Potential for Sri Lankan GREEN BEANS

In Selected Major World Markets

An SRD *Export Potential Brief*™

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

Market Intelligence
Project Design/Evaluation
Technology Transfer/Training
Enterprise Development/Management
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SRD *Research and Development Groups Inc.*

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A. Executive Summary of Green Bean Market Opportunities.

Figure 1 contains a list of the major world markets for Green Beans. 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.

Though Asia and the Middle East are major markets, the superior size and recent growth of Europe make it a primary target. In the 1980's the Western European import market for vegetables expanded at roughly one-half billion US dollars each year. Though much of this expansion was supplied from inside the EC (Spain, Italy & Greece), Sri Lanka has 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. The graph presents the weekly supply of fresh green beans into Germany in 1990. It is SRD's estimate

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

that the German market can absorb approximately 200-400 metric tons of green beans each week during the off season and still maintain prices which would be profitable to a reason

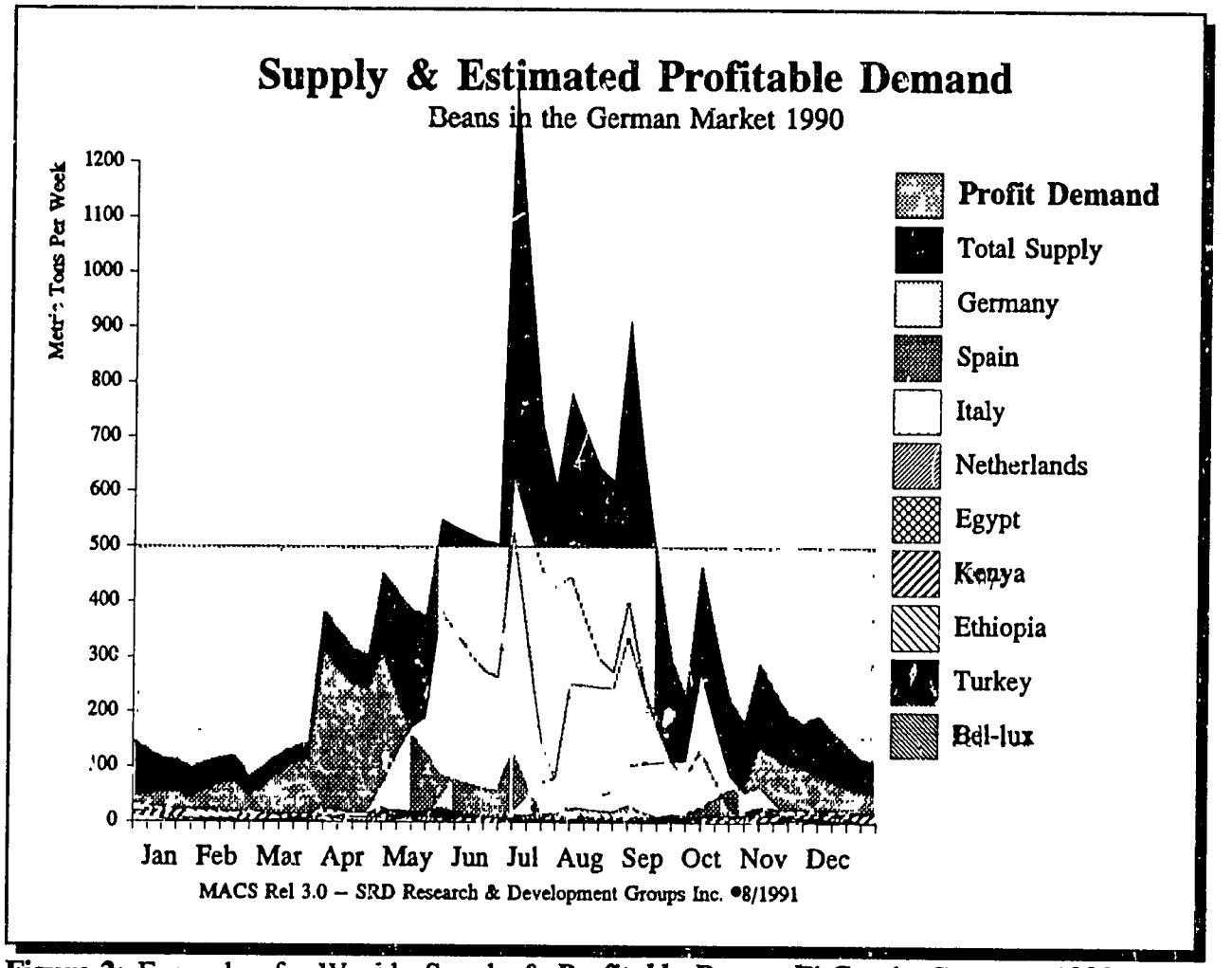


Figure 2: Example of a Weekly Supply *& Profitable Demand*™ Graph, Germany 1990

Figure 3: Example of Fresh Green Bean Packaging

ably efficient Mahaweli producer. ***Profitable Demand***™ *(the quantity which the market will purchase at or above prices profitable to an average grower/exporter located in the Mahaweli)* is estimated by SRD at 500 metric tons per week. Figure 2 clearly illustrates that there exists a seasonal window. During this off-season period lasting from about October to May there appears to be 2-4 hundred tons of unsatisfied demand which could be profitable to Mahaweli grower/exporters. If unmet profitable green bean demand in Germany is added to the other Western European countries like Holland, Switzerland and Scandinavia, unmet profitable demand is approximately 700 MT/-Wk. In annual terms this implies a total of almost 9,000 tons unmet demand per year. Japan unmet profitable demand is estimated at over 70,000 MT./Yr.

