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Sri Lanka Export Market Information Development Project

Strawberry Export Market Profile

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Introduction

This document is a profile of export market potentials for fresh strawberries from Sri Lanka, and in particular from the Mahaweli region. The objective of this document is to provide a brief overview of strawberry supply and demand in major markets and to assess Sri Lankan competitive position and potential profitability in those markets. The information for this report was drawn partly from SRD Research Group Inc. files and partly from market and competitor field trips undertaken under contract to the Agency for International Development in Sri Lanka for the EIED Division of the Mahaweli Authority of Sri Lanka.

A. Brief Overview of an Illustrative Strawberry Export Enterprises

Our analysis suggests that there is approximately 80,000 metric tons per month of unmet demand in Japan and Europe for fresh strawberries at prices which would be profitable to a Sri Lankan grower/exporter during the period from August-March. These markets appear to be oversupplied during the months from April to July which drives the wholesale price down for all competitors in the market.

Strawberry yields under tropical conditions are likely to be somewhat less than those obtained under ideal temperate conditions like California. We estimate that yields in Sri Lanka are likely to be around thirty metric tons of exportable fresh product per hectare with good management. At thirty tons per hectare per year it would appear that the major European and Japanese markets could profitably absorb the product of an additional 20,000 hectares of off-season tropical production.

During the profitable eight month seasonal window in these markets, wholesale prices have been averaging about US\$5-7 per kilo during the last three years. We estimate that Sri Lankan costs of production will average between \$.50-.55 per kilo, and that when air-freight, tariffs and marketing fees are added, the total cost to the wholesale market point will be about \$1.5-2/kg in Europe and about \$4.00/Kg. in Japan. This suggests a very high profit margin of roughly \$3-5/kg. Assuming thirty tons of exportable production per hectare that would suggest a stunning profit of about US\$ 90,000 per hectare per year.

A minimum commercial scale strawberry export operation would be about 10 hectares and require a fixed investment of approximately the following amounts:

1. Cooling equipment	\$ 45,000
2. Cooling and Packing Shed & Equipment	25,000
3. Field Equipment	35,000
4. Irrigation Equipment and Installations	15,000
5. Refrigerated Trailer and Lorry Tractor	75,000
 Total	 \$195,000

The product is normally packed in 12.5 lbs., 12 pint trays. With reasonable care and post-harvest cooling, strawberries can be expected to maintain acceptable market quality for about 8 days under refrigerated conditions. This implies that Sri Lankan fresh strawberries will have to be air-freighted to European and Japanese markets because refrigerated sea transport takes too long en route and sails too infrequently.

B. Seasonal Supply & Demand for Fresh Strawberries

The largest export market for Sri Lankan strawberries is West Germany with roughly 29,000 tons/month of unmet profitable demand during the eight month off-season. Japan has about 27,000 tons/month of unmet demand during this period. Switzerland is another large market with a profitable demand of about 6,000 metric tons/month during the off-season. Behind these very large markets are a number of highly profitable markets such as the U.K., Netherlands, Belgium, Hong Kong, Italy and Scandinavia.

We have selected West Germany, Japan, the U.K., Switzerland, Netherlands, Hong Kong and Singapore for the detailed supply and demand profiles which follow.

1. West German Market.

Figure one outlines monthly supplies and our estimate of profitable demand for fresh strawberry in the West German market during the twelve months of 1987.

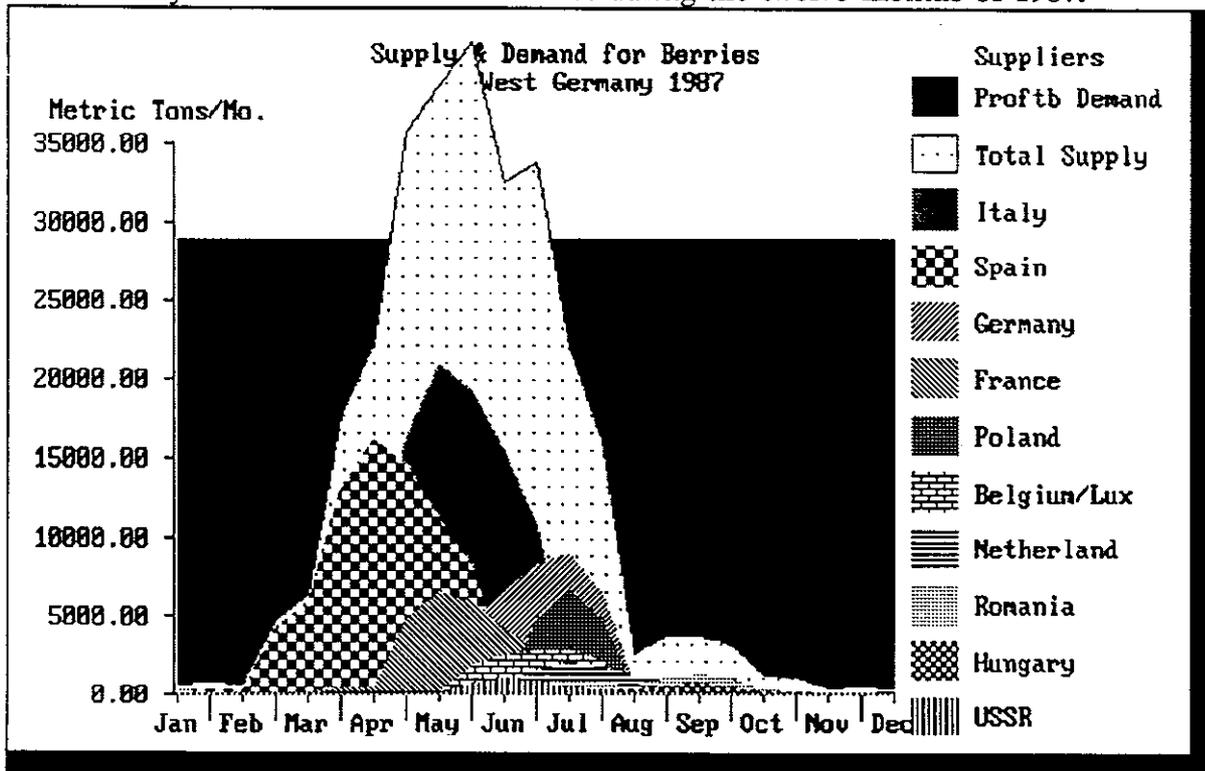


Figure 1: Strawberry Supply & Demand in Germany 1987

The solid black area represents our estimate of unmet demand in the West German market in 1987 which could have been sold at prices profitable to a Sri Lankan grower/exporter. This "profitable demand" level is estimated as follows. An examination of wholesale prices of fresh strawberries in Germany compared with Sri Lankan production and export costs, suggests that the safest profitability period for a Sri Lanka grower/exporter would be from August to early April.

Thus for the period from late April to late July or early August the market is over-supplied from the point of view of a Sri Lankan exporter since wholesale prices are substantially lower than during the off-season. We therefore ascertained the tonnage absorbed by the market during the month before prices dropped and set this level as the profitable demand level. This is a very conservative setting.

The dotted area is the total monthly supply which is the sum of all of the indicated suppliers. Italy, Spain, and France are the major suppliers, with Germany providing less than one fifth of its peak month consumption. Belgium, Poland and Holland are the other important on-season suppliers.

The German market is essentially unsupplied during the optimum market window from mid-July to mid-February and only partially supplied mid-February to mid-March.

The total unmet demand at prices profitable to Sri Lankan exporters is estimated at approximately 250,000 metric tons per year.

Figure 2 outlines the supply and profitable demand situation in the West German market for 1985 and 1986. Total supply in 1986 was roughly 40,000 tons during the peak season which was about the same as the 1987 level and 10% above 1985 levels. German domestic production in 1986 was seventy percent of its 1987 level.

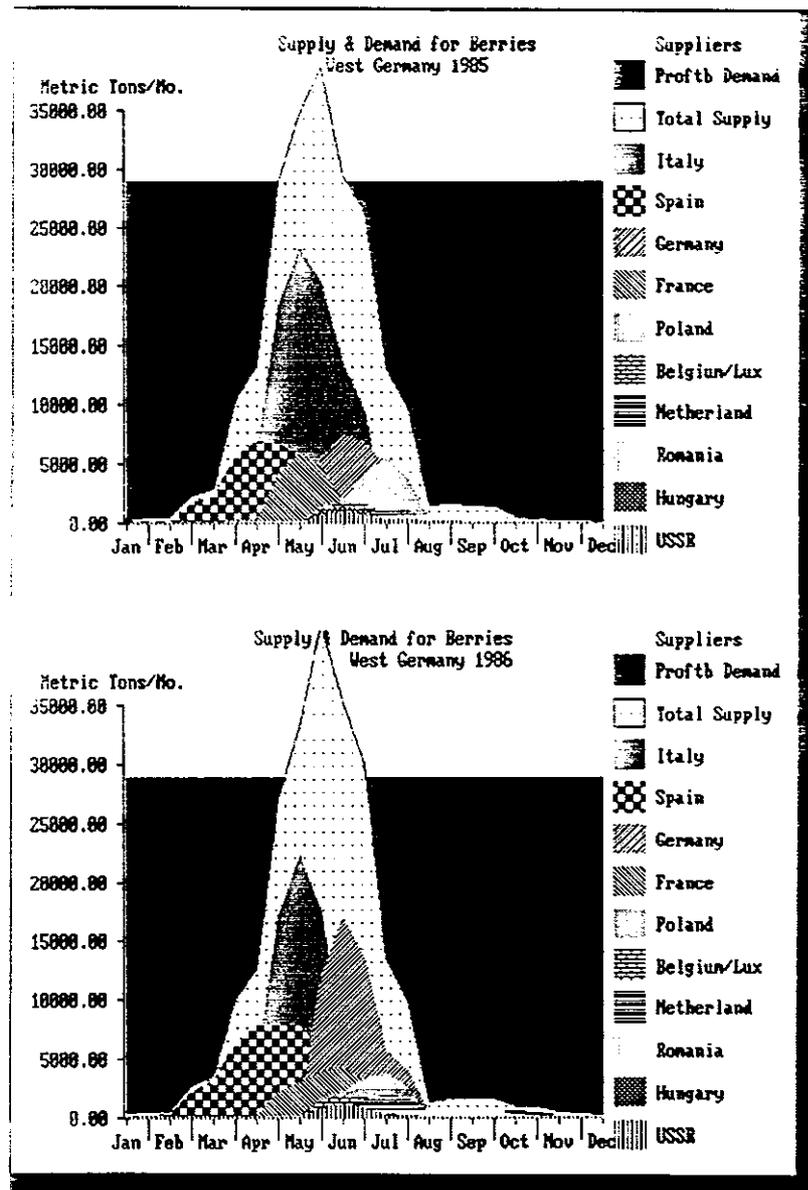


Figure 2: Strawberry Supply and Demand in Germany 1985/86.

Thus year-to-year seasonal differences may have a significant impact on the total supply from any one country and the timing of supply may vary from year to year by a week or two. However, the general pattern and magnitudes have changed little during the last three years. This suggests that the West German market will likely remain a very attractive off-season market for Sri Lankan and other tropical exporters.

2. United Kingdom Market

Figures 3 & 4 outline imported supply for the U.K. from 1984-86.

