

EXECUTIVE SUMMARY

The objectives for the project were to review the export marketing and postharvest handling technology of Thailand's fresh fruits and vegetables and to make recommendations for improvements.

Marketing Component

The work program developed by the Plant Pathology and Microbiology Division of the Department of Agriculture was well planned and included visits to the different growing regions of the country. This included meetings with exporters and with experts from Kasetsart University; discussions with Department of Agriculture (DOA) researchers and other governmental departments on production, postharvest handling, and marketing; and a trip to Frankfurt, West Germany and London, England to observe the arrival of a trial air shipment of Thai fruit. Meetings were held with importers in these markets to evaluate the possibility of increasing exports of Thai fruits and vegetables.

The research and development work being conducted in Thailand on postharvest handling and marketing by the Department of Agriculture, the Extension Service, the Department of Export Promotion, Kasetsart University, and the private sector is excellent and should be continued. In order to avoid duplication of effort by the different groups, it may be worthwhile to consider a division of responsibilities. This might insure closer cooperation between them, so that new technologies in production, postharvest handling and marketing can be transmitted to the private sector as rapidly as possible.

Asian Marketing Prospects

Small, local companies are currently exporting fruits and vegetables to Malaysia, Singapore, Hong Kong and Taiwan. Large national companies are now becoming interested in the marketing possibilities in Japan and are conducting market research. Trial shipments by air and sea are being made to test consumer acceptability, packaging, and shelf life of different Thai products.

Test ocean shipments of fresh pineapple are being made to Japan, which if successful could develop into a large potential market for this and other Thai fruits and vegetables. Many Thai products now being sold in Western Europe have a potential market in Japan, although Japan's quality standards and phytosanitary regulations are very strict.

European Marketing Prospects

Thai fresh fruits are highly acceptable in the two markets that were visited in Europe -- West Germany and the United Kingdom. In general, importers are satisfied with the quality of Thai fruits. However, they would like to have the packaging improved for some fruits to avoid damage in transit and would be interested in having more research done on methods to extend the shelf life of tropical products.

European importers are working closely with their Thai exporters on quality control and packaging. These efforts could be enhanced by conducting additional controlled trial shipments and having the results evaluated by both the importers and the Department of Agriculture to consider changes that would be acceptable from quality and cost viewpoints.

Potential markets may be developed in Western European countries such as Denmark, France, the Netherlands and Sweden. However, it is essential that sufficient production be available before expanding the promotional and marketing efforts in these countries. This is especially true of tree fruits, which may take three to five years to come into commercial production.

Some of the fresh products now being sold in Western Europe are baby corn, carambola (star fruit), cherimoya, guava, lychee, mango, mangosteen, papaya, passion fruit, pineapple, pummelo, and rambutan. A small, ethnic market may be developed for specialty products such as durian, longan and sapodilla. It may, however, take some time until these fruits become acceptable to the non-Asian population. The demand for vegetables is increasing in the United Kingdom and many of the desired items can be grown in Thailand, especially during the winter months. Asparagus, strawberries, and baby or small vegetables offer interesting prospects for the future.

Postharvest Component

The entire system, from harvesting to the consumer, was reviewed. This covered both domestic and export activities.

The production and marketing of Thai fruits and vegetables is very progressive. The export marketing of fruits is more advanced than for vegetables. This is normal and is to be expected. Production of fruits is inadequate for a vigorous export program. Therefore, production must be increased in the future.

Additional work should be done in the area of grade standards so that the seller and the buyer understand what is expected from each party. This can be accomplished by

having the Department of Agriculture work with growers, exporters and importers from the different markets to establish acceptable norms that can be expected from Thai fruits and vegetables. This is one way to increase the cooperative work between government and the private sector. Unless the private sector becomes more actively involved, progress will be slow.

Various Thai governmental agencies have done excellent experimental work in the areas of postharvest handling and packaging. Results from these tests should be disseminated to growers and exporters who can benefit from this information. The need to cooperate with the private sector cannot be emphasized too strongly.

As the markets for Thai fruits and vegetables expand in the more sophisticated countries, improvements will be required in harvesting methods, postharvest handling, cooling, transportation, and packaging to increase the shelf life of these products. Much has been accomplished in these areas. However, it is a never ending task to keep Thailand's technology up to date with the developments that are taking place in Thailand and other parts of the world.

Shipping tests must be made to apply laboratory postharvest test results to commercial export shipping practices. To do this, cooperative shipping tests with the DOA and private exporters should be the next step.

One of the major problems facing the Thai fruit and vegetable industry is transportation to foreign markets. Air freight at present is expensive and unreliable, while ocean shipments take a long time to arrive at their destination. Experimental work is being done on methods to extend the shelf life of various fruits for both air and ocean shipments.

Activities for future work in Thailand are summarized below:
(not listed by priority)

1. Continue laboratory work on postharvest handling and decay control treatments.
2. Continue work on packaging, particularly in conjunction with foreign importers so packaging fits into their local marketing methods. This is being done already but is a never-ending task, particularly with consumer packaging.
3. For ocean shipments, palletize when required.
4. Build more refrigerated coolers in Thailand to cool the produce as soon as possible after harvest.
5. Continue increasing the production of fruits to provide a constant supply to foreign importers.
6. Establish grade standards.
7. Continue the objective of having the entrepreneur make a profit. This is especially true for the private exporter who will create a good demand for fruits and vegetables in the market if it is profitable.
8. Make shipping tests to apply laboratory postharvest results to commercial export shipping practices. Both air and ocean shipments should be made.
9. Investigate shrinkwrap more thoroughly. This should include normal atmosphere and modified atmospheres between the fruit and the wrap.



POSTHARVEST INSTITUTE FOR PERISHABLES

EXPORT MARKETING AND POSTHARVEST HANDLING OF
PERISHABLE COMMODITIES IN THAILAND

Prepared by:

Waldo Heron

Jack Ross

Postharvest Institute for Perishables

Cooperative Agreement AID/DAN-1323-A-00-5093-00
USAID Bureau for Science and Technology/Agriculture

GTS Report No. 98

July 1988

Project No. 543-005-Delivery Order No. 05

Funded by USAID/Thailand

Agricultural Technology Transfer (ATT)



University of Idaho

in cooperation with
**United States Agency for
International Development**

EXPORT MARKETING AND POSTHARVEST HANDLING OF
PERISHABLE COMMODITIES IN THAILAND

Waldo Heron

Jack Ross

Postharvest Institute for Perishables

University of Idaho

Cooperative Agreement AID/DAN-1323-A-00-5093-00
USAID Bureau for Science and Technology/Agriculture

GTS Report No. 98

July 1988

Project No. 543-0005-Delivery Order No. 05

Funded by USAID/Thailand

Agricultural Technology Transfer (ATT)

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY.....	1
Marketing Component.....	1
Asian Marketing Prospects.....	2
European Marketing Prospect.....	2
Postharvest Component.....	3
INTRODUCTION - Scope of Work.....	6
MARKETING OF THAI FRESH FRUITS AND VEGETABLES.....	8
Background Information.....	8
Transportation.....	10
Discussions With European Importers.....	11
Hameico.....	11
Fruco.....	12
Hunter Produce Ltd.....	14
POSTHARVEST HANDLING OF THAI FRESH FRUITS & VEGETABLES.	16
Postharvest Handling Observations in Thailand.....	18
Handling Trials & Postharvest Results.....	19
RECOMMENDATIONS.....	22
General Marketing.....	22
Postharvest Handling.....	23
Workshop.....	29
ANNEX A - Work Schedule for Waldo Heron & Jack Ross....	30
ANNEX B - Price Comparisons at Retail Level in Frankfurt & London.....	36
ANNEX C - Papers Presented by Waldo Heron:	
Annex C-1 - May 18, 1988, Association of Plant Pathologists, Bangkok.....	38
Annex C-2 - September 7, 1988, Workshop on Improvement of Postharvest Hand- ling System for Fresh Fruits & Vegetables, Bangkok.....	49
Annex C-3 - September 9, 1988 Marketing of Thai Fresh Fruits & Vegetables, Department of Agri- culture Seminar, Bangkok.....	58
ANNEX D - Paper Presented by Jack Ross to the Associ- ation of Plant Pathologists in Bangkok on Cold Storage Guidelines.....	67
ANNEX E - Temperature Management.....	70
ANNEX F - Workshop Schedule on Improvement of Post- harvest Handling System for Fresh Fruit & Vegetables and List of Participants.....	72
ANNEX G - American President Company (APL) Refrig- erated Containers.....	84

EXECUTIVE SUMMARY

The objectives for the project were to review the export marketing and postharvest handling technology of Thailand's fresh fruits and vegetables and to make recommendations for improvements.

Marketing Component

The work program developed by the Plant Pathology and Microbiology Division of the Department of Agriculture was well planned and included visits to the different growing regions of the country. This included meetings with exporters and with experts from Kasetsart University; discussions with Department of Agriculture (DOA) researchers and other governmental departments on production, postharvest handling, and marketing; and a trip to Frankfurt, West Germany and London, England to observe the arrival of a trial air shipment of Thai fruit. Meetings were held with importers in these markets to evaluate the possibility of increasing exports of Thai fruits and vegetables.

The research and development work being conducted in Thailand on postharvest handling and marketing by the Department of Agriculture, the Extension Service, the Department of Export Promotion, Kasetsart University, and the private sector is excellent and should be continued. In order to avoid duplication of effort by the different groups, it may be worthwhile to consider a division of responsibilities. This might insure closer cooperation between them, so that new technologies in production, postharvest handling and marketing can be transmitted to the private sector as rapidly as possible.

Asian Marketing Prospects

Small, local companies are currently exporting fruits and vegetables to Malaysia, Singapore, Hong Kong and Taiwan. Large national companies are now becoming interested in the marketing possibilities in Japan and are conducting market research. Trial shipments by air and sea are being made to test consumer acceptability, packaging, and shelf life of different Thai products.

Test ocean shipments of fresh pineapple are being made to Japan, which if successful could develop into a large potential market for this and other Thai fruits and vegetables. Many Thai products now being sold in Western Europe have a potential market in Japan, although Japan's quality standards and phytosanitary regulations are very strict.

European Marketing Prospects

Thai fresh fruits are highly acceptable in the two markets that were visited in Europe -- West Germany and the United Kingdom. In general, importers are satisfied with the quality of Thai fruits. However, they would like to have the packaging improved for some fruits to avoid damage in transit and would be interested in having more research done on methods to extend the shelf life of tropical products.

European importers are working closely with their Thai exporters on quality control and packaging. These efforts could be enhanced by conducting additional controlled trial shipments and having the results evaluated by both the importers and the Department of Agriculture to consider changes that would be acceptable from quality and cost viewpoints.

Potential markets may be developed in Western European countries such as Denmark, France, the Netherlands and Sweden. However, it is essential that sufficient production be available before expanding the promotional and marketing efforts in these countries. This is especially true of tree fruits, which may take three to five years to come into commercial production.

Some of the fresh products now being sold in Western Europe are baby corn, carambola (star fruit), cherimoya, guava, lychee, mango, mangosteen, papaya, passion fruit, pineapple, pummelo, and rambutan. A small, ethnic market may be developed for specialty products such as durian, longan and sapodilla. It may, however, take some time until these fruits become acceptable to the non-Asian population. The demand for vegetables is increasing in the United Kingdom and many of the desired items can be grown in Thailand, especially during the winter months. Asparagus, strawberries, and baby or small vegetables offer interesting prospects for the future.

Postharvest Component

The entire system, from harvesting to the consumer, was reviewed. This covered both domestic and export activities.

The production and marketing of Thai fruits and vegetables is very progressive. The export marketing of fruits is more advanced than for vegetables. This is normal and is to be expected. Production of fruits is inadequate for a vigorous export program. Therefore, production must be increased in the future.

Additional work should be done in the area of grade standards so that the seller and the buyer understand what is expected from each party. This can be accomplished by

having the Department of Agriculture work with growers, exporters and importers from the different markets to establish acceptable norms that can be expected from Thai fruits and vegetables. This is one way to increase the cooperative work between government and the private sector. Unless the private sector becomes more actively involved, progress will be slow.

Various Thai governmental agencies have done excellent experimental work in the areas of postharvest handling and packaging. Results from these tests should be disseminated to growers and exporters who can benefit from this information. The need to cooperate with the private sector cannot be emphasized too strongly.

As the markets for Thai fruits and vegetables expand in the more sophisticated countries, improvements will be required in harvesting methods, postharvest handling, cooling, transportation, and packaging to increase the shelf life of these products. Much has been accomplished in these areas. However, it is a never ending task to keep Thailand's technology up to date with the developments that are taking place in Thailand and other parts of the world.

Shipping tests must be made to apply laboratory postharvest test results to commercial export shipping practices. To do this, cooperative shipping tests with the DOA and private exporters should be the next step.

One of the major problems facing the Thai fruit and vegetable industry is transportation to foreign markets. Air freight at present is expensive and unreliable, while ocean shipments take a long time to arrive at their destination. Experimental work is being done on methods to extend the shelf life of various fruits for both air and ocean shipments.

