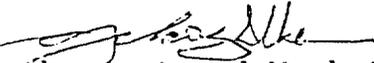


AGRICULTURAL MARKETING DEVELOPMENT PROJECT

AGRICULTURAL MARKETING ORGANIZATION

مشروع تطوير التسويق الزراعي
مؤسسة التسويق الزراعي - عمان - الأردن

TO : Mr. Richard J. Peters,
Senior Technical Representative,
Sigma One Corporation

FROM : Dr. Y. Ilker, 
Consultant Postharvest and Marketing

DATE : December 5, 1993

SUBJECT : Response to your Memo (DO2) regarding a Production
Component to AMDP

I fully agree with your "Thoughts on the Vertical View from Production to Export" of off-season vegetables from Jordan.

We discovered the lack of substantial volumes of winter-export crops of marketable quality early on during the first phase of the JAMD Project and discussed its seriousness with Project Management, the National Agricultural Development Project (NADP) staff at NCARTT, growers and exporters. At the time both USAID and AMO emphasized this to be NADP-related work. During the Project's first three years, unfortunately, AMDP advisors were able to work with Jordanian growers only during one winter (1989-90). Our first winter season (we started in December, 1988) during which heavy frost occurred in the Jordan Valley was a fact-finding experience, and our third winter coincided with the Gulf War, and our absence from the Project.

We are now at a new cross-roads and actions such as controlling the total production environment for off-season produce exports is of great importance. Virtually all Jordanian vegetables destined for the European markets are warm-season crops, with origin in the tropical or warm, subtropical regions of the world. They are highly sensitive to temperature stress below 10-12 Degree Centigrade, as well as to wide temperature fluctuations during growth and development but are amenable to very high yields when environmental growing conditions are ideal. While cold temperatures in the Jordan Valley, including Ghour Safi, differ from year to year, cold temperature inflicted stresses are a fact every winter, and avoiding them is a problem that should urgently be addressed.

Jordanian growers in general are aware that benefits, both in terms of better produce and higher yields, can be derived from heating plastic houses. They hesitate to assume risks in this respect, because of the absence of formal contract growing agreements between them and the exporters. Growing quality produce for the domestic market, on the other hand, is still without much incentive, because of price controls.

I suggest that both imaginative "trial production", and "trial contract", agreements be worked out between AMDP, growers and exporters. With no serious risks of their own, if farmers see that higher yields and better produce can offset their larger production expenses, they will adopt them.

At the same time, we must keep market demand in sharp focus. Environmental control should first be adopted for those commodities desired by the importing markets. In addition by controlling temperatures, all other factors must be carefully considered, for example, a warmer environment may accelerate pest-life cycles. These problems must be anticipated, discussed, and plans must be drawn up with utmost care.

For all produce going to Europe, EEC Standards for Grades and Maximum Residue Level (MRL) of pesticides remain the first priority.

A last thought on tunnels verses plastic houses. There are thermal blankets available for the tunnel type production, but normal size plastic houses, where most of the export vegetable production occurs, must be heated, during critical cold periods.



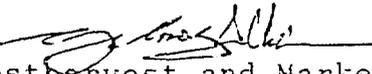
AGRICULTURAL MARKETING DEVELOPMENT PROJECT

AGRICULTURAL MARKETING ORGANIZATION

مشروع تطوير التسويق الزراعي
مؤسسة التسويق الزراعي - عمان - الأردن

File

TO : Richard J. Peters,
Senior Technical Representative
Sigma One Corporation

From : Yilmaz Ilker, 
Consultant Postharvest and Marketing

Date : 12th December, 1993

Subject : Trip Report - Visit to Port of Aqaba
Container Terminal, December 6/7, 1993

Purpose : (1) To observe the operation of produce transfer from the refrigerated truck vans into the refrigerated marine containers (reefers) intended for long-distance ocean shipment;

(2) To examine the overall operation in order to recommend improvement, if needed.

