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Potential for Sri Lankan MELONS In Selected Major World Markets

An SRD *Export Potential Brief*™

Prepared by
Samuel Daines, International Agribusiness
Edward Hurlston, International Marketing
Mark Thorpe, Jr. Economist
K. Kodituwakku, Agribusiness Management & Computers
Stanford Smith, Research Analyst
SRD Research Group Inc.
880 E. 1800 N., Logan, Utah 84321

Prepared for
Employment, Investment & Enterprise Development Division
Mahaweli Authority of Sri Lanka,
Colombo, Sri Lanka.

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Horticulture, Agribusiness, Irrigation
Logan Utah, Colombo, Budapest, Guatemala City

SRD *Research and Development Groups Inc.*

Table of Contents

A. Executive Summary of Melon Market Opportunities 1

I. Introductory Topics 3

A. Illustrative Mahaweli Enterprise 3

B. Agronomic Feasibility of melon Cultivation in Mahaweli Areas 6

II. Enterprise Development & Marketing Strategies 14

A. Enterprise Organization Patterns 14
1. Vertical Integration & Channel Captains 14
2. Vertically Owned & Operated Enterprise Formats. 14
3. Contract Production & Mixed Enterprise Formats. 14
4. Small Farmer Grower/Exporter Associations 15

B. European Marketing Channel Options for Sri Lankan Grower/Exporters 16
1. Importers. 16
2. Wholesale Agents & Markets 17
3. Vertically Integrated Pre-Packers 19
4. Retail Specialty Grocers 21
5. Supermarkets & Multiple Outlet Grocers 21

C. Trade Associations 22
1. Marketing & Technology Development 22
2. Transport Development 23
3. Policy Leverage 23

D. Financing and Joint Ventures 23

III. Market Intelligence Profile Overview 24

A. General Fruit Consumption & Melon Import Trends 24

B. Timing & Depth of Market Windows for Melons in the Mahaweli 25

C. Competitive Suppliers & Comparative Costs 25

D. Weekly Wholesale Price Patterns 26

E. Seasonal Profit Potentials & Competition 26

A. Executive Summary of Melon Market Opportunities.

Figure 1 contains a list of the major world markets for melons. This report has selected four of those markets (underlined) as illustrative markets for in-depth analysis. The recent opening of Eastern European markets to open trade, the possible re-emergence of Iran and Iraq as important markets, and the opening of Korea are all market developments with direct relevance for Sri Lanka.

The largest potential markets for Sri Lanka are in Western Europe. In the late 1980's the Western European import market for fruits expanded at roughly one billion US dollars each year. Though much of this expansion was supplied inside the EC (Spain, Italy & Greece), Sri Lanka has a sufficient seasonal edge to be a viable competitor.

Figure 2 presents an example of the type of supply and profitable demand graphs used by SRD to estimate market potentials. This graph shows the German market in 1990. It is estimated that the German market can absorb approximately 900 metric tons of melons each week and still maintain prices which would be profitable to a reasonably efficient Sri Lankan producer. When the U.K., Japan, and Nether

EUROPE	ASIA/AMERICA	MIDDLE EAST
Germany	Japan	Saudi Arabia
France	Hong Kong	Yemen
United Kingdom	Singapore	Egypt
Netherlands	Australia	UAE
Switzerland	Korea	Bahrain
Belgium	United States	Kuwait
Italy	Canada	Oman
Sweden		

Figure 1: Major Export Markets

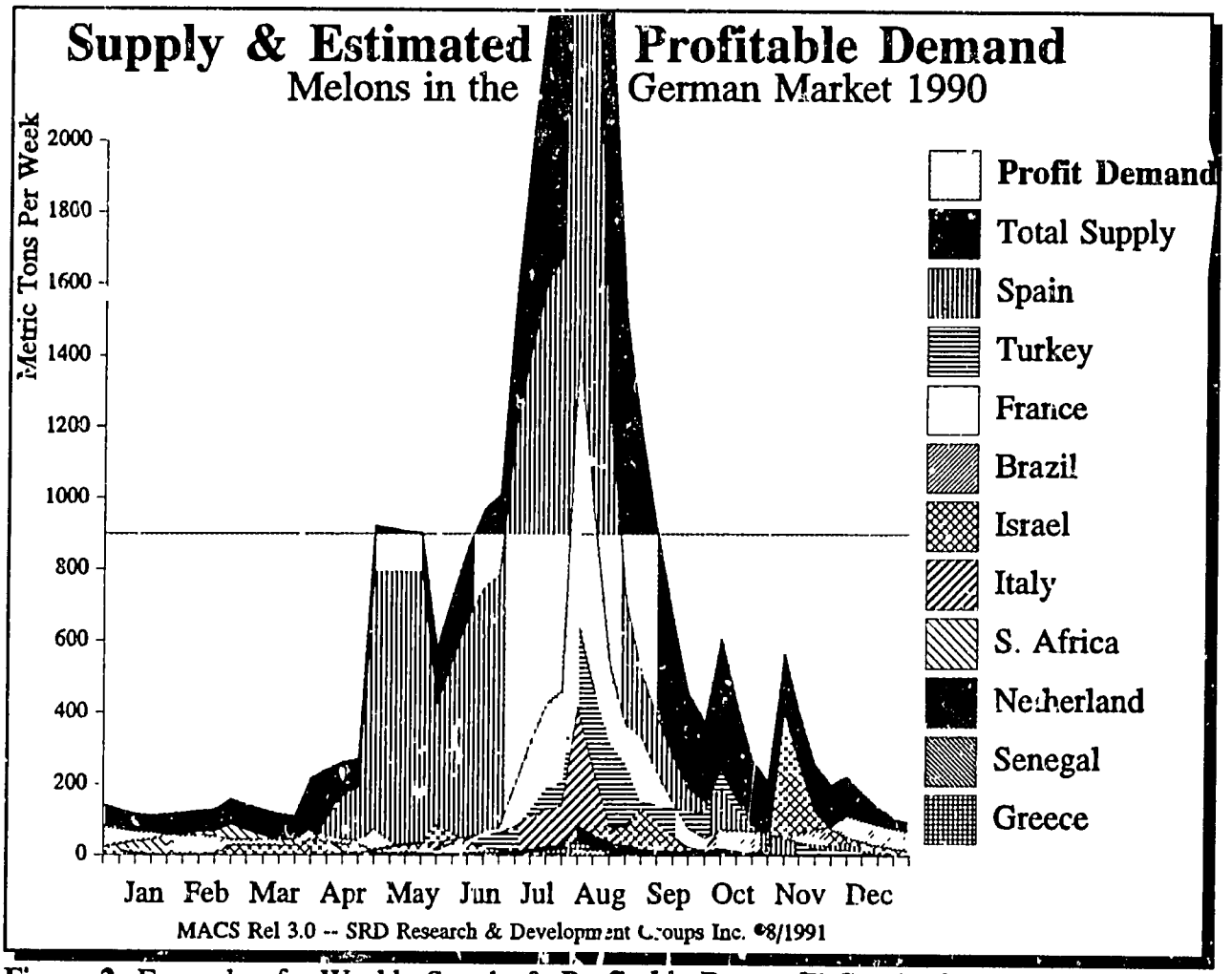

Figure 2: Example of a Weekly Supply & ***Profitable Demand***™ Graph, Germany 1990

Figure 3: Example of Fresh Export Melon Packaging

lands added, it appears that the four markets this report examines can absorb roughly 20,000 metric tons per week at prices profitable to a Sri Lankan producer. Figure 2 also illustrates that the supply of melons exceeds this ***Profitable Demand***™ during the period of the year from May through September in Germany. The market "window of opportunity" for Sri Lanka in Germany is therefore from October through April. For all four markets SRD estimates roughly $500 million of un-met ***Profitable Demand***™ for Sri Lanka.

Figure 4 is an example of the weekly wholesale price graphs contained in this report. It indicates that the wholesale price for melons in 1990 varied from lows in July and August of just under $1/Kg. to peaks over $3/kg. in December to March.

This report estimates that reasonably efficient Sri Lankan producers could deliver melons to European and Asian markets by refrigerated container for $.70-.80/Kg.. These delivered prices imply potential profits during the higher price window period from $.20/kg. to $1.60/kg..

Quality is the key in penetrating the very demanding West European & Japan markets. Figure 3 illustrates the type of packaging and quality product required to penetrate the European and Asian markets. Product is normally marketed in 10 kg. cases.

The major non-EC competitors in the off-season window include Israel, Morocco, South Africa, Venezuela, Chile and Brazil.

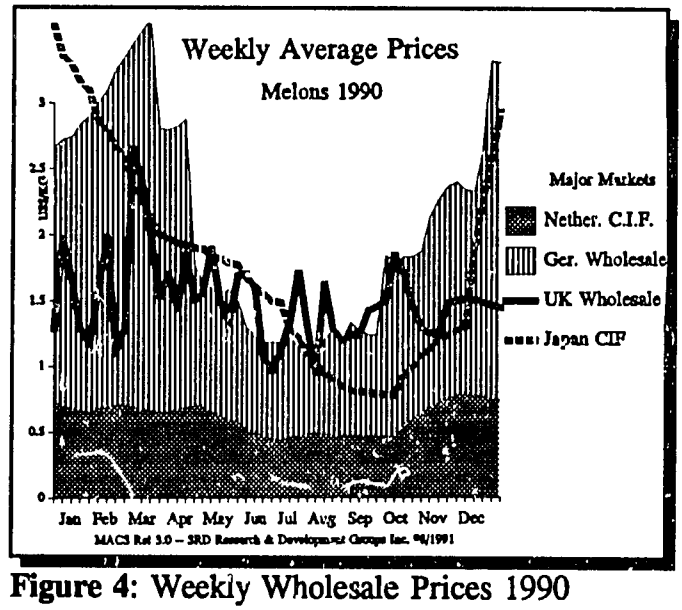

Figure 4: Weekly Wholesale Prices 1990

Spain, France and Italy dominate the early spring imports which could compete with the earliest Sri Lankan produce. France and Spain are the major players in the late summer market, with Brazil playing a role in that market for the U.K. Brazil in recent years has become a factor in the Dec-Mar. market in the U.K.

I. Introductory Topics

A. Illustrative Mahaweli Enterprise

With efficient cooling facilities (described below) Mahaweli melons may be shipped by refrigerated containers to European and Japanese markets. A minimum scale commercial export operation would need to pack at least two 40'container per week. Such an operation would operate for approximately three months and require a minimum weekly production of approximately 36 tons during that time which could be produced on roughly 40 Ha.

Melon crop can be established by direct-seeding or by transplanting. Muskmelon fruits mature in 35-55 days. Plants are easily killed by frost during all stages of development. Locally adapted melon cultivars of the Charentais, Galia, Honeydew, Juan Canaria are available for open field, tunnel and greenhouse production.

Melons should be grown on raised beds. Bed height will vary from 10-20 cm. Beds will help reduce fruit rot. Where polyethylene mulch is to be used the beds should be formed and shaped with a bed press so that close contact between the soil and mulch can be obtained. The major advantages of mulch include earlier crops, larger total yields, conservation of fertilizer and soil moisture, and weed control. Pollination of melons is very important. Concentration of bees is directly related to the earliness of yield and the size of fruit. In addition to the fruit protection practices described above,

Figure 5: Melons in a box after harvesting.

Figure 6: SRD Designed Small Scale Cooling/Packing Plant & Modified 40' Container Under Construction in Pakistan ©SRD 1990

the commercial melon production areas must be sprayed periodically to control several diseases and pests.