Activities for future work in Thailand are summarized below:
(not listed by priority)

1. Continue laboratory work on postharvest handling and decay control treatments.
2. Continue work on packaging, particularly in conjunction with foreign importers so packaging fits into their local marketing methods. This is being done already but is a never-ending task, particularly with consumer packaging.
3. For ocean shipments, palletize when required.
4. Build more refrigerated coolers in Thailand to cool the produce as soon as possible after harvest.
5. Continue increasing the production of fruits to provide a constant supply to foreign importers.
6. Establish grade standards.
7. Continue the objective of having the entrepreneur make a profit. This is especially true for the private exporter who will create a good demand for fruits and vegetables in the market if it is profitable.
8. Make shipping tests to apply laboratory postharvest results to commercial export shipping practices. Both air and ocean shipments should be made.
9. Investigate shrinkwrap more thoroughly. This should include normal atmosphere and modified atmospheres between the fruit and the wrap.

INTRODUCTION - SCOPE OF WORK

This project was funded by USAID Thailand under the Appropriate Technology Transfer (ATT) Project. The scope of work was as follows:

1. Consulting services to ATT Subproject 004, particularly on problems related to the export of fresh fruit and vegetables.
2. Advice on how to extend shelf life of selected fresh commodities.
3. Advice on grades and standards.
4. Advice on controlled atmosphere storage and transport of fresh commodities.
5. Advice on use of 502 PAS in conjunction with refrigerated containers.
6. Advice on precooling mango, mangosteen, lychee, longan, rambutan, papaya, yard long bean, baby corn, asparagus.
7. Advice on shrinkwrapping to extend shelf life and control fruit flies in fruit (Note: to be handled by a specialist from USDA/ARS but coordinated by PIP).
8. Comments on trial shipment to Frankfurt after accompanying RTE staff and planning for workshop in August/September 1988.
9. Preparation and presentation of Marketing/Postharvest Workshop.

The consultants assigned to the Thai project were Waldo G. Heron and Jack Ross. They arrived in Bangkok on May 2 and were in Thailand until May 22. Immediately following, four days were spent in West Germany and two days in the United Kingdom for an observation and inspection tour of Thai fruits arriving in Europe.

A second trip was made to Bangkok from September 2-15 to participate in a postharvest workshop, make presentations to a gathering of private sector exporters and public officials, and finalize the project report.

In Thailand trips were made to the following areas:

- A. Pattaya, Rayong, Chantaburi - to observe the growing and handling of pineapple, mangosteen, rambutan, papaya and durian.
- B. Nakhon Pathon - to visit producers of baby corn, fresh vegetables, grapes and pummelo.
- C. Chiang Mai, Fang, Lanphun - visits were made to producers of longan, lychee, mangoes and tangerines.

On the trips to Frankfurt and London inspection tours were made to wholesale markets, small retail stores and supermarkets.

A schedule of the work program and contacts that were made during the trip is included in ANNEX A.

MARKETING OF THAI FRESH FRUITS AND VEGETABLES

Background Information

Marketing of Thai fresh fruits and vegetables is still in the developmental stage as there is no set pattern for handling produce from the farm to the consumer. Some exporters contract with farmers prior to the harvesting of their crops, while others buy from middlemen or at wholesale markets. The larger companies are now considering establishing plantations or farms to grow part of their requirements.

Fruit and vegetable farmers have not yet established associations or cooperatives to market their produce under one label. This is common in the United States and in many of the more developed countries such as Israel and Taiwan. This presents a problem as the small exporters now have little control over harvest maturities, varieties of crops, postharvest handling, packaging, or transportation. Very little of the fruit that was observed is being cooled after harvesting. Cooling, of course, increases the shelf life of the product. This is important, especially with those fruits and vegetables that are exported to overseas markets. Minimizing the time lag from harvesting to the consumer is critical to avoid spoilage losses that must be absorbed by the exporter, or the producer through reduced prices.

The number of small exporters and the limited volume of exports at this time does not warrant large, modern packing houses with mechanized facilities for assembling, grading, cooling, and packaging. These factors are already known in Thailand, and improvements in this direction are gradually being made to modernize the packing system as the export volume increases.

The Department of Export Promotion in the Ministry of Commerce is doing excellent work in promoting Thai fruits and vegetables in various markets in Europe. This Department, the Department of Agricultural Extension, Thai International Airlines, and some of the larger exporters have all coordinated their efforts to produce attractive brochures, posters, and point-of-sale material to assist in market ng Thai products. Consideration should be given to joint promotions with importers, retailers, and exporters, in which the Thai Government shares the cost of these efforts. (An example of this type of cooperation is Carmel, a well known cooperative in Israel, that provided advertising funds to promote avocados in West Germany.)

During the visits to the various regions in Thailand, shipments of fruit for both the domestic and export markets were observed. These included durian, lychee, mangoes, mangosteen and pineapple. Fruit for the domestic market is not being graded and is packed in bamboo baskets or cartons that do not provide sufficient protection in handling and transit to avoid bruising or damage.

Fruit for export is being graded and packed in cartons. Depending on the exporter, some of the fruit goes directly to the air terminal, while in other cases the exporters grade the fruit again in Bangkok. These are then repackaged in the exporters' cartons. While this additional handling may be necessary to insure the selection of high quality fruit for export, the more times fruit is handled after harvesting the greater the possibility of bruising and future spoilage.

In general, the consultants were impressed with the activities in Thailand on postharvest handling and marketing. For example, the Horticulture Department at Kasetsart University has completed work on postharvest

handling of longan, mango, mangosteen and rambutan. This information should now be made available to exporters so they may take advantage of the research results.

Transportation

Trial ocean shipments have been made with pummelo and other citrus fruit to Europe and with pineapple to Japan. As the results are evaluated, modifications can be made to improve the postharvest handling of these products. In the case of pummelo, tests are being conducted with waxes to prolong the shelf life. Waxing is a standard practice in the United States for citrus. The shipping time for pineapple to Japan is only seven days so the fruit should arrive in good condition. However, as the transit time to Europe is about 26 days longer, more research should be conducted to determine what steps can be taken to prolong the shelf life of pineapple. Other countries are now shipping pineapples by ocean vessels; consequently, information should be available to Thai researchers and exporters.

Several of the packing sheds visited are installing small cold storage facilities and are using refrigerated trucks to haul their fruit to Bangkok and Singapore through Malaysia. This practice should be continued and the advantages of this type of handling made known to other exporters. One of the main problems at the Bangkok wholesale market and Don Muang Airport is the lack of adequate cold storage facilities. This deficiency should be corrected, especially at the airport, since many times fruit arrives for a scheduled departure but cannot be shipped because the carrier has cancelled the shipment. This means that the fruit is held at ambient temperature until the shipment can be rescheduled, or is moved to a cold storage warehouse some distance from the airport. In either case it adds cost to

the exporter for the additional handling or by increased spoilage.

Discussions with European Importers

The following comments were made by the importers in the wholesale markets in Frankfurt and London.

Hameico

This company is part of SCIPIO, an importer/wholesaler that will be handling fruit shipped by the Shell Company of Thailand, Ltd. The company sells its produce to supermarkets and small wholesalers. They are now importing papaya from Brazil, sold under a Canadian Sun Taste label; bananas from Honduras exported by United Brands under its Chiquita label; asparagus from Spain; strawberries from Italy; kiwi from Corsica, France; watermelons from Israel under the Carmel brand; dwarf pineapples from South Africa shipped by Del Monte; and nectarines from Valencia, Spain.

In a discussion of the sale of Thai products with one of the buyers, she mentioned that West Germany is primarily a price market and the prices for tropical fruits seem expensive. She also mentioned the following:

1. Lychees should not be shrinkwrapped, but the market is good, at DM 35 per 2 kg package.
2. Rambutans are difficult to sell.
3. The preferred type of mangoes are a red-green variety, that can sell for between DM 16 to 25 per 5 kg for the best quality fruit, but lower quality fruit sells for DM 5 per 5 kg. She felt that demand for green-yellow

mangoes is limited, because the consumers are not used to this color and think the fruit is not ripe.

4. The off season (winter, December through March) prices for strawberries from Israel and South Africa range from DM 20 to 30 for 2 to 2-1/2 kg packages.
5. Small papayas are preferred, packed 6 to 8 in a carton.
6. Pummelos are being imported from Israel from December to May.

FRUCO

The other wholesaler interviewed was FRUCO, which imports fruit from HOPCO, House of Oriental Products Co. in Bangkok and Intra-Foods Far East Co., also of Bangkok. All of their Thai shipments are made by air. The buyer was very impressed with the packaging prepared by the DOA and planned to telex the importers to continue this method on their next shipment of lychees, mangosteen and rambutan.

Some of the other comments the wholesaler made were the following:

1. Five kilos of mangoes are selling for DM 30. He purchases small type papayas, primarily from Brazil.
2. FRUCO can import about 400 boxes of lychees per week during the season.
3. Baby pineapple are being imported from South Africa.
4. Carambola (star fruit) comes from Malaysia and an eighteen count sells for DM 18 to 20.

5. Imports of mangosteen and rambutan are about 60 boxes each per week.
6. Baby corn is being imported from Thailand.
7. Brazil is the main supplier of guavas. These have white pulp, similar to the fruit produced in Thailand.

Thai exporters should also be aware that food marketing in West Germany is undergoing a change that could affect their strategy. While price is still an important factor that influences consumers, the current trend is to emphasize appearance, freshness, quality, then price. The average housewife shops twice a week to insure that the produce she buys is fresh. She is also doing more buying on impulse, which means that shelf life and attractive packaging play an increasing role in marketing.

The distribution channels are also changing. In the past importer/wholesalers supplied large distributors, traditional wholesalers, wholesale markets, and regional distribution centers. The trend now is towards larger stores that offer a wider variety of products.

The national retail organizations and department stores are regionalizing their purchases and supply their stores through central area warehouses. Chains and discount houses work through specialty fruit and vegetable distributors who take orders and supply the retail stores directly. The larger companies are starting to operate at the import/wholesale level and are establishing exclusive, direct contacts with their suppliers overseas.

The wholesale markets are shifting their emphasis to fruit ripening, packaging, cold storage, and produce distribution. The growth of self service stores has increased the need for

prepackaging. This operation is costly in Germany and the United Kingdom but in many instances could be done in Thailand by the exporter where labor rates are lower. This would require strict control in the selection, grading and packaging of the fruit, and is an interesting possibility.

Standard packaging is also becoming important, especially for palletized ocean freight shipments. The standard pallet measures 800 mm x 1200 mm while carton sizes of 600 mm x 300 mm x 400 mm are commonly used since they fit well on the pallet. In order to avoid carton movement on the pallet, metal or plastic strapping can be used with corner boards. This type of palletized load can be handled efficiently with forklifts.

Hunter Produce Ltd.

The wholesaler visited in England was Hunter Produce Limited in Faversham, Kent. Some of the comments made by its buyer were the following:

1. The company's exporter in Thailand is P. Prime Pathom Taekem, c/o R.P.S. System Co. Ltd., located in the Amarin Tower Building in Bangkok.
2. They are now buying baby corn, lychee, mangoes, mangosteen and rambutan from Thailand.
3. They are satisfied with the packaging for air shipments, but are interested in the possibility of receiving products with a longer shelf life by ocean.
4. They would like to receive a trial shipment of pineapple from Thailand.

5. Hunter is interested in winter strawberries, especially a variety called "Fraise du Bois."
6. Pummelo would have to be introduced to the English market. but there might be some demand from ethnic groups that are familiar with this fruit.
7. Small papayas are preferred on the English market and the fruit sells for L 1.49 each.
8. Sapodilla could be an interesting new product in England.
9. Passion fruit is being imported from South Africa and sells for L .19 each.

Retail prices for the fruit observed in Frankfurt and London are included in ANNEX B.

(See ANNEX C for additional information on marketing.)

POSTHARVEST HANDLING OF THAI FRESH FRUITS AND VEGETABLES

World-wide, there is a tremendous effort to produce and market fruits and vegetables both for domestic use and for export to other countries. This effort will continue for many years. Typical are efforts in Thailand, Malaysia, Sri Lanka, Kenya, Ivory Coast, Morocco, Spain, Italy, Brazil, and the U.S.

Thailand is in a favorable position to compete in this market, both domestically and for export. This report is aimed primarily at the export market, but many comments apply to the domestic market as well.

Extensive postharvest research has been conducted in Thailand. Most of this is experimental work by the Department of Agriculture Plant Pathology and Microbiology Division, Kasetsart University, and the Thailand Institute of Scientific and Technological Research (TISTR). They are excellent sources of information. Typical of the work are tests to determine the best temperatures, relative humidity, decay control chemicals, and wax coatings. For some fruits, such as mangoes and mangosteen, the postharvest research is near completion. For other fruits, such as lychee, more work is needed. Postharvest research is never completely finished because of changing requirements, new chemicals, mold spores becoming resistant to chemicals, and changing regulations (such as allowable chemical residues). Therefore an on-going postharvest research program should be continued indefinitely in Thailand.