Figure 4 is an example of a weekly wholesale and CIF price graph showing CIF prices for green beans in 1990 varied from less than $.50/kg. in the Netherlands to above $6.00/kg in Japan. For wholesale prices, the low was about $2.75/kg and the high over $4.00/kg.

SRD estimates that reasonably efficient Mahaweli located producers could deliver large volume green beans to European markets at a cost of roughly $2.15/kg. and Japan for roughly $3.00/kg. Estimated delivered prices for high volume green beans imply potential losses in the Netherlands, but profits in the other three markets which vary from near break-even

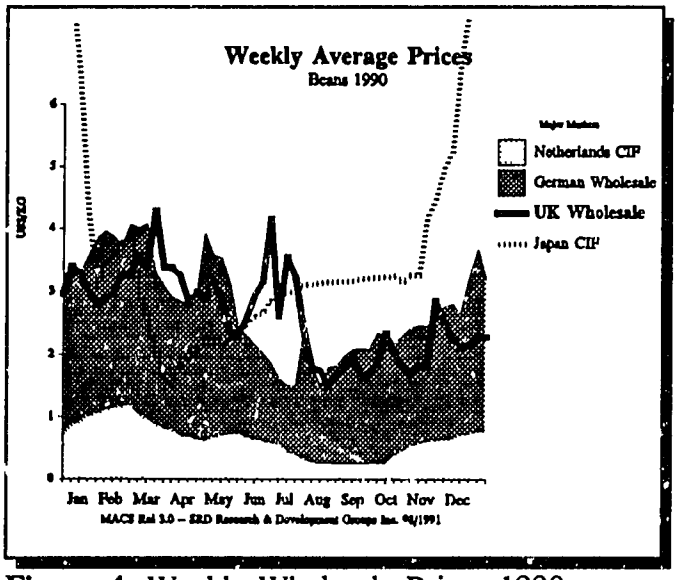


Figure 4: Weekly Wholesale Prices 1990

(when marketing fees are included) to over $2.00/kg. for Mahaweli located production.

I. Introductory Topics

A. Illustrative Mahaweli Enterprise

This section outlines the economic characteristics of a hypothetical and purely illustrative green bean enterprise in the Mahaweli region. Even with efficient cooling facilities (described below) Mahaweli beans must be air-freighted in refrigerated containers to European and Japanese markets. A minimum scale commercial export operation would need to pack the equivalent of at least two 40' containers per week. Such an operation could be done for about 8 months and require a minimum ~~weekly~~ annual production of approximately 1,100 tons which could be produced on roughly 200 Ha.

Green Beans are usually established by direct-seeding. Beans are grown on a wide range of well-drained, friable soils. Seed germination is optimized at 30°C.

Prior to seeding, the soil is plowed and disked. Depth of seeding may be adjusted for soil conditions, with shallow seeding 2.5 cm or less suggested for cool and moist soils, deep seeding 5 cm for dry situations. Preplant herbicides are preferred for weed control and are effective if incorporated immediately after application. Cultivation, if practiced, must be shallow to avoid damage to roots. Some growers seed in a shallow furrow, allowing the soil from light cultivation to cover the small weeds in the row.

Green beans are delicate and perishable and should be packed and cooled soon after harvest. They should be moved to a nearby cooling facility and field heat should be removed in a hydrocooler. the common type of package favored for beans is a box or crate container. Green beans can be hydrocooled or iced to remove field heat. Palletized loads are now usually demanded in most import markets.