Melons are fairly delicate and perishable and should be packed shortly after harvest in order to insure the highest quality. In the most operations, they must be moved to a nearby cooling facility and the field heat removed by means of either a hydrocooler or a forced-air cooler. Melons are often packed directly in the field and are then cooled using forced-air. Grading and culling must be performed carefully when packing in the field. Hydrocooling is usually preferred for export because it improves the look of the fruit by washing away the dirt and debris. The common type of package favored for melons is a fiberboard container consisting of a top and a bottom. The box is often waxed so that it can withstand moisture, but this is often a significant added cost. A typical melon box is shown in Figure 5, but melons can be shipped in a variety of different boxes. Palletized loads are now usually demanded in most im port markets whenever the fruit is not shipped by container.

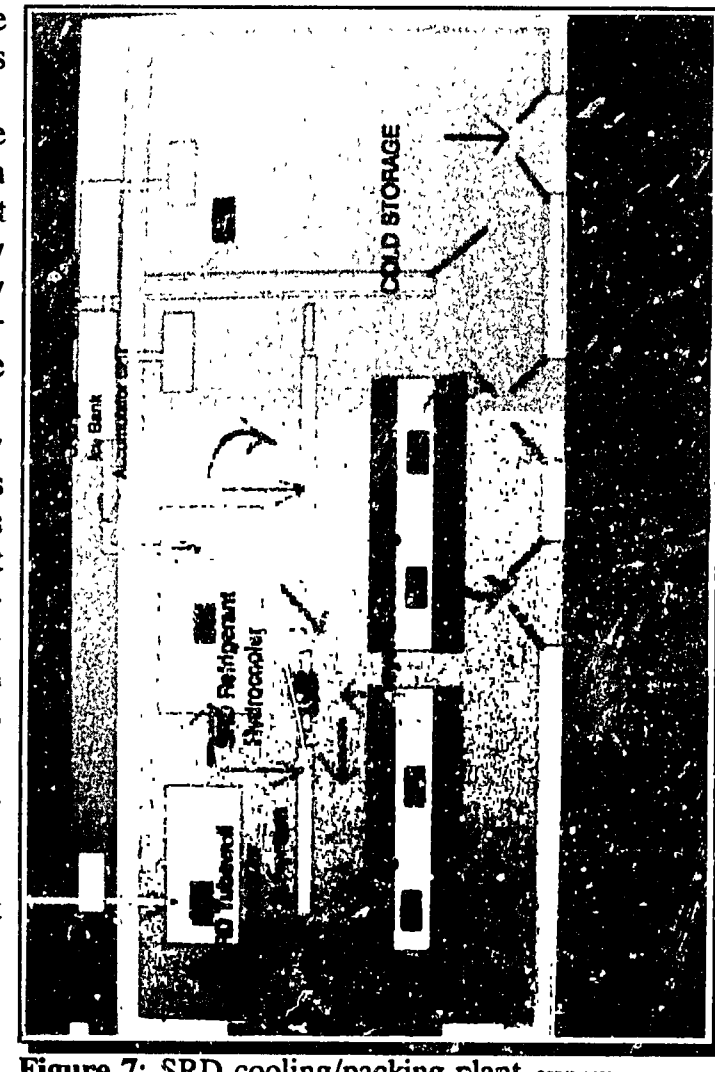

Figure 7: SRD cooling/packing plant ©SRD 1990

Fixed Investment. The small scale cooling/packing plant and refrigerated transport containers illustrated in Figures 6 and 7 are examples of the facilities required to support a minimum commercial scale melon export operation of roughly 40 Hectares. The fixed investment cost of this building constructed in Sri Lanka is estimated at $50,000. Construction time would be 60-90 days. The investment cost of transport containers or trailers are not included in the enterprise budget but are rather accounted as a part of transport costs. The minimum scale cooling/packing plant illustrated in Figure 6 is called SRD's "15 horsepower" plant since it is powered by a 15 horsepower compressor. The equipment required also includes the hydrocooling equipment, pallet handling jacks, and air circulation fans. The equipment for the minimum scale facility would cost approximately $50,000. The investment in the total facility would therefore be roughly $100,000. Field investment costs vary widely depending on the type of open-field or row cover systems employed. Including irrigation and row cover or green greenhouse installation, the cost could range from $5,000-50,000 per hectare. For a 40 hectare operation, the field investments could range from $200,000 to $2,000,000 Field equipment such as tractors, trailers and a bus for worker transport could require an additional $100,000. Assuming two thirds open-field, one-third covered, the total field and field equipment investment would be about $500,000. It is important to note that the cooling/packing facility and equipment is only 17% of the total $600,000 fixed investment in a small scale operation.

Figure 8: Open-field Melon growing system ©SRD 1990

Variable Costs. The operating costs for open-field production and packing are approximately $.30/Kg. This estimate includes the cost of field labor, management, inputs and the cost of packing materials. It also includes the interest cost of operating capital and amortization of the fixed investment costs. Delivered costs including transport, handling and tariffs to European markets are about $.68/Kg. The costs to the Japanese market is slightly higher at $.80/Kg.

Wholesale Prices. Wholesale prices during the Sri Lankan market window should range from $1.00-$3.00/Kg. Prices will be the highest in Japan.

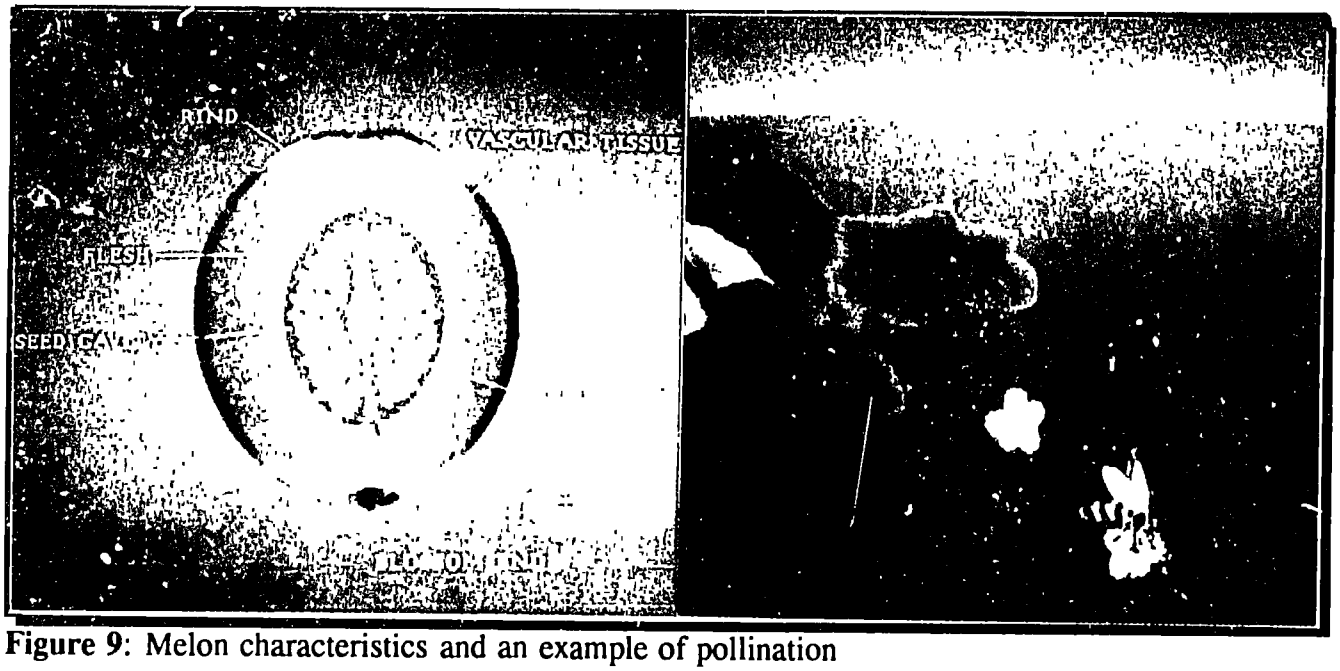

Figure 9: Melon characteristics and an example of pollination

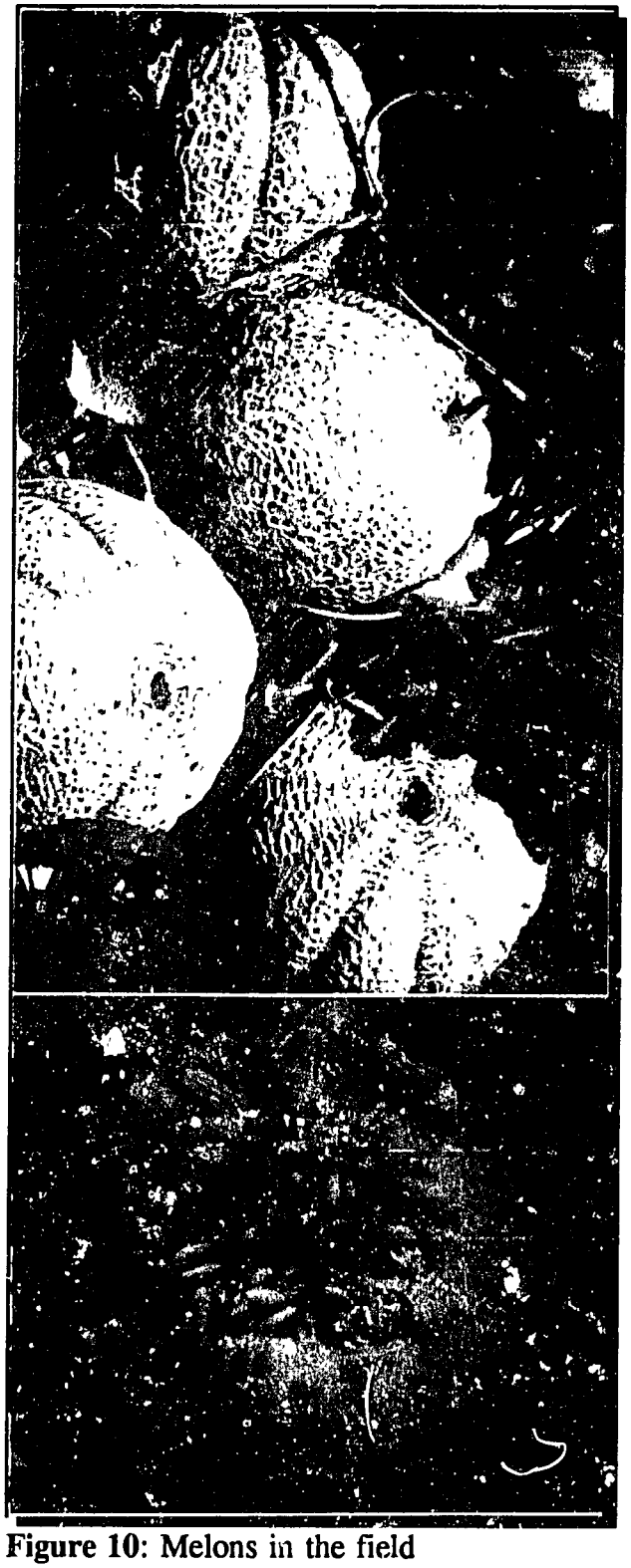

Figure 10: Melons in the field

Potential Profit Margins. Profit margins for reasonably efficient melon enterprises in the Mahaweli could range from $.20 to $1.60/kg depending on the season and the method of production.