This report is not meant to provide new or different postharvest data. Instead, it is meant to provide simple, practical advice about handling fruits and vegetables while, at the same time, making use of the postharvest information already available from numerous sources in Thailand and

other countries. The farmer, packer, or exporter may have difficulty reading a formal research report and then putting this information into practical use. Also, a person without previous experience sometimes cannot determine which technical procedures fit best into his system of practical operations, which are limited by the amount of money and other available inputs.

A very good publication that provides excellent information and advice for postharvest handling is "ASEAN Horticultural Produce Handling Workshop Report" published by the ASEAN Food Handling Bureau in 1984 in Kuala Lumpur, Malaysia. This book is a collection of reports resulting from the ASEAN Workshop on Transportation and Handling Techniques for Horticultural Produce held in Bangkok, Thailand on 6-8 June, 1983. This inexpensive paperbound book is available at this address:

Chairman
ASEAN-Cofaf Secretariat
Department of Agriculture
Jalan Imam Bonjol 29
Jakarta, Indonesia

Another good publication is "Tropical Products Transport Handbook."

Brian M. McGregor
Agricultural Marketing Specialist
Export Services Branch
US Department of Agriculture
Office of Transportation
Washington, D.C. 20250-4500

This publication is USDA Agriculture Handbook No. 668 and is available from the Office of Transportation address shown above. Many subjects are covered in this publication such as grading, packaging, quality control, transport, loading

practices, precooling, and suggested shipping temperatures. This publication was shown and discussed with many people in Thailand as an excellent source of information. The precooling information in the publication is sufficient reason to buy one. Precooling of most tropical fruits is included in it.

Postharvest Handling Observations in Thailand

In observations made in Thailand, production practices were generally acceptable and produced good quality fruit. As mentioned earlier, fruit must be of good quality coming from the fields in order to end up with good quality in the markets. The main problem noted was mealybugs on pineapple, durian, and rambutan. Well designed spray programs in the fields can control mealybugs. Suitable cultural practices are also important. A suggested program for controlling mealybugs was provided to Thai specialists by the consultants

Of the packing houses seen, all were very simple and appropriate for their operations. The most advanced consisted of an open shed with a conveyor belt for grading and a refrigerated cooler for precooling. At present, this is adequate. More sophisticated packing houses aren't needed yet for the level of production in Thailand. Low labor costs are an economic factor in deciding this. Labor intensive operations still are generally acceptable.

Processing plants can play an important role in utilizing fruits and vegetables that cannot be sold on the fresh market because of small defects that affect their shelf life. This produce is wholesome and may be suitable for canning or freezing. Processing may also be applicable for fruits that require special treatment; for example, durian and mangosteen are being successfully frozen and exported.

In the case of durian it reduces shipping costs of the fruit, while mangosteen may not be imported fresh into many countries because of fruit flies, but is acceptable as a frozen product.

Postharvest Handling Trials and Results

In addition to observing situations in Thailand, an export shipment of fruit was prepared by the Thailand Department of Agriculture Plant Pathology and Microbiology Division and shipped by air cargo to Europe. (See Introduction Section.) The purpose of the trip was to evaluate handling techniques and to promote Thai fruits with European importers.

The following fruits were shipped in the test shipment to Europe:

1. Mangosteen

No postharvest chemical treatment. Five types of packaging were tested:

- A. Twenty-four fruits per box, partitions between each fruit.
- B. Same box (as above) but with perforated Cryovac film cover over top surface of box.
- C. Same box, (as above) no partitions. White plastic foam trays, four fruits/tray, each tray covered with PVC stretch film.
- D. Same box, entire box covered with perforated Cryovac film.
- E. Same box with partitions, large fruit.

Results: All treatments were satisfactory.

2. Baby Corn

No postharvest chemical treatment. Two types of packaging.

- A. White plastic foam trays, each tray covered with PVC stretch film.
- B. Clear plastic trays, each tray covered with PVC stretch film.

Results: All treatments were satisfactory.

3. Rambutan

Chemical treatment: Fruits were dipped for 3 minutes in 500 ppm water solution of benomyl at 15 degrees centigrade. Packaging was with white plastic foam trays, each tray covered with PVC stretch film.

Results: Treatment was satisfactory.

4. Mango (yellow and green types)

Chemical treatment: Fruits were dipped for 3 minutes in 500 ppm water solution of benomyl at 15 degrees centigrade. Packaging was of two types:

- A. Sixteen fruits/box, partitions between each fruit. Each fruit covered with foam sleeve.
- B. Sixteen fruits/box, no partitions. Each fruit covered with foam plastic.

Results: All treatments were satisfactory.

5. Lychee

Chemical treatment: Fruits were dipped in one percent solution of sodium meta bisulfite at 15 degrees centigrade. Packed in trays with one layer of fruits, covered with PVC stretch film.

Results: Some fruits were excellent, some became soft after two days. Not satisfactory. More work needs to be done with this fruit and treatment.

The overall results of the test shipment indicate that postharvest treatments were satisfactory for most of the fruits. These results are substantiated by previous shipments. However, of this group of fruits, more postharvest work is needed for lychees. Packaging was generally satisfactory for air shipments. As expected, individual importers in Europe made suggestions for packaging changes, especially consumer packages, to fit their particular market. Packaging will change in the future as situations change in various countries.

RECOMMENDATIONS

General Marketing

1. The research conducted by the Department of Agriculture in postharvest technology and the work being done by the Department of Export Promotion in the Ministry of Commerce should be closely coordinated with the needs of the private sector. Small exporters and some of the larger companies lack the necessary funds to do the basic research needed for developing new markets overseas. In many countries the cost to initiate these types of programs is financed by the government or through some form of cost sharing between the government and the private sector.
2. Market research should be conducted to select a few countries that offer the best potential to import Thai fruits and vegetables. At present there is insufficient production in Thailand to meet its domestic needs and also to supply the demands of all the European nations, Japan, the United States, and the Asian countries.
3. Thailand should develop a high quality image for its fruits and vegetables. Sophisticated markets expect their international suppliers to provide the same quality merchandise they demand from their domestic suppliers. This must be achieved through improved varietal selection, postharvest handling technology, packaging, and transportation. Production of tropical fruits and vegetables is becoming highly competitive, and only those countries that offer the best quality produce on a continuing basis will be successful.

4. Controlled tests on air and ocean shipments should be continued to determine the arrival condition of the products. These tests should be evaluated by personnel from the Department of Agriculture and the exporter and importer to determine what steps are needed to improve the handling of these shipments.
5. There should be more personal contact between the exporters and overseas buyers so they will have a better understanding of their mutual problems and be able to seek solutions to them.
6. Many tropical fruits and vegetables are highly perishable and require good postharvest practices to minimize spoilage. Tests should be continued on methods to extend the shelf life of these products.
7. The Bangkok International Airport should have cool storage facilities available to hold fruit or vegetable shipments that have been delayed or cancelled. An inexpensive way to achieve this goal might be to buy or lease the type of refrigerated containers used on ocean shipments, which can store the products under controlled temperature and humidity conditions.

Postharvest Handling

The overall purpose is to produce good quality fruit and vegetables in the field, to protect the crop after harvesting to maintain that quality, and to move it to market quickly so the consumer receives good quality fruit and vegetables before deterioration becomes a problem.

1. Establish grade standards for export. Existing grade standards are available from United States Department

of Agriculture and the European Economic Community (EEC).

2. Use gentle harvesting procedures to protect the produce.
3. Use well built field containers, such as plastic boxes, to protect the produce immediately after harvesting.
4. Handle the boxes and individual fruits the fewest times possible. Avoid unnecessary handling.
5. Cool the produce as soon as possible after harvesting to the best storage temperature. (See ANNEX D for cold storage guidelines.) On the farm, shade harvested boxes until leaving the field.
ANNEX E shows the downgrading effect of high temperatures and the effects of exposure to sun and temperature on three horticultural commodities.
6. There are four ways to maintain quality from the packing operation forward. The choice of which to use depends on the commodity. Sometimes all four should be used. These are as follows:
 - A. Low temperatures (refrigerated cooling).
 - B. High humidity (high humidity environment to prevent drying).
 - C. Decay control chemicals (to retard growth of fungi and bacteria).
 - D. Waxes (to prevent drying).

The Thailand agencies handling postharvest technology can provide detailed advice for these quality control measures.

A list was provided by the consultants to show the allowable chemical residue for decay control chemicals permitted by countries around the world.

7. Provide adequate packaging. The Thailand agencies working with postharvest technology have considerable information for improving packaging. One or more of these agencies should be contacted for packaging recommendations. Some of the box manufacturers also have this type of information. The "Tropical Products Transport Handbook" No. 668 of the USDA has a wide range of packaging information. For packaging, it should be noted that the importers in the countries of destination should be consulted to satisfy any special needs they may have relating to display features, box strength or consumer packages. More boxes with interlocking tabs for proper stacking alignment should be used. This interlocking box is available and should be tested very soon.
8. After packaging, ship the commodity immediately. Do not let it stay in the precooler or in ambient temperatures any longer than absolutely necessary.
9. Maintain good sanitation where produce is packed. This is to prevent contamination with fungi and also to prevent fungi from developing strains resistant to decay control chemicals. The resistance problem will become very important in the future.
10. If necessary, palletize boxes on 120 cm x 100 cm pallets for sea shipments. Exporters from various countries already palletize produce for export. Also, strapping and cornerboards may be needed to further immobilize the boxes on the pallet. No firm rule need be made at this time regarding palletizing. The

desires of foreign importers will decide this issue. Generally, palletizing is a good procedure for protection of the boxes of fruit during transit and should be used by Thai exporters if the foreign importers want to have it.

11. Decide whether to ship by ocean vessel or air. The choice of shipping by sea or by air will continue to be unclear for some years in the future. Obviously, if a commodity can be shipped in large volumes by sea, the freight rate will be lower than by air cargo. Several of the Thailand postharvest agencies are working to develop successful methods of shipping fruits in refrigerated containers by sea. This consultant team has offered some suggestions in this regard, but much work remains to be done for transit periods longer than one week. To be successful for sea shipment to Europe, a fruit must have a shelf life of at least five weeks. This is not practical for some fruits. Sometimes freezing or other methods of preserving can be used instead of shipping fresh. Modified atmospheres and controlled atmospheres have not been evaluated sufficiently for shipping fresh tropical fruits in refrigerated containers. Preliminary work of this type should be done.

For sea shipments, it is important to select the most appropriate refrigerated cargo container (usually known as reefers). After the proper container is selected, it is important to stow the boxes or cartons in a pattern that permits good airflow around each box. Ample venting in each box is an important part of airflow. It is recommended that test shipments by sea be planned carefully. The shipping company that provides the reefer should be consulted. For example, American President Lines (APL) has done considerable

work in developing reefers specifically for fruits and vegetables. ANNEX G is an excerpt from the APL reefer handbook that shows an excellent reefer to use. If the local Bangkok office of APL does not have the desired technical people to assist in using this reefer, the exporter can contact the following person for recommendations of which reefer to use, stacking patterns for boxes, temperatures, etc:

Mr. William P. Hargraves
Manager, Product Development, APL
1800 Harrison Street
Oakland, California 94612, USA
Telephone (415) 272-8455

Several shipping companies can provide good reefers and advice in Bangkok. Another company that can be contacted is:

Malaysian International Shipping Service (MISC)
3354/36, 11th floor, Mandrom Building
Rama IV Road
Klong Toey
Bangkok 10110, Thailand
Contact: Mr. Mohamad Bustami Bin Yahaya
Telephone: 249-9786

The other alternative for shipping is air cargo. This is excellent for maintaining fruit quality by having short times enroute. On the other hand, there are three major problems with air cargo from Thailand.

- A. High cost.
- B. Unreliability of space on a given airplane.

- C. Lack of refrigerated coolers at Bangkok and Chiang Mai Airports to store early arrivals or shipments that do not depart on the planned aircraft.

The above three problems are being discussed at length by a number of government officials in various agencies in Thailand in hopes of finding solutions.

12. More interaction between public agencies and the private sector to make test shipments and to apply laboratory results to commercial practices. Cooperative air and sea shipping tests between DOA and private exporters must be made with both parties participating or sharing in the costs, preparing the shipments, and observing arrival conditions of shipments. These shipments should be on-going until satisfactory results are achieved. In total, much more contact must be made with the private sector than is being made now.
13. Conduct more research using shrinkwrap film to extend shelf life. This should be done with normal atmospheres and also modified atmospheres. A new technique for modified atmosphere packaging was developed recently by Dr. Bill Powrie at the University of British Columbia in Canada. The patent for this technology was purchased by:
- Pacific Rim Foods, Inc.
Suite 920 - 1176 West Georgia St.
Vancouver, British Columbia, Canada V6E 4A2
Telephone: (604) 662-7121
Telex: 04-508 375 MAROB VCR

It is claimed by Dr. Powrie that the use of low temperatures, clear plastic packaging, and mixtures of

non-toxic inert gases has allowed fresh strawberries to remain firm for one month. This method should be evaluated as a possible solution to increasing shelf life of tropical fruits.