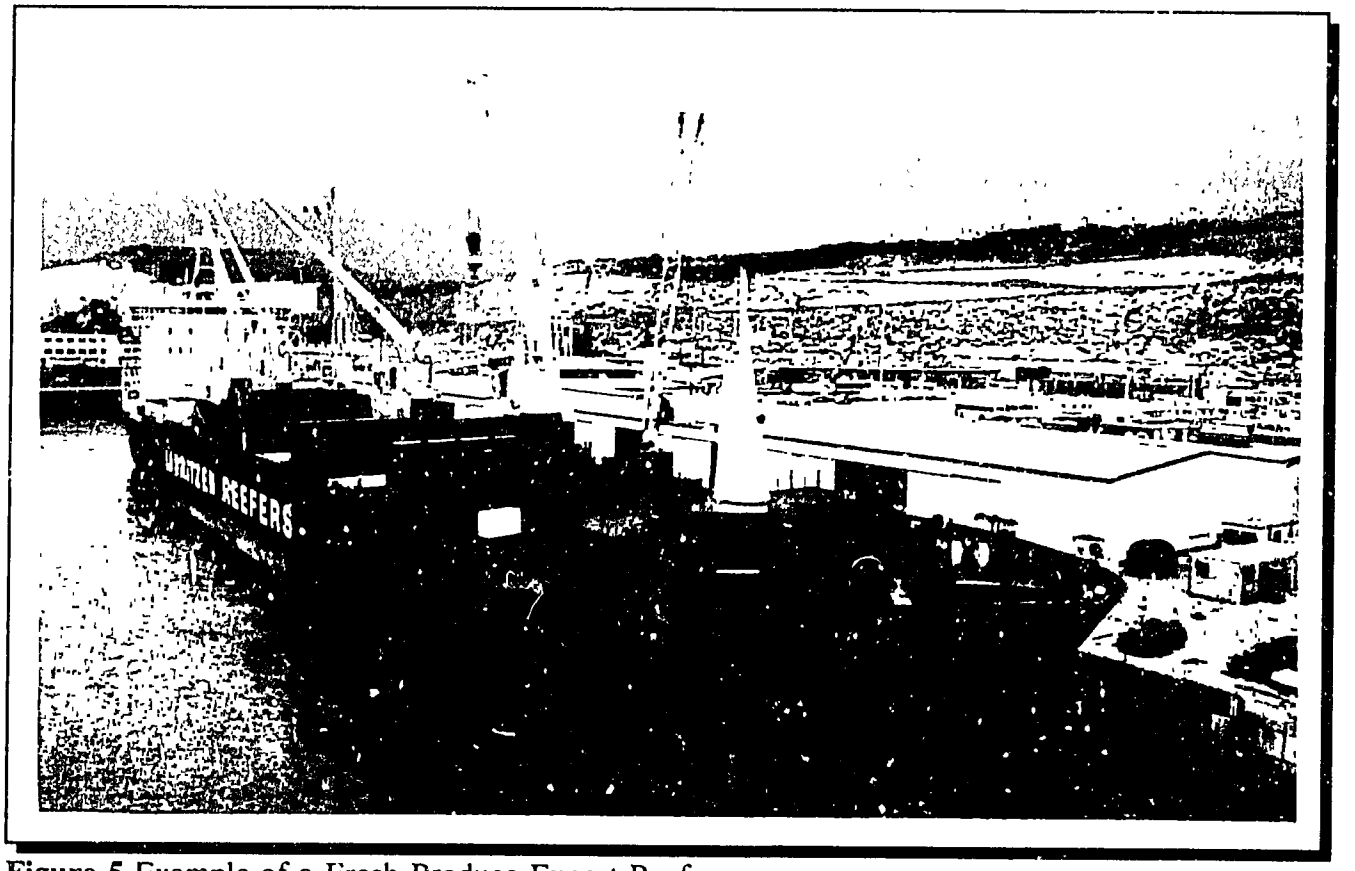


Figure 5 Example of a Fresh Produce Export Reefer

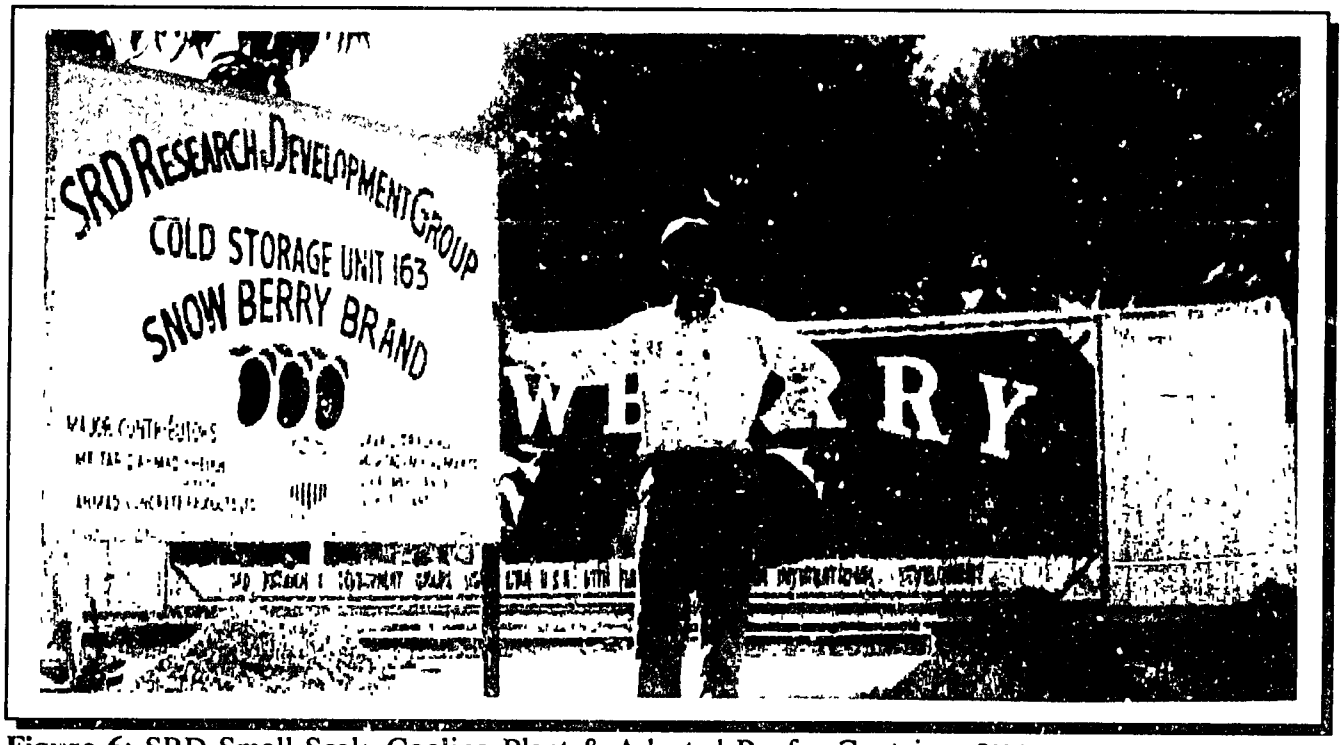


Figure 6: SRD Small Scale Cooling Plant & Adapted Reefer Container ©SRD 1990

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 tomato export operation of roughly 20 hectares. Its cost is estimated at $50,000.

The cooling/packing plant illustrated here 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 be roughly $100,000.

Field investment costs can vary depending on the type of open-field or row-cover systems employed. Including irrigation and row cover or greenhouse installations, the cost would range from $5,000-50,000 per hectare. For a 20 hectare operation, the field investments could range $1,000,000-10,000,000. Field equipment such as tractors, trailers

Figure 7: Schematic of SRD Plant & Reefers ©SRD 1990

and a bus for worker transport could require an additional $100,000. Assuming one third open-field, one third high row covers, and one third low row covers, the total field and field equipment investment would be about $3 million. It is important to note that the cooling/packing facility and equipment is only 3% of the total $3.1 million fixed investment.

Variable Costs. The variable costs for open-field production and packing are approximately $.25/kg. This estimate 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 $2.15/kg.