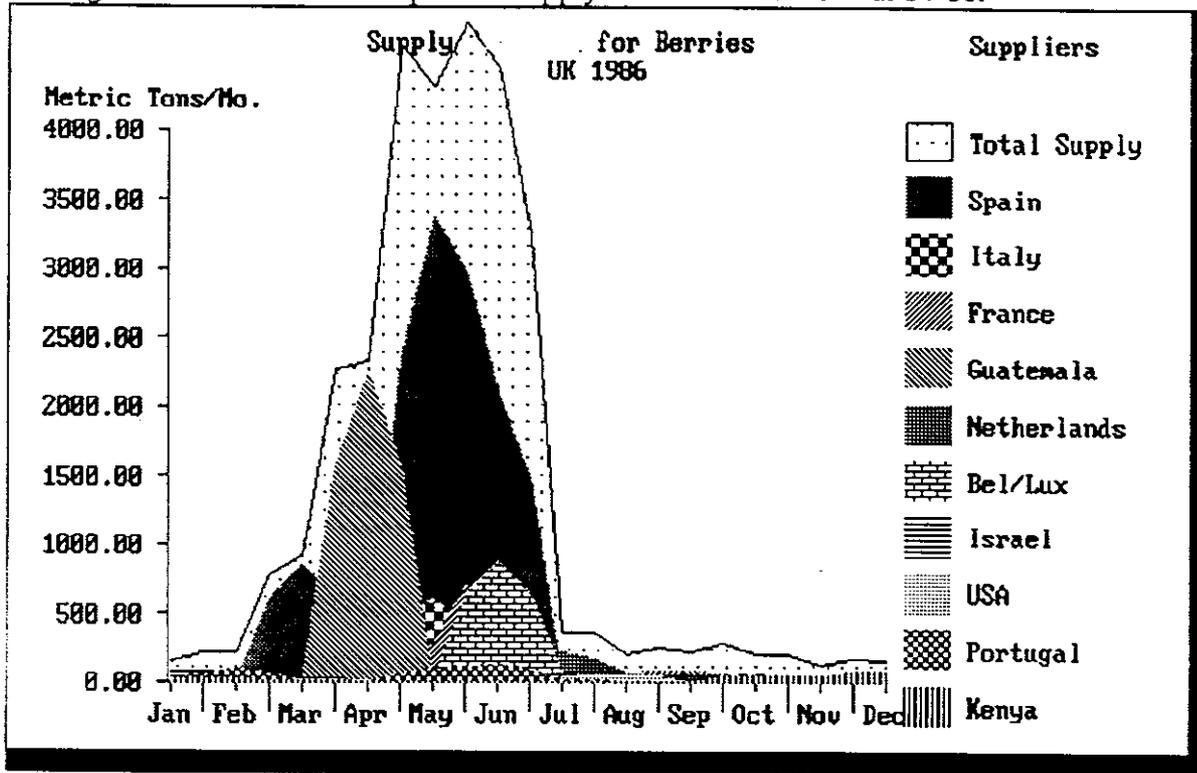


Figure 3: Strawberry Imported Supply in the U.K. Market for 1986

The U.K. total market is about 40% the size of the West German market for fresh strawberries. We estimate that during the off-season this market will absorb only about 12,000 metric tons per month. A small part of this off-season demand is already supplied by countries like the Italy, Spain, and France. Thus while the U.K. is a very profitable market and one to which Sri Lanka should certainly export, the long-term prospects are not as good as West Germany for large volumes.

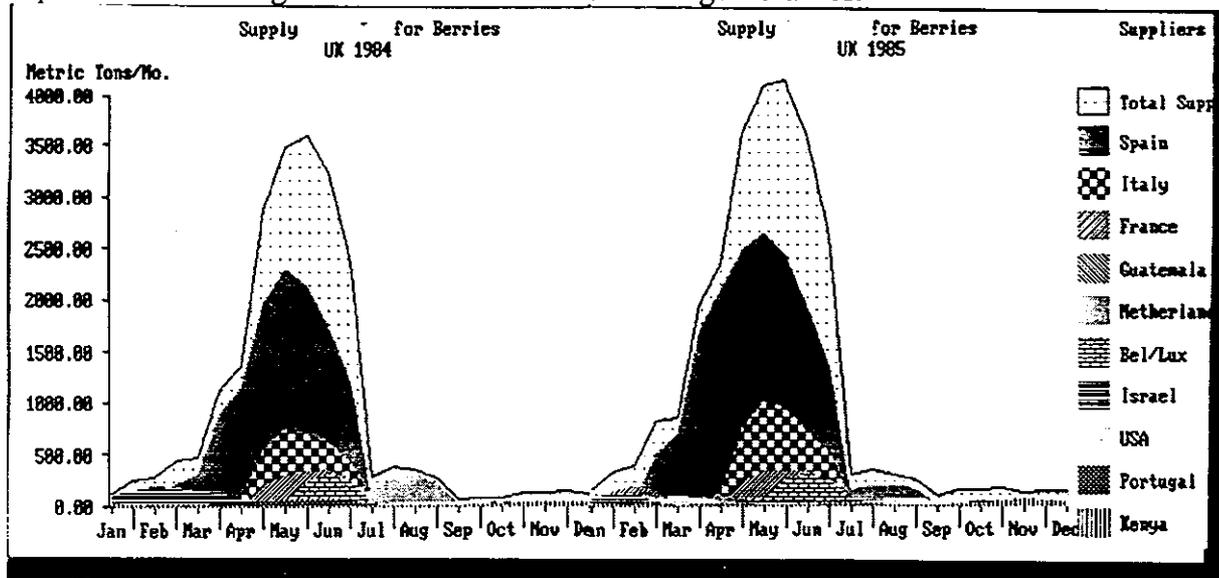


Figure 4: Strawberry Imported Supply in the U.K. Market 1984 and 1985

3. Japanese Market

Figure 5 outlines supply and our estimated profitable demand for the Japanese market in 1986. The Japanese market is roughly three-quarters the size of the German market. We estimate that it can absorb approximately 27,000 tons per month at prices profitable to Sri Lankan exporters. The optimal off-season period is from June to

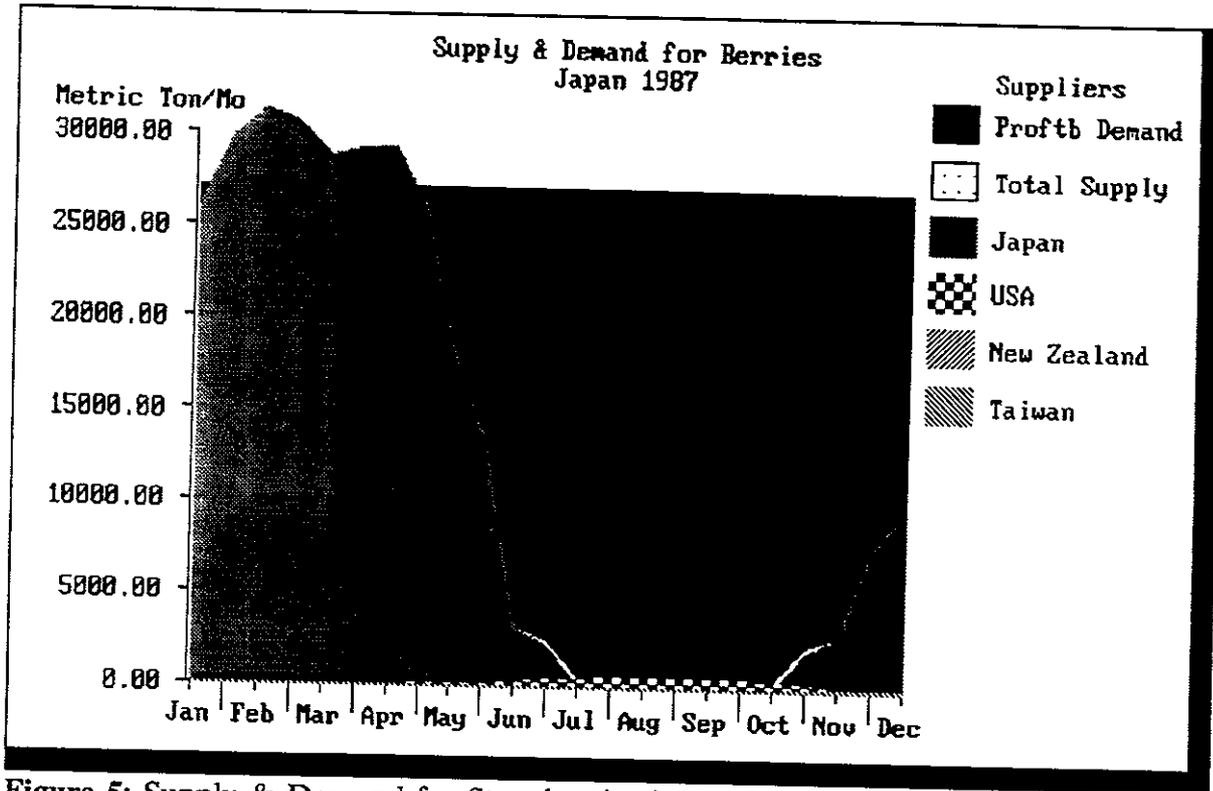


Figure 5: Supply & Demand for Strawberries in the Japanese Market 1987

November. The off-season is as sharply defined as the West German and U.K. markets. About 5% of the off-season profitable demand is being supplied by the United States, New Zealand and Taiwan.

Japan itself supplies the dominant share of its on-season supply in contrast to Germany which imports half of its on-season strawberries. Japanese production also spans a much longer seasonal range (from late December to early June) than does any European producer.

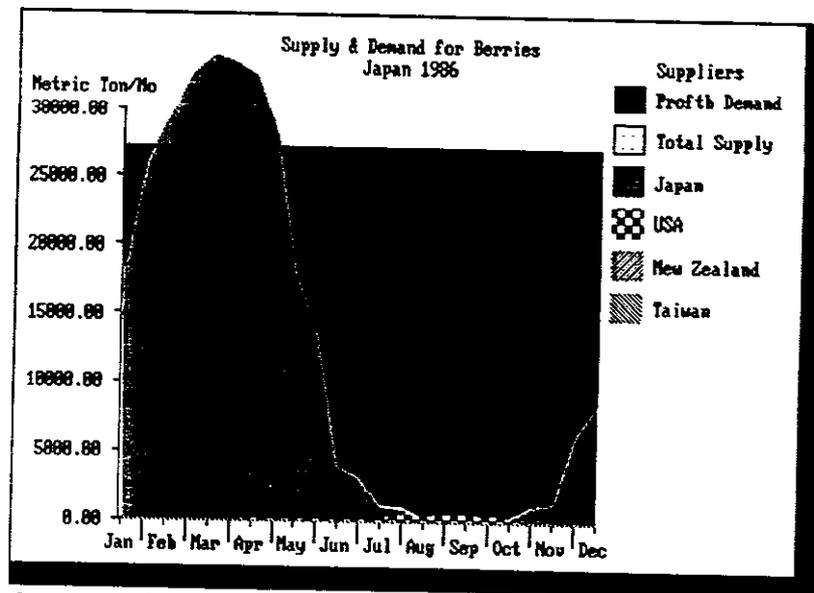


Figure 6: Supply & Demand for Strawberries in Japan 1986

4. Swiss Market

The Swiss market for fresh strawberries is very large given its small population. We estimate that Switzerland can absorb roughly 6,000 metric tons per month at prices profitable to Sri Lankan exporters. Profitable demand is not shaded black in Figure 7 as in the other graphs to denote that this is a tentative estimate not based on careful analysis of seasonal prices.

Switzerland supplies almost none of its own consumption of strawberries and depends on Italy, Spain, and France for most of its supplies. The off-season period is sharply defined and begins in late June and lasts until mid-March.

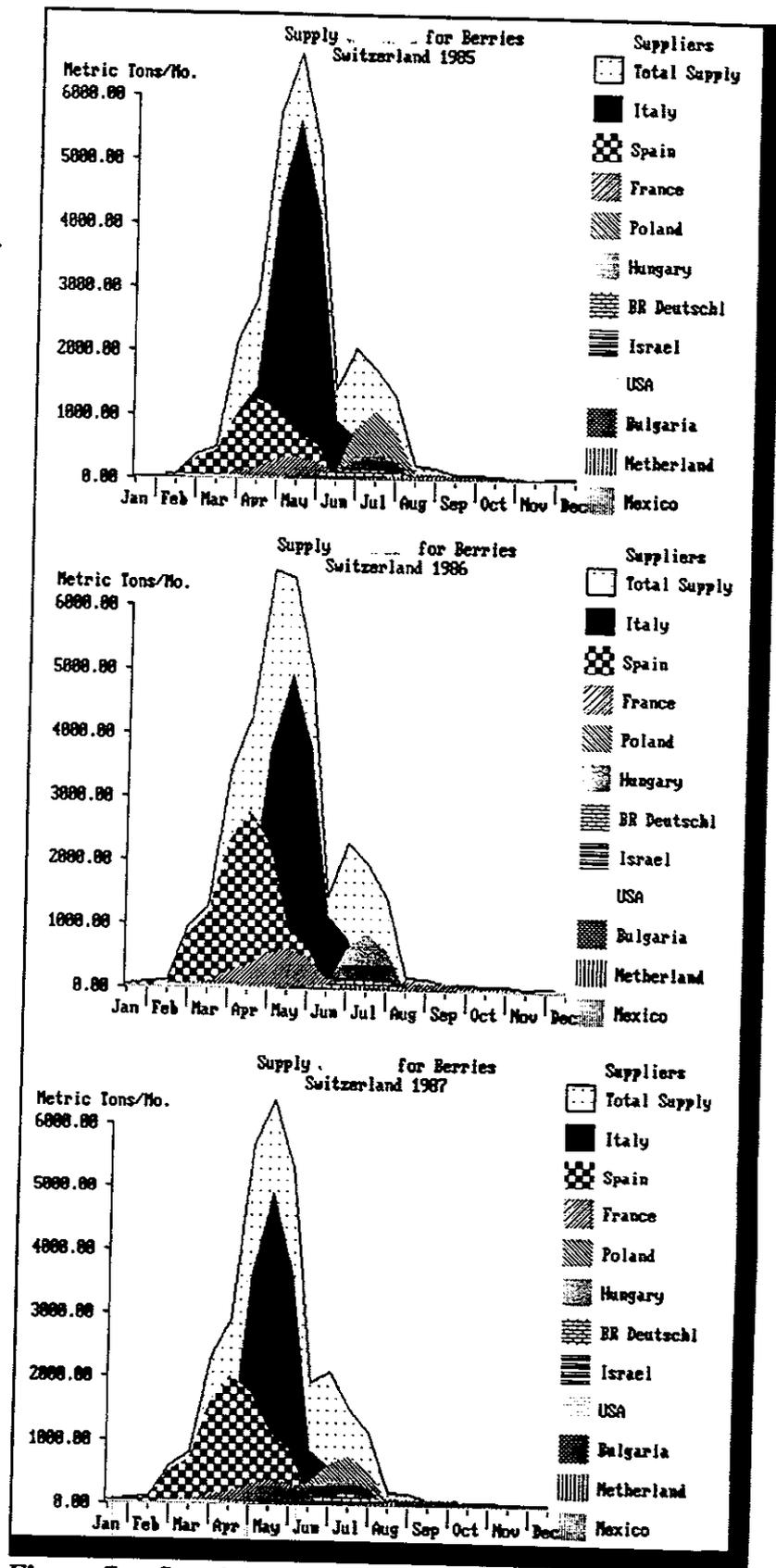


Figure 7: Supply for Strawberries in Switzerland 1985-87

5. Other Markets

The Netherlands, Hong Kong, and Singapore are very small but potentially profitable strawberry markets.