1. Transfer of Fruit from Truck Van into Reefers:

In connection with JAMDP's activity on trial sea shipments of perishables, and by request of the Asia Star Establishment, Amman, Jordan and Serennita Mita, fruit importing Company, Jakarta, Indonesia, I visited the Container Terminal at the Port of Aqaba.

Messrs. Amad Saleh, and Abu Mahmoud, representatives of Asia Star Est. came along on the trip. We were to observe the refrigerated truck loads of apples and grapes, grown, packed and dispatched from Lebanon enroute to Jakarta, via the Port of Aqaba. The highlights of the trip follow.

Upon arriving in Aqaba, we met Abu Naief, Asia Star Est. Together, we called on the Dolphin International Freight Forwarders, to make sure that the necessary documentation for the transfer of the produce into the reefers, and the export permits for the loads were complete. However, the office was closed for the day.

Later we found that all documentation was complete, and that the six refrigerated trucks loaded with Lebanese apples and grapes had arrived in Aqaba, and awaited the transfer of their loads early the next morning.

On Tuesday, December 7, early in the morning, Messrs. Amad Saleh, Abu Naief (Mr. Naief Qutash's father), and Abu Mahmoud

(Mr. Naief's uncle), went to the Aqaba Port Authority and obtained a permission to enter the container terminal yard for our observation. At the terminal, the trucks went through the scale, their weight was recorded before unloading. While they were waiting for the weighing, we checked the thermostat setting, and the temperature gauge reading of each trucks' refrigeration unit. Two trucks had thermostat settings of 0 Deg. Centigrade, two at 2.5 Deg. Centigrade, one at 3 Deg. Centigrade, and one at 4.5 Deg. Centigrade. Their temperature gauges read from 1.5 to 5 Deg. Centigrade. These different thermostat settings, and temperature readings, indicated that the thermostats of four of the trucks were out of calibration.

The unloading of the trucks was carried out simultaneously at two different locations. Two trucks at a time were backed up to the tail of two Maersk reefers for the transfer. A crew of nine worked on each pair of containers to unload the loosely-stacked boxes of apples and grapes from the truck vans, directly into the reefer containers, hand-stacking them in a block-stowed pattern from the front to the tail.

Three of the trucks carried 2000 boxes of "Red Delicious" apples, and the other three 5,600 boxes of grapes, CV "Halevani". Both apples and grapes were packed in telescopic cardboard boxes. The apples were of medium size and were placed into cell trays in the boxes. The gross weight of the boxes was 20 kg, net weight of apples/box was 18 kg. The grapes, attractive, reddish in color, and large-berried, were packed two layers deep into boxes lined with a thin polyethylene film. The bottom and the top of the pack contained SO₂ (sulphur dioxide) generating pads. The gross weight of each box was 10 kg, and contained 9 kg of grapes.

The apples, were stowed into the two 40-ft. reefers. However, after the two 40 ft. reefers were completely filled with boxes of grapes, another 690 boxes remained unloaded. These were stowed into a 20 ft. reefer, after loading of which, close to 50% void/unutilized cargo space remained. The transfer of the loads from the trucks to the reefers was accomplished within about four hours.

Observations:

a. Transit time from Lebanon

It took four days for the trucks to reach Aqaba after dispatch from Lebanon. Obviously, the distance between anywhere in Lebanon and Aqaba is not large. The main problem is the border crossing in Syria, which can take between one and two days. As in the past, we recommend that perishable shipments be given priority treatment by governments. Ultimately, such treatment is for the benefit of everyone involved.

b. Load Transfer

The loads were transferred by a crew who were poorly organized and poorly trained, both working individually or as a team. Dropping of boxes of fruits from considerable heights onto the container floor or onto other boxes in the stack, pulling and shoving them roughly during unloading and reloading operation was the norm. They need to be trained urgently, in order to handle produce loads properly during transfer. Physical injuries, which can easily be inflicted on these perishable products, must be avoided, in view of the long-distance the produce must travel before final marketing. Even less highly perishable fruit and vegetables can not withstand a 3-4 weeks transit time in good condition, if physically injured at the outset.