Enterprise Financial Potential. Assumming a mix of two thirds open-field production and onethird covered production, a 40 Ha. enterprise could net roughly $10,000 per Ha. or a total of $400,000 per year. It would probably take three years to establish a financially viable enterprise even though the melon plantings take only a few months to mature. A melon export enterprise is a demanding management challenge, but considerably less difficult than ones like strawberries or asparagus. However, market and competitive risks are still high. It would probably take three years to achieve a positive cash flow even though the melon shipments would begin soon after planting.

B. Agronomic Feasibility of melon Cultivation in Mahaweli Areas

INTRODUCTION

Literature reveals that muskmelons originated in Africa, where wild and primitive types exist(Davis et al. 1965). Drieberg (1915) reported that the Manketan melon originated from the arid parts of the North of Cape Colony. The fruits are green initially and later turn into white. Each fruit can weigh up to 50 lbs. and give yields of 50 tons per acre. Fruits are reported to have a long keeping period of 18 months. Seeds were distributed to members of the Agricultural Society, but results were not promising. The author also mentions that seeds of Cucumis dudain introduced from Egypt to Ceylon was a superior variety of fine flavour and takes 6 to 7 months to reach maturity.

DAAR (1919) indicates that the Department of Agriculture which was established in 1912, created an Agricultural Experiment Station at Anuradhapura to cater to the needs of dry zone areas of Ceylon. By 1921 this station was reported to be testing several introduced fruit crops, which included melons.

Macmillan (1925) refers to muskmelon or cantaloupe known in Sinhalese as 'Petti-Kekiri', which is a round or ovoid fruit, 4 to 5 ins. in diameter, with netted or smooth skin, red or greenish-white flesh, produced by a creeping annual gourd. having large, angular leaves. The fruit is described as carrying a pleasant odour and the interior being of a somewhat floury consistency. The author states

that the best varieties are grown in hot-houses in temperate countries and are highly prized due to their luscious flavour. Mention is also made of a fine variety in India called 'Surdah', having large seeds and consumed by the wealthy classes paying as much as Rs.6/- per fruit. The author refers to an inferior variety, sometimes cultivated in the dry zone of Ceylon.

Considering the scanty literature on melons currently available in Sri Lanka, the consultant took the option to report on melon cultivation in the United States, where some of the data could be relevant under our conditions.

Maynard and Norton (1991) mention important characteristics in selecting melon varieties for commercial cultivation in Sri Lanka. They indicate factors such as profitable yields; disease resistance; fruit size and quality and market acceptability. To these characters, the addition of adaptability for transport and longer shelf life would be relevant. The authors have also recommended some promising varieties for Sri Lanka. To this list, the Consultant would suggest adding the varieties of melon that have been tried out with rather inconclusive data at the Agricultural Research Stations at Maha Iluppalama and Girandurukotte. It is therefore imperative, that more meaningful and ambitious varietal screening program with introduced and existing local types be launched at relevant research centres, with adequate financial assistance and technical support from the Mahaweli Agency. A similar program in collaboration with the University students as an agricultural research project will also be beneficial, in an attempt to obtain quick & meaningful results.

CLIMATIC REQUIREMENTS

Good growth of muskmelon is seen in areas of dry and warm weather with irrigation and mean monthly temperature of 65-75°F. Abundant sunshine, low humidity and absence of heavy rainfall preclude fungus diseases responsible for defoliation of plants seen in more humid areas. Defoliated plants produce many cull fruits, lacking in desired size and a well developed netted surface. Defoliation can also cause sun burned spots on fruits which result in low sugar and insipid taste. Macmillan (1925) states that the plant is suited to hot,dry climates and rich porous soil. It requires moisture at the roots, but the vines are susceptible to a damp atmosphere. During cultivation, precaution should probably be taken of forming a collar of earth round the base of the stem to keep it dry.

SOILS

The crop thrives on well drained sandy or silt loams. Muskmelons are sensitive to acid soils and are most productive on neutral or slightly alkaline soil. This crop is reported as one which derives the most benefit from the application of lime to acid soil.

West & Yapa (1990) reported that the weak tap root of the melon family does not permit good growth in hard pan or compacted soil and therefore lighter soils for easier root penetration are recommended. The findings of their investigations justifies this conclusion, where the variety "Honey dew orange fresh" recorded 4124 kg/ha in less compacted soil and 2513 kg/ha in more compacted soils in System B of the Mahaweli.

VARIETIES

All varieties of muskmelon belong to Cucumis melo which include many botanical varieties. Botanically the term 'Cantaloupe' is relevant only to melons with a rough and warty surface, pronounced rib and a hard rind. They are grouped under 'Cantaloupensis'. However, in the United States melons with netted, green and yellow green rind of the botanical variety 'inodorous' includes the Honey Dew, Honey Ball, Casaba and Persian melons. This last group refers to the so called winter muskmelons which are late maturing, with a firm thick flesh and long storage life. These varieties require a long growing season and are ideally suited to hot, dry and irrigated areas (Doolitte et al 1961).

The authors describe the plant as an annual trailing vine, with 3 to 5 runners and growing up to about 12 ft. in length. The short fruiting branches are produced along the runners and they bear perfect flowers which subse-

quently set fruit and staminate flowers. The tap root is short and thick, from which laterals emerge at 6 to 8 ins. below the soil surface and grow outwards and downwards showing numerous small fibrous roots.

DDR:Maha Illupalama (1955) reports that none of the varieties of cantaloupe tested performed well. Vine growth was poor, with very poor fruit set. However, two varieties of muskmelon namely, Maddona and Bolero showed good growth initially, but after fruit set, there was a sudden decline in vigour and the plants died. Fruits were easily detached from the peduncle. Fruits are described as having a rich aroma and average taste. Estimated yields of 6303 Kg/ha for Maddona and 14063 Kg/ha for Bolero are indicated. Research data on flowering habits, days for maturity, number of picks and fruits per vine are also given. The report concludes that these may not be suitable for this soil type.

DDR. Girandurukotte (1986) mentioned the screening of 9 sweet melon varieties. Cultural and relevant research data is given. Panonia Fl gave the highest yield with 65.5 m/t per ha of marketable fruit, while Sugar Baby was next in yield recording 54.4. The variety Bolero gave no marketable yields, with the fruits decaying in the vines.

Sugar baby tasted the sweetest, while Panonia Fl had an ice cream flavour. Both varieties matured in 51 days, with Panonia fruits weighing on an average about 3.5Kg and Sugar baby about 2.5.

The report continues that in another trial 10 sweet melon varieties were tested, and MS-93 and MS-95 gave the best yield, with good consumer preference. They are reported as being promising varieties.

DDD: Girandurukotte(1987) reported the screening of three varieties of muskmelon and one variety of cantaloupe. Planting was done on 8th May 1987 and the data reveal that all varieties of muskmelon and the cantaloupe were severely attacked by the Aulacaphora beetle in the seedling stage, however control was achieved by spraying Dipterex at 15 ml per litre of water. Details of cultural operations are given. Estimated yield data is as follows:

Variety	Days to Fruit Picking	Estimated Yield mt/ha	Avg.Fruit Weight Kg
Muskmelon:			
HS-LARGLAN 3	75	40	0.8-1.0
Sweet annas	68	30	0.7-1.0
Durine Fl	72	84	1.2-1.8
Cantaloupe :			
Milky Way	63	60	1.1-1.8

Taste of these melons is described as 'ice creamy' and acceptable.

Klaus, (1976) reported that in melon varietal introduction and screening, they performed well during the dry and hot seasons with supplementary irrigation at Maha Ilupallama. In Yala 1973, thirteen varieties were included in a yield trial and the maximum yield was recorded by the introduction from U.S.A. named Golden Beauty giving 21.55 tons/ha; with Honey Dew, 15.68 and Dixie Queen, 10.49 tons/ha.; occupying second and third positions respectively. The control Sugar Baby gave 7.39 tons/ha.

During yala 1974; 17 varieties were tested at four different locations namely. Maha Ilupallama; Rahangala; Gannoruwa and Thirunevelley. At Maha Ilupallama, Fyzabadi from India gave the maximum yield of 68.86 t/ha. Florida Market from U.S.A. was second with 34.68 and Asahi Miyako from Japan was third with 32.13 t/ha.

At Rahangala (Up country dry zone) the data indicated that Sugar Baby from USA gave the highest yield of 35.83 t/ha; with Asahi Miyako from Japan second, yielding 21.67 and Sugar Swika also from Japan recording 7.45 t/ha.

At Gannoruwa, maximum yield was given by Asahi Miyako, 7.93 tons/ha; followed by Hales Best Improved from the U.S., giving 7.24 and Sugar Swika recording 7.02 t/ha.

At Thirunevelly, Asahi Miyako gave the maximum yield of 10.31 t/ha; with Takii's Earliest Gem giving 9.92 and Sugar Swika recording 8.97 t/ha.

The author describes fruit characters of some sweet and watermelon varieties.

* The author has combined sweet and watermelon varieties in his varietal testing program. No distinction is made to identify the categories.

West & Yapa, (1990) studying the growth of the sweet melon variety "Honey Dew Orange Fresh" in System B of the Mahaweli region during the yala season reported its potentialities both for export and local consumption. The authors emphasize the need for proper post harvest management to increase the shelf life of the fruit. Details of plot size, planting method, fertilizer application, agro chemicals used and yield are given.

The authors recommended continued varietal evaluation; different methods of trailing the vines on varying soil types and increasing the current plant population by 75%, by means of closer spacing of the plants in an attempt to make this crop a viable commercial proposition.

PLANTING AND AFTERCARE:

Doolittle et al. (1961) reported that in the arid areas of Arizona in the United States, the irrigated early crop is planted in single rows with their centres spaced 5 to 8 ft. apart. The rows are placed immediately above the irrigation waterline. The seeds are placed in hills spaced 9 to 12 ins. apart and later thinned to one plant per hill.

Planting depth of seed varies from .5 to 1.5 inches, depending on soil type, moisture content and the variety of melon. The seed is placed deeper in lighter soils, than in very moist soil or irrigated land. Varieties with larger seed are planted deeper than the small seeded types. Davies et al.(1965) indicated that a pound of muskmelon seed contains 12,000 to 20,000 seeds. Research data has revealed that at a soil temperature of 50°F it takes approximately 15 days from planting to the growth of a normal seedling. At 68°F it takes about 7 days and at 77°F, about 5 days. At temperatures below 59°F germination is very slow, if at all.

THINNING SEEDLINGS :

It is suggested to thin seedlings twice, to allow for loss of small plants from insect damage etc. Thinning commences when one or two, true leaves appear between the cotyledons.

PRUNING VINES & THINNING FRUITS

Doolittle et al. (1961) indicate that experiments have shown that very little or nothing is to be gained by pruning muskmelon vines. Reducing the number of fruits on a vine can increase the size of melons left on the vine.

WEED CONTROL

Pre-emergence sprays of NPA (N-l-naphthylphthalamtic acid) immediately after planting at 2 to 3 lbs. in 20 galls. water on light sandy soils, or 4 to 6 lbs. on clayey soils gave excellent weed control.

Maynard and Norton (1991) emphasize the need for good weed control in melons and suggest methods for their management, such as polythene mulches, quick establishment of crop to shade and out-grow the weed, good mechanical field preparation with ploughing, harrowing etc. and finally the use of chemicals.

The Consultant suggests that the data on weed control available for other crops in the dry zone agriculture research stations in Sri Lanka could be successfully used for melons, although nothing is specifically recommended for this crop.

FLOWERING & POLLINATION

Muskmelon flowers are of two types, with the initial blossoms having only stamens, while the subsequent blooms are those with pistils that produce fruit. Small undeveloped embryos may be seen at the base of pistillate flowers even before they open. The melons develop only when pollen is deposited onto the pistils of these flowers. When a vine sets a few fruits, the demand for nutrients is so great for their maturity, with the result that only a few pistillate flowers are borne later, although different varieties of muskmelon cross with each other, they do not cross with other cucurbits like pumpkin, squash, cucumber or watermelon, (Davis et al. 1964).