Workshop

On August 29 to September 7, 1988, various subjects were discussed in Bangkok, Thailand at the Department of Agriculture in a workshop entitled "Postharvest Improvement of Fresh Fruits and Vegetables." A wide range of subjects were covered at this workshop, including postharvest handling and marketing. This consulting team (Jack Ross and Waldo Heron) were on the program. (See ANNEX F for Workshop Schedules.) Participants in the workshop were from various Asian countries.

ANNEX A

WORK SCHEDULE FOR WALDO G. HERON AND JACK ROSS FROM
MAY 2 TO MAY 29, 1988

5/02	Mrs. Dara Buangsuwan Division and Staff, Bangkok	Plant Pathology & Microbiology, Department of Agriculture; planning meeting
	Mr. Saichol Ketsa Bangkok	Horticulture Department, Kasetsart University; discussion on postharvest handling of Thai fruits and vegetables
5/03	Mr. Woravut Yovit Pattaya-Rayong	Assistant Managing Director, Siam Agro Industry (Pineapple) Co. Ltd; visit to a pineapple plantation and experimental farm for tropical fruit
5/04	Mr. Niwat Pontchour Rayong	President, Rayong Fruit Growers Association; visit to mangosteen and rambutan plantation; packing of mangosteen
	Chantaburi	Department of Agriculture Experimental Station; viewed trial plots of black pepper, durian, mangosteen and rambutan
5/05	Mr. Palakool Rayong	Managing Director, Rayong Fruit Co. Ltd; discussed growing and marketing of durian, mangosteen and rambutan

5/06	Mr. Udom Dechmani Mr. Somchai Suckhontasing Mr. Prasit Sornthum Bangkok Dr. Suraphong Kosiyachinda Bangkok	Director, Plant Protection Service Division, Dept. of Agricultural Extension (D.O.A.E.); discussion of Thai fruits and problems related to exporting Department of Horticulture, Kasetsart University; discussion of postharvest problems
5/07	Nakhon Pathom Mr. Saeng Kittiyanyanya Nakhon Pathom	Visit to areas growing baby corn, grapes, papaya, fresh water shrimp and fresh vegetables Discussion with citrus and pummelo grower on marketing of fruit
5/09	Bangkok	Visit to a private wholesale market to see the arrival and distribution of fruits and vegetables. Some packaging equipment was available for exports
5/09	Don Muang Airport Bangkok	Visit to observe export procedures and how air shipments are handled
5/10	Chiang Mai	Discussion with Export Promotion Department, D.O.A.E.

	Dr. Prapat Sitdhisung Chiang Mai.	President, Prapat Farm; visit to a mango plantation, packinghouse and exporter
5/11	Mr. Wanchai Lerdpongdee	Managing Director, International Fruits (Bangkok) Co. Ltd; visit to packinghouse and exporter of lychee and orchids
	Mr. Buntoon Chirawathanakul	Managing Director, Chiangmai Thanathon Co., Ltd; visit to a citrus plantation and discussion of exports of citrus and lychee
5/12	Lanphun	Visit to longan growing area
	Mr. J.George Bummer Chiang Mai	Head Maltster, Chiang Mai Malting Co. Ltd. (Owned by Boonrawd Brewing Co.); discussion of the brewery's plans to grow and export fruits and vegetables
5/13	Mr. Suchart Nilvas Bangkok	Fruit business assistant, The Shell Company of Thailand, Ltd; discussion of Shell's plans to export Thai fruit to Western Europe
	Bangkok	Kwang Hua Industries, Ltd, Partnership; carton manufacturer
5/14	Dr. Robert A. Ralston Bangkok	Projects Division, Ministry of Agriculture & Cooperatives;

- meeting to report on
observations and future plans
- 5/16 Ms. Tanva K. Lee
Bangkok
Food Trader, C.P. Inter-trade
Co. Ltd; discussion of C.P.'s
plans to export Thai fruits and
vegetables to Western Europe
- 5/17 Ms. Tassnee Suthapa
Bangkok
Export Service Division,
Department of Export Promotion,
Ministry of Commerce;
review of work that is being
done to promote the sale of
Thai fruits and vegetables
overseas
- 5/17 Mrs. Sing Ching
Tongdee
Bangkok
Postharvest technology
laboratory, Thailand Institute
of Scientific and
Technological Research (TISTR);
discussion of the work being
done by this organization
- 5/18 Bangkok
Association of
Plant Pathologists;
presentation of paper on
"Marketing of Thai Fresh Fruits
and Vegetables"
- 5/19 Mrs. Dara & Staff
Bangkok
Meeting to plan observation and
inspection trip to Frankfurt
and London;
examine the fruit held in cool
storage since April 26th, to
determine feasibility of future
ocean shipments

5/20 D.O.A. Bangkok	More examination of fruit held in cool storage
5/21 D.O.A. Bangkok	Observe the grading, selection and packaging of the trial air shipment to West Germany
5/23 Frankfurt	Obtain fruit shipment from airport; conclude plans for trial shipment
5/24 Suwipan Thisyamondol	Assistant Director, Thai Trade Center; examine trial shipment of fruit for packaging damage and condition of the fruit; discussion of the work being done by the Thai Trade Center to promote fruit and vegetable exports
5/25 Frankfurt	Visit to wholesale market and talks with Hameiso and FRUCO concerning the acceptability of Thai fruit in West Germany; visit to retail fruit market and a department store
5/26 Frankfurt	Visit to H & L & Toom Markets
5/27 Mr. A.R. Miller Faversham, Kent	Buyer, Hunter Produce Limited; discussion of the sales possibilities for Thai fruit and vegetables in the United Kingdom

5/28 London

Visits to J. Sainsbury,
supermarket, and Marks &
Spence, Department Store

Annex B. PRICE COMPARISONS AT RETAIL LEVEL IN FRANKFURT AND LONDON.

PRODUCT	COUNTRY OF ORIGIN	FRANKFURT, WEST GERMANY			LONDON, U.K.	
		Small Retail Market	H & L Markt	Toom Markt	Mark & Spencer Dept. Store	J. Sainsbury Supermarket
1. Baby Corn	Thailand	DM 2.50/Pack US\$ 1.51/Pack			L 1.19/Pack US\$ 2.31/Pack	L 0.78/250 grms US\$ 1.51/250 grms
2. Carambola (Star Fruit)	Malaysia	DM 3.00/3.50			L 2.25/lb US\$ 4.36/lb	
	Israel	US\$ 1.82/1.92		DM 2.99/ea US\$ 1.81/ea		
3. Cherimoya		DM 6.50/ea US\$ 3.93/ea				L 1.45/lb US\$ 2.81/lb
4. Guava	Brasil					
5. Lychee		DM 2.20/100 grms US\$ 1.33/100 grms				
	Malaysia		DM 19.90/kg US\$ 12.06/kg	DM 19.90/kg US\$ 12.06/kg		
	Thailand				L 1.49/Pack US\$ 2.89/Pack	L 2.25/lb US\$ 4.36/lb
6. Mango	Brasil	DM 5.94/ea US\$ 3.60/ea		DM 3.99/ea US\$ 2.42/ea		
	Costa Rica	DM 5.00/ea US\$ 3.03/ea				
	Ivory Coast		DM 1.99/ea US\$ 1.21/ea			
	Haiti			DM 2.99/ea US\$ 1.81/ea		
	Kenya					L 1.15/lb US\$ 2.23/lb
	Thailand (Green)				L 1.39/ea US\$ 2.70/ea	
7. Mangosteen	India	DM 2.20/100 grms US\$ 1.33/100 grms				
	Indonesia					L 2.25/lb US\$ 4.36/lb
	Thailand				L 1.49/Pack of four US\$ 2.89/Pack	
8. Papaya	Costa Rica	DM 5.95/ea US\$ 3.61/ea				
	Brasil					
9. Passion Fruit	Kenya & South Africa	DM 2.50/ea US\$ 1.51/ea			L 1.29/ea US\$ 2.50/ea L 0.19/ea US\$ 0.37/ea	L 0.95/lb US\$ 1.84/lb L 1.65/lb US\$ 3.20/lb
10. Pineapple	Ivory Coast		DM 4.99/ea US\$ 3.02/ea		L 1.99/ea US\$ 3.86/ea	
	Costa Rica		DM 3.99/ea US\$ 2.42/ea		L 1.49/ea US\$ 2.89/ea	L 0.98/ea US\$ 1.90/ea

10. Pineapple Australia
 (cont.) Puerto Rico
 Ghana

11. Rambutan Thailand

12. Sapodilla Thailand

13. Strawberries Spain

DM 2.99/500 grms
US\$ 1.81/500 grms

L 1.49/ea
US\$ 2.89/ea
L 1.99/ea
US\$ 3.26/ea
L 0.99/Pack
US\$ 1.62/Pack

L 3.50/ea
US\$ 6.79/ea

L 2.35/lb
US\$ 4.56/lb

Note: D: quoted at US\$ 1.00 = DM 1.65
 L quoted at US\$ 1.94 = L 1.00

Source: Personal observation

ANNEX C-1

PAPER PRESENTED BY WALDO G. HERON TO THE ASSOCIATION OF
PLANT PATHOLOGISTS IN BANGKOK ON MAY 18, 1988

It is a pleasure to be here with you this afternoon to discuss export marketing of Thai fresh fruits and vegetables. In the short time we have been in Thailand we have had the opportunity of visiting many parts of your country and talking to growers, exporters, government officials in the Department of Agriculture and the Ministry of Commerce, professors at Kasetsart University and the Thailand Institute of Scientific and Technological Research. We certainly appreciate the help and time these people have given so that we might have a better understanding of the problems you are faced with.

The trips that we took were to:

1. Pattaya - Rayong - Chantaburi. Here we were able to see how durian, mangosteen, papaya, pineapple and rambutan were grown, harvested, packaged and transported.
2. Nakhon Pathon. In this area we visited and talked with growers of baby corn, grapes, papaya, pummelo and fresh vegetables.
3. Chiang Mai - Fang - Lanphun. On this trip we saw citrus and mango plantations and areas where lychee and longans are grown. We also visited packing sheds for mangoes and lychees.

As I mentioned earlier, my topic today will be marketing of fresh fruits and vegetables. Many people who have not been involved with selling products overseas have attached an

aura of mystery about marketing. I would like to change this idea, for basically all that is required is a knowledge of the customs and buying habits in each country where sales are to be made and a lot of hard work to convince buyers to purchase the products you are selling.

I would like to divide my talk into three parts, market research; selection of markets or sales areas, products that can be sold in these areas and the distribution channels to be used; and finally the type of organization that can be successful in exporting.

Market research is the key to success in selling a product, whether it be for the domestic or export markets, as the information that has been collected will provide the background for making sound decisions in planning the marketing strategy to be used.

The first step is to obtain statistical data on the markets where you would like to sell your products. This may be difficult in some countries that do not have accurate records of their imports of tropical fruits and vegetables because of their limited volume. However, I try to develop data for at least a five year period to see if there are any trends, such as an increase or decrease in imports, that may affect the sale of my products. I also try to determine the country of origin for the different products, physical volume and dollar value for each product. This information provides me with an insight on the competition I may expect and the size of the market I am trying to develop.

Once I have collected this data, I can then target the countries that offer the best possibilities for the products that I am offering for sale.

The second step is to obtain detailed information on the markets that have been targeted. This can best be done through personal visits to each country to determine how to sell in that area. It is important to know that each country is different and that a marketing program must conform to local customs to be successful.

A country visit should include the following activities:

1. Talks with as many importers as possible to know what type of products they are interested in selling.
2. Visits to retail stores, supermarkets and department stores if they carry fresh produce, to see what tropical fruits and vegetables are available, how they are displayed and selling prices.
3. Interviews with suppliers of first class hotels and restaurants, since many of these dining out establishments would like to feature new and exotic products.
4. Investigations of the different ethnic markets, for areas with large Asian populations know and would like products they are familiar with and consume in their own countries. For example, Jack Ross knows of a Thai lady in Los Angeles who paid US \$25.00 for one durian and was happy to find this fruit which reminded her of home.

The third step is to analyze the results from your personal visit. By this time you should have a knowledge of the following data:

1. Products which have a demand in the countries you have visited.

2. Who your major competitors are, their advantages and disadvantages.
3. Packaging requirements in each market you have visited. This should include the most acceptable sizes for the different products, the type of packaging that is required and steps which should be taken to avoid product damage in transit. In some countries, palletizing is becoming important to lower handling costs at the supermarket level.
4. Acceptable varieties of fruits and vegetables consumed in each country or market. For example, green mangoes vs the orange red varieties, as some consumers think that a green mango is not ripe and will not purchase this fruit. Remember, it is very difficult to change peoples' buying habits, their tastes and preferences.
5. Pricing data at both retail and wholesale levels in the countries you have visited in addition to information on import prices from nations you may be competing with.
6. The distribution channels normally used to move fresh fruits and vegetables from the time they arrive at the port of entry until they reach the consumer. It is also very important to know who your major customers will be, so that you may choose the right distribution system to service this market.
7. The problems associated with exporting fresh fruits and vegetables to different markets. These can include grades and standards, quarantine regulations, customs clearances and requirements, acceptable chemical residues on the products and labeling information.