c. Calculating Reefer Space

As indicated before, after loading four 40 ft. reefers, two with apples, and two with grapes, 690 boxes of grapes remained unloaded. Eventhough these boxes could be stowed in a 20 ft. reefer container for this shipment, it resulted in extra freight costs, since close to half of the container cargo space remained empty. To avoid this kind of problem, the shipper must communicate with the shipping line agency ahead of time and indicate the number of boxes of produce and the size of the boxes that he intends to use for his shipment. This allows the agency to set aside the exact number and size of reefer containers to carry his shipment, not more and not less. Knowing the inner cargo space dimensions of the reefer, and the size of the shipping boxes, the shipper can easily calculate how many reefers are needed. This type of information is also readily available from the shipping lines and their agencies. Customers should request them for their own use.

d. Packaging

Telescopic (two pieces - lid and base) cardboard boxes were used for both apples and grapes. They were of good design. However, the cardboard used (more so with the grape boxes) was lacking somewhat in stacking and handling strength, especially in consideration of long-distance shipment. Also, the boxes were not treated with water repellent. as a result of rough handling during transfer, some boxes were already damaged.

Since the relative humidity in reefers is between 75% and 95% depending on the produce stowed and the climate during transit, the cardboard boxes for long-distance shipments of perishables, should be constructed from

heavy cardboard material, providing good handling and stacking strength, and furthermore, should be treated with a water repellent for additional strength. The function of packaging is to ensure that the perishable commodities are protected from any external impacts. For this reason, long-distance marine shipment requires stronger packages than are needed for shipment to most other markets.

e. Condition of Fruits After Transit from Lebanon

APPLES:

The apples were medium-sized with good red colored fruits. They were nicely packed on cell trays and were clean. However, examining a number of boxes revealed that the majority were already slightly soft to the touch, with some loss in crunchiness. This is an indication that these apples had been exposed to poor temperature management at the origin. An additional four weeks of transit will have a further negative effect on their already limited quality. Moreover, some apples had old physical injuries, i.e., cuts, nicks, and bruises, and an incipient stage of blue mold was already visible. In addition, bitter pit disorder could be seen on several fruits.

GRAPES:

The grapes were fresh looking, large-berried, and of an attractive reddish color. The large bunches were full, and the stems were green, and fresh. However, some bunches had lost their bloom and some berries had sustained cuts and other physical damage. In my opinion, this was the result of improper handling before and during packing. The boxes were slightly over-filled with bunches up to the top. Covering with the lid caused the berries to touch the lid. The boxes positioned on the lower parts of the stacks had some crushed berries on top. In addition, as a result of the rough handling during unloading and reloading, some of the berries had shattered from the bunches. An incipient stage decay, possibly blue mold had already started to grow on some of these physically injured berries. Proper packaging is a critical operation of postharvest handling. The package has to be designed for its function, which is to protect the commodity. It then has to be filled, packed and stowed with knowledge and care. Since marine shipments are new to the regions exporters, training appears to be urgently needed.

With regard to physical injuries sustained by the berries at the origin, they are the main entries for decay organisms. The presence of injured berries left on the bunches rather than removed carefully during packing,

indicates that there certainly is a lack of supervision and quality control at the origin. The same is also true for the apples.

f. Terminal Yard Operation

There are two small reefer yards at the container terminal. It is surprising that the reefer containers are sitting directly on the concrete floor at the yard, rather than on chasis or at least on some blocks, raised to some height away from the concrete. In general, marine containers do not have thick insulation at their bottom, and if directly placed on the floor, particularly in hot places like Aqaba, the heat leakage through the floor into the container is considerable. as a result, the refrigeration unit may operate in full cool-defrost-full cool mode most of the time. This causes continuous loss of water from the produce causing desiccation and loss of overall product quality. for this particular shipment these reefers will sit at the concrete yard until December 15, for feeder vessel pick up en route to their additional 3 to 3.5 weeks long transit to Jakarta.

While at the reefer yard, I discussed this problem and its effect on product quality with the representatives of Dolphin International. They understood the problem. I will also discuss the situation with the Amin Kawar Shipping Agency which represents Maersk Line. At the time, we were not able to locate any one in charge at the terminal yard. We will however, discuss the problem and suggest improvements.