Data from these countries has been analyzed and presented in graphical format on the following pages.

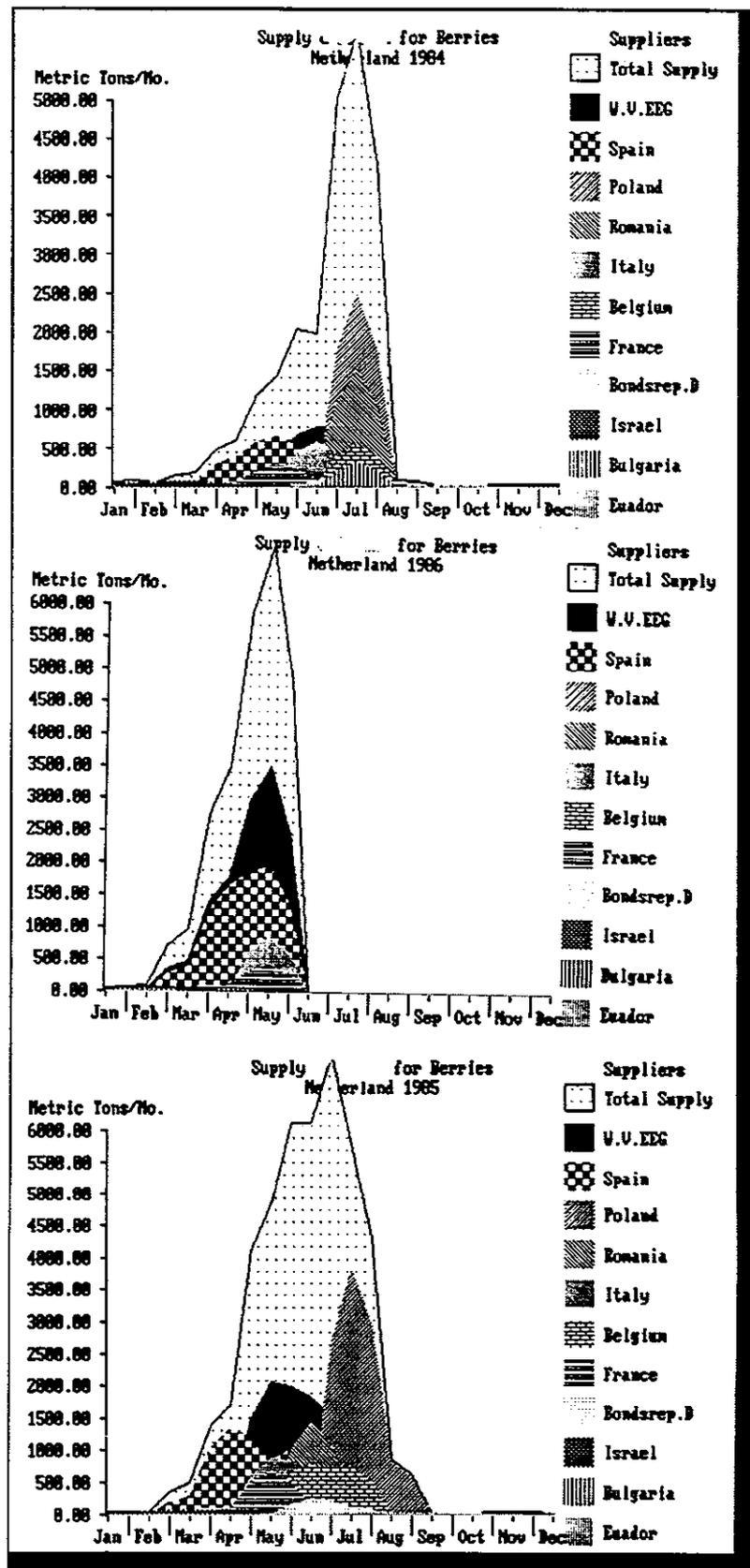


Figure 8: Supply & Demand for Strawberries in The Netherlands 1985-87

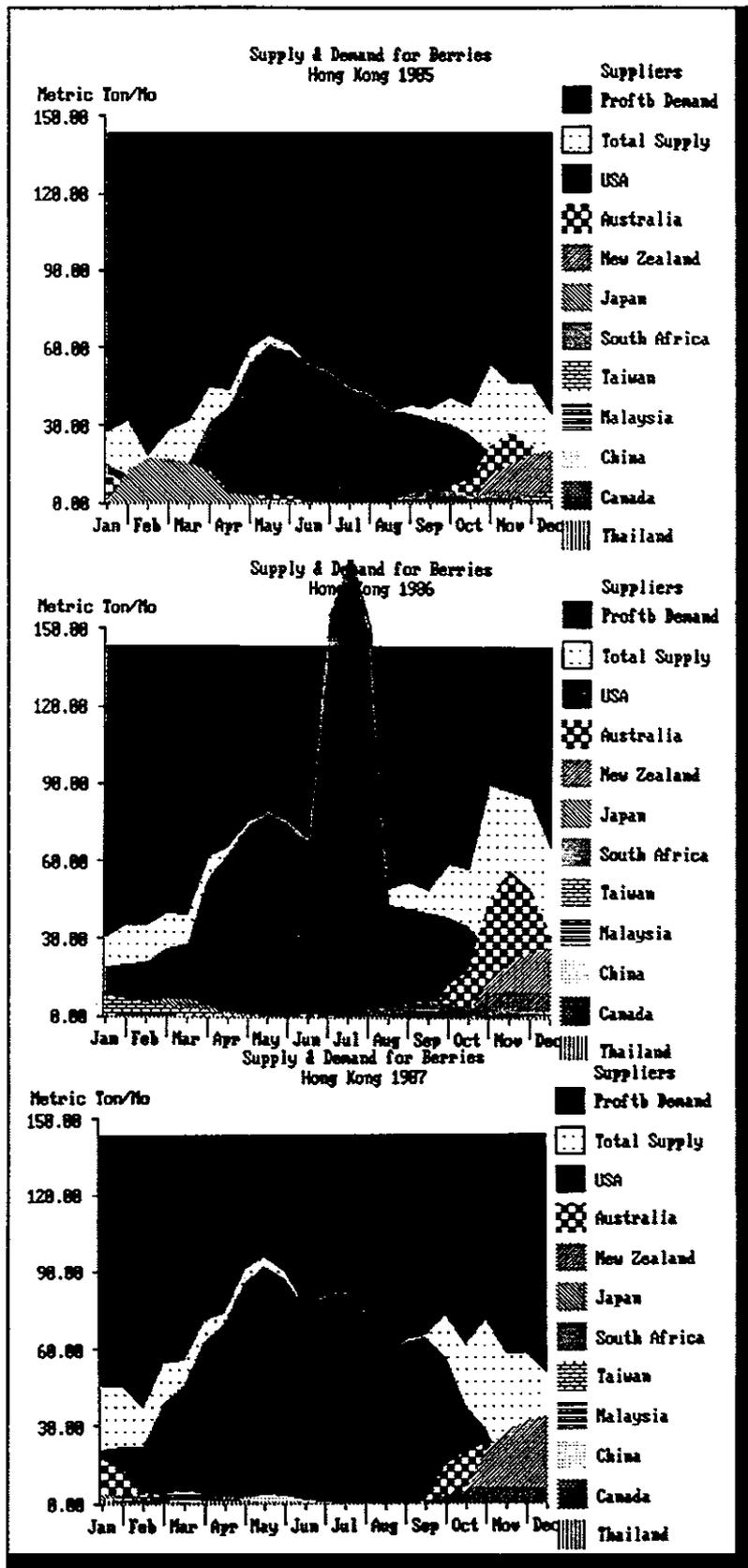


Figure 9: Supply & Demand for Strawberries in Hong Kong 1985-87

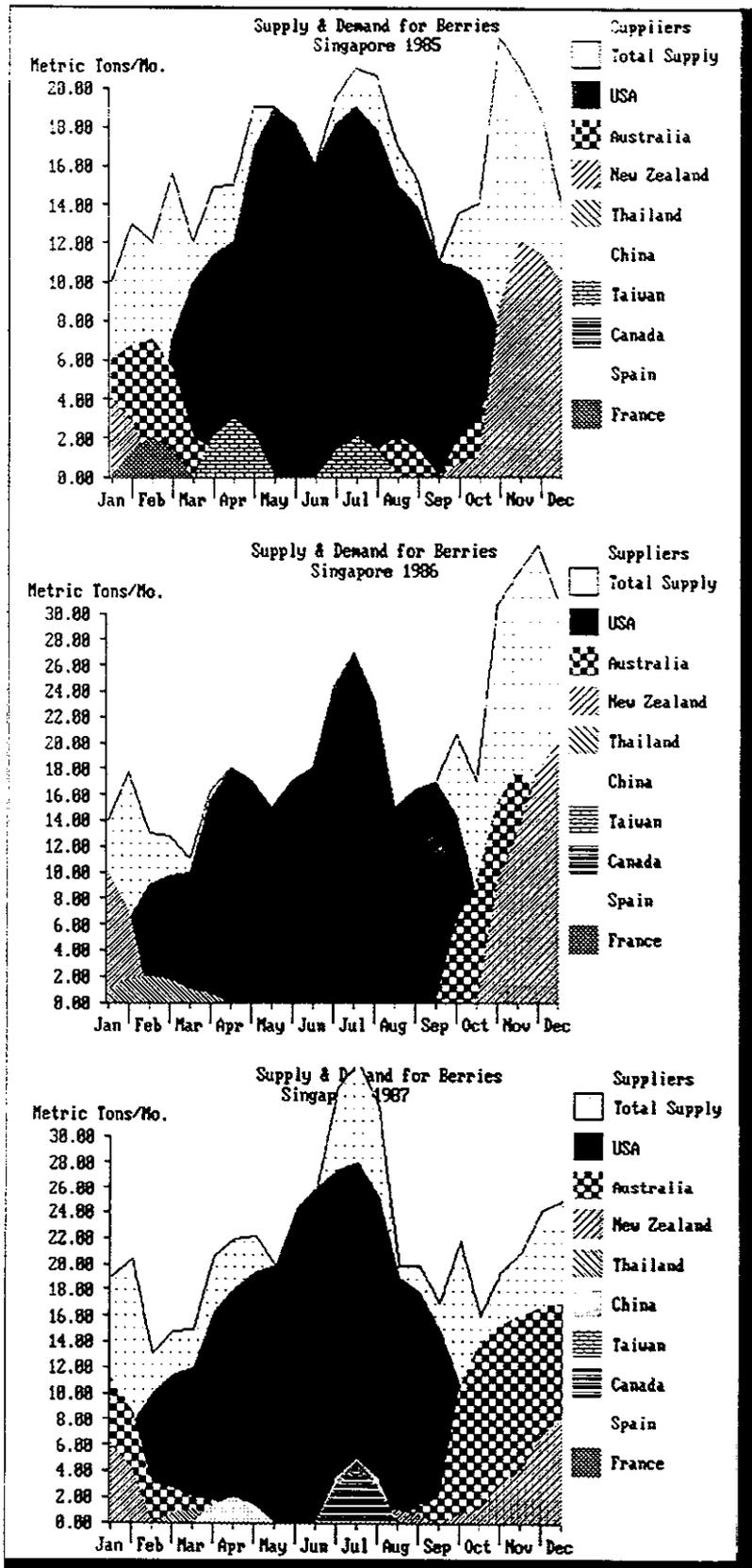


Figure 10: Supply & Demand for Strawberries in Singapore 1985-87

C. Sri Lanka and Competitor Costs of Production

Figure 11 describes our estimates of the costs of producing one kilo of fresh, export-quality strawberries in Sri Lanka (at high and low yield levels) and in seven major competing exporter countries.