Once this information has been compiled and analyzed, decisions can be made on selecting target markets, products that have a demand in these markets and the most suitable distribution method for each market.

The selection of the proper distribution channel is vital to the success of an export program and the final choice should be decided through personal contact. Some of the steps which should be taken are the following:

1. Talk with as many people as possible before choosing an importer or distributor.
2. Be sure to obtain references from banks and customers.
3. Request importers or distributors who are interested in your products to take you on visits to their clients. This will give you an indication of who their customers are and how they will fit into your marketing plan.
4. Decide how important your product line will be to the importer. For example, does he/she have allied or competing products and how familiar is the importer with tropical products.
5. Plan on a long term relationship with the importer or distributor you select, for if an exporter changes sales outlets frequently, buyers will lose confidence in you and your product.

A word of caution, be sure to pick your markets carefully as it is nearly impossible to develop several new areas simultaneously. It is important to concentrate your efforts on those countries that offer the best possibilities and

once you have established your products in these markets, move on to your next target.

Thailand is now selling its fruits and vegetables to many of the markets I would like to comment on:

1. Japan--offers high prices but is very quality conscious and has difficult regulations that must be complied with.
2. Europe--a market that is developing rapidly for tropical fruits and vegetables. Many countries are quality and price oriented.
3. The Middle Eastern countries--have money to spend but like to bargain on pricing and quality.
4. Asian Rim Countries--Thai products are well known in many of these markets and their products are accepted in Malaysia, Singapore, Hong Kong and Taiwan.
5. United States--is a difficult market because of the various regulatory agencies that establish standards on imported products, such as the U.S. Department of Agriculture (U.S.D.A.); Animal and Plant Health Service (APHIS); the U.S. Food and Drug Administration (F.D.A.); and the Environmental Protection Agency (E.P.A). In addition, the average American consumer is not familiar with many of the available tropical fruits and vegetables, though ethnic markets are becoming very important.

I would also like to comment on some of the products which I think have good export potential. These are:

1. Mangoes. Europe is importing mangoes from many tropical countries, so there is a lot of competition

especially from varieties that have been accepted in these markets. Green mangoes will be more difficult to introduce than the yellow variety. Sales to Japan offer a good possibility; however, it may take some market research to determine what varieties are acceptable there.

2. Pineapple. There should be a good market for fresh pineapple in Europe, Japan and the Middle East. There will be competition, but the quality of Thai pineapple is excellent and can be sold in these areas. Because of the physical volume, pineapple should be shipped via ocean freight; therefore, research may be required on postharvest handling to insure that the fruit arrives in good condition.
3. Papaya. The greatest demand in Europe is for small papaya similar to those grown in Hawaii. Experimental plots should be started with this variety to see if it would be profitable to raise this type of papaya in Thailand. The varieties that are being produced in Thailand are very good with an excellent flavor, but the size is a disadvantage. Possibly a market could be developed with the hotel and restaurant trade for large fruit.
4. Guava. This fruit is not well known outside of the tropical countries; consequently, the demand is limited in Europe. There is, however, a market for frozen pulp in both Europe and the United States.
5. Mangosteen. The demand for mangosteen is limited as it is not well known in Europe, Japan and the United States. It is one of the most delightful tropical fruits and sales can increase with proper promotional

efforts. Frozen mangosteen offers a good possibility in those countries with fruit fly problems.

6. Rambutan. The fruit has a limited demand at present in Europe as it is not well known and has a relatively short shelf life. Additional research should be conducted in postharvest handling to determine what steps can be taken to increase its usable life. Sales can be made in the Asian Rim Countries.
7. Lychee. Sales of lychee are increasing in Europe due to the promotional work that has been done. Here too, research is needed to extend the shelf life of the fruit. Canned lychee is found in both Europe and the United States. Competition will come from China and other Asian countries.
8. Strawberries. Off season strawberries offer an interesting possibility in Europe and Japan. Prices are high from November to March, so the fruit can be air freighted to these markets and the cost of transportation absorbed by the consumer.
9. Durian. This fruit is an Asian delicacy and not well known in the Western countries. Sales of durian should be targeted to ethnic markets with large Asian populations. Frozen durian offers an interesting possibility, since only the edible part is frozen; thus one can avoid the cost of shipping the entire fruit, which is heavy. Freezing also provides a long shelf life, while fresh fruit has a usable life of six to eight weeks when held at four to six degrees centigrade at 85 to 90% humidity.
10. Baby Corn. The demand for fresh baby corn is increasing in both Europe and the United States.

Thailand is supplying a large part of the European market while the American market is supplied by Central American countries.

There are many other products that can be exported, such as fresh asparagus and baby or small vegetables. However, this would require market research to determine what products can be sold to the different countries and their sales prices to determine if it would be a profitable venture.

I believe that an export program should be developed through three broad categories; large companies, trade associations or cooperatives and small exporters.

Trade with the more sophisticated countries such as those Western Europe, Japan and the United States can best be serviced by large companies or trade associations. Large companies have the advantage of international experience, the necessary capital to develop an export market through sales promotion and travel, and the willingness to make a long term commitment to obtain future profit. They also understand the need for quality control requirements, reliability and continuity of sales efforts.

Trade associations or cooperatives, composed of farmers, could play an important role in expanding Thailand's export program, but they must be managed by competent, market oriented professionals. As an avocado and citrus grower in Southern California I belong to two cooperatives, Calavo for avocados and Sunkist for my oranges. Our relationship has been most satisfactory, for I only grow the products while the cooperatives harvest, clean, grade, package and market my products much better than I could as an individual or through an independent broker.

Small exporters can sell to the less sophisticated markets such as Malaysia, Singapore, Hong Kong and Taiwan, where restrictions on quality, packaging and transportation are not as stringent as those of the more developed nations. Language is less of a barrier, and travel to these countries is less expensive.

I would like to conclude my talk with some do's and don'ts in developing export markets:

1. Don't expect miracles overnight. Plan on three to five years to develop an export market.
2. Remember, quality starts on the farm and that a marketer cannot improve the products he is given to sell. Work on improving varieties that are acceptable in the export markets, as well as yields, quality and postharvest handling methods.
3. Be prepared to travel abroad to work with your importer or distributor, for this will give both parties a better understanding of each others problems.
4. Continue the excellent sales promotional efforts conducted by the Department of Export Promotion in the Ministry of Commerce.
5. Participate in Trade Fairs, but take an active role in seeking out buyers; don't wait for them to come to you.
6. Plan on closer cooperation between the different Thai technical groups and the farming community, so that the available knowledge is disseminated to the farmers where it can be used most advantageously.

7. Don't vary the quality of the product to be sold once grade standards have been established. It is an impossible task for a marketer to explain quality variations on different shipments, and you will lose the confidence of your buyers.

Thank you for your attention and I am looking forward to seeing you in September when we will return to Thailand to continue working with you on postharvest handling and marketing.

I will be very pleased to answer any questions that you may have regarding my presentation.

ANNEX C-2

**PAPER PRESENTED TO WORKSHOP ON IMPROVEMENT OF POSTHARVEST
HANDLING SYSTEM FOR FRESH FRUITS AND VEGETABLE, AUGUST 29 -
SEPTEMBER 7, 1988.**

By Waldo G. Heron

It is a pleasure to be back in Thailand and to have the opportunity of addressing this workshop. I have reviewed the topics you have covered this past week and I would like to commend the organizers on a very complete and detailed program. By now all of you must be experts in postharvest technology. The next step is to apply this knowledge in marketing your products.

In my talk this afternoon I would like to emphasize the practical aspects of marketing, and to do this will divide my presentation into two parts, grade standards and the basic considerations in establishing market strategy.

Grade standards provide a common meeting ground between the buyer and seller of fresh produce, so each party will know what is expected of the other. To show the importance attached to grade standards, the European Common Market has established standards for 11 fruits and 20 vegetables, while the United States has 156 standards covering 85 different fruits and vegetables. The U.S. Department of Agriculture also publishes instruction bulletins for inspectors on how they should grade the different products.

I would now like to show you some slides on the quality requirements for fruits and vegetables in Western Europe.

(Showed "A Guide to Quality Requirements for Fruit and Vegetables in Western Europe" prepared by the Tropical Development and Research Institute, London, England.)

You have probably noticed that there are no grade standards for tropical fruits and vegetables in the European Common Market countries. The reason is that many of these products are relatively unknown, and there is not sufficient volume to warrant developing grade standards for these products at this time. I am sure that in the future as new markets are developed for these products that standards will be established.

Some of you will probably be called upon to assist in developing these standards. This should be achieved through meetings with buyers, sellers, growers and technicians from the Department of Agriculture and universities. Every effort should be made to arrive at practical norms that growers can meet, yet at the same time are acceptable to the buyers.

A standard will normally consist of three to four grades for each product. For example in the United States you might find the following grades for a product: U.S. Fancy, U.S. #1, U.S. #2 and U.S. Commercial.

Usually each grade will contain the following information:

1. A description of what is expected from that grade.
2. Acceptable sizes for the product.
3. Acceptable tolerances for defects and sizes, usually expressed in percentages.
4. An explanation of how the tolerances will be applied.

5. A definition of the terms contained in the description of the grade.

Grade standards for the European Common Market can be obtained through the:

United Nations Office,
Distribution and Sales Section,
Palais des Nations,
Ch 1211 Geneva 10, Switzerland

The U.S. standards can be obtained by writing:

Agricultural Marketing Service, AMS/USDA
Information Staff, Room 3058 S
Washington, D.C., 20250, U.S.A.

In addition to grade standards, you must also be aware of the regulatory agencies you will be dealing with in each country where you will be selling your products. In the United States, the major agencies involved in the importation of fruits and vegetables are:

1. ANIMAL AND PLANT HEALTH INSPECTION SERVICE. (APHIS)

This department performs the following services:

- A. Issues Import Permits.
- B. Inspects all imported products.
- C. Maintains a list of approved commodities that may be imported from each country in the world.

2. FOOD AND DRUG ADMINISTRATION. (FDA)

- A. Inspects and enforces tolerance levels of pesticides and other contaminants.

- B. Enforces labelling requirements for consumer packaging.
3. ENVIRONMENTAL PROTECTION AGENCY. (EPA)
- A. Registers and reviews pesticides and establishes tolerances for residue levels in foods.
 - B. Maintains a list of approved pesticides and tolerance levels.
4. AGRICULTURAL MARKETING SERVICE. (AMS/USDA)
- A. Maintains 156 standards covering 85 products as well as inspection instructions. The standards and instructions give guidance on size, color, shape, texture, maturity, cleanliness and defects. The standards are voluntary except in the case of 15 fruits and vegetables where the regulations are mandatory. None of these products are now being exported from Thailand; however, the list can be obtained by writing AMS.
 - B. Enforces marketing orders which may apply at certain times during the year for different products.
 - C. Enforces the Agricultural Commodity Act, which prohibits fraudulent practices in the marketing of fresh and frozen fruits and vegetables. Commission merchants, dealers and brokers handling these products must be licensed, so AMS actually is a police force to insure that these groups are operating within the law.

The United States Department of Agriculture has recently published an excellent handbook on tropical agricultural products that covers many of the topics you have discussed this week. Some of the information contained in the handbook includes postharvest practices, packaging, transportation and data on 115 different fruits and vegetables; potted flowering and foliage plants; and cut flowers and florist greens. The data for each product includes availability during the year from different countries, U.S.D.A. grade standards, special treatment if required, precooling information, temperature and humidity requirements, transit and storage life and types of preferred packaging used by the trade.

I strongly recommend that you try to obtain a copy of this handbook, as I have found it extremely helpful in the postharvest handling and exporting of tropical products. Copies of the publication may be obtained by writing the Office of Transportation and requesting a copy. The title and address are as follows:

Tropical Products Transport Handbook, No. 668
Export Services,
U.S.D.A. Office of Transportation
Washington, D.C., 20250-4500

I believe that by now you will have realized the importance that grade standards play in export marketing.

In order to be successful in developing an export market for tropical fruits and vegetables, the first step is to learn all that you possibly can about the different potential markets for your products. I usually start by accumulating import statistics from the various countries where I would like to sell my products. The Thai Trade Centers overseas can either obtain this information for you or advise the source you should contact that publishes this data.

Normally I try to get statistics for at least a five year period as this will show trends in imports as well as country of origin, volume and value for each product. A word of caution, because of the low volume of tropical imports the country statistics may lump several products under one classification, so it may be difficult to find accurate data for some of the tropical fruits or vegetables you would like to export.