The pollen is somewhat sticky and heavy, requiring insects for fertilization, although the flowers are perfect, they are dependent on insect activity for successful pollination

and will not fertilize by their own pollen. The author reports that studies on pollination have revealed that commercial production of muskmelon is not possible without the aid of pollinators and that the honey bee is an effective agent for this purpose. It is also mentioned that thrips and beetles do not contribute to pollination. It is suggested to maintain two honey bee colonies per acre of muskmelon production for successful pollination.

Maynard and Norton (1991) indicate that flowers open early in the mornings and remain receptive for about 24 hours. This emphasizes the importance for daily activity by honey bees. The authors discuss optimum conditions for pollination, weather requirements, honey bee activity and placement of their colonies.

IRRIGATION :

Doolittle et al. (1961) reported that the muskmelon vines initially required plenty of moisture for vigourous growth and fruit development, However, irrigation should be controlled during the period of fruit maturation and ripening. In semi arid areas with light to medium soils, the soil should be wet up to 6 ft. In heavier soils where the roots do not penetrate so deep irrigation can be restricted to a shallower depth. Sandy soils will require more frequent irrigations and for shorter periods, than silt or clay loams.

The authors mention that yield of marketable melons can be significantly increased in the arid regions by giving about 6 ins. water between plant emergence and harvest, even though the soil is at field capacity moisture content at planting time. They also recommended irrigation every 10 to 12 days for young plants where no rain occurs. At vigourous fruit development and ripening, irrigations at 5 to 7 days at 1 ½ ins. per acre is suggested for very light soils.

FERTILIZERS & PLANT NUTRITION :

Davis et al.(1965) report that muskmelon plants thrive best on soils well supplied with organic matter.

Nitrogen is usually applied in spilt doses, half at planting and the balance at runner formation. Phosphorous is also applied at or before planting in one application. Experiments have shown that banded phosphorous is four to five times more efficient, than when it is broadcast.

The authors describe an effective method of plant tissue analyses to evaluate nutrient requirement of muskmelon. They report a decline of N, P & K with plant maturity to the degree that it is necessary to relate plant composition with the age of the plant. Excellent results have been obtained with petiole samples of recently matured leaves (approximately 6th leaf from the tip of runner). An evaluation at the time of fruit set gives the following classification based on dry weight.

Nutrient	Safe level	Deficiency level
NO_3 - N	10,000 ppm	5,000 ppm
PO_4 - P	3,000 ppm	1,500 ppm
K	4%	2%

Plants below the levels listed as deficient will have reduced yields. The same levels can be applied to cantaloupes, honey dews, persians and crenshaws. Analyses of leaf blades cannot be used with the same degree of precision as seen for petioles. Concentration of N. P & K in leaf blades are reported to be about ¼ as high, as in petioles.

ROTATIONS

A judicious rotation where other crops of the Cucurbitaceae family are not grown on the same land more than once every three years, helps to contain soilborne diseases of fungi and bacteria. Where root knot nematode is a problem, tomato and other susceptible crops should also not be planted frequently.

HARVESTING & HANDLING

Cantaloupes are harvested at the "full-slip" stage of maturity, shown by a thin abscission crack encircling the stem at the point of fruit attachment. At this stage, the melon separates easily from the stem. Melons harvested prior to "full-slip" maturity do not attain their

full potential for sugar content, flavour, texture or aroma. Other external features of cantaloupe harvest maturity are fruit colour and appearance of the net, resembling masses of corky, criss-crossed, heavily calloused tissue, that emerge through the epidermis. At maturity the skin colour changes from dark green or gray, to light gray or yellow. In many cantaloupe varieties, the change in skin colour coincides with the abscission layer development and is reckoned as an alternative index of maturity where the net appears raised rounded and broader, covering more of the surface than on immature fruits.

Harvest maturity of Persian melons is judged mainly by skin colour changes, as in this variety the abscission layer does not develop or can be delayed until the fruit is overripe. The ground spot of Persian melons develop a pinkish colour when the fruits are mature, serving as a good index of harvest maturity.

Honey Dew melons reach minimum harvest maturity when they are well filled out, with a ground colour of white combined with a greenish aspect. The blossom end is hard to firm, with no aroma and no evident waxy skin coating. The fruit surface tends to feel prickly or hairy. Such melons may require ethylene treatment for good ripening.

Varieties like Casaba, Crenshaw etc. behave differently and only an experienced operator can judge harvest maturity accurately by applying firm pressure with the thumb to the blossom end. A slight yielding or softness indicates maturity.

In general, harvesting should be done as the fruit approaches maturity to obtain the finest flavour and eating quality. After harvest, the sugar content in fruit does not improve, but texture can improve for a short period. Melons harvested immature never develop a high quality, while those left on the vine for too long, lack sugar and softness.

Maynard and Norton (1991) give a comprehensive description on harvesting and handling of melons, as reported by M.J.Ahrens. The literature covers fruit structure of melons; their development; maturity, deterioration, field conditions affecting storage; solar injury; temperature effect and mechanical injury. It also refers to storage diseases and their control. The authors discuss handling problems related to transport from the field; storehouse operation; grading;packing; cooling, transport and artificial ripening.

DISEASES ON MUSKMELON :

The common diseases causing severe damage to the crop are; damping off; downy mildew, fusarium wilt, bacterial wilt, mosaic, curly top, crown blight, root knot, anthracnose, alternaria leaf blight and powdery mildew.

(a) Damping-Off:- *Rhizoctonia solani* (Kuehn) and *Pythium* spp. These fungi cause very serious losses during long spells of wet weather. Seed decay and killing of seedlings before emergence can be controlled by dusting seed with fungicides like thiram, captan and semesan. Seedling damage is controlled by spraying the soil immediately after planting with a suspension of 2 lbs. captan in 100 gals. water at one gal. per 125 sq. ft. or bed.

(b) Downy mildew :- *Pseudoperospora cubensis* (Berk. & Curt) Rostow. The fungus appears when vines are starting to set fruit. It spreads very rapidly in warm, moist weather. The fruits are not attacked.

The fungus is not seed borne and survives on other host plants. Zineb is effectively used to control the disease.

(c) Fusarium wilt:- *Fusarium oxysporum* (Schlecht. f.) Melonis(leach & Currence) Snyder & Hansen.

The fungus is soil borne and enters the plant through its roots. On young plants grown in badly infected soils it causes root rot or wilting of seedlings with very little evidence of external stem injury. On older plants, initial symptoms are wilting of one or more runners. This is followed by the foliage turning brown and dead streaks usually develop on stems near the soil surface. In moist weather, salmon pink masses of fungi spores can be seen. Rotations and the use of resistant varieties seem the only ways to control the disease.

(d) Bacterial wilt :- *Erwinia tracheiphila* (E.F. Sm.) Holland. Infected plants show drooping of few leaves which remain green. The wilting slowly extends to foliage in other runners and

eventually the plant is killed. The bacteria are spread by the cucumber beetle.

(e) Mosaic:- This is caused by several viruses and a serious disease of muskmelon. The disease can be caused on muskmelon by the cucumber mosaic virus, watermelon mosaic virus and squash mosaic virus. Watermelon mosaic alone, or in combination with cucumber mosaic virus can cause very severe injury to muskmelon. Fruits that form are small,mottled and malformed and of poor quality and netting. Control measures include, not growing muskmelon near squash, cucumber, watermelon and peppers.

(f) Curly Top:- The virus is transmitted by the beet leaf hopper and is not soil borne or seed transmitted. Severity of the disease depends on the age of the muskmelon crop at the time of infection. Seedlings infected in the cotyledon stage usually die. Plants with two or four leaves at the time of infection are also killed or badly stunted. Plants infected in the six leaf stage or later, may not show evidence of the disease, but occasionally bending of leaves at the tip of runners may be observed. No satisfactory control measures are recommended. Weed free fields can protect muskmelons from leaf hoppers.

(g) Crown blight:- The cause of this disease seems to be unknown. Initial symptoms usually appear after fruit set and the injury intensifies as the fruit approaches maturity and ripening. Its severity seems to be increased by high soil and air temperature; by smallness and number of living roots; by a heavy fruit load on plants and the presence of certain root rotting fungi in soil.

(h) Gummy Stem Blight:- This is a serious disease that should be considered.

DISEASES

(a) Root knot :- Meloidogyene spp. Disease is caused by very small nematodes, where symptoms above ground are lack of vigour, dwarfing of plants and tendency to wilt during heat of day. Roots will have distinct galls or knots. Control is by using nematocides or soil fumigants. Rotations also control the disease, when crops that are not attacked by root knot are grown for at least two years, prior to growing muskmelon.

(b) Anthracnose :- Colletotrichum lagenarium (Pass) Ell. & Halst. The fungus causes small, yellowish water soaked spots irregular in shape, occurring along the veins of the leaf. These spots later enlarge to form reddish brown dead patches. On stems and petioles, long, dark sunken spots are seen, which can girdle the petioles and young runners. When the injury is severe, defoliation of the plant is seen in a short time. The fungus can be seed borne and may live in the soil for about two years. Recommended control measures are, use of resistant varieties; rotating the crop; disinfecting seed surface with chemicals and the use of suitable fungicides.

(c) Alternaria leaf blight :- Alternaria cucumerina (Ell.& Ev.) J.A.Elliot. The disease causes a severe defoliation of the plant. The first symptoms usually appear on the older leaves. In warm, moist weather the disease spreads rapidly, killing most of the foliage. The fruit is thus exposed to sun scaled injury. Control measures recommended are; a three year rotation; and spraying or dusting with zineb, ziram, nabam with zinc sulphate or captan.

(d) Powdery mildew :- Erisyphe cichoracearum. The fungus has two races, 1 & 2. Both races produce same symptoms. Muskmelon varieties resistant to race 1, may not be resistant to race 2. Initial symptoms are white patches on the underside of older leaves and on shaded parts of stem near the ground. They soon spread to both leaf surfaces and enlarge covering older stems and leaves with a white powdery growth of the fungi. Control is affected by using resistant varieties or sulphur dust. However, when high temperatures prevail during much of the growing season, severe injury is seen on muskmelon fruits. It is reported that Honey Dew melons are tolerant to sulphur treatment.

(e) Verticillium wilt :- Verticillium albo-atrum The fungus attacks mature leaves, making plants chlorotic which subsequently wilt and die. Disease is favoured by moderate temperature and plants may persist, or recover to some extent at high temperatures exceeding 100F. The plants collapse and wither if moderate temperatures prevail - 70 to 90F.

INSECT ATTACKING MUSKMELON :

Doolittle et al. (1965) lists the following insects attacking muskmelon.

(a) Beet leafhopper :- Circulifer tennellus (Barker)

This is a sucking insect about 1/8th inch long, with a gray to greenish yellow colour. It is responsible for carrying the virus of curly top disease. Clean culture and therefore weeding is essential in the control of beet leaf hopper. When plants start to produce runners, they show considerable resistance to the disease.

(b) Leaf miners :- Liriomyza spp. They are tiny yellow maggots of small black and yellow flies. Their damage consists of irregular white and winding tunnels in melon leaves. They are controlled in nature by tiny-wasp like parasites. Insecticides should be used cautiously, as it can kill this parasite, as well as the leaf miners.

(c) Melon aphid :- Aphis gossypii (Glover) They are louse like insects, sucking the plant juices from the underside of leaves. Its presence is often indicated by a slight curling or cupping of leaves. These vectors spread the virus of mosaic disease.