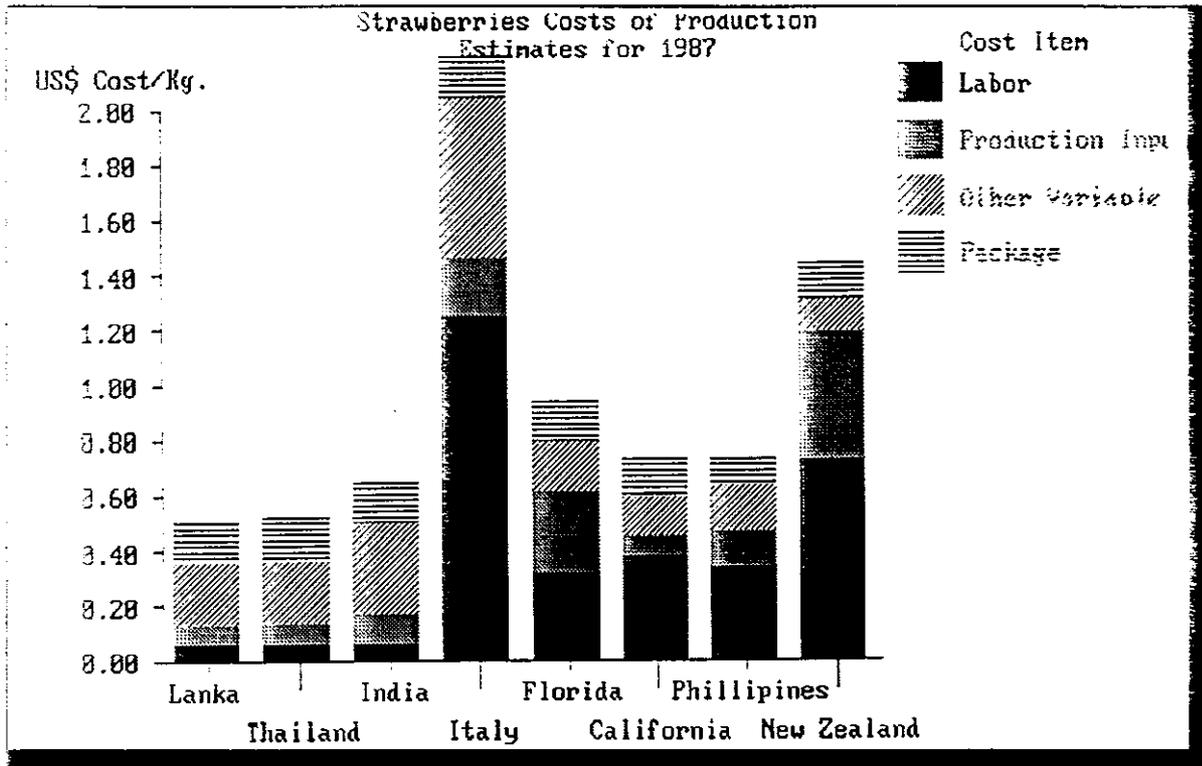


Figure 11: Strawberries Costs of Production

Sri Lanka is the low cost producer of the eight major strawberry exporters compared. This is the result of ideal temperate climate, combined with good technology, high yields and relatively low cost labor. Comparing Sri Lanka with other producers in Figure 11 reveals that most of the difference is due to labor cost differences.

The cost of package materials is roughly the same for all producers, but all other factors vary with changing technology, yields and factor costs. Italy has a relatively high cost due to the combination of relatively high labor costs and lower yields than the U.S. While low labor cost is a positive factor since strawberry harvest and packing are very labor intensive processes, low yields and poor technology can easily remove the benefit a low wage cost country should have.

Since there is no established strawberry industry in Sri Lanka it was impossible to obtain reliable cost estimates. We have therefore estimated costs of production for Sri Lanka based on two alternative assumptions about yields.

D. Total Cost Competition in Major Markets.

Figure 12 compares total costs for the seven major competing exporters in the wholesale markets of West Germany, the U.K. and Japan.

These costs include production costs outlined in detail in Figure 11 plus air-freight and tariffs. In Figure 12, Sri Lanka is very competitive with all exporters in the West German market.

The cost of air-freight from Sri Lanka to West Germany (indeed to any European destination) is set by commodity rate at approximately US\$1.25/kg. This puts Sri Lanka in an excellent competitive position.

Italy's transport and tariff advantages is essentially overcome by Sri Lanka's labor advantage in production costs.

Against most off-season competitors like New Zealand, Sri Lanka fares very well in the European markets based on costs.

In Japan, Sri Lanka is not in such a good competitive position since many similarly low labor countries also have significant transport advantages such as Thailand, India, and the Philippines.

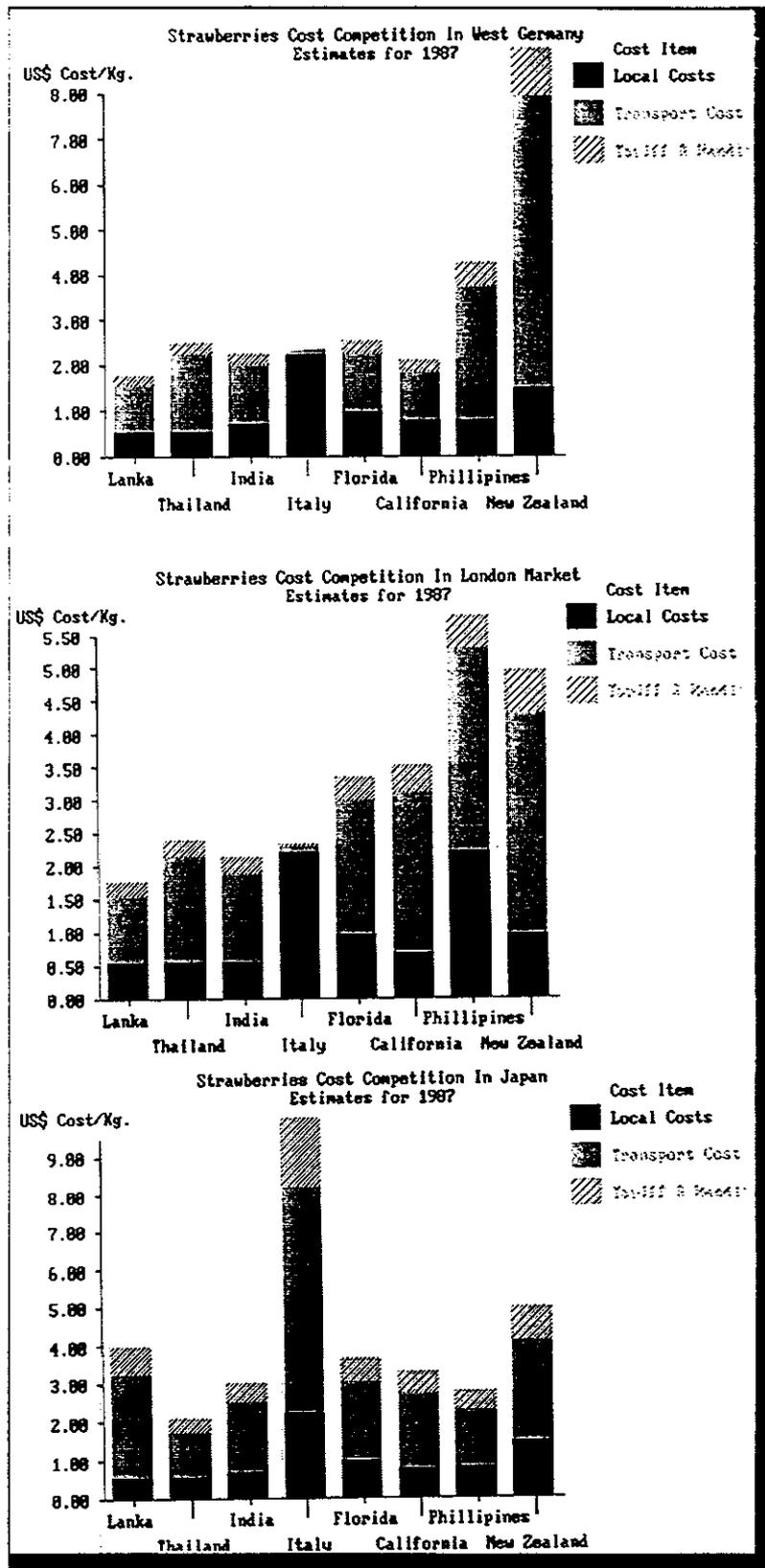


Figure 12: Production & Export Cost Competition in Germany, U.K. & Japan Markets

E. Seasonal Wholesale Prices and Profitability

This section analyzes seasonally fluctuating wholesale prices and their effect on the profitability of export strawberries in each of the three selected major markets.

Figure 13 graphs the biweekly average wholesale price per kilo for eleven major wholesale markets in West Germany. This price is the average for all grades of fresh strawberries which were on the market during the specified two-week period.

The graph is in US\$ per kilo at point of sale in the wholesale market. In January 1987, the wholesale price in Germany began at about \$8.75 per kilo and dropped in February to about \$6.25 and then again by May to about \$2.85.

This dotted area in Figure 13 is the gross sales value which would be generated by the sale of one kilo of strawberries in the West German wholesale market in any week during 1987.

Figure 11 shows the net profits which would have resulted to a Sri Lankan exporter from a sale of one kilo of fresh strawberries in any week in West Germany in 1987.

The solid area displays net profits per kilo after subtracting out production costs, transport, tariffs, handling and wholesale marketing fees. Thus a Sri Lankan grower/exporter would have made approximately \$5.75 per kg net profit on the sale of one kilo in the first two weeks of January, and \$0.50 per kilo on sales during mid-

April and May. One can now see how conservative our profitable demand analysis estimates presented earlier are by comparing this profit margin picture with the supply and profitable demand figures presented above.