Once I have sufficient statistical information, I can then decide which countries offer the best possibilities for importing my products and can visit the more promising ones to collect specific information on how to sell in that market. A country visit should include the following activities:

1. Contact as many different importers as possible to know what products they would like to sell. They can also provide information on pricing, packaging, import regulations or restrictions and potential customers that might buy your products.
2. Visit retail stores, supermarkets and department stores if they carry fresh produce. This will give you some idea of the tropical fruits and vegetables that are being sold in that market, how they are being displayed and consumer selling prices.
3. Interview suppliers of first class hotels and restaurants as many of these establishments would like to feature new and exotic products or dishes from foreign countries.
4. Investigate the different ethnic markets in a country, for areas with large Asian populations are familiar with tropical fruits and vegetables and will buy

products they normally would consume in their country of origin.

Once this information has been accumulated and analyzed, you can select those markets that offer the best possibilities for the sale of your products and the market strategy you should use to develop sales in that country.

One of the most important decisions to be made is selecting the proper distribution channel in each country that will provide the broadest possible coverage for your products in that market. This selection should be made through personal contact and not by mail; you should know and trust the person you will be dealing with as your success will depend on the efforts he expends in your behalf. You must plan on a long term relationship with the importer or distributor you select, for if an exporter changes sales outlets frequently, buyers will lose confidence in you and your products.

Another important decision is to pick your target markets carefully as it is next to impossible to develop several new areas simultaneously. It is important to concentrate your efforts on those countries which offer the best possibilities for your products, and once you are established in one country move on to the next target.

On our recent trip to Frankfurt and London we saw many tropical fruits and vegetables in the different stores we visited. In talking with the importers and distributors the feeling was that this is a new market and one which will grow in future years. Some of the tropical fruits that were in demand are mango, pineapple and papaya. Some of the lesser known fruits that can be developed are guava, mangosteen, rambutan and lychee. Durian can be sold primarily in areas with Asian populations as they are

familiar with this fruit and consider it a delicacy. The demand for baby corn is increasing in Europe, and interest is being shown in new sources for fresh asparagus and baby or small vegetables. The market for fresh fruits and vegetables during the winter months in Europe is very interesting, as prices are high because of limited supplies at this time of year.

I would like to conclude my talk with some do's and don'ts in developing export markets:

1. Don't expect miracles overnight. Plan on three to five years to develop a new export market.
2. Remember that quality starts on the farm and an exporter cannot improve the products he is given to sell. This is the reason for the emphasis on proper postharvest handling of fresh produce.
3. Be prepared to travel abroad, especially when trial shipments are being made, to see the arrival condition of your products. Work closely with your importer or distributor to improve the quality of your products through better handling, packaging and transportation.
4. Continue the excellent sales promotion efforts conducted by the Department of Export Promotion in the Ministry of Commerce. Consider possible cost sharing between the private sector and Thai Government agencies for special product promotional activities.
5. Participate in Trade Fairs, but take an active role in seeking out buyers; don't expect them to come to you.
6. Plan on closer cooperation between the different Thai technical groups and the farming community so that the

available technology is disseminated to the farmers where it can be used most advantageously.

7. Don't vary the quality of the product to be sold once grade standards have been established. It is an impossible task for an exporter to explain quality variations on different shipments, and you will lose the confidence of your buyers.

Thank you for your attention, and I will be very pleased to answer any questions you may have regarding my presentation.

ANNEX C-3

**REPORT BY WALDO G. HERON ON MARKETING OF THAI FRESH FRUITS
AND VEGETABLES PRESENTED AT THE DEPARTMENT OF AGRICULTURE
SEMINAR, SEPTEMBER 9, 1988**

When Mr. Ross and I were in Thailand last May we had the opportunity of visiting many of the growing areas in your country to view the production and handling of Thai fruits and vegetables, and needless to say we were impressed with what we saw.

We made trips to the following areas:

1. Pattaya - Rayong - Chantaburi: where we observed the growing and handling of pineapple, mangosteen, rambutan, papaya and durian.
2. Nakhom Pathom: to visit producers of baby corn, fresh vegetables, grapes and pummelo.
3. Chiang Mai - Fang - Lanphun: on this trip we saw citrus and mango plantations and areas where longans and lychees were growing. We also visited packing sheds where mangoes and lychees were being prepared for export.

While we were in Bangkok we also met with exporters and experts from Kasetsart University and had discussions with technical people from governmental departments responsible for the production, postharvest handling and marketing of fresh fruits and vegetables.

In Europe we observed the arrival of the trial shipment of fruit made by air to Frankfurt, visited a wholesale market where we talked with importers of tropical products and saw

street markets, supermarkets, retail stores and shopping centers where tropical fruits were being sold. In London we interviewed a major fruit importer and also visited supermarkets and shopping centers that were selling tropical products. I am pleased to report that throughout our trip there was an interest shown in importing Thai products.

I would now like to report on my observations during our trip and will start with some recommendations on steps that should be taken to increase Thai exports of fruits and vegetables.

1. It is important that the research conducted by the Department of Agriculture in postharvest technology and the work being done by the Export Promotion Program of the Ministry of Commerce be closely coordinated with the needs of the private sector. Small exporters and some of the larger companies lack the necessary funds to do the basic research in these areas that is needed to develop new markets overseas. In many countries the cost to initiate these types of programs are financed by the government or under some form of cost sharing between the government and the private sector.
2. Market research should be conducted to select a few countries which offer the best potential to import Thai fruits and vegetables. At present there is insufficient production in Thailand to meet your domestic needs and also to supply the demands from all of the European nations, Japan, the United States and the Asian countries.
3. Thailand should develop an image of high quality for its fruits and vegetables. Sophisticated markets expect their international suppliers to furnish the same quality produce they demand from their domestic

suppliers. This must be achieved through improved varietal selection, postharvest technology, packaging and transportation methods. Production of tropical fruits and vegetables is becoming highly competitive, and only those countries that offer the best quality produce on a continuing basis will be successful.

4. One way to achieve this goal is to establish grade standards for each product and insure that they are being complied with on all export orders. Grade standards should be developed through committees consisting of growers, exporters, importers and government agencies. These standards must be practical to they can be met by the growers using their normal production methods.
5. A common complaint we have heard in Thailand concerns the cost and unreliability of air freight shipments. These problems must be negotiated with the carriers and as an alternative, consider ocean shipments for those products with a long shelf life. Additional trial shipments will have to be made by ocean to determine the arrival condition of the products and steps taken to correct any deficiencies that may have occurred. This can be done by improving the current postharvest handling methods using existing technology available from the more developed countries.

One way to improve the handling conditions at Don Muang Airport is to install cool storage facilities to store produce when a scheduled shipment has been cancelled or delayed. If the products are stored at ambient temperatures, spoilage will occur and the shelf life of the product reduced. In Central America where they had similar problems, the air terminal either rented or purchased refrigerated containers used for ocean

shipments to store the products under controlled temperature and humidity conditions. This minimized spoilage and losses to the exporter.

I would not like to talk about our interviews in Europe. Some of the better known imported fresh tropical products found in the stores we visited were:

1. Baby corn from Thailand
2. Caramobola or starfruit from Malaysia
3. Guava from Brazil
4. Lychee from Malaysia and Thailand
5. Mangoes from Brazil, Costa Rica, Haiti, Ivory Coast, Kenya and a few green mangoes from Thailand. The mangoes from the other countries were either green/red or yellow/orange in color. One of the points stressed by the importers was the housewife considers a green mango to be immature or unripe, so she is unlikely to buy this variety.
6. Mangosteen from India, Indonesia and Thailand. The Thai product was better presented with regards to uniformity and packaging.
7. Papaya from Brazil and Costa Rica. The preferred variety is the Solo with an average weight between 400 and 800 grams. A market for the larger Thai papaya might be developed with high class restaurants and hotels for use in tropical fruit cocktail or as sliced fruit.
8. Passion fruit from Kenya and South Africa

9. Pineapple from Australia, Costa Rica, Ghana, Ivory Coast and Puerto Rico. South Africa has started to export a small or baby variety of pineapple that has gained some acceptance in the local markets.
10. Rambutan from Thailand
11. Sapodilla from Thailand
12. Strawberries from Spain.

Importers showed an interest in fresh fruits and vegetables, including specialty items such as asparagus and strawberries that can be shipped to Europe during their winter months, from November through March, when local production is not available. New items that have future possibilities are baby or small vegetables for the restaurant and hotel trade.

Marketing methods in Europe are changing, and it is important that an exporter be aware of what is happening in the marketplace. For example, Germany has been known as a price market, but now the housewife looks for appearance, freshness and quality, then looks at the price. The average housewife shops twice a week to insure that the produce she buys is fresh. She is also doing more impulse buying, which means that shelf life and attractive packaging play an increasing role in marketing.

National retail organizations and department stores are regionalizing their purchases and supplying their stores through central warehouses. Chain stores and discount houses work through specialty fruit and vegetable distributors who take orders and supply the individual retail stores directly. Some of the larger chains are starting to operate at the import/wholesale level and are

establishing exclusive direct contacts with overseas suppliers or exporters.

The increasing importance of self-service stores has made pre-packaging in consumers size units a factor in marketing. This type of operation is expensive in Germany and the United Kingdom due to their high labor costs. It may be worthwhile to consider prepackaging in Thailand where labor rates are lower. This would require very strict controls over selection, grading and packaging of fruits and vegetables, but it offers an interesting possibility for the future.

Many of you are probably already exporting Thai fruits and vegetables, while others may be considering new ventures in this field. In either case it would behoove you to learn as much as possible about the individual markets where you plan on selling your products. One of the first steps is to obtain accurate statistical data on imports into a country. Most governments prepare this information from their customhouse receipts and in many instances show the product, country of origin, volume and value of the imported product. This may be difficult for some tropical products since their limited volume does not warrant keeping records on individual items, and a classification may include several or more products under one grouping. Data covering imports over a three to five year period will indicate trends that can be helpful in making decisions on which products can be sold in each country.

Personal visits to targeted countries is a must, for they can yield a wealth of information on the food consuming habits and distribution methods in a country. This type of information can be obtained through talks with importers and distributors; visits to stores where fresh produce is sold; interviews with suppliers to hotels and restaurants; and in

talks with ethnic groups. The data that can be accumulated from a country visit should include:

1. Tropical products in demand in that market
2. Countries that are now supplying this market
3. Packaging requirements
4. Acceptable varieties of fresh fruits and vegetables
5. Pricing data at wholesale and retail levels
6. Distribution methods normally being used to move products from the port of entry to the stores that sell to consumers.
7. Problems associated with exporting to different countries, which can include grade standards, quarantine regulations, customs clearances and requirements for acceptable chemical residues on fresh fruits and vegetables and labeling requirements.

The selection of an importer or distributor is vital to the success of an export program. This should be done through personal contact and some of the steps to be taken are:

1. Talk with as many people as possible before making a choice
2. Obtain references from banks and customers on the person or company you are considering to appoint as your representative

3. Have the importer or distributor take you on visits to their customers to have an idea of the clientele he/she is servicing
4. Decide on how important your product line will be to the importer or distributor and how familiar he/she is with tropical products
5. Plan on a long term relationship with the importer or distributor you have selected, for if you make frequent changes buyers will lose confidence in your business ability and your products
6. Once you start selling in a market, make periodic trips to work with your agent and his customers, to solve problems which may arise or to see what steps are needed to increase your sales in that country

I would like to conclude my talk with some do's and don'ts in developing an export market:

1. Don't expect miracles overnight. Plan on a three to five year program to obtain your objectives
2. Remember, quality starts on the farm, and an exporter cannot improve the raw material he is given to sell. Good postharvest practices will minimize spoilage and maintain the product, but will not change its original state
3. Work with your Department of Agriculture on developing varieties that are acceptable in the export markets; on increasing yields; on improving quality; and on postharvest handling methods

4. Be prepared to travel abroad to work with your agent and to keep abreast of changes that might be taking place in the different markets where you are selling
5. Continue the excellent sales promotional efforts conducted by the Department of Export Promotion of the Ministry of Commerce
6. Participate in trade fairs, but take an active role in seeking out buyers for your products. Don't expect them to come to you for their purchases
7. Don't vary the quality of the products to be sold, so maintain strict control over grade standards on all export orders
8. Close cooperation between the different Thai governmental agencies and the private sector is essential to the success of the program. Remember, nothing really happens until a product is sold at a profit for all concerned parties

Thank you for your attention and I will be very pleased to try and answer any questions you may have regarding our trip to Europe or the points I have brought up in my presentation.

ANNEX D

PAPER PRESENTED BY JACK ROSS TO THE ASSOCIATION OF PLANT PATHOLOGISTS IN BANGKOK ON MAY 18, 1988

COLD STORAGE GUIDELINES

To be successful with fresh fruits and vegetables, cold storage should be associated with a packing operation. In Thailand this means the product is for export.

A sizeable volume of product is needed to obtain high efficiencies and low cost per unit of production.

The costs of hauling products to and from the packing/cold storage facility are major factors in profitability.