(d) Green Peach aphid :- Myzus persicae The watermelon mosaic virus is transmitted by this vector. It does not breed on watermelon plants. Insecticide applications have been ineffective in checking the spread of this virus.

(e) Cucumber beetle :- There are two types namely;

i. Striped cucumber beetle: Acalymma vittata (Fabricius) showing three longitudinal black stripes on the back.

ii. Spotted cucumber beetle:- Diabrotica undecimpunctata howardi (Barber) with black spots.

Cucumber beetles usually attack the plants soon after emergence and can kill them. On growing plants, beetles feed on leaves, flowers, tender shoots and fruits. They are responsible for spreading bacterial wilt and mosaic diseases. The larvae feed on the root and underground parts of the stalk.

(f) Spider mites :- Tetranychidae : They are very tiny and difficult to observe with the naked eye. They form a conspicuous webbing and injure the foliage by destroying the chlorophyll which results in the poor quality of fruits. When the damage to foliage is severe, melons are exposed to sunburn.

(g) Cutworms:- Peridroma saucia (Hubner)

They are stout, soft-bodied, smooth caterpillars, growing up to about 1 1/4 inches in length. There are many species, varying from dull grey to black or brown. Some are spotted or striped. Cutworms are very destructive to small melon plants, cutting them off at, or just below the soil level. They feed on the plant at night, and hide in the soil by day.

Maynard and Norton (1991) list the insects and diseases that attack melons and suggest methods of control. The Consultant suggests that as most of these insects and diseases are already prevalent on other crops in Sri Lanka, the control measures currently in vogue would be meaningful, with slight adjustments perhaps in frequency and concentration.

RECOMMENDATIONS

1. The involvement of University students to collaborate in research projects pertaining to varietal screening; fertilizer responses; insect and disease control etc. can produce quick and meaningful results.

2. The sweet and watermelon varieties mentioned as being promising in past research data in Sri Lanka, together with the varieties currently being tested by the MARD team should be re-tested in a "crash research program." No definite varieties can be recommended currently, as research data available is most inconclusive. However, past research data indicates that melons have been grown in dry zone areas of Sri Lanka with some success. Therefore, while accepting the fact that melons can be grown in the dry zone, varietal introduction and screening is both urgent and imperative, prior to launching on ambitious commercial cultivations in the Mahaveli System B.

3. Excepting for soils which show a distinct 'hard pan', most of the other soils in the Mahaveli System B can judiciously be manipulated to produce a good crop of melon, by deep ploughing, use of green manuring or organic matter, appropriate drainage and adjustment of soil pH to neutral or slightly alkaline conditions.

II. Enterprise Development & Marketing Strategies

A. Enterprise Organization Patterns

1. Vertical Integration & Channel Captains.

The development of successful enterprises for perishables export into the demanding market environment of Europe requires coordination and management control over the many stages of production and marketing from varietal selection, production, packing, transport and marketing. When new markets or new products are involved there is a critical element of pio- neering required of the early enterprises. SRD's view is that for these new product or market situations a single "mind" must be able to visualize the process from seeding to supermarket and be able to exert enough management and quality control over the complete chain to make successful market penetration. There may be one or more of these entrepreneurs who have the vertically integrated vision of the business, but frequently it starts with a single such person who becomes, in effect, a "*channel captain*". During the early phases of the development of the production technology and transport/marketing chain, this "*channel captain*" serves as a major link infusing information and opening contacts for all participants.

The idea of vertical integration is simply that the export business needs to have an intimate management connection between the various "vertical" elements in the production-to-market chain. These businesses will not likely succeed if producers are independently selecting varieties, producing according to their own schedules, selling in local wholesale markets etc. The achievement of quality production sufficient to confront the challenges of the European marketplace is not likely without vertical integration. The key is to have management control and coordination from the top end of the chain (markets) to the bottom (production). This can be achieved through various different ownership and management formats as discussed below.

2. Vertically Owned & Operated Enterprise Formats.

Perhaps the most obvious vertical integration format is an enterprise which owns and operates all of the production, transport and marketing elements in the chain. The classic example of the *vertical ownership* format are the multinational banana companies which own and operate the banana plantations, the refrigerated vessels that transport the product, and the storage and marketing companies that wholesale market and distribute the product in the consuming countries.

In the case of bananas this format requires massive capital and economies of scale and is largely impractical for start-up industries. However, in some cases it may be the best format, and it may be financially practical where 8-10 refrigerated trucks could constitute the complete transport network required. While a vertically integrated banana operation would take hundreds of millions of dollars of investment to get started, many vertically owned enterprises for Sri Lanka would take only approximately two million dollars of investment capital including the investment in refrigerated containers. The management reach achieved by full vertical ownership provides the best conceptual format for quality control.

3. Contract Production & Mixed Enterprise Formats.

A wide variety of mixed ownership and coordinated management enterprise formats are viable alternatives to the vertically owned model. The most successful of these formats involve a high degree of managment coordination and even control over the seperately owned

enterprises which comprise the production-to-market chain. Figure 11 is an advertisement by a mixed format enterprise describing the full range of their activities. While Glass Glover has its own farms, the largest part of their business involves management and marketing coordination with independent growers under contract and technical assistance agreements. The services they provide to growers, as noted in their advertisement, includes crop planning, agronomic advice, packaging, storage, distribution and marketing. As the industry matures it becomes possible to achieve adequate quality control and management trust between independently owned enterprises.

4. Small Farmer Grower/Exporter Associations.

Small farmers have successfully been organized into grower/exporter associations in several countries. Small scale packing and cooling plants may be successfully owned and operated by such an association, frequently using a management contract for the plant.

GROW WITH GLASS GLOVER

GLASS GLOVER ARE LARGE GROWERS IN THEIR OWN RIGHT AND HAVE INVESTED MILLIONS IN PRODUCTION, HARVESTING AND PACKING EQUIPMENT.

WE HAVE UTILISED THE LATEST TECHNOLOGY TO BECOME SPECIALIST PRODUCERS AND UNRIVALLED MARKET LEADERS IN OUR CHOSEN SECTORS.

THROUGH OUR SPECIALIST MARKETING TEAMS, AMONGST THE MOST PROFESSIONAL IN THE INDUSTRY, WE HAVE ACCESS TO THE WIDEST RANGE OF CUSTOMERS FROM THE MAJOR MULTIPLES TO PROCESSORS.

OUR WORLDWIDE PROCUREMENT GIVES US AN UNRIVALLED UNDERSTANDING OF COMMODITY TRENDS AND OPPORTUNITIES.

GLASS GLOVER OFFER A COMPREHENSIVE MARKETING SERVICE TO OUR FRUIT, SALAD AND VEGETABLE GROWERS WHICH INCLUDES SPECIALIST HELP IN:

- CROP PLANNING
- AGRONOMIC ADVICE
- PACKAGING, STORAGE AND DISTRIBUTION
- QUALITY ASSURANCE
- SALES AND MARKETING.

WE HAVE A SUCCESSFUL TRACK RECORD WITH OVER 100 GROWERS ALREADY AND OFFER A PROFITABLE PARTNERSHIP FOR ALL COMMITTED GROWERS.

GLASS GLOVER PRODUCE

Join us and grow with Glass Glover

GLASS GLOVER PRODUCE LTD
COLDHARBOUR ROAD, HARLOW, ESSEX
TEL: 0279 35422 FAX: 0279 441509 TELEX: 817921

Figure 11: An Example of A Mixed Vertical Integration Format from the U.K.
(From, *Fresh Produce Journal*, 20 October 1990, p. 7)

B. European Marketing Channel Options for Sri Lankan Grower/Exporters

This section describes the basic structure of fruit and vegetable marketing channels in Europe-Asia and evaluates their potential for Sri Lankan grower/exporters. The figures are intended to give Sri Lankan growers and potential exporters a visual feel for each of these marketing entity types. For ease of description we have divided marketing entities into somewhat artificial categories, most entities perform functions classified in more than one category. The marketing channels may be divided into wholesale and retail levels. The wholesale segment involves importers, wholesalers and vertically integrated suppliers called prepackers. Retail channels include specialty grocers and supermarkets. It is SRD's judgement that it is better for a grower/exporter to connect as far "down" this chain in the retail direction as possible. The easiest and least demanding connection, however, will likely be at the top end of the chain. Only large volume and proven high quality suppliers can connect directly to supermarkets.

1. Importers.

The least complicated of the marketing channel institutions are those who act narrowly as importers and do not have storage, marketing, packing or other facilities. Importers market only in the sense of a broker or agent handling the paperwork related to import clearances and arrangements. Their "marketing" function is to make contacts and "place" the product in one of the forward marketing channels discussed below. Almost all of the "forward" marketing entities discussed below also handle the importing functions provided by importers combined with their other capabilities. Importers' capability to effectively make the forward marketing arrangements varies widely and may be very difficult for a newcomer to evaluate. Some importers have extensive and effective contacts and forward marketing arrangements, and many of them have at least the facilities implied by a stand in a major wholesale market. Some have developed and recognized brand associations and pay for advertising. Figure 12 is an example ad by a significant importer, Lisons Ltd., which has diversified forward with marketing infrastructure and capability.

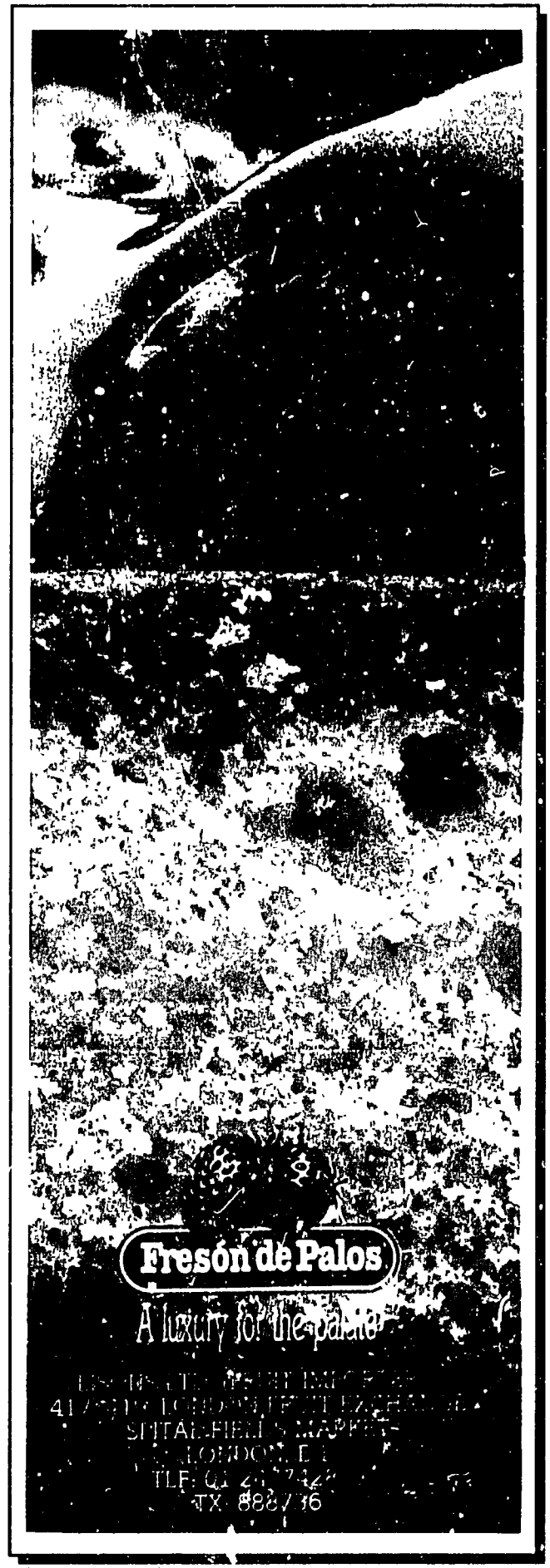

Figure 12: Lisons Ltd. Ad (*Eurofruit* Nov. 88 p.69)

2. Wholesale Agents & Markets

Figure 13 illustrates the make-up of an example wholesale agent stand and market in a medium size European city (Cardiff). At the top is Ray Bishop of WR Bishop, an independent wholesaler. His business occupies one "stand" in the market which consists of roughly 50 square meters on one of the corridors which can be seen in the middle of the figure. Behind his stand most wholesalers have a storage room and loading dock where produce is received and dispatched on waiting trucks. The bottom of the figure in an overhead view of the wholesale market from the outside showing the loading docks. Buyers from retail grocers, supermarkets, restaurants etc. can be seen in the center of the figure moving down one of the corridors inspecting the fruit and making deals. Except for Holland, where formal auctions are used for wholesale distribution, the market structure in Figure 13 dominates in the rest of Europe.