Wholesale Prices. Wholesale prices for Mahaweli beans during the market period

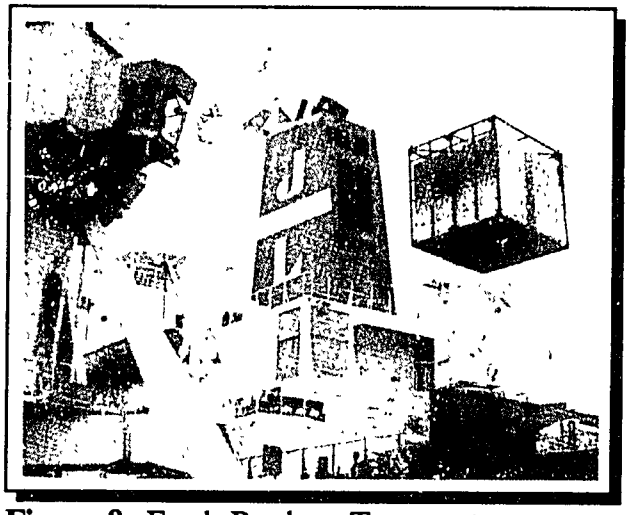


Figure 8: Fresh Produce Transport

should range roughly from $1.75 to over $4.00/kg in Europe. Japan's wholesale prices would probably range from $2.00 to over $6.00/kg.

Potential Profit Margins. Profit margins for reasonably efficient green bean enterprises in the Mahaweli could range from just slightly below break-even up to $2.00/kg.

Enterprise Financial Potential A 200 Ha. enterprise or group of farms could net roughly $4,000 per Ha. or a total of $800,000 per year. A bean export enterprise is a demanding management challenge because of the perishable nature of the vegetable.

B. Agronomic Feasibility of Bean Cultivation in Mahaweli Areas

Beans (Phaseolus vulgaris)

INTRODUCTION

Beans belong to the family Leguminosae and its origin is mentioned as Central and South America and China. The two main groups identified are; bush or dwarf beans and pole or climbing beans, with the former growing up to 30-45 cm(12 to 18 ins.) and the latter 180-240cm(6 to 8 ft.) tall. These day neutral annuals are erect or twining with twisted stems, angled. ribbed and often streaked with purple.

The slender stems bear alternate, trifoliate leaves, attached to long petioles. Flowers are borne in axillary racemes on stiff, hairy peduncles and are usually white, but sometimes are purple. Self fertilization is the rule. Pods are long and narrow, straight or slightly curved having pointed tips. Pod sizes vary according to cultivar and so does the colour and size of seeds. The plant has a well developed root system, with a strong tap root and many branched laterals. The smaller roots bear dense clusters of brown nodules. Bush bean varieties mature in about 50-60 days after planting in the tropics, while pole beans take a little longer (Doerfler, 1976).

CLIMATIC REQUIREMENTS

Beans grow well, when planted towards the end of the rains. Excessive rainfall causes flowers to drop and promotes the incidence of diseases. The optimum conditions would be where the crop has the benefit of warm weather for germination and cooler conditions during flowering and thereafter. In the low country dry zone of Sri Lanka, the crop will grow best during the cooler maha season, where the time of planting is important. Research data from Sri Lanka suggests that the optimum period for planting in the dry zone would be in November or December. Late sowing in January is reported to give poor yields, because of the rise in temperatures

after February. Trials conducted at Thirnunelvelly revealed that there was no pod formation after March, although the plants flowered profusely.

SOILS

Beans can grow on most types of soil, from sandy loams to heavy clays, provided their drainage and tilth is good. The crop however prefers the heavier and more fertile soils, with slightly acidic to neutral conditions having a pH of 6 to 7.5. Soils which form a crust on drying, may hamper seedling emergence and require irrigation to remedy the situation.

ROTATIONS

Beans can be rotated with cereals, root crops and other vegetables, but should not follow each other to control soil borne diseases.

CROP HUSBANDRY

If bean is a new crop to the land, pre-inoculation of seed with commercial Rhizobium inoculant is often useful to enhance nodulation. Seed treatment with agro-chemicals gives good control of the bean stem maggot, which is a pest of seedlings.

SPACING

Bush beans can be planted on ridges or on the flat and the spacings recommended for the latter are;

(a) Single rows, 45 to 65 cm apart (18-26 ins.), with 12.5 to 22.5 cm (5 to 6 ins.) between plants.

(b) Double rows, 30 cm apart(12 ins.), with 60 to 75 cm (24 to 30 ins.) between double rows and 22.5 to 30 cm (9 to 12 ins.) between plants. A guiding factor for selecting the correct spacings and seed rate is that both depend on soil fertility and fertilization. For higher fertilizer applications (160 lbs.N/ac or 160/kg N/ha), close spacings and plant populations are recommended, which are between 110,000 to 140,000 plants per acre or 275,000 to 350,000 plants per ha. Sowing rates have to be adjusted from 60 to 130 kg/ha or 60 to 130 lbs./ac, according to the growth habits of the varieties.

Pole beans can be planted in double rows 30-37.5 cm (12-15 ins.) apart, with 75cm (30 ins.) between double rows, and 22.5 to 30 cm (9-12 ins.) between plants. Plants will require staking with supports of about 180 to 270cm long (6-12 ft.) Doerfler, 1976.

VARIETIES

Bush Beans: Deputy Director Research, Maha Illupalama(1972-73) reporting on the performance of introduced varieties of pole bean stated that of the 37 introductions, three were selected as being promising, namely, 'Genuine Corn Field'(USA); 'Morses Pole No.171' (USA) and 'Kentucky Wonder'

(Japan). Description of pods and their quality is given.

In another trial with bush beans, out of 48 introductions, three were selected as promising, namely, 'Taylors Horticulture' from Ferry Morse; 'Tender Green Improved' from Ferry Morse and 'Long Tom' from Kirchroff. Growth and pod characters of the selections is mentioned as being good. 'Taylors Horticulture' and 'Long Tom' are described as arly flowering, producing green fleshly pods, with flowering occurring 20 days after germination.

Klaus, (1976) reported that over 100 varieties of bush bean introduced from several countries were tested in observational rows in different agro-climatic locations in Sri Lanka. The plot size was 2m x 3m, with a spacing of 30cm x 10cm, which accommodated 120 plants per plot. Each plot was replicated four times. Results for yala 1972, indicated that in the 5 Stations the experiments were carried out the following recorded maximum yields at different locations.

Station	Variety	Origin	Yield,tons/ha.
Gannoruwa	Red Pioneer	Australia	9.28
Rahangala	Richgreen	USA	11.34
Sita Eliya	Long Tom	Kenya	15.07
Gallpalama	Richgreen	USA	14.11
Bindunuwewa	Masterpiece	Kenya	17.13

This same trial with 48 varieties was repeated in maha 1972-73 at three locations and the following data reported for maximum yields.

Station	Variety	Origin	Yield,tons/ha.
Thirunelvelly	Provider	USA	22.70
Rahangala	Cherokee Wax	Japan	14.01
Gannoruwa	Long Tom	Kenya	21.82

The varietal screening trial programme continued during maha 1973-74 with 29 varieties at four locations. The trials at Maha illupalama failed completely due to adverse weather conditions.The results from the other Stations are given below, showing varieties recording maximum yields.

Station	Variety	Origin	Yield,tons/ha.
Rahangala	Redlands green leaf	Australia	26.75
Gannoruwa	Top Crop	USA	16.90
Thirunelvelly	Contender	USA	26.18

During maha 1974-75, the varietal testing programme was continued at four locations, with 22 varieties. The varieties giving maximum yield at each Station are indicated below.

Station	Variety	Origin	Yield,tons/ha.
Sita Eliya	Res. Kinghorn Wax	USA	15.17
Galpalama	Yates Tendergreen	New Zealand	13.83
Gannoruwa	Res. Kinghorn Wax	USA	9.55
Thirunelvelly	Bush Blue Lake		
	Prime Pak	USA	11.74

Besides the above trials which were in observational plots, randomized, replicated varietal trials were conducted at several other locations during maha and yala seasons. The results, of varieties giving

maximum yields are indicated below.

Season : Maha 1972/73
Location : Gannoruwa
Date of planting : 28 December, 1972

Twelve bush bean varieties were included in this trial and 'Masterpiece' from USA gave the highest yield of 4.38 tons/ha. During the same season in the trial conducted at Rahangala, the variety 'Provider' from USA recorded the maximum yield of 15.57 tons/ha. when planted on 15 February 1973. Both trials were statistically not significant.

A continuation of this varietal testing programme during maha 1973-74 at Gannoruwa, gave the following results when planted on 11 December 1973. The variety 'Long Tom' from Kenya gave the highest yield of 11.83 tons/ha and was significantly superior to all other varieties except, 'Richgreen' (10.98 tons/ha); 'Top Crop' (10.52 ton/ha); 'The Prince' (10.47 tons/ha); 'Masterpiece' (9.93 tons/ha) and 'Carmencita Osena' (8.79 tons/ha).

At Maha illuppalama during the same season with 14 varieties, 'Long Tom' from Kenya gave the highest yield of 2.58 tons/ha and was significantly superior to all other varieties except 'Masterpiece' which recorded 2.17 tons/ha. The author mentions that the very low yields were due to water logging in the trial areas. The planting was done on 5 February 1973.

The bush bean varietal screening programme at Thirunelvelly when planted on 26 December 1973, showed the maximum yield from the variety 'Provider