1. Long hauls are expensive. For long hauls, large trucks are more cost efficient. For short hauls, small trucks of one or two tons are best. A general rule is that 25 kilometers is the maximum distance from farm to packing/cold storage. A more optimum maximum distance is in the range of 15 to 20 kilometers.
2. The trip from the packing/cold storage facility with products for export can be longer if proper conditions are observed. For example, if a product has been cooled below the dew point, refrigerated trucks must be used to prevent condensing of moisture on the product. Moisture leads to decay problems. The main objective in hauling the product from packing/cold storage is to maintain product quality while keeping transportation costs low. For short distances or in low ambient temperatures, the trucks may not be refrigerated if the product has not been precooled below the dew point. In Thailand the dew point often is in the range of 18

degrees Celsius, and the product will collect moisture if not refrigerated. For long hauls, large trucks are more cost efficient than small trucks.

In using cold storages, a good rule to follow is that any product precooled below the dew point should be kept cool until shortly before it is consumed. The cycle of cooling and warming usually leads to product deterioration and decay.

Moisture condensation on the surface of produce that is transferred from a cold storage room or refrigerated transport vehicle into a warm, humid environment is difficult to remove. This problem is commonly known as "sweating." Its continued presence provides ideal conditions for the development of decay once the product has warmed up. If sweating is likely to occur, the produce should be open-stacked to accelerate warming, which facilitates evaporation of moisture, thus reducing the amount of condensation. However, unless warming is necessary to stop sweating or for ripening purposes, precooled produce should be kept cool.

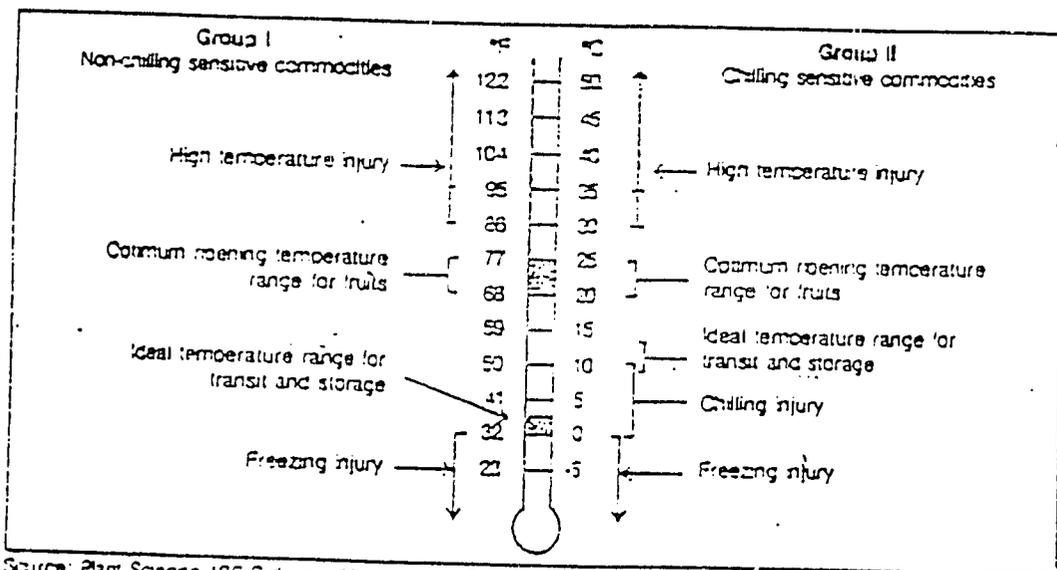
The attached table and graph illustrate the effect of temperatures on fruit and vegetable quality.

ANNEX D

Table 3: Effect of Temperature on the Rate of Deterioration

Tempo (°C)	Relative Velocity of Deterioration	Relative Shelf Life (%)	Loss per Day (%)
0	1.0	100	1
10	3.0	33	3
20	7.5	13	8
30	15.0	7	14
40	22.5	4	25

Source: Plant Science Syllabus, University of California, 1982



Source: Plant Science 195 Syllabus, University of California (1982)

Group I			Group II	
Apples*	Artichokes	Onions	Avocados	Beans, snap
Apricots	Asparagus	Peas	Bananas	Cucumbers
Bush berries	Beans, lima	Radish	Cherimoya	Eggplant
Cherries	Beets	Solanum	Citrus	Muskmelons
Figs	Broccoli	Turnips	Feijoa	Okra
Grapes	Brussels sprouts		Guava	Peppers
Nectarines	Cabbage		Mangoes	Potatoes
Peaches	Carrots		Olives	Pumpkins
Pears	Cauliflower		Papayas	Squash
Persimmons*	Celery		Passion fruit	Sweet potatoes
Plums	Corn, sweet		Pineapples	Tomatoes
Prunes	Garlic		Savola	Watermelons
Strawberries	Lettuce			

*Some varieties are chilling sensitive.

Figure 1. Effects of temperature on storage life of fruits and vegetables (Group I and Group II).

ANNEX E

Temperature Management

Temperature management is the most important tool that we have to extend the shelf life of fresh horticultural commodities. Protection of fresh fruit and vegetables must begin in the field at the time of harvest and continue throughout the postharvest handling period until they are consumed. This protection is vital, not just to avoid immediate deterioration but to delay the onset of deterioration that would appear later in the distribution channels.

Temperature protection in the field should start with shading of the commodity soon after harvest, followed by rapid handling and cooling to minimize high temperature exposure. This means moving harvested crops to the shade of trees or vines while awaiting transport. If natural shade is not available, then portable shading is desirable. At the very least inverting empty containers over the top of stacks of containers, or spreading a tarpaulin or other device can provide some field protection. Figures 1 and 2 show the effects of exposure to sun and of temperature on three horticultural commodities.

Thaimkr.doc

10/6/88

ANNEX E

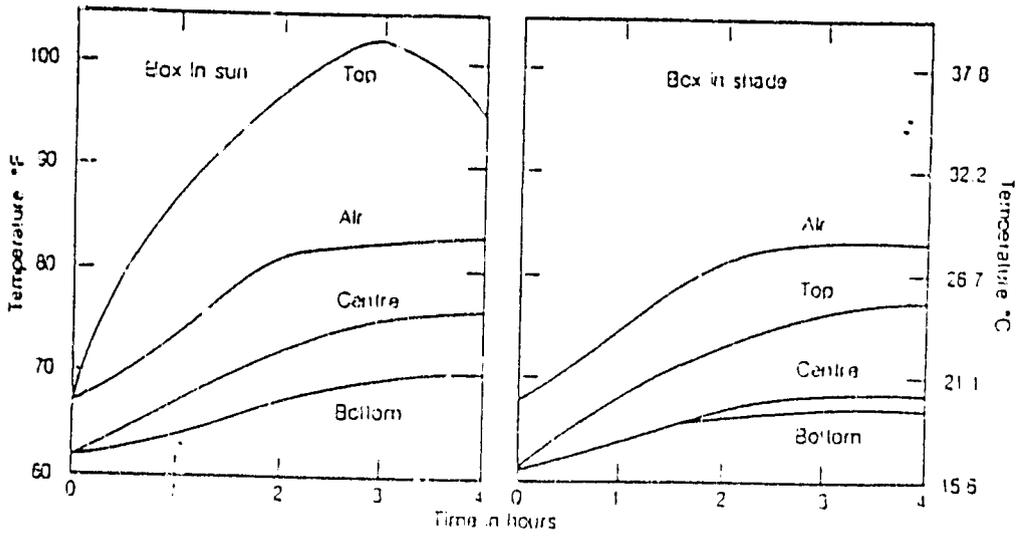


Figure 1. Field temperature of cherries (position in box).

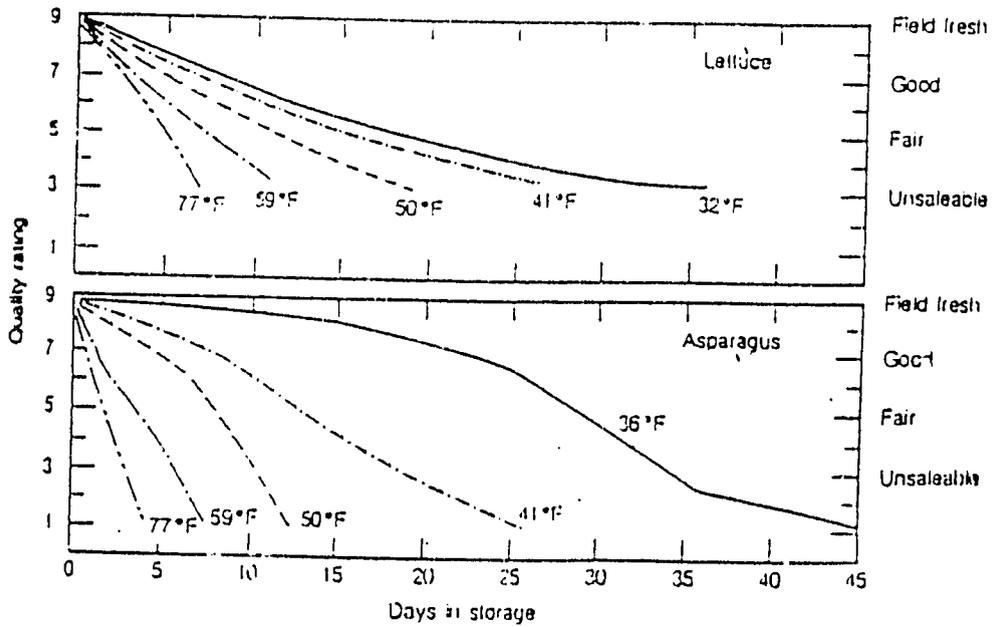


Figure 2. Quality rating of asparagus and untrimmed lettuce stored at five temperatures for various days.

ANNEX F

VENUE AND ACCOMMODATIONS:

The Training Course will be held at the Technical Information Center for Agricultural Export Commodities, Department of Agriculture, Bangkok, Bangkok, Thailand.

Phone: 5794127; 5794111 5790151-8 ext 209

Foreign participants will stay at:

Golden Dragon Hotel:

20/21 Ngarm Wong Wan Road

Bangkok, Thailand.

Hotel reservation, contact:

Mrs. Dara Buangsuwon Director,
Plant Pathology and Microbiology Division

Department of Agriculture

Bangkok 10900, Thailand.

Phone: 5794127; 5794111, 5790151-8 ext 209

Telex: 84103 ACNARP-TH

Special room rates have arranged for course participants at rate:

single room 400 Baht

double room 500 Baht

To obtain these rates which do not include the cost of meals, participants should make advance reservation through the organizers.

GROUND TRANSPORT

The organizers will arrange transportation between the hotel and the Department of Agriculture and transportation for the field trips.

REGISTRATION

A registration fees of US \$ 500 per person will be charged and will include course materials, lunches, coffee breaks and field trips.

Registration fees may be paid before 31 July, 1988

by BANK DRAFT to

The Siam Commercial Bank, Bangkok Branch

1436/ 10-13 Phaholyothin Road, Lardyao

Bangkok, Bangkok 10900. Thailand.

Saving's account no.: 041-1-19050-6.

Name of account: AFHB/DOA TCPH

PARTICIPANTS QUALIFICATIONS

Participants must have a working knowledge of English and a bachelor's level training in an agricultural and/or biological discipline. The course will be particularly useful to those working or planning to work on postharvest problems at a national or regional program level.

CONTACT PERSONS

For further information about the Seminar or clarification of particular points, contact:

Mrs Dara Buangsuwon

Director:

Plant Pathology & Microbiology Division

Department of Agriculture

Bangkok, Bangkok 10900

Thailand

Phone: 5794127; 5794111; 5790151-8 ext 209

Telex: 84103 ACNARP-TH

or

Mr R T Gonzalez

Officer-in-Charge

ASEAN Food Handling Bureau

5th Floor, Block F (North)

Damansara Town Centre

50490 KUALA LUMPUR

Malaysia

Phone: 2551088; 2544199

Telex: 31555 AFHBKL

Fax: 2552787



IMPROVEMENT OF POSTHARVEST HANDLING SYSTEMS FOR FRESH FRUIT & VEGETABLES

A Training Course Organized by:

Thailand Department of Agriculture

ASEAN Horticulture Working Group

ASEAN Food Handling Bureau

The goal of the course is to train agricultural technicians from developing countries to identify and evaluate postharvest problems of perishable commodities and to determine potential solutions applicable within different socio-economic conditions. The course will emphasize the adaptation of postharvest technologies to marketing systems in the ASEAN member countries.

Bangkok, Thailand

29 August - 7 September 1988.

Improvement of Postharvest Handling System
for Fresh Fruit and Vegetables
29 August - 7 September, 1988
Bangkok, Thailand.