The wholesale trade in fruits and vegetables through these markets is almost exclusively on a consignment basis. A Sri Lankan grower/exporter using one of these agents could expect to pay a fee of 8-12% of the sale price and receive the remittance within 10-30 days of sale. There is great variety in the capability and reliability of wholesale agents and there are frequent rumors about "nicking" or underestimating sale prices in order to keep back part of the sale. Reasonable care and reference checks will usually suffice to identify reliable agents.

Figure 14 describes Runjis Market, which serves Paris. Runjis covers 500 acres and houses 290 wholesalers and 150 importers and handles roughly 2.5 million tons of produce. The vast network of markets and wholesalers can provide relatively easy access for Sri Lankan grower/exporters to Europe.

Figure 13: Wholesaler & Market (*Fresh Produce Journal* June 22, 1990 Supp.)

Rungis — from strength to strength

FRANCE'S largest wholesale market, Rungis, was set up in 1969 and is conveniently situated between Paris' two airports Orly and Roissy. The site covers some 200 hectares, 60 per cent of which is dedicated to fruit and vegetables, serving 150 importers and 290 wholesalers. The market itself is a very highly structured unit administered and regulated by an organisation known as the 'Semmaris' (Rungis Market Authority) The many on-site facilities include freight-forwarders, a press office, banks and catering services. There is also an administration office which, in liaison with the Ministry of Agriculture, is responsible for the quality control of produce.

The market at Rungis has an annual turnover of 2 5 million tonnes of fresh produce, with fruit and vegetables accounting for 1.5 million of this total and there are plans to extend the area allocated to fruit and vegetables. The space set aside for wholesalers at the market consists of three storey units for offices, sales floor and cold storage Space is also allocated for small producers who come to sell their produce on a daily basis. This constitutes five per cent of the turnover.

The majority of sales continue to be made in the market itself, but 35 per cent is carried out by phone and the

The hustle and bustle inside one of the main halls

Figure 14: *Eurofruit* Article on Runjis Wholesale Market, Paris, (*Eurofruit*, Nov. 1988, p. 58)

Wholesale agents range from single stand and single market agents like the one pictured in Figure 14, to agents with 10 or more stands at many different city wholesale markets. Since they operate on consignment commissions, they are relatively easy to engage. Most of them can handle import formalities either on their own account as importers, or by arranging for an importer to handle it for them. Wholesale agents tend to be very flexible and are an obvious entry point for a grower/exporter unfamiliar with the market.

As a grower/exporter's volume and quality consistency stabilize, the business may outgrow the single market wholesale agent as principal distribution channel. The logical transition is to utilize a vertically integrated pre-packer who has wider access to other markets and to direct distribution to retail outlets including specialty produce stores and supermarkets. Even after the business has made such a transition in volume and quality, an agile wholesale agent can continue to be a useful channel. High quality gourmet restaurants and hotels frequently rely on the wholesale market to supply them with the very best and most exotic produce which seldom appears in supermarkets. A grower/exporter can frequently obtain a higher price premium on a small quantity of high quality product from such a wholesale agent than from a prepacker. Wholesale agents are also able to salvage some price for low quality/damaged produce which would simply be rejected by prepackers. Thus at both high and low ends of the quality spectrum, wholesalers can be uniquely useful.

Figure 15: Scipio Group, A Major Vertically Integrated German Firm (*Eurofruit* Nov. 1988 p. 88)

3. Vertically Integrated Pre-Packers

Figures 15 & 16 present examples of the larger scale vertically integrated fruit and vegetable firms in Europe. These firms have large scale cold storage and packing facilities, fleets of refrigerated trucks, agricultural experts and, in some cases, farms of their own. Their main business is the direct supply of product to retail outlets based on direct imports or domestic grower contracts. In spite of their size, they are surprisingly accessible and willing to explore international marketing and joint venture possibilities.

Figure 16: FTK Holland BV, A Major Vertically Integrated Dutch Firm (*Eurofruit* Nov. 1988 p. 17)

Figure 17: Mack Ltd.: Example Facilities of a Vertically Integrated U.K. Prepacker (*Eurofruit* Oct. 1990 p. 42)

Prepackers can work in a wide variety of different marketing modes. Since most prepackers have multiple stands at wholesale markets, they are capable of operating in low volume consignment mode. More importantly, they are able to work on high volume fixed price supply contracts which they will place with supermarkets and/or their wide clientele of specialty grocers. A prepacker contract or joint venture can bring considerable stability and risk protection to a grower.

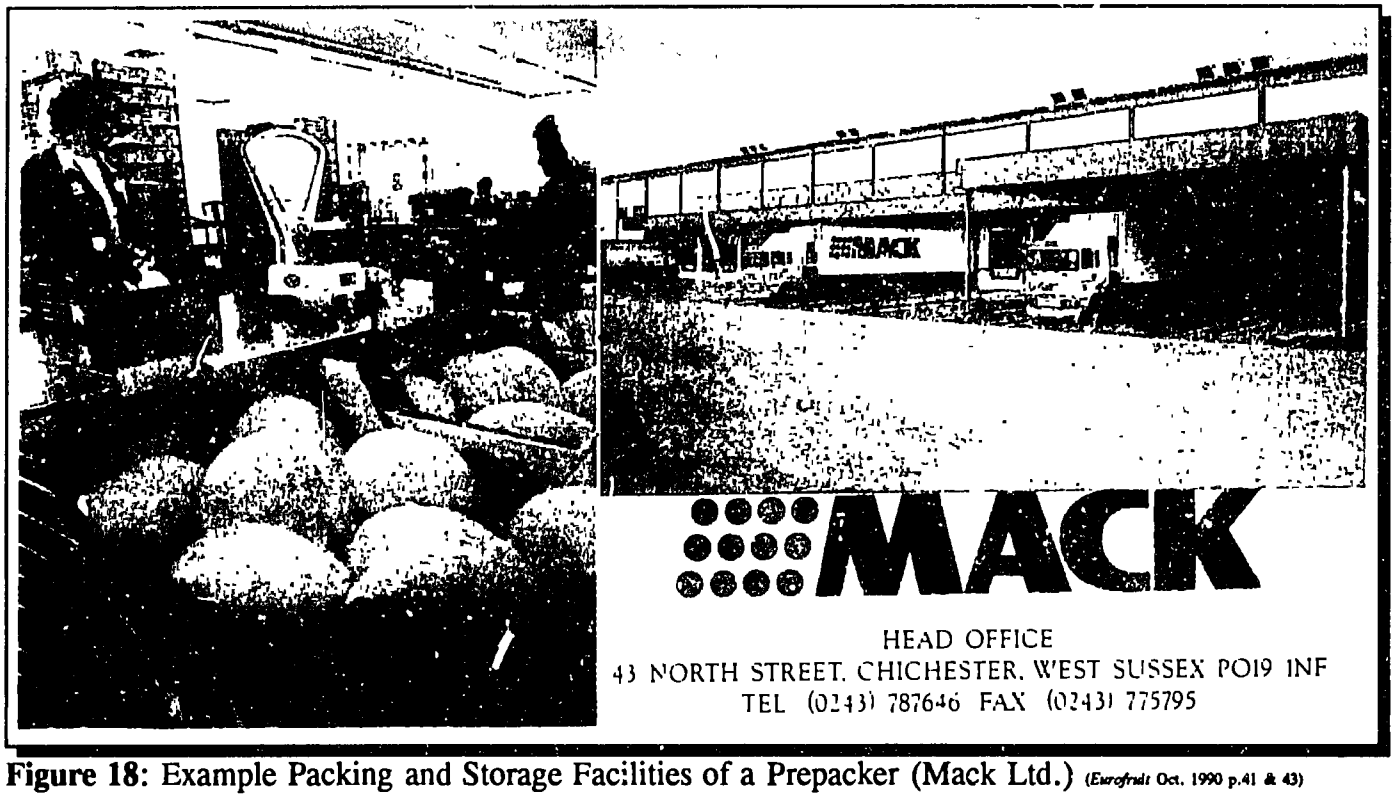

Figure 18: Example Packing and Storage Facilities of a Prepacker (Mack Ltd.) (*Eurofruit* Oct. 1990 p.41 & 43)

4. Retail Specialty Grocers

Unlike the United States, specialty grocers still represent a large proportion of fruit and vegetable sales in Europe. Supermarkets (known in the U.K. frequently as "Multiples") are gaining market share, but grocers still handle 40-60% of fruit and vegetable sales depending on the region in Europe. Figure 19 illustrates a typical specialty grocer shop. Grocers supply themselves through a variety of wholesale channels including importers, wholesale agents and prepackers, but they never interact contractually in a direct way with overseas grower/exporters. The quality demands of grocers varies widely with some catering to high priced and gourmet clients, others located in lower income or rural areas with a lower quality requirement. Supermarkets tend to concentrate in the center of this range, demanding a consistent but usually median priced quality product.

Patrick Britton's window displays take him at least four hours to arrange

Figure 19: J. Britton; U.K. Specialty Grocer (*Fresh Produce Journal*, Sept. 14, 1990, p. 10.)

5. Supermarkets & Multiple Outlet Grocers.

Figure 20 illustrates the high volume produce business transacted in supermarkets in Europe. Supermarkets are themselves vertically integrated produce enterprises with a wide variety of procurement formats. Some supermarkets such as Marks & Spencers in the U.K. have their own product brand names and require packing facilities to utilize their packaging. Many supermarkets procure directly from international growers in countries like Spain and Italy, and act as importers on their own account. The final maturity stage for a grower/exporter or association is to deal directly with supermarkets on fixed price and quantity supply contracts. The supermarkets deal only with the most reliable and high volume suppliers, and while their prices are generally lower than wholesale channels, their willingness to remit payments immediately, or even in advance, and their capacity to absorb vast quantities make them the premier clients in the industry. Supermarkets are notoriously demanding when it comes to quality and usually reject supplies they deem not to qualify without discussion or allowance. Suppliers with supermarket contracts must be prepared to absorb these rejections and insure that they are infrequent occurrences. Grower/exporters new to the market generally pursue high-price low-volume marketing arrangements and fail to see their long run interest in low-price high-volume deals. This failure in vision leads them to ignore the importance of early supermarket contacts.