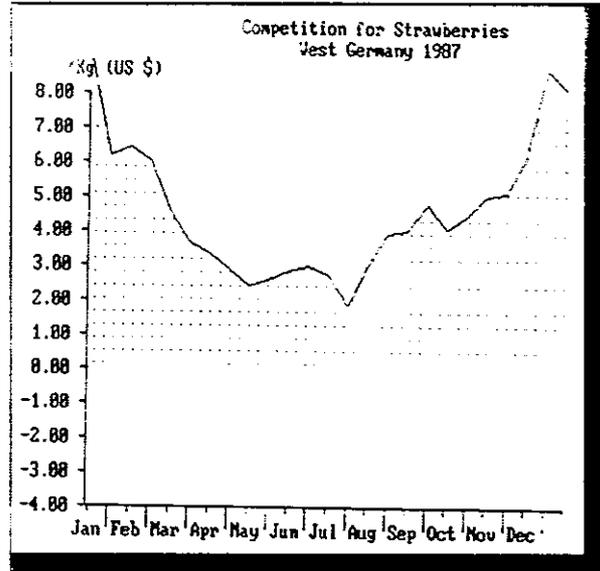


Figure 13: Asparagus Wholesale Prices in West Germany 1987

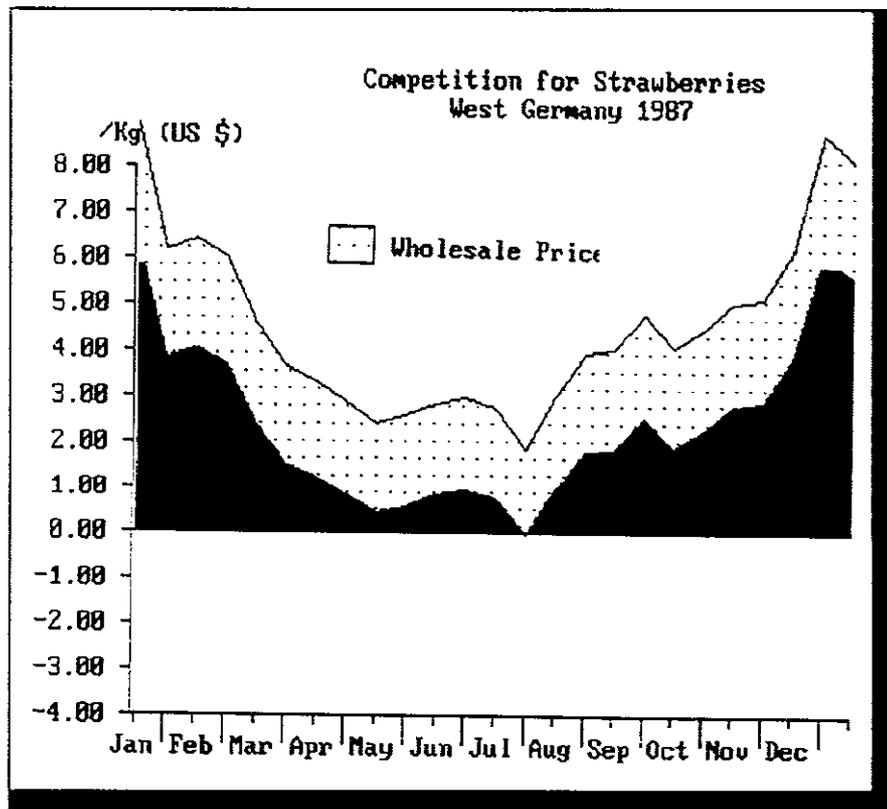


Figure 14: Net Profits to Sri Lankan Grower/Exporter in the West German Market

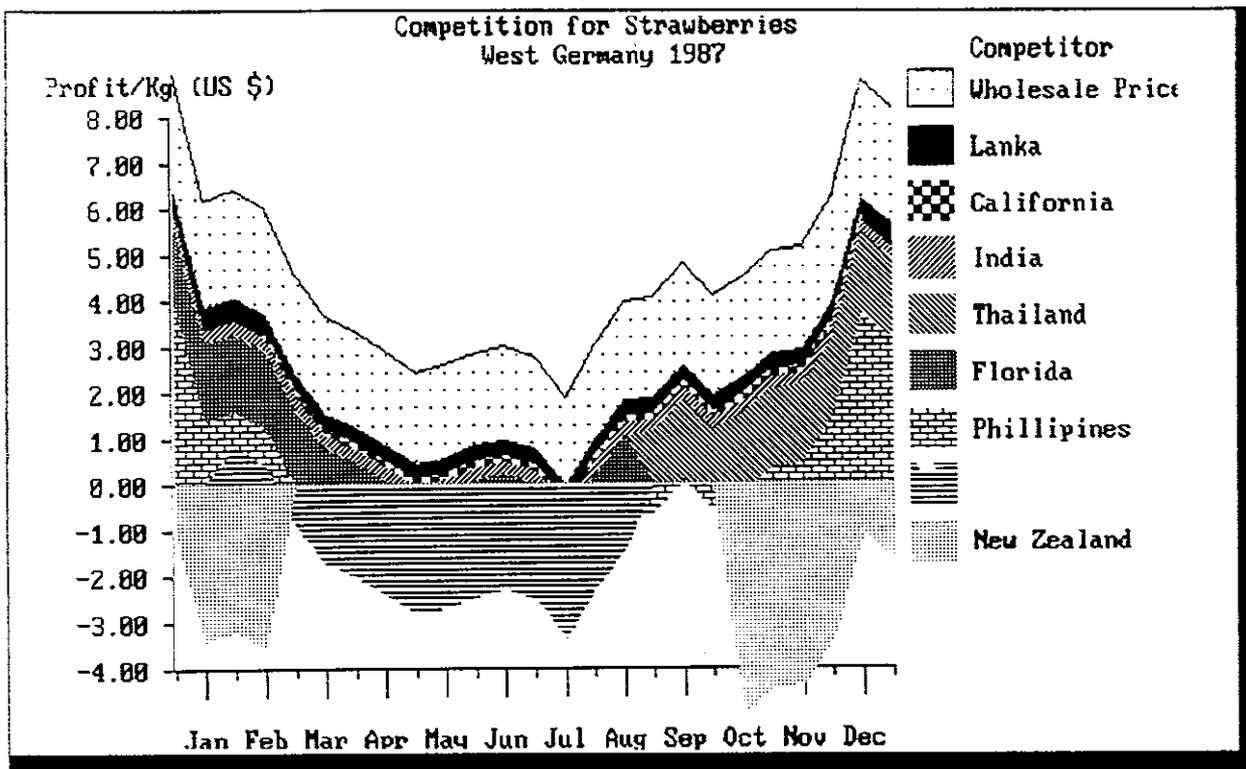


Figure 15: Seasonal Net Profit/Kg. for Eight Major Competitors German Market 1987

Figure 15 adds the low-yield Sri Lankan and seven competitors to the seasonal profit competition picture. One can now see the solid area representing Sri Lankan net profits, overlaid by profitability of other competitors. These are stacked like profit mountains in front of each leaving only the highest profitability competitor showing. Taking an example from the first week of January, we can see that the wholesale market price was about US\$9.00 per kilo. The dotted area left showing is total costs. The net profits of the highest yielding grower/exporter for Sri Lanka are represented by the dark solid area. In January this Sri Lankan exporter would earn about \$5.75 per kilo net profit and spend \$3.25 in costs (the dotted area).

Sri Lanka is the most profitable of all competitors. The least competitive countries in the West German market are New Zealand and Italy. Competitor total costs can be estimated by measuring the vertical distance between their profit line and the wholesale cost. For example, the total cost for a Florida exporter during the first week of January would be the vertical distance from the top of his profit line at \$5.15 and the wholesale price line of \$9.00. Thus the Florida total cost including production, airfreight, tariffs, handling and marketing fees would be \$3.85 (9.00 minus 5.15).

Sri Lankan hypothetical net profit margins are estimated to fluctuate in the West German market in 1987 during the off-season from a low of about \$1.00/kg to a high of about \$6.00/kg.

During the on-season these profit margins would have dropped to less than \$1/kg.

These margins are very respectable, especially when we remind ourselves that each hectare should produce approximately thirty tons of exportable fresh strawberries.

Prices vary between years with fluctuating seasons, incomes and exchange rates. In 1985 profits would have ranged from \$3-8 in the off-season and \$0.75-3.50 in the on-season.

During 1986, hypothetical Sri Lankan profit margins would have fluctuated from \$2-7/kg during the off-season and \$0.25-2 during the on-season.

An analysis of this variation suggests that the off-season minimum profit has held rather stable at about \$3-4 per kg. over the last three years while the maximum has fluctuated from \$6-7. The on season minimum profit has likewise held stable at around \$0.25 per kilo while the on-season maximum has varied over a one dollar range.

It would appear from these data that Sri Lankan exporters might expect minimum profit levels to remain rather stable over the medium 3-5 year span during which their business develops, but should not count on stable maximums during that same period.

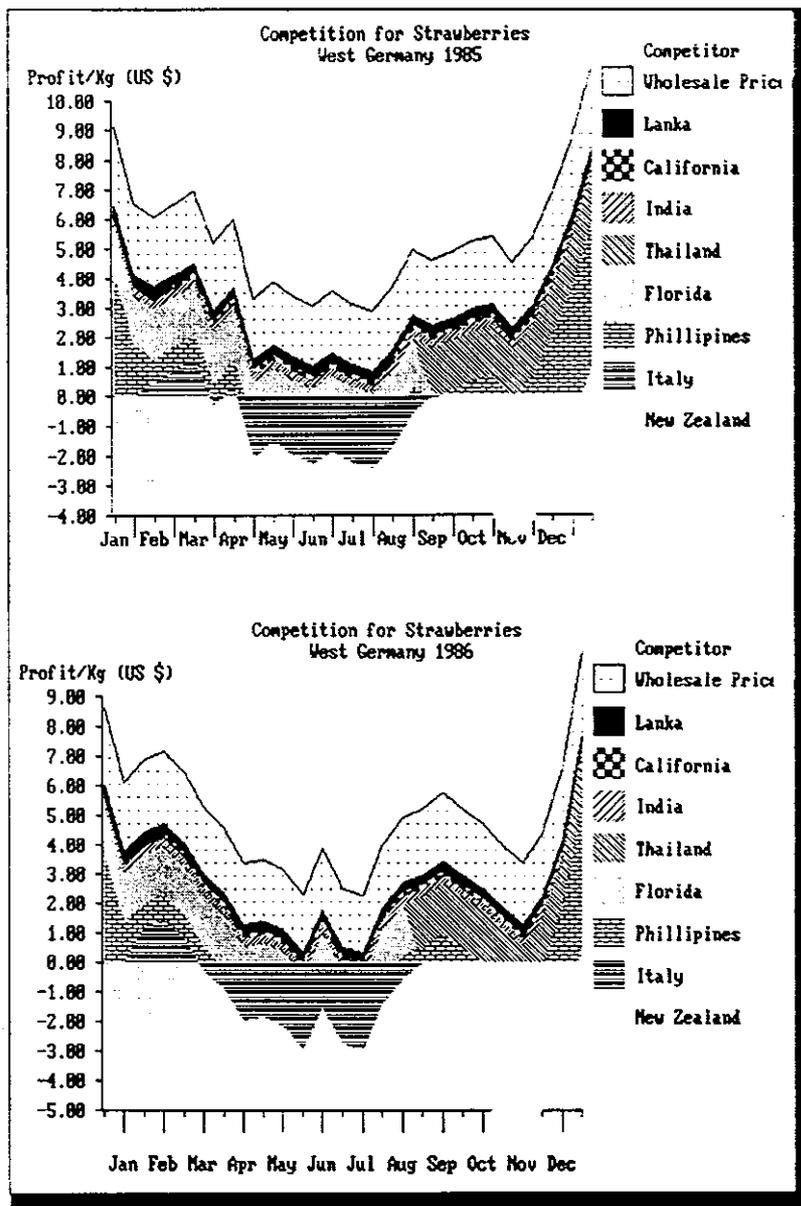


Figure 16: Profit Competition Germany 1985-86

2. United Kingdom Market

This section analyzes seasonally fluctuating wholesale prices and their effect on the profitability of export strawberries in the United Kingdom's major markets.

The price graphed is the average for all grades of fresh strawberries which were on the market during the specified two-week period.

The graph is in US\$ per kilo at point of sale in the wholesale market. In January 1987 the wholesale price in the U.K. began at about \$8.45 per kilo and declined in February to \$7.50 and then dropped by May to about \$4.00.

This dotted area in Figure 17 is the gross sales value which would be generated by the sale of one kilo of strawberries in the United Kingdom wholesale market in any week during 1987.

Figure 18 shows the net profits which would have resulted to a Sri Lankan exporter from a sale of one kilo of fresh strawberries in any week in the United Kingdom in 1987.

The solid area displays net profits per kilo after subtracting out production costs, transportation, tariffs, handling, and wholesale marketing fees.

Thus a Sri Lankan grower/exporter would have made approximately \$5.00 per kg. net profit on the sale of one kilo in the first two weeks of January, and \$0.25-1.00 per kilo on sales during mid-June and July.

One can now see how conservative our profitable demand analysis estimates presented earlier are by comparing this profit margin picture with the supply and profitable demand figures presented above.

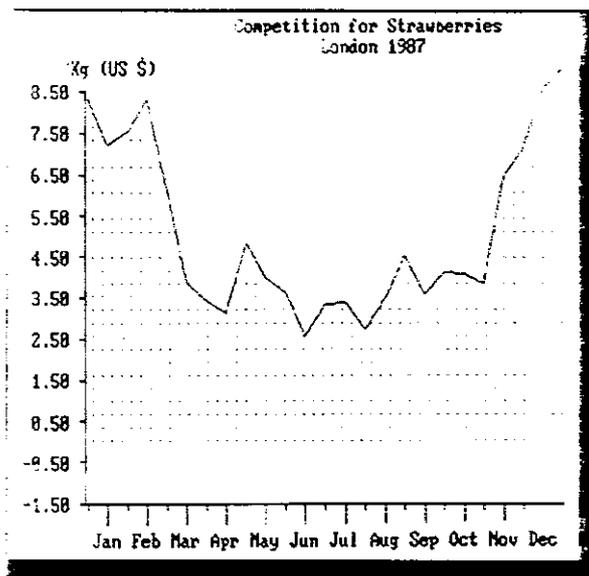


Figure 17: Strawberry Wholesale Prices in United Kingdom 1987

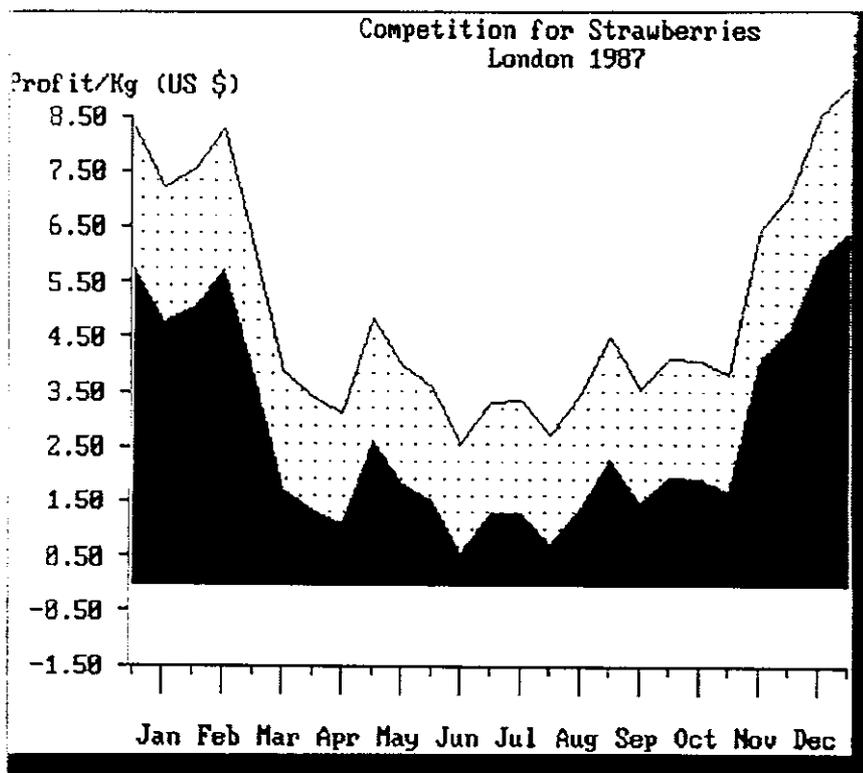


Figure 18: Net Profits to Sri Lankan Grower/Exporter in the United Kingdom Market