SUMMARY AND CONCLUSIONS

The apples and grapes from Lebanon, observed by us on Dec. 7, 1993 during transfer into marine containers, were of good horticultural quality. However, there were some postharvest management deficiencies, which, for domestic or regional markets, might have only minor consequences. For the international trade and especially for long-distance transit by ocean carrier, these deficiencies are magnified and may become the cause of significant qualitative and quantitative losses. Postharvest problems observed were as follows:

- APPLES : - Loss of firmness
- Cuts, bruises, scars and mold infected scars
- GRAPES : - Damaged berries not removed during packing
- Cuts, crushed berries, acquired during handling
- Some shatter, some loss of bloom
- Some mold infection
- Over filling

PACKAGES : - Eventhough of good design
 - Not strong enough for long sea-transport
 - Not treated with water repellent, necessary for
 long-distant sea transport

HANDLING AT AQABA PORT FACILITY: Eventhough reefer units are
 state-of-the-art-type;

- No chasis or other support at the reefer yard
reefers are stored directly on heat radiating
concrete floor.
- Crew not trained in perishables handling, and not
careful, cause damage to packages and their
contents.

The sooner these problems are alleviated the better, if Jordan is
to embark on successful regional perishable sourcing, and
international trading via marine transport.

I suggest the following:

1. Training of shippers / exporters in a regional meeting i.e.,
AFMANENA?
2. Requesting governments to allow trucks loaded with perishables
to cross the borders on a priority basis. Determining in
advance the time needed for crossing, by communicating with
customs at the borders. Ideally, trucks should arrive in
Aqaba just hours before the feeder vessel sails.
3. Train crew for the proper unloading and loading practices in
Aqaba. In addition, provide good supervision when crew are
working.
4. Discuss reefer yard problems with responsible groups /
authority and assist in improvement.
5. Encourage shippers and agency carrier personnel to communicate
effectively in order for timely shipments without any delays.

NOTE: Unfortunately this report is not supported by a
photographic record, because permission to take picture
was withdrawn, after quite a bit misunderstanding.

To: Richard J. Peters, Senior Technical Representative,
Sigma One Corp.

From: Y. Ilker, Consultant Postharvest and Marketing Expert 

Date: 12/21/93

Subject: **Trip Report: Visit to Sukhtian Co. plastic houses in the Jordan Valley and Kastal, South of Amman, re. "Baby's Breath" production problems; December 20, 1993**

Purpose

To observe the production practices of *Gypsophila* (Baby's Breath) grown under plastic at two different locations, one in the Jordan Valley, the other in the highlands, and to diagnose, if possible, a severe "lodging" problem occurring in the plants now flowering under Jordan Valley conditions.

Introduction

By request of the Sukhtian Co., I accompanied Mr. Mahfuz Ahmad Judeh, Gnl. Manager, Tayyebah Agricultural Company (A subsidiary of Sukhtian Co.) on a trip to their farms in the Jordan Valley, and in Kastal, on the Airport Road, about 25 km South of Amman. Mr. Abdalla Musallam, Amo Extension, and Ms. Shatha Al-Rabadi, Amo Trainee, also joined the trip.

Sukhtian Co. has a newly established cut-flower farm in Ma'adda, in the mid-Ghor. Presently 48 plastic houses are planted to *Gypsophila* (Baby's Breath) a cut flower used for trimming in floral arrangements. Sukhtian is an exporter of *Gypsophila* from the Jordanian highlands, but is growing it for the first time for commercial purposes in the valley.

Jordan Valley

During our visit, fully grown plants, in bloom, were harvested in some of the houses, while in others, plants were at several pre-flowering stages, from seedlings to about 2-month old. Only the plants ready for harvest had the "lodging" problem

The site of "lodging," i.e., the inability of the plant to stand erect, occurred at a height of about 20-25 cm from the soil level, where the internodes of the main axis and the side branches reached a length of about 3.5 cm. Below this height the internodes were between 1 and 2 cm, quite woody, and at the time of inspection, devoid of side branches. At this height also the

80-90 cm high, the upper 20-30 cm forming open panicles with a multitude of the typical white Baby's Breath florets. At panicle height, the flowering stalks were strong and upright.