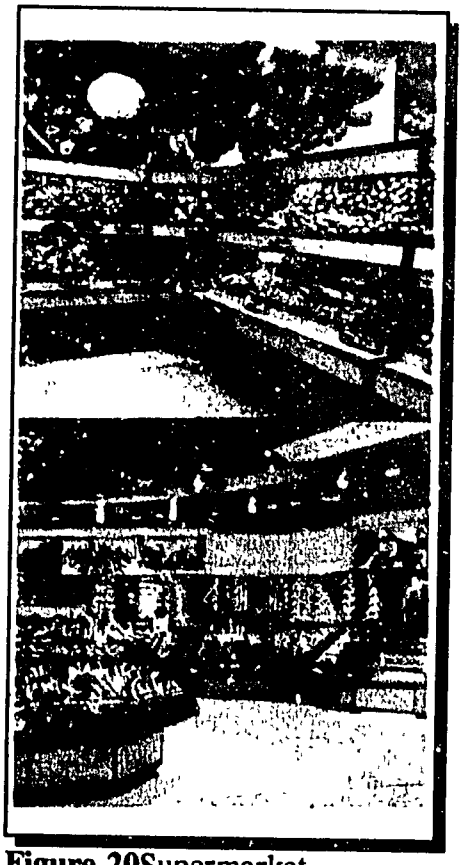

Figure 20 Supermarket (*Fruit Produce Journal*, Sept. 7, 1990, p. 25 by Thorpark)

C. Trade Associations

There are many benefits to organizing trade associations among the firms engaged in growing and exporting produce. This section outlines these functions and potential positive results for the general growth and viability of the industry.

1. Marketing & Technology Development

Trade associations have been major factors in the success of produce export industries in many countries. Figure 21 is an advertisement by one such association, the New Zealand Apple and Pear Marketing Board. The development of the Kiwi market and the establishment of New Zealand grower/exporters as the leading players in that market was largely the result of work by the Board. Associations can provide market intelligence, fund market promotion, and provide member growers with technological assistance.

Figure 21: New Zealand Marketing Board Ad (Fresh Produce Journal, June 22, 1990, p 21)

In addition to providing assistance in marketing, a trade association can dictate quality standards which protect all growers from the bad market reputation of a small number of irresponsible grower/exporters. Figure 22 is an example of the type of market information which an association can monitor and communicate to growers. The EEC has a complex set of seasonal regulations on the import of major products, while most minor fruits and vegetables are open. However, the regulatory structure allows the EEC to impose special limitations and controls on a temporary basis as they see fit. Monitoring these unpredictable changes in the regulations requires constant monitoring and is best done not by individual growers but by an association. Market price monitoring and tracking competitor developments and plans are both functions which an association can ably discharge.

Commission applies first new STM limitations on Spanish strawberries

SPANISH strawberries exported to other EEC member states in the two weeks after Easter will be subject to control by Supplementary Trade Mechanism (STM) export documents, while volume ceilings have also been set by the EEC Commission

This is the first time the Commission will have applied this measure since the new Regulation (776/90) came into effect, on March 29, 1990

As **Les Norris**, EEC consultant to the National Federation explains, this will mean Spanish senders wishing to export their strawber

This merchandising banner was placed on display on New Covent Garden this Monday

"All the administration and issuing of export documents takes place at the Spanish end, which will no doubt regulate sendings carefully so as to ensure supplies can continue to flow"

It is understood that last week's Commission meeting also decided to maintain Period I of the STM (a monitoring exercise) on tomatoes, lettuce, broad leaf endives, carrots, artichokes, table grape and melons, though it is reported by Eucofel that the committee involved would prepare the application of STM to apricots and peaches.

The news of this action coincided with a promotional effort for Spanish strawberries in the UK by Foods from Spain, involving a combination of consumer advertising on a national basis in a number of daily national and Sunday newspapers, plus a major merchandising effort on 16 wholesale markets. This latter aspect featured the hanging of large colourful banners featuring Spanish strawberries on 275 traders' pitches.

Commenting on the situation, FFS UK director **Patrick Gooch** expressed disappointment at the Commission's decision, adding that it is difficult enough to gear up and promote if volume restrictions apply, and even worse if this is combined with administrative restrictions.

Figure 22: Example of EEC Regulation (*Fresh Produce Journal*, April 13, 1990, p. 3)

SRD's experience with associations in many countries suggests that commodity specific associations have the best chance of making concrete and practical contributions in the short run. General trade associations can serve many useful functions outlined below, but they are too broad to provide commodity focused marketing and technology help which is always crop specific.

2. Transport Development.

Transport development is the critical link between the grower and the market. Individual growers will find it relatively easy to negotiate transport arrangements where adequate carrier availability exists on well established transport routes. It is very difficult, if not impossible, however, for an individual grower/exporter to have the volume or finances necessary to open new transport routes or increase carrier availability. In the case of Sri Lanka this is most important in opening the sea transport, and in expanding carrier availability for air-freight. An association of growers, whether it is commodity specific or general in nature, could be a major influence in solving these transport bottlenecks. Groups of grower-/exporters can have sufficient joint volume to attract charter aircraft, and to attract reefer trailer companies from Europe. Joint association/carrier agreements can also guard individual members against capacity shortfalls and unfair pricing.

3. Policy Leverage.

Another important function of trade associations is to exert group leverage on trade policy. The administrative controls on the export trade should be developed and administered in such a way as to favor the expansion and effective development of export activity. An association of grower/exporters can provide the group leverage necessary to have an influential input into the structure of export policy and the administrative procedures which are used to implement it.

D. Financing and Joint Ventures

Bank finance is difficult to obtain on normal agriculture finance terms. The problem is that there is usually insufficient value in the fixed assets to provide collateral or security for the required level of finance. Export horticulture creates a very large and expensive business on a very small area of land. This means that a bank cannot find sufficient value in the land or equipment to secure the necessary level of lending.

The underlying difficulty is that the value in an export horticulture enterprise is in the perishable produce itself and banks without experience in the trade are reluctant to use a lien on a perishable product as security for a large loan.

BANCO EXTERIOR U.K.
The Spanish Bank

Active in the U.K.
Fruit & Vegetable Markets
for 37 years

Head Office:
9 King Street,
London EC2V 8HB.
Telephone: 01-796 4100
Telex: 886820
Facsimile: 01-796 3898

Branches:
City
Covent Garden
Vauxhall

Figure 23

One solution is to assist local banks to develop this experience, or work with experienced banks like the one advertising in Figure 23. The second alternative is to finance through a joint marketing and technology venture with an experienced outside firm such as a vertically integrated prepacker of the type described above. These firms have access to finance and have proven track-records with banks who are acquainted with produce finance.

III. Market Intelligence Profile Overview

This section is a brief overview of the information contained in the second part of this report. The Market Intelligence Profile™(M.I.P.) is a analysis of potential market countries who already exhibit a strong tendency to importing fruits and vegetables. For the Mahaweli development project, four countries have been identified and analyzed as possible export markets. These countries include three in Europe(the United Kingdom, the Netherlands, and Germany) and one in Asia(Japan). The M.I.P. uses prices, domestic production, import supply, tariff, handling and cost data to analyze the market structures and trends in each of these countries. The individual sections which make up the M.I.P. are summarized briefly.

A. General Fruit Consumption & Melon Import Trends.

During the decade of the 80's consumers in the major importing countries in Europe and North America have become more conscious about nutrition and physical fitness. This trend has been gaining strength and is now beginning to exhibit itself strongly in the marketplace in the form of a shift in consumption in favor of fruits and vegetables and away from processed food products. Figure 24 illustrates the recent effects of the "fresh trend" in the imports of the two largest importing regions, W.Europe and the U.S. during the 80's. One can see even in these macro level data, a fairly even trend for both processed and fresh vegetables imports, and then a sharp up-turn in fresh imports while processed ones increase only slightly. This trend strengthened during the later part of the 80's and is expected to continue during the foreseeable future. Though this trend affects most processed forms of fruit and vegetables, it does not appear to have negatively affected those processed forms which are thought of as "additive free" such as frozen and fresh juices. Both fruit juices and frozen products have shown continuing strong demand. Fresh fruits and vegetables have been transported thousands of miles from Southern located winter production sites to Northern consumption sites for more than one hundred years in the U.S. and Europe. In the distant past, however, this trade has been of limited dimension tapping only a few very high income households. Since World War II, the fresh trend has become a major industry and recent data indicate that it is strengthening over time. Melon imports have increased steadily over the past four decades following the general trend of all fruit imports. Melons have seemed to gain wider acceptance as a fruit to eat during all seasons and at all times of the day. The growth rate has been steady with only a few drops. Europe is the largest melon importing region.

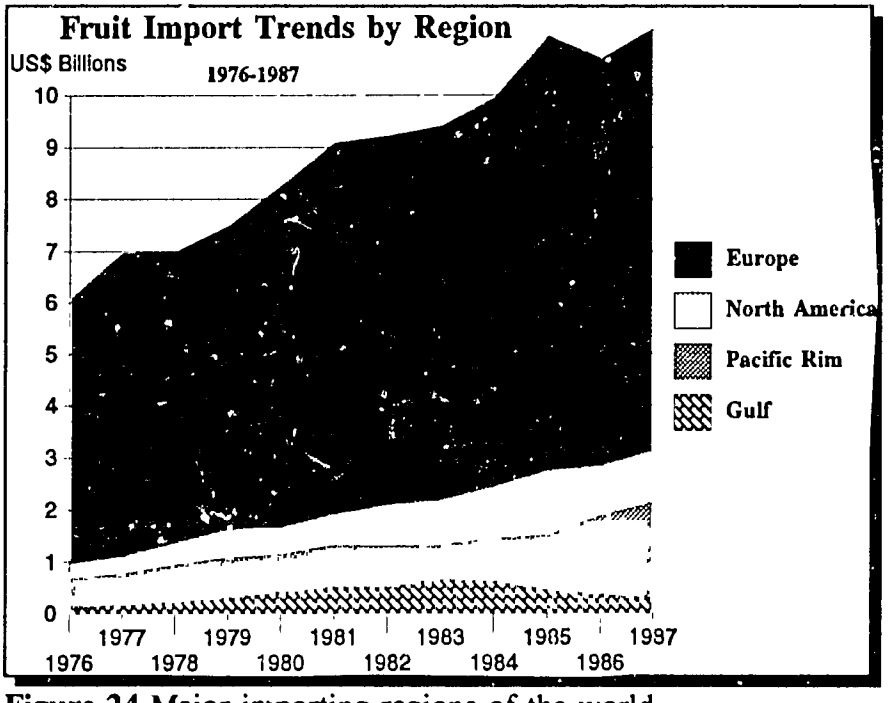

Figure 24 Major importing regions of the world

B. Timing & Depth of Market Windows for Melons in the Mahaweli

Melon markets are analyzed using three European markets (Germany, U.K. and Netherlands), and the major Asian market (Japan). Figure 25 indicates total Melon supplies by week for 1990 in the four major markets in terms of tons entered per week. The total supply figures in this graph do not include watermelon. This graph shows the total supply of melons both from import and domestic supplies into these markets. Major supply peaks are normally caused by coincidental arrivals of many boats during a particular customs data gathering period and do not indicate consumption peaks. The Japanese market is by the far the largest market, but does not necessarily provide the best market opportunities because most of the market is domestically supplied and imports are often restricted.