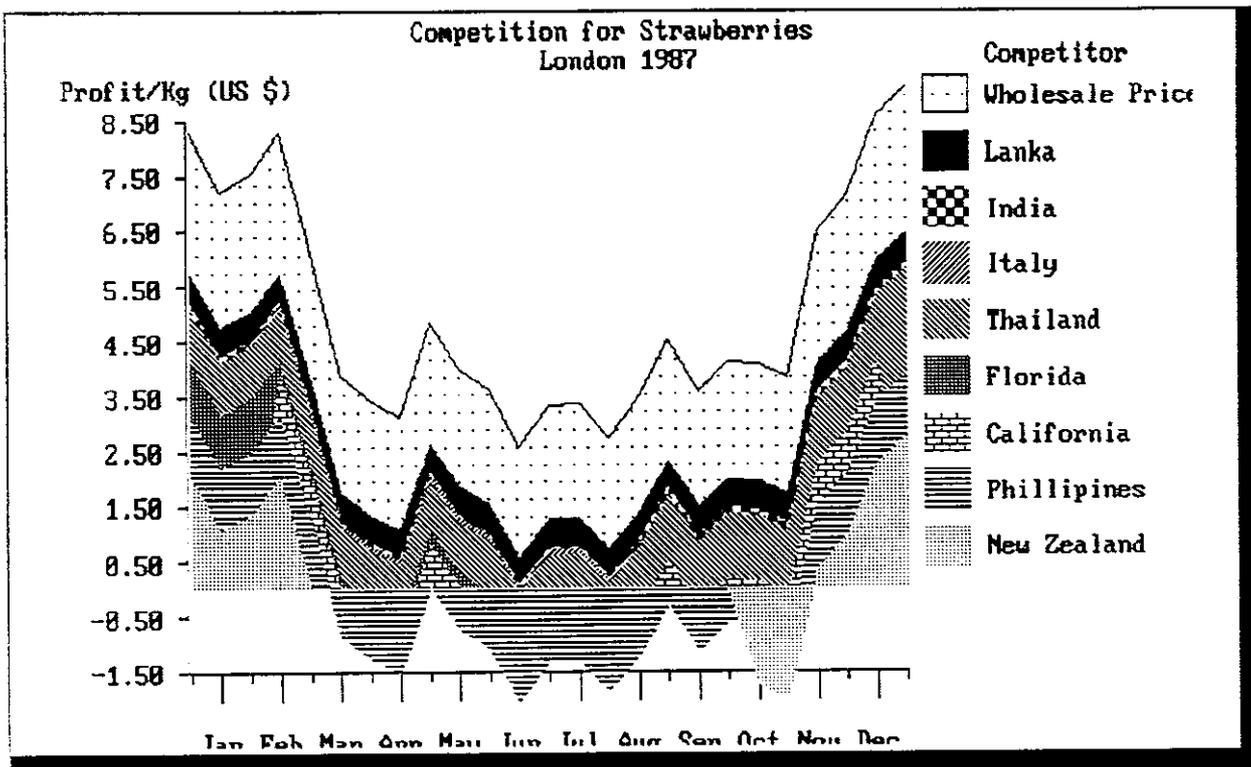


Figure 19: Seasonal Net Profit/Kg. for Eight Major Competitors U.K. Market 1987

Figure 19 adds the low-yield Sri Lankan and seven competitors to the seasonal profit competition picture. One can now see the solid area representing Sri Lankan net profits, overlaid by profitability of other competitors. These are stacked like profit mountains in front of each leaving only the highest profitability competitor showing. Taking an example from the first week of January, we can see that the wholesale market price was about US\$8.45 per kilo. The dotted area left showing is total costs. The net profits of the highest yielding grower/exporter for Sri Lanka are represented by the dark, solid area. In January this Sri Lankan exporter would earn about \$5.50 per kilo net profit and spend \$2.95 in costs (the dotted area).

Sri Lankan is the most profitable of all competitors. The least competitive country in the U.K. market is the Phillipines, denoted by horizontal lines. In fact, a Phillipine exporter would actual lose up to \$1.75 on each kilo sold.

Competitor total costs can be estimated by measuring the vertical distance between their profit line and the wholesale cost. For example, the total cost for a Florida exporter during the first week of January would be the vertical distance from the top of his profit line at \$3.65 and the wholesale price line of \$8.45. Thus the Florida total cost including production, airfreight, tariffs, handling and marketing fees would be \$4.80 (8.45 minus 3.65).

Sri Lankan hypothetical net profit margins are estimated to fluctuate in the United Kingdom market in 1987 during the off-season from a low of about \$1.50/kg to a high of about \$6.50/kg.

During the on-season these profit margins would have dropped to between \$0.25-2.50/kg.

These profit margins are very respectable, especially when we remind ourselves that each hectare should produce approximately 30 tons of exportable fresh strawberries.

Prices vary among years with fluctuating seasons, incomes and exchange rates. In 1986, profits would have ranged from \$1-8 in the off-season and \$0.45-1.65 in the on-season.

An analysis of this variation suggests that the off-season minimum average profit has been rather predictable at \$3 per kg, over the last three years while the maximum has fluctuated at around \$6.35. The on-season minimum profit has likewise held stable at around \$0.25 per kilo while the on-season maximum has varied over a range from \$1-2/kg.

As could be ascertained from the charts, Sri Lankan exporters should expect their return to vary substantially throughout the medium 3-5 year span during which their business develops, but should not count on stable maximums during that same period.

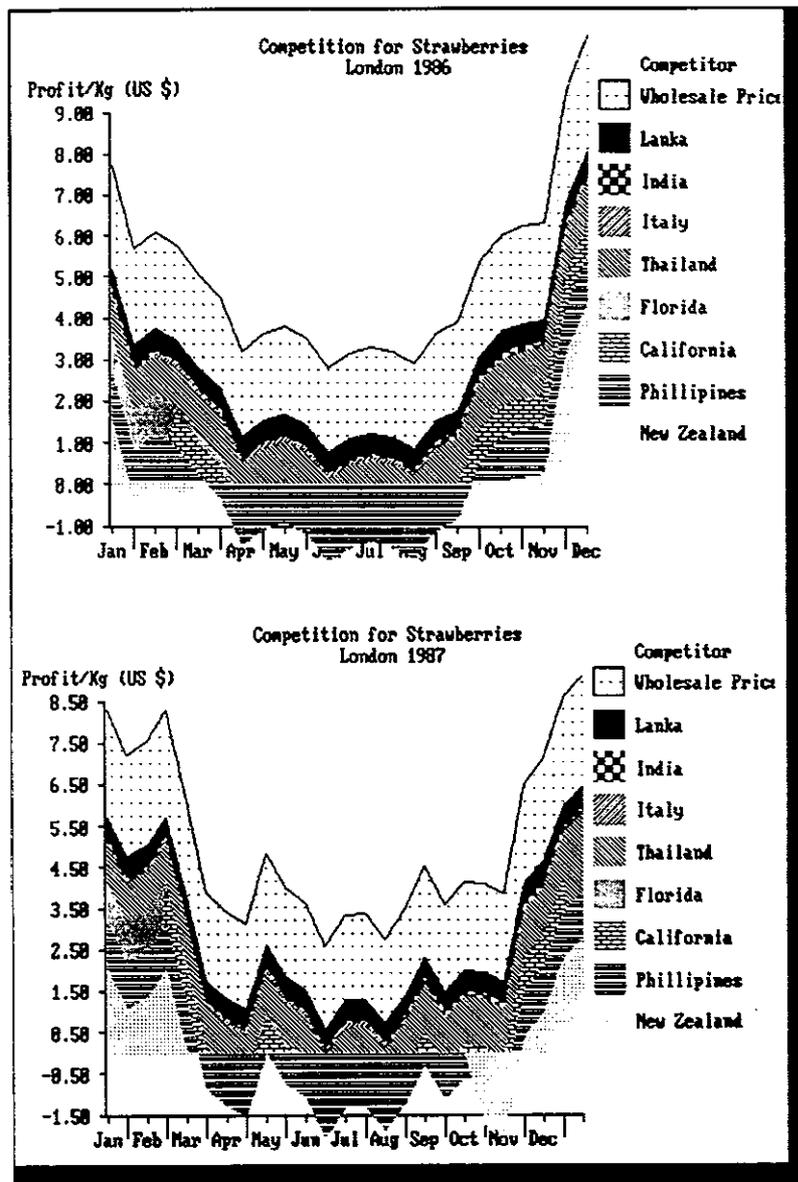


Figure 20: Seasonal Net Profit/Kg. for Seven Major Competitors United Kingdom 1986 and 1987

3. Japanese Wholesale Markets

This section on Japan analyzes seasonally fluctuating wholesale prices and their effect on the profitability of export strawberries.

Figure 21 graphs the biweekly average wholesale price per kilo the major wholesale markets in Japan. This price is the average for all grades of fresh strawberries which were on the market during the specified two-week period.

The graph is in US\$ per kilo at point of sale in the wholesale market. In January 1987, the wholesale price in Japan began at about \$7.50 per kilo, then dropped by May to about \$4.00.

This dotted area in Figure 21 is the gross sales value which would be generated by the sale of one kilo of strawberries in the Japanese wholesale market in any week during 1987.

Figure 22 shows the net profits which would have resulted to a Sri Lankan exporter from a sale of one kilo of fresh strawberries in any week in Japan in 1987.

The solid area displays net profits per kilo after subtracting out production costs, transport, tariffs, handling and wholesale marketing fees. Thus a Sri Lankan grower/exporter would have made approximately \$5.00 per kg net profit on the sale of one kilo in the first two weeks of January, and \$10.00 per kilo on sales during mid-June and July. One can now see how conservative our profitable demand analysis estimates presented earlier are by comparing this profit margin picture with the supply and profitable demand figures presented above.