The plants appeared healthy in all respects. Their large taproot was firmly anchored in the soil, the foliage was dark green, and the heavy bloom typical of what is seen in flower shops. However, excessive nitrogen fertilization could be postulated from the very dark, succulent leaves, and the relative non-woodiness of the stems.

Lodging currently causes a 30% loss of marketable *Gypsophila*, and diagnosis of the problem is important. The plants ready for harvest had been planted in late August and in September, and had received cultivation practices similar to *Gypsophila* grown successfully in the highlands for several years. Sukhtian plastic houses are provided with supplemental heat, whenever the temperature falls below 16 C, but in case of excessive heat, cooling is not available. Of course, both the day and night temperatures during August and September are very high in the Jordan Valley, certainly much higher than in the highlands, at altitude differentials of about 1100 or 1200 m higher.

Kastal, South of Amman

The second Sukhtian facility we visited is located in Kastal, about 25 km South of Amman. There are 105 plastic houses, 18 of them planted to *Gypsophila*. The plants here also were in different stages of growth and development. Those almost ready for harvest were of the same variety and provenance (mostly tissue culture) were taller (about 1.2 m high) and of upright habit, with no apparent sign of lodging. On closer examination, the stems were thicker and had a woody feel. Both stems and leaves appeared more silvery than fleshy dark-green, and the stems had a slight touch of anthocyanin coloration. All-in-all, the appearance of these plants were more similar to what one sees when the plants are grown out of doors, as is the practice in Florida.

According to the staff, the valley and highland plants are of similar variety and provenance, have similar planting dates, and have received similar regimes of fertilizer (NO_3^- supplied in irrigation water) light (16 hr day/8 hr night) and water. The main difference between the lodging valley and the non-lodging highland plants appears to be temperature, especially the very high temperatures the valley plants were exposed to during early development. While this may be true, many other factors such as soil conditions (the name *Gypsophila* botanically, means limestone plant) and high fertilizer, high temperature interactions, etc., must be considered. Cooling, evaporative or other also must be provided, if temperate-zone plants are to be grown under plastic during the early fall in the Jordan

Recommendation

1. Avoid planting during the hottest periods of the season, if no cooling is available in the plastic houses.
2. Compare the fibrous tissues of valley-grown and highland *Gypsophila* to determine whether valley plants lack lignified tissues. Also analyze the plants from competing growers.
3. Analyze for soil nutrients before planting.
4. Analyze plant tissues, and compare the nutrient levels to those established as the standard by the industry. Analyze healthy plant tissues from other sources for comparison. Adjust fertilizer rates to rectify any discrepancies.
5. Investigate what type of cultivation regimes are followed by other successful growers.
6. Keep complete daily records.
7. Provide Jordan Valley plastic houses with evaporative cooling systems. Use white paint rather than mud to re-radiate heat from the sun.
8. When planning the commercial production of a plant cultivar under new environmental conditions, experiment with small areas, make records of all variables used, and of all adjustments made. Select the best set of conditions before planting on a large scale.

CC: Mr. Jamil Zureiqat, Project Director, AMO
Mr. Marwan Haddadin, Dir. Postharvest, AMO
Mr. Mahfuz Ahmad Judeh, Gen. Mgr. Tayyebah Agr. Co.
Mr. Abdalla Musallam, Extension, AMO
Ms. Shatha Al-Rabadi, Trainee, AMO



AGRICULTURAL MARKETING DEVELOPMENT PROJECT

AGRICULTURAL MARKETING ORGANIZATION

مشروع تطوير التسويق الزراعي
مؤسسة التسويق الزراعي - عمان - الأردن

TO : Richard J. Peters,
Senior Technical Representative
Sigma One Corporation

From : Yilmaz Ilker, *Yilmaz Ilker*
Consultant Postharvest and Marketing

Date : 18th December, 1993

Subject : Trip Report to Jordan Valley,
(JORICO and Bashir Al-Gazavi Farms)
December 14-15, 1993

- Purpose :
- (1) To observe past and present cultural practices on different varieties of Turkish peppers, grown under plastic houses, and to determine whether there is a need for additional recommendation for their optimum growth and development.
 - (2) To place temperature recorders (self operating, ryan-type) into both the heated and non-heated plastic houses for off-season vegetable production, in order to recommend whether and to what extent heating is needed for optimum production.