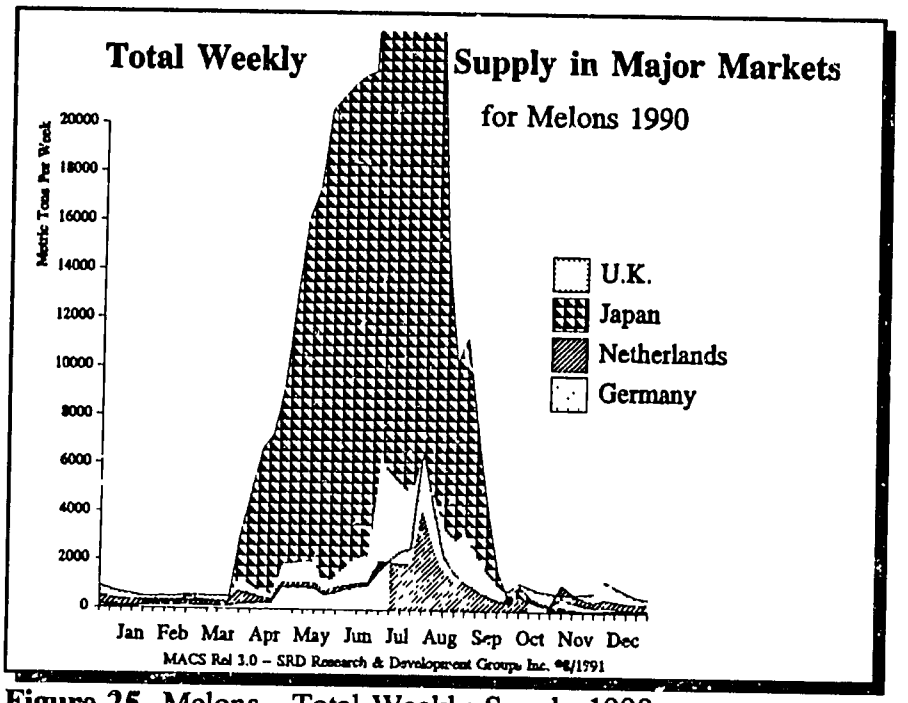

Figure 25 Melons - Total Weekly Supply 1990

C. Competitive Suppliers & Comparative Costs

This section analyzes the costs of production for Sri Lanka and major suppliers of melons. Figure 26 outlines SRD's estimates of the costs of production and packing for a reasonably efficient Sri Lankan producer along with selected competitors. The competitive countries were chosen to represent the major competitive regions during the Sri Lankan market window. Sri Lanka has a good competitive position because of it's low production costs. It is estimated that of the producers analyzed only Turkey and Costa Rica can produce melons at a lower cost. Sri Lanka must use low cost shipping channels to be competitive.

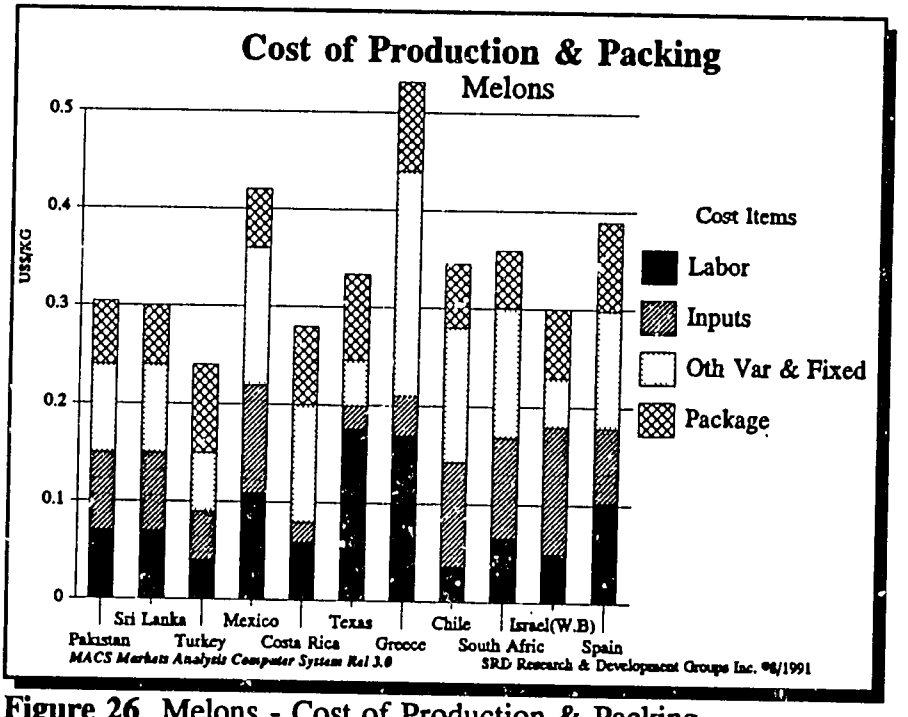

Figure 26 Melons - Cost of Production & Packing

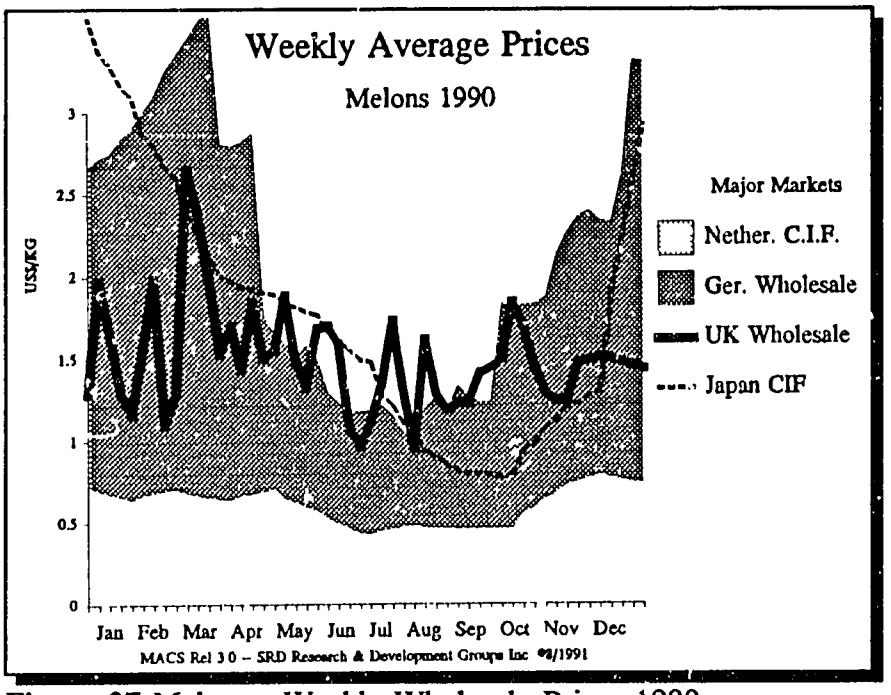

Figure 27 Melons - Weekly Wholesale Prices 1990

D. Weekly Wholesale Price Patterns

The wholesale price section looks at the trend in prices from one year to the next and also analyzes the price difference in the market countries. Historically the Japan has had the highest overall price level for melons. The prices used for Japan in this graph are C.I.F. prices which are the reported value price on arrival. C.I.F. prices for melons are generally one to two dollars lower than the wholesale price in Japan. Germany generally has the second highest price level of the countries analyzed. The prices used for the Netherlands are reported C.I.F. prices which are generally lower, but still useful for analyzing trends. The U.K. prices fluctuate between $1.00-$2.00/Kg. during the year.

E. Seasonal Profit Potentials & Competition

The profit potential section of the M.I.P. demonstrates the weekly profitability potential of Sri Lankan melon exports. The top dark area indicates the wholesale price level. The costs of production, packing, shipping, tariffs and handling are subtracted for the wholesale price to determine the level of profitability. Because of Sri Lanka's low cost of production it has a good competitive position in most of the world markets. For example, in the German market Sri Lanka can be one of the lowest cost producers. It has a competitive disadvantage with countries like Turkey, Spain and Greece because they have significantly lower transportation costs. These countries can utilize low cost refrigerated trucks to supply European markets. Sri Lanka does have an advantage over these countries in the Japanese market.

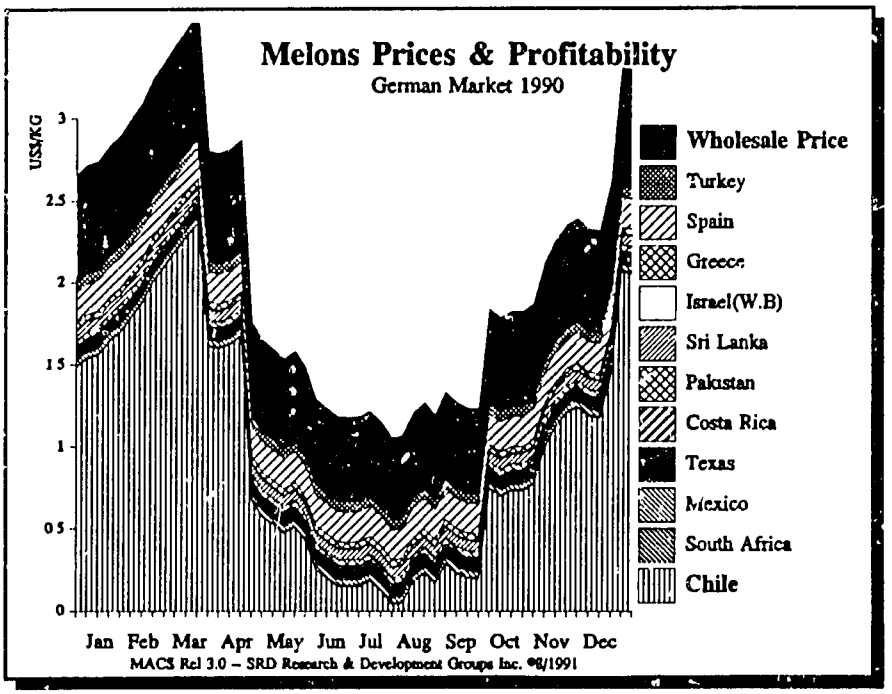

Figure 28 Melon Profitability - German Market 1990

The Mahaweli Enterprise Development Project

The Government of Sri Lanka as well as the international donor community has given high priority over the last several decades to the development of the resources of the Mahaweli river basin. The Accelerated Mahaweli Development Program was launched in 1978. The first phase of this program, the construction of major capital infrastructure, is complete. The second phase, developing the land for settlement and forming an agricultural production base, is well under way. The third phase, just beginning, seeks to build on the agricultural base to create a diverse and dynamic regional economy, improving employment and income prospects for settlers and their families. It is in this phase that the private sector has to play a leading role in enterprise development.

The Mahaweli Enterprise Development Project (MED) is a five year USAID-supported initiative of the Mahaweli Authority of Sri Lanka(MASL) to foster private enterprise development in the Mahaweli areas. MED assists small, medium and large-scale investors to develop new ventures in the Mahaweli and expand existing ones. This is to be accomplished by a three-pronged approach: 1) investment promotion, technical assistance and marketing support to medium and large scale investors; 2) advisory services, training and improved access to credit for small scale enterprises; 3) policy assistance to improve access to resources, such as land and water,and the legal and institutional framework for enterprise development in the Mahaweli settlement areas.

The Employment, Investment and Enterprise Development Division of MASL is the MED implementing agency. The main technical consultancy is provided by a consortium led by the International Science and Technology Institute (ISTI), but marketing consulting is provided by the SRD Research Group Inc. Other firms in the MED consortium are Development Alternatives, Sparks Commodities, High Value Horticulture and Two Sri Lankan firms, Agroskills and Ernst and Young. This significant array of organizations and expertise is ready to assist private sector firms in the Mahaweli areas.

For further information please contact the Director of EIED (Tel: 502327/8/9), or James Finucane (Tel: 508683/4) the Chief of Party of MED, or K.Kodituwakku (Tel: 502327/9) the Local Representative of SRD.