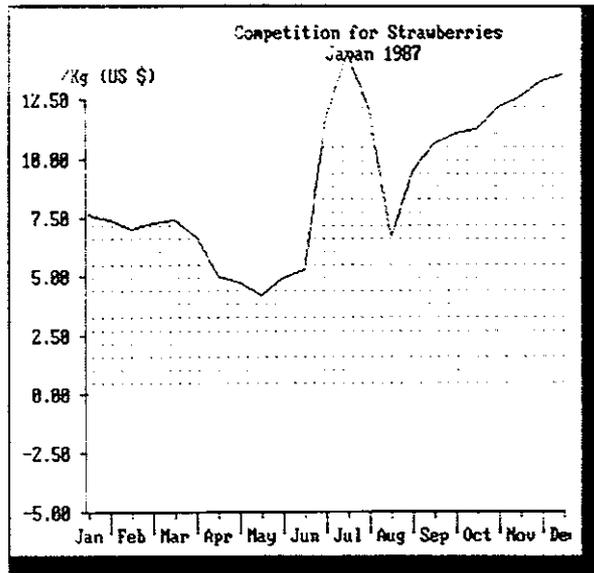


Figure 21: Strawberry Wholesale Prices in Tokyo 1987

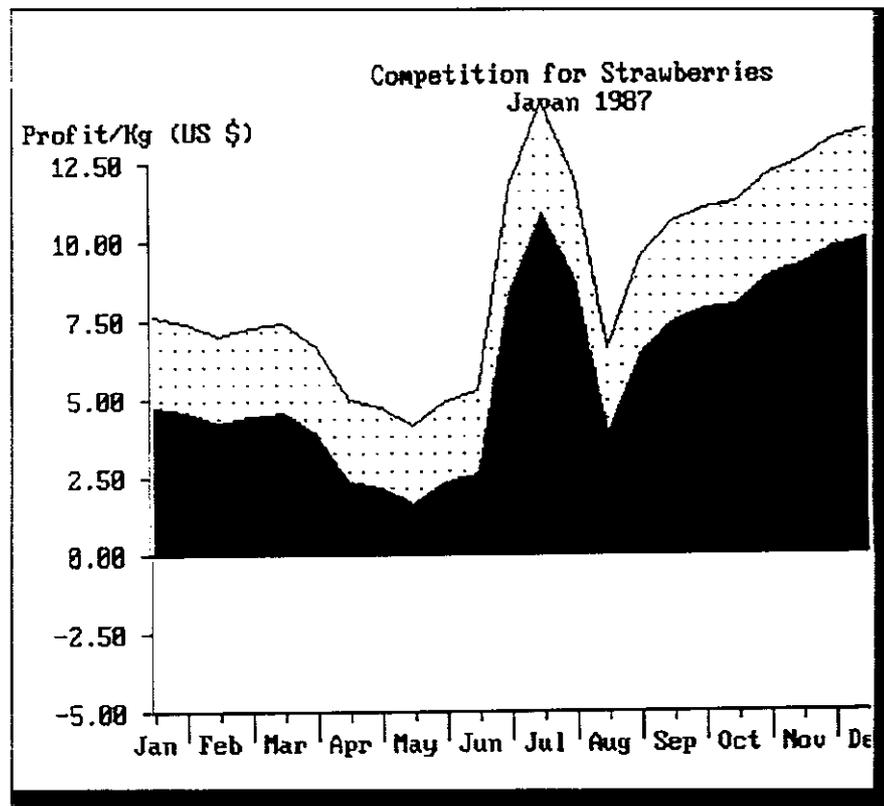


Figure 22: Net Profits to Sri Lankan Grower/Exporter in the Tokyo Market

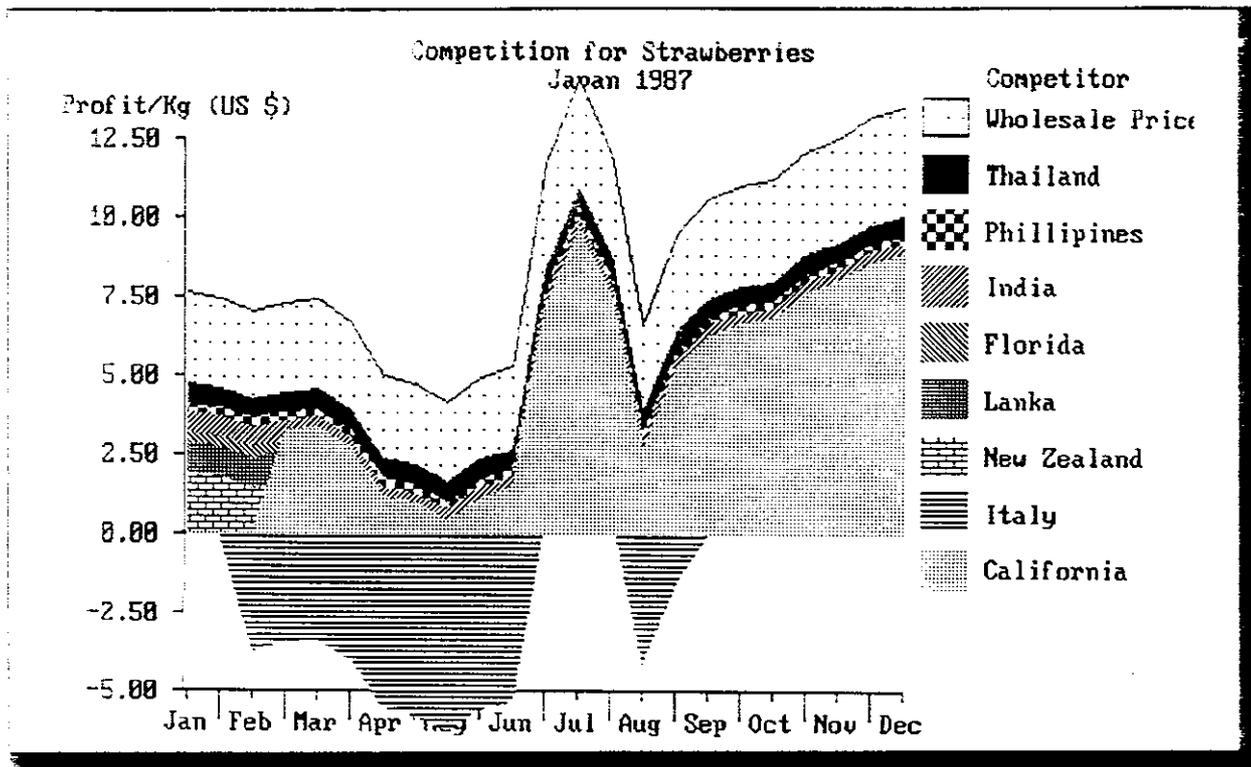


Figure 23: Seasonal Net Profit/Kg. for Eight Major Competitors Tokyo Market 1987

Figure 23 adds the low-yield Sri Lankan and seven competitors to the seasonal profit competition picture. One can now see the checkered area representing Sri Lankan net profits, overlaid by profitability of other competitors. These are stacked like profit mountains in front of each leaving only the highest profitability competitor showing. Taking an example from the first week of January, we can see that the wholesale market price was about US\$7.50 per kilo. The dotted area left showing is total costs. The net profits of the highest yielding grower/exporter for Sri Lanka are represented by the checkered area. In January this Sri Lankan exporter would earn about \$2.50 per kilo net profit and spend \$5.00 in costs (the dotted area).

Throughout the year, Sri Lanka is a profitable competitor. Italy would be operating at a loss during most of the on-season period. Sri Lankan hypothetical net profit margins are estimated to fluctuate in the Japanese market in 1987 during the off-season from a low of about \$1.00 to a high of about \$9.00. During the on-season, these profit margins would have dropped to between \$0.65 and \$2.00.

These profit margins are certainly lucrative, especially compared with the average prices in the European markets. At a yield of 30 tons per hectare, the potential profit is noteworthy.

Prices vary among years with fluctuating seasons, incomes, and exchange rates. During 1985, hypothetical Sri Lankan profit margins would have fluctuated from \$2.50-8.00 during the off-season and \$1.00-2.00 in the on-season.

In 1986, profits would have ranged from \$2.00-15.00 in the off-season and \$0.75-1.50 in the on-season.

An analysis of this variation suggests that the off-season minimum average profit has been rather predictable at between \$4-9 per kg. over the last three years while the maximum has fluctuated from \$10-12.

The on-season minimum profit has likewise held stable at around \$2. The on-season maximum has varied over a range of about US\$3.

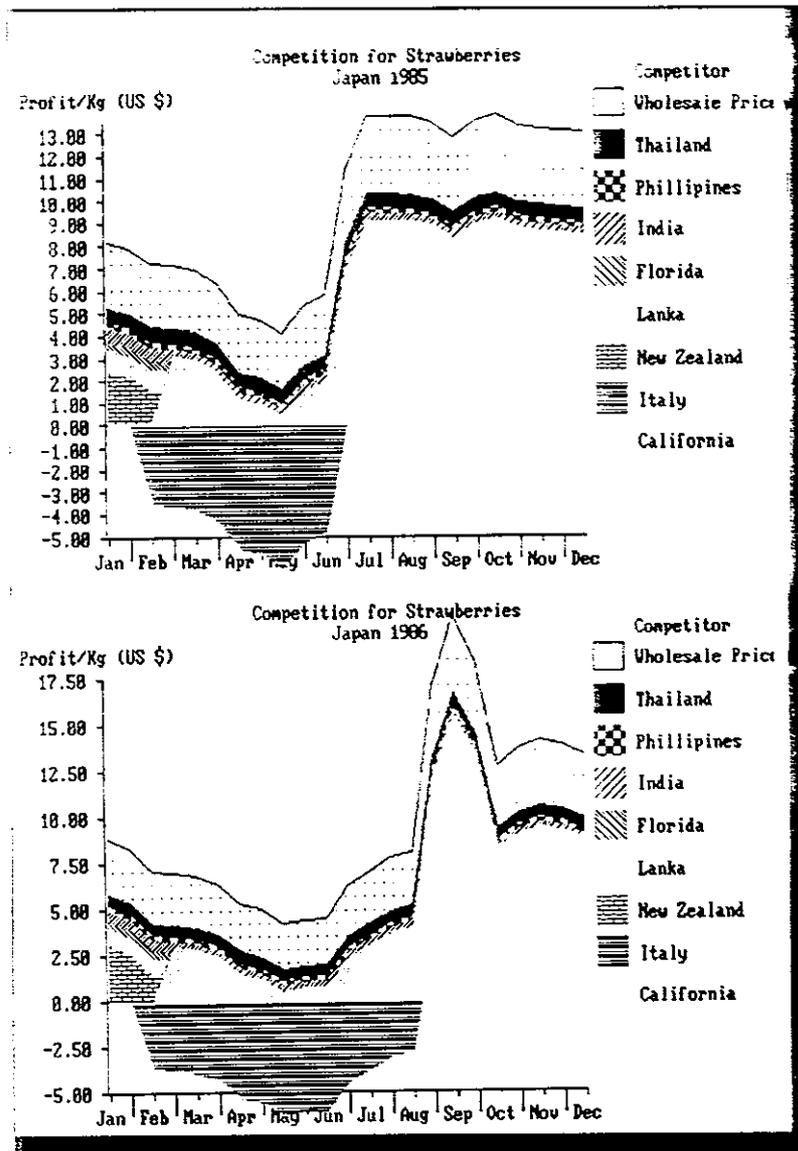


Figure 24: Seasonal Net Profit/Kg. for Seven Major Competitors Tokyo 1985 and 1986

As could be ascertained from the charts, Sri Lankan exporters should expect their return to vary substantially throughout the medium 3-5 year span during which their business develops, but should not count on stable maximums during that same period.

F. Recommended Varieties

Day-neutral varieties appropriate for tropical and arid production areas include: Chandler, Douglas, Pajaro, Selva, Tangi and Cardinal. Of these, the best market variety is Chandler. Since these varieties would be forced into an annual production mode, there is little long-term risk. Commercial production should commence with Chandler reproduction with some smaller test quantities of all others.

At the end of the first commercial year, the conclusion should be determined and further reproduction could be directed away from Chandler in the unlikely event that another variety is more successful.

G. Potentials and Constraints on Strawberry Exports from the Mahaweli

Post-Harvesting Technology

The introduction of difficult post-harvest technology is most critical in the case of Strawberries where self life is only 9-12 days maximum and where a few minutes delay in cooling or slight mishandling of the fruit make a big difference to the viability of the business.

This is particularly difficult since the technology must be similar to that used in high field heat circumstances like California desert strawberry production and not like Japanese cooler technology. Post-harvest handling is also made more difficult by rain during the harvest which is similar to the Dutch and English post-harvest situation. All of this adds up to a very difficult but superable constraint.

The conclusion of our analysis with reference to constraints in post-harvest technology are that where the constraint is critical it is not because of a lack of appropriate existing post-harvest technology, the constraint is a training constraint of transferring that technology to Mahaweli farmers and firms.

Training in post-harvest technology is only effectively done on the job in packing facilities with adequate cooling equipment. There is little point in undertaking technology training independently of actual project development.

The added costs associated with post-harvest technology training mean that the first packing plants which pioneer the application of the technology to the Mahaweli will bear an abnormally high training cost which may warrant public or external financial support. Small farmer crop specific production cooperatives have proved to be an excellent mechanism for channeling this kind of training support where small farmers are concerned.

Year Round Irrigation

Year round irrigation is the second most important production constraint in the Mahaweli region. This constraint is a critical one for all varieties and production schedule options for strawberries. This is called a 365-day irrigations constraint because for this product not only does year-round water need to be available, its daily availability needs to be under the control of the producer. The standard rotational periods are not satisfactory supply arrangements for these crops.

Irrigation availability on a daily basis year round is a *sine qua non* for large investment in any of these products, and an informed investor would not proceed even to expend significant sums on site specific feasibility analysis until the solution to this constraint was clearly possible.

The difficulty of obtaining year-round, daily available irrigation water from in the Mahaweli region arises from two companion problems. The first is that the Mahaweli irrigation systems were designed and are currently being managed to provide seasonal irrigation principally on paddy rotation schedules.

This would permit certain of our selected short season export crops to service during one or two crop cycles each year such as gherkins, tomatoes and melons and allow for approximately a 90-day marketing season. Some permanent crops are drought resistant and could likely service from year to year and produce some short season exportable fruit with minimal irrigation support from shallow wells when Mahaweli irrigation was not available.

Seasonal irrigation would, however, substantially reduce the profitability and viability problems from the fact that a 90-day marketing season leaves the very heavy physical and managerial infrastructure, required for these enterprises, idle during three fourths of the year, and prevents the product from being in the market for a long enough time to permit effective market channel management.

Two possible solutions might be examined to solve this important problem. The first might be to allow small farmer cooperatives to exercise their basic rights in "dead storage" as a kind of backup insurance to keep their permanent crops alive during the non-paddy season. Even under drought situations this use is consistent with the Mahaweli policy which is to give the settlers the final rights to the last drop of water (dead storage) in the reservoirs to keep their families, animals and permanent crop alive.