On Tuesday, December 14, by request of Mr. Said M. Masri, General Manager, JORICO, I accompanied him to his farm in the Jordan Valley. He wanted me to see his pepper production under plastic houses, for the export markets. JORICO is growing several Turkish varieties of peppers (hot and sweet) besides several other European cultivars in 20 low-type (height, about 2m) plastic houses. On the farm, we met Mr. Husam Zorba, the grower, and together, we checked the Turkish peppers.

In general, the plants were healthy looking, with uniform green foliage, and with no serious nutritional or pathological problems. The plants were loaded with flowers and fruits of different growth stages. However, besides their uniform green foliage, and heavy fruiting, the plants were not of uniform height, and some of them had a weak stem. These plants were prone to lodging. After talking to Mr. Zorba about possible reasons for this situation, it became clear that the cause was related to transplanting stress.

These peppers which are relatively new to the growing environment in the Valley, were transplanted to their permanent locations under plastic at high temperatures. Mr. Zorba said that, because of the high temperatures during and after transplanting, 10% of the transplants were lost. They replanted the empty spots later with new seedlings.

In my opinion, these Turkish varieties, because of the severe temperature shock received during transplanting, have still not recovered, and possibly some of them will not recover fully.

I suggested to Messrs. Masri and Zorba that it may be possible to reduce the high temperature stress, during transplanting by just changing the transplanting time from the hotter part of the day to lesser ambient temperature periods, for example, very early in the morning, late in the afternoon or even at night. They said they will try it next season.

On December 15, Mr. Abdalla Musallam, Extension, AMO and I visited Mr. Mahmoud Bashir Al-Gazavi's farm in Mashara, Jordan Valley. Mr. Bashir Al-Gazavi is one of the large fruit and vegetable growers in the Valley. On part of his citrus orchard, he has twenty 64x8m size plastic houses, all are equipped with heaters. They said, they purchased these heaters and air circulation fans (also 20) in Syria for a total cost JD 25,000. The heaters use diesel oil and have electric motors. The heated air is pushed through a large plastic tube by a powerful fan. The tube which runs the entire length of the house, has outlets for warm air distribution. We were told that, they start the heaters when the ambient air temperature inside the houses drop to below 16 Deg. Centigrade. Usually, they said, they run the heaters between 10:00 pm and 6:00 am.

It appears that these are the first heated plastic houses for off-season vegetable production in the Valley. We placed two temperature recorders (ryan) in the heated and two in non-heated plastic houses to obtain a permanent temperature record for evaluation. Moreover two more recorders were also placed in one of the low-type plastic houses at Mr. Said M. Masri's farm to obtain the ambient air temperature data. We will be checking the recorders once a week, to make sure they are operating properly. From the data obtained, it will be possible to make recommendations as to heating requirements at JORICO, and potentially other farms in the Valley. Data on energy consumption (cost) might also be obtained from cooperating growers.

cc: Mr. Jamil Zureigat, Project Director, AMO
Mr. Marwan Haddadin, Director, Postharvest Tech., AMO
Mr. Abdalla Musallam, Extension, AMO

IV.4

LIST OF CONTACTS

LIST OF CONTACTS

AGRICULTURAL MARKETING DEVELOPMENT PROJECT:

- Mr. Jamil Zureigat, Dir.
JAMDP / AMO
Tel: 689192
- Mr. Richard J. Peters, Senior Technical Rep., Sigma One
Agricultural Marketing Development Project
Tel: 6899192/3
- Mr. David Cayton, Pres.
Cayton Assoc., Salinas, CA, USA
Tel: (408) 4551533