List of Participants

BRUNEI

Mr. Asut Kadai
Senior Agricultural Assistant
Sinaut Agricultural Training Centre
KM 33 Tutong Road, Tutong 5185
Bandar Ser. Begawan, Negara Brunei
Darussalam

INDONESIA

Ms. Barus Herlina
Training Staff Officer
J.W. Pendidikan No.3
Brastagi, North Sumatra

Mrs. I. Laksmi Dangini Siswoputranto
Researcher and Head of Information
Subdivision of Research Communication
Research Coordinating Centre for Horticultural
Crop, Jalan Ragunan, No.19 Pasarmingu
Jakarta 12520

Mr. Mulyoto
Head, Postharvest Technology Section
Directorate of Production Development
for Horticulture, Jalan Ragunan No.19
Jakarta 12520

Mr. Surya Effendy Siregar
Product Manager
Pasmakop, Jalan Cemaaka No.3

MALAYSIA

Mr. Jusoh ABD Rahim
Assistant Director
Federal Agricultural Marketing Authority
Tingkat 5,6,7+8 Bangunan Kuasa
Jalan Raja Laut, 50350 Kuala Lumpur

Mr. Mohari Bin Muhamad
Marketing Officer
3rd Floor, Bangunan Kuasa
Jalan Raja Laut, 50350 Kuala Lumpur

Mr. Omar Dali
Senior Technician
Food Technology Division, MARDI

PHILIPPINES

Mr. Doroteo, JR Danbo Mendoza
Affiliate Associate Professor
MTRC, Department of Horticulture
UELD College, Laguna

Ms. Martina Marita Formentera De Ocampo
Agronomist
Philippines Far East Agro-Products INC.
Rambutan Rd., FTI Complex, T.SIG
Metro Manila

Ms. Macita Marquez Palma
Food Technology Supervisor
Philippines Far East Agro-Products INC.
Rambutan Rd., FTI Complex, T.GIG
Metro Manila

Mr. Tito Jalarbal Rimando
Associate Professor of Horticulture
XTRC, JALC College, Laguna

SINGAPORE

Mr. Tang Kock Chong
Primary Production Officer
Primary Production Department
Sembawang Field Experimental Station
Agriculture Division, Postharvest
Horticulture Unit, Sembawang Rd.
Singapore 2776

THAILAND

GOVERNMENT AGENCIES

Ms. Anong Vera-Urai
Lecturer
Agro-Industry Department
Faculty of Agricultural Technology
King Mongkut's Institute of Technology
Latkrabang, Bangkok 10520

Ms. Benjamas Ratanachinokorn

Agriculturist

Horticulture Research Institute

Department of Agriculture, Bangkok

Bangkok 10900

Mr. Chachawal Wijarn

Researcher

Thai Packaging Center, Thailand

Institute of Scientific and Technology

Bangkok

Ms. Margaretha Maria Cordes

Food Technologist/Lecturer

Faculty of Technology, Khon Kaen University

Khon Kaen 40002

Ms. Nipa Kunsongkeit

Lecturer

Bang Pra Agricultural College

Aspur Sathu, Chon Buri

Ms. Mantavon Suwanudana

Head, Project and Evaluation Department

109 BAAC (Bangkok Branch) Bldg.

Paholyothin Road, Bangkok, Bangkok 10900

Mr. Pattarachai Wichaiya

Technical and Planning Analyst

Technology and Environmental Planning

Division, UNDP, Krung Kasem Rd.

Bangkok 10100 76

Ms. Rungnaphan Pongswathanit

Lecturer

Department of Agro-Industry

Faculty of Agricultural Technology

King Mongkut's Institute of Technology

Lakrabang, Bangkok 10520

Mr. Sonsiri Sangchote

Assistant Professor

Department of Plant Pathology

Kasetsart University

Bangkok 10900

Ms. Supaporn Reungmaneeviton

Scientist

Thai Industrial Standards Institute

Rama VI Road, Bangkok 10400

Mr. Thavis Pengsa

Lecturer

Department of Industrial Art

Faculty of Architecture, King Mongkut's

Institute of Technology, Lakrabang

Bangkok 10520

Mr. Moranart Suttawong

Representative

Mango Developers for exportation Association

21/24-25 Ngamwongwan Road, Lad Yao

Bangkhien, Bangkok 10900

PRIVATE SECTORS

Ms. Angsuma Chayasombat
Assistant Manager and Quality Control
S.D. Groups Trading Co. Ltd.
1001 Sansen Rd., Dusit, Bangkok 10300

Mr. Songboon Chiamsombat
Horticulturist (HomeLo)
SAP Co. Ltd., 61 Kasemraj Rd.
Klong Toey, Bangkok 10110

Mr. Mano Thammasaga
Torsap International Co. Ltd.
31 Room 411 Phayathai Bldg.
Phayathai Rd., Bangkok 10400

Ms. Nareerat The
Fresh Fruit and Vegetables Manager
174/4-5 A + D Building, Silom Rd.
Bangkok 10500

Ms. Saipin Maholyotin
Directing Manager
The Red Bull Co. Ltd.
Bangkok 10150

Mr. Poon Kongcharoenkiat
Directing Manager
Packmates Co. Ltd.
514 Racharas-Lumpen Rd.
Bangkok 10310

Mr. Poonsak Thiapairat

Marketing Officer

1 Siam Cement Road, Bangsue

Bangkok 10200

Mr. Preachan Sunatgit

Siam Agro-Industry (Pineapple) Co. Ltd.

Rayong.

Mrs. Ratchaneebul Vutrapongwatana

R&D Manager

2154/1 New Patchaburi Rd.

Bangkok

Mr. Roland Faupon

Road Technology Assistant

Soi Pradoo 1, Sathupradit Rd.

Yannawa, Bangkok

Mr. Sujin Chantarasa-ard

Product Development Assistant Manager

The Shell Co. of Thailand Ltd.

Bangkok 10110

Mr. Ubol Horasing

SAICO, Bangna-Trat Rd.

Bangkok

Ms. Viriya Pungthong

Graduate Student

Department of Packaging Science

Rochester Institute of Technology

Rochester, NI 14623, U.S.A.

Mr. Wasun Trenatra

L.S.S. Co. Ltd.

363/21 Bandojai, Vorachak Rd.

Promprab, Bangkok 10100

Mr. Yanapon Chaicharnavonsarot

Manager/Owner

40/52 Sukapiban 3, Bangkoki

Bangkok 10240

Mr. Yongyuth Kungnimitr

Marketing Manager

1126/1 Room 906 Arkanwanit

New Petchaburi Rd., Phayathai

Bangkok 10400

Improvement of Postharvest Handling System
for Fresh Fruit and Vegetables
29 August - 7 September, 1988
Bangkok, Thailand.

List of Lecturers

MALAYSIA

Mr. Abdullah Hassan

MARDI, P.O. Box 12301, G.P.O. 50774

Kuala Lumpur

PHILIPPINES

Dr. D.S. Mendoza

Department of Horticulture

University of Philippines

Los Banos College, Laguna

THAILAND

Dr. Athapol Noomhorm

Division of Agriculture and Food Engineering

Asian Institute of Technology

P.O. Box 2754, Bangkok 10501

Dr. Danai Doonyakiat

Department of Horticulture

Faculty of Agriculture

Chiangmai University, Chiangmai 50002

Mrs. Dara Duangsuwon

Director, Plant Pathology and Microbiology

Division, Department of Agriculture,

Bangkhun, Bangkok 10900

Mr. Chamlong Chettanachitara
Agricultural Regulatory Division
Department of Agriculture
Bangkhon, Bangkok 10900

Dr. Miran Miranpradit
Horticultural Research Institute
Department of Agriculture
Bangkhon, Bangkok 10900

Dr. Jintae Siripanich
Department of Horticulture
Faculty of Agriculture, Kasetsart University
Kamphaengsaen Campus, Mahornpathon 73140

Dr. Piyawat Boon-Long
Department of Mechanical Engineering
Faculty of Engineering, Chiangmai University
Chiangmai 50002

Dr. S.G. Wiersma
Leader, Postharvest Technology Thrust
International Potato Centre (CIP)
P.O. Box 9-159, Bangkhon
Bangkok 10900

Dr. Sunalee Tungsiriyakul
Institute of Food Research and Product
Development, Kasetsart University
Bangkhon, Bangkok 10900

Dr. Surapong Kosiyachinda
Postharvest Horticultural Lab.
Department of Horticulture, Faculty
of Agriculture, Kasetsart University
Bangkhon, Bangkok 10900

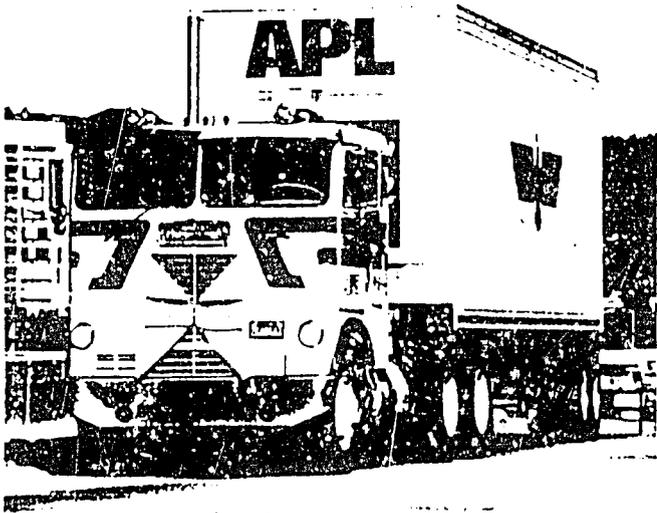
Mrs. Warunee Premmanoch
Seed and Postharvest Pathology Section
Division of Plant Pathology and Microbiology
Department of Agriculture, Bangkhon
Bangkok 10900

U.S.A.

Mr. Jack Ross
University of Idaho
College of Agriculture
Moscow, Idaho 83843

Dr. J.W. Eckert
Department of Plant Pathology
University of California, Riverside
California 92521

Mr. W. Meron
University of Idaho
College of Agriculture
Moscow, Idaho 83843



APL REEFER EQUIPMENT

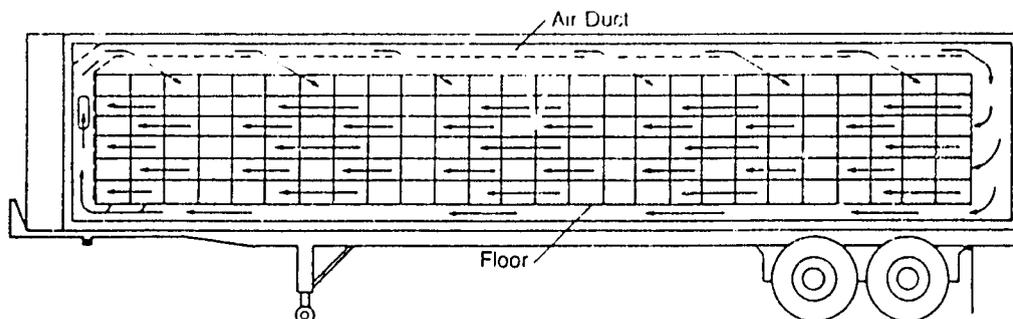
APL operates the largest fleet of refrigerated containers in the Pacific. Our state-of-the-art equipment includes computer-controlled refrigeration units specially designed for super-sensitive chill commodities. Containers range in size from the standard 8'6" up to our 9'6" wide-body super-cube reefer, which provides increased loading capacity for commodities such as apples, pears, and lettuce.

Our reefers can be divided into two basic categories: top air-delivery and bottom air-delivery containers. Although these containers can be used universally, some have been designed with specific needs in mind. For example, self-diagnostic units record temperatures every hour to a tenth of a degree and retain 80 days of historic data in memory. Temperature profiles of cargo in these containers show a spread of less than 3° throughout the load, making them ideal for super-sensitive chill cargoes.

Top Air-Delivery Reefers

Top air-delivery reefers are used primarily for hardier chill and freeze cargoes. Top air delivery requires horizontal channels between rows of cartons to allow good airflow for chilled cargoes. Air takes the path of least resistance and will flow around the load and through the channels. Because a tightly stowed load resists the penetration of air, a tight block stow is recommended for frozen cargoes. This stow pattern protects as much of the cargo as possible from exposure to warmer air that may be introduced from outside the load. Figure 2-1 illustrates the airflow in top air-delivery reefers.

FIGURE 2-1. Top Air-Delivery Reefer



Bottom Air-Delivery Reefers

Bottom air-delivery (also known as reverse airflow) reefers are the most effective for sensitive chill cargoes which require even temperature management throughout the load. The primary requisite for good airflow in a bottom air-delivery reefer is ample venting in the packaging to allow the cold air to circulate up through the load rather than around it. Because air will always take the path of least resistance, these units maintain more even temperatures throughout the load if the floor is entirely covered with cargo, thus forcing the air to circulate only up through the load rather than around it.

APL uses bottom air-delivery containers with microprocessor-controlled refrigeration units for especially sensitive cargoes.

Figure 2-2 illustrates the airflow in bottom air-delivery reefers.

With this versatile fleet of equipment, APL makes every effort to ensure the safe carriage and good outturn of our customer's product.



The Thermoguard microprocessor temperature controller used by APL is the most advanced in the industry, designed and engineered specifically for ocean-going containers. This new, easy-to-operate controller device incorporates thermostat control, digital thermometer, fault indication, and data recording in a self-contained package, which boosts reefer unit performance, reliability, and versatility. All of these enhancements contribute to the safe transport of perishable goods.

FIGURE 2-2. Bottom Air-Delivery Reefer