A small scale settler cooperative, pooling their inherent dead storage rights could thus assure a year round supply of water available on a daily basis with a simple pump and PVC pipe into a reservoir. This is the pattern on which the grape grower cooperatives are functioning securely in the drought prone areas of Southern Maharashtra India.

By using drip irrigation application systems, these small farmers assure that they can keep their small grape gardens alive on a minimum of water.

A second option would be to develop groundwater through shallow dug wells or deep tube wells. During most of the year, the water table in many Mahaweli areas appears to be high enough that shallow dug wells could be a practical method of obtaining farmer controlled daily reliable supplies of water. If drip or even sprinkler application is used, these limited supplies could be effectively stretched to support significant areas of export crops.

The difficulty arises because the possibility in all areas, and certainty in many, that these wells will go dry during the critical periods of the year. The SRD team did not examine the hydrological feasibility of deep tube wells and the existence or non-existence of deep aquifers in the region.

Production Technology and Training

The technology for export production of the crops chosen under soils and climatic conditions similar to the Mahaweli exists in many countries. None of the priority products selected need be the subject of the development or even modification of existing production technologies.

This is a major positive factor in moving these activities rapidly from the research to the development phase in the Mahaweli region. This should not be read to imply that there is no production technology constraint, but simply to mean that it lies in production technology training and not in production technology research and development.

Training for production technology in fresh fruit and vegetable export crops takes place most effectively on-the-job during the course of project development. It is both needlessly costly and relatively ineffective to undertake training in artificial educational or even demonstration sites or facilities. The most effective mode for providing this training is with "field-men" employed as agronomists representing the packing cooperative or company.

The substantial added costs of training which will be borne by the pioneering cooperative or firm may justify substantial public or external financial subsidy. With a significant training subsidy, the success of the technology is secured not just for the pioneering cooperative or firm, but also for all those coops that follow.

For more than a decade, the production of strawberries in hot arid areas using "day-neutral" varieties as annual crops has been a commercial reality. In fact, this technology now dominates strawberry production over cool-climate three-year type technology. This technology involves production of starts in cool climate nurseries and the transplanting of these starts to hot, arid areas for a single season of production.

This technology is, by far, the most complex and difficult of all the crops selected, and is the only crop case where a production technology constraint is given a major rating. Small areas of land would be required in a hill area for reproduction of starts.

Soils Constraints

The soils requirements of the selected crops vary little if irrigation water is available. Under rain-fed conditions, some crops will do better on somewhat heavier than those which are optimal if irrigation is available. Sandy loam soils with good internal and external drainage and reasonable depth (60-100 cm) are ideal for all of the crops selected. These soils are what Mahaweli soils maps generally classify as class II and class III soils. Acceptable soils of these classes are sufficiently abundant in the Mahaweli region represent no constraint on production.

Cooling and Packing Export Infrastructure

The most critical infrastructure constraint is the total absence of field cooling infrastructure in the Mahaweli region. Without such facilities, no produce exports can take place.

Refrigerated Trucking

Another critical constraint is the non-existence of refrigerated trucking either in the Mahaweli elsewhere in Sri Lanka. A handful of frozen trucks exist in Sri Lanka for ice cream and seafood, and a few small flower trucks were located. However, there are no forty foot refrigerated trucks of the type needed for fresh produce transport from the Mahaweli to Colombo.

On-Farm Irrigation Infrastructure

The lack of on-farm irrigation infrastructure was rated as a major constraint on the production of most of the selected crops. Should a drip irrigation be needed, the cost would approach approximately US\$2,000/Ha. Strawberries require precision, on-farm irrigation infrastructure involving drip, sprinkle, or micro-leveled surface application. The availability of on-farm irrigation infrastructure was rated as a major constraint.

Air and Sea Transportation Infrastructure

Air and sea transport availability and port facilities are critical links in the international marketing chain for perishables. The SRD team assessment is that these facilities present a minor constraint on the development of strawberries.

Sea port facilities are acceptable for reefer container handling and there is adequate current to major market destinations. Current traffic would not be sufficient to handle major expansions, but that is to be expected. Container vessel traffic is normally a function cargo demand and it would be unusual to find the capacity to have wildly outrun market. As additional capacity is needed, there will be a capacity expansion response, but the time lags can be painful to specific enterprises.

H. Export Promotion and Development

This section explores our assessment of the potentials and needs of the various institutions provide support services to export enterprises. We have defined four categories support institutions: a) financial support; b) grower/exporter associations, c) export promotion or regulation functions, and d) those providing advisory services.

Financial Institutions

The financing of perishable export enterprises present special challenges for mainline agricultural and development banks. The financial needs and requirements of perishables export enterprises, and the institutional potentials and constraints of Sri Lankan financial institutions is discusses in sufficient detail in a companion report and need not be repeated here. We discussed these issues with a major Sri Lankan banking institution and found them to be most interested in exploring specialized procedures and practices to accommodate the unique problems and opportunities presented by the perishable export trade.

Grower/Exporter Associations

Trade associations of growers and exporters are the organizations which come closest to representing private sector interests and needs. Since these organizations often have a particular product focus they are particularly suited to receive and make good use of product information and assistance. The needs and problems associated with export development vary so widely between different products that it is difficult at best to mount multi-product export promotion or advisor assistance program. The level at which these efforts begin to take on a practical business utility is almost always at the product level and not before.

A program which tries to deal with production, transport, marketing or any other important issue will be most useful when it focuses on a specific product. This concept is one we call "commodity focus." It has institutional implications. In many different country settings we have observed this theme reappear in every possible context to the point that we accept the importance of "commodity focus" as an operating axiom. The Sri Lankan situation simply reinforces our conviction that the most useful export promotion institutions are those which gather grower/exporter firms together around a particular or narrow range of commodities.

In Sri Lanka, there are only a few of these grower/exporter associations at the present time. The Orchid Growers' Cooperative Association and the Fruit and Vegetable Exporters' Association are the only two that we identified during our study. We would recommend that future work by EIED and/or AID in the area of export development be directly involved with those associations that now exist, and that efforts be made to establish strengthen additional ones as specific commodity opportunities mature.

I. International Marketing and Joint Venture Enterprises

Effective export enterprise development always begins in the marketplace and builds backwards local production, and not the other way round. This pattern also holds for institutions and enterprise players, the most important institutions are those in the marketplace. This section provides an overview of the players and institutions in the marketplace an assessment of their levels of interest and capability of playing different roles in the development of Mahaweli and Sri Lankan perishables exports. These roles and the institutions vary somewhat by market, but the roles are generalizable enough to allow for overall discussion.

Different types of marketing entities vary according to many characteristics. The characteristic which we think is most important to a potential Sri Lankan exporter is the relative of access. Some of these companies are very easy to access and relatively less demanding in terms of the minimum size import they will handle and the level of quality demanded.

Ranked in order of their relative ease of access, marketing entities may be grouped follows: a) Import Agents; b) Wholesale Market Agents; c) Pre-packer/Distributors; d) Supermarkets or Multiples. The discussion which follows explains and evaluates of these types.

Import Agents

The easiest and least useful group of marketing companies, is the import agent group. These are very small firms, usually just an office and five to ten employees, but often just one or two agents. These companies are essentially import documentation agents some transport connections to move the product to a delivery destination requested either by the exporting seller or an importing buyer. These agents are not really "buyers" or "marketers" and while they frequently have acquaintances and contacts in the wholesale or even supermarket companies, they are seldom useful in obtaining sales contracts with these firms.

In some cases, importers will act like buyer/marketing agents offering to market the produce. In such cases, they will sometimes offer a CIF price for the product or agree take it on consignment. It is our experience that dealing with an import agent as if he/she were a purchaser/marketer is seldom an effective way to sell produce. These agents very easy to access and no shipment is too small, and no quality too poor for them. They can give the emerging export business person a false sense of security. They are best used, when it is necessary to do so, simply as export documentation handlers for a service fee or a fixed fee per transaction.

Wholesale Market Agents or Commission Merchants

Wholesale market agents and/or commission merchants are marketing companies licensed to operate in a public fresh produce wholesale market. All major cities in Europe the Pacific Rim have regulated wholesale markets. Only in the case of the Netherlands these markets operated as formal auctions where produce is placed before all buyers who formally bid for it. In the other countries, the sales are informally negotiated the wholesale market "halls" which are lined with individual merchant's stalls.

Wholesale market agents place a small sample of the produce on the market floor in the hall in front of their stall and buyers review those samples and negotiate quantity and price. The volumes purchased are then shipped to the buyer designated location in some cases on trucks owned or leased by the wholesale marketing agent and more often in trucks owned or leased by the purchaser.

Wholesale market merchants are just a bit more difficult to work with than importers, they are considerably more useful. The normal mode of operation is on consignment the exporter paying the costs of transport and tariffs. The wholesale merchant usually somewhat more demanding in terms of quantities and quality than the importer but not nearly so demanding as the pre-packers or supermarket buyers. Thus the wholesale market represents a useful beginning point for the emerging, but not yet established exporter.

The advantages of working with a wholesale market commission merchant is relative ease of access, willingness to work with uneven quality and small and seasonally irregular quantities of produce. The disadvantages are that the commission merchant will seldom assist the grower/exporter with financial or technical support and since he/she is handling produce on consignment, the grower/exporter has no price security. The buyer database supplied to EIED contains many hundreds of names of wholesale merchants along with their addresses and products handled and language abilities.

Wholesale merchants are very approachable and may usually be relied upon to provide accurate accounting of the prices received for the merchandise. These merchants will usually liquidate the sales within a week or two, but some merchants pay habits are questionable and their accounting occasionally suspect. Trade references are available which provide an evaluation of the financial promptness and general reliability of the merchants. Wholesale agents will most often be willing to make all the necessary arrangements to handle imports, even if they do not have the documentation and clearance capabilities in-house.

Even though wholesale agents are important to the emerging business, it is important to the emerging business to realize that they do not dominate the trade. In the United States, more than 70% of all fresh produce is sold directly by grower/packers without ever passing through wholesale markets. In Europe and Japan, the percentages are somewhat less, but the pattern is basically the same. Wholesale markets can usually get better prices out of lower quality and highest quality produce than the other marketing alternatives. Our experience is that the mid-range of good quality produce will bring the best stable price when sold directly through pre-packer/distributors to supermarkets.

Prepacker/Distributors

Prepacker/distributor companies are characterized by having ongoing contractual supply arrangements with major supermarkets and other multiple retail outlets. These companies large volumes of produce on a regular basis to the supermarkets and they compete aggressively for the confidence of supermarket buyers. This competition is based consistent quality and quantity supplies.

Most prepackers/distributor's business is the large and stable volume trade with supermarkets. In order to maintain this large volume business, the distributor must have large and consistent sources of supply and cannot run the business on the day to day uncertainty in supply which characterizes the wholesale markets. Because of the nature of their business, these companies reach both directions from the wholesale level, forward the supermarkets and backward to domestic and foreign growers.

This wide reach of their interest and the constant pressure on them to maintain large volume high quality supplies to the supermarkets makes them very attractive joint venture partners for emerging grower/exporter enterprises such as those targeted for Mahaweli development. A possible joint venture with a major distributor/packer like Geest or Fyffes can bring three major benefits to an emerging grower/exporter. The first is financing, the second is technology, and the third is market position.

Financing

Major distributor/prepackers frequently pack in a brand name container. These brand name marked packages may be in the distributor's brand or in the brand of the supermarket. As a result of this practice and by frequent custom, when a grower/-exporter and a prepacker often supplies the packaging as part of his share in the venture. Since packaging can be half or more of the total costs of production, such an arrangement can relieve a grower/exporter of half of the production cost financial burden.

Transportation is almost always the single most important cost in an enterprise exporting perishables. A second, and even more important financial benefit from a joint venture with a prepacker/distributor is that they will frequently pay the transportation cost as their part of the deal. If the product must be air freighted this can mean eighty percent of the total landed cost. That can be a vital financial benefit of dealing with these entities.

A joint venture with a prepacker can also provide technological assistance in production and post-harvest stages. The ability of the joint venture partner to assist with technical aid can be an important benefit of a joint venture with a prepacker/distributor.

Prepackers have established their market position over many years of aggressive competition. A contract with a prepacker puts the grower/exporter inside that established market position. A wholesale commission merchant can seldom match this kind of market security.

The main disadvantage of working with prepacker/distributors are consistent quality and volume requirements of these arrangements. An emerging grower/exporter may require a few seasons of accessing the market before being able to make an acceptable joint venture with a pre-packer. If the initial plan is well-developed and there is significant scale in the project and equity investment from the Sri Lankan side, it is possible to develop joint venture from the beginning.

Our experience suggests that large pre-packer/distributor firms are more trustable on the average than wholesale market merchants, but they tend to be much more demanding and difficult to negotiate a fair split in profits. On balance, however, we recommend a pre-packer/distributor joint venture as the best alternative marketing arrangements.