AGRICULTURAL MARKETING ORGANIZATION:

- Dr. Salem Al-Lozi, Dir. Gnl.
Agricultural Marketing Organization
Tel: 819161
- Mr. Marwan Haddadin, Head, Postharvest Div.
Agricultural Marketing Organization
Tel: 819161
- Mr. Osama Najdawi, Postharvest
Agricultural Marketing Organization
Tel: 819161
- Mr. Abdallah Musallam, Extension
Agricultural Marketing Organization
Tel: 819161

PRIVATE SECTOR:

- Mr. Adel Katamin, Gnl. Mgr.
AGRIPCO, Shipper
Tel: 692902
- Mr. Augustine Samandar, Gnl. Mgr.
Eastern Services Freight Forwarding Co.
Tel: 621775
- Mr. Aiad Al- Drawshed, Mgr.
Dolphin International Freight Forwarders
Tel: 649020

SB

- Mr. Audeh Rawashdeh, Farmer
Ghor Al-Safi, Jordan Valley
- Dr. Ayed Al-Wirr, Pres.
Agribusiness Co.
Tel: 811927
- Mr. Amad Saleh, Mgr.
Asia Star Est., Shipper
Tel: 824020
- Mr. Camille Hanna Franjeh, Marketing
Aqaba Shipping Co.
Tel: 679892/3
- Mr. Farouq Al-Natour, Eng. D.G.M.
Petra Engineering Indus., Co.
Tel: 692740
- Mr. Humam Nabulsi, Mgr.
Abu Ghazaleh Farms / Green Valley, Grower/Shipper
Tel: 610581
- Mr. Husam Zorbah, Grower
Kibed, Jordan Valley
- Mr. Isah Madanat, Grower
Ghor Al-Safi, Jordan Valley
- Mr. Khaireddin Shukri, Gnl. Mgr.
JOVAC, Grower/Shipper
Tel: 05 573153
- Mr. Khalid Salameh, Gnl. Mgr.
Pt. Serennita Mitra Abadi, Importer, Jakarta, Indonesia
Tel: (6221) 4300521
- Mr. Khalid Bashir Al-Gazawi, Gnl. Mgr.
Bashir Al-Gazawi Farms, Jordan Valley
Tel: 02 291063
- Mr. Mutaz Khalili, Gnl. Mgr.
Blue Bird, Shipper
Tel: 817565
- Mr. Mohammed Gharibeh, Marketing
Assad and Akram Abu Amer Co., Shipper
Tel: 692133
- Mr. Mohammed Taweed, Mgr.
Jordan Valley Farmers Assoc.
Tel: 05 573025

- Mr. Mahfuz Ahmad Judeh, Gnl. Mgr.
Tayyebah Agr. Co.
Tel: 644422
- Mr. Nasser Shurrab, Pres.
Shurrab Bros. and Co., Shipper
Tel: 736001
- Mr. Naief Qutash, Mgr.
Asia Star Est., Shipper
Tel: 824020
- Mrs. Najwa Shashaeh, Grower
Jordan Valley
Tel: 05 573127
- Mr. Nabil Rajabi, Gnl. Mgr.
Samih Al-Rajabi and Sons, Export/Import
Tel: 771881
- Mr. Osama Husain, Mgr.
Petra Engineering Indus., Co.
Tel: 692740
- Mr. Omar Abu Wishah, Eng., D.G.M.
Petra Engineering Indus., Co.
Tel: 692740
- Mr. Rakan Faour, Pres.
Jordan Valley Farmers Assoc.
Tel: 05 573025
- Mr. Said Masri, Gnl. Mgr.
JORICO, Shipper
Tel: 692727
- Mr. Saud Ayyash
Petra Engineering Indus., Co.
Tel: 692740/2
- Mr. Salim O. Naber, Pres.
Odeh Naber and Sons Transport Co.
Tel: 736621
- Mr. Walid Awwad, Mgr. Dir.
AIMAS, Shipper
Tel: 689922
- Mr. Ziad Afram, Gnl. Mgr.
Jordan Venture Projects Co.
Tel: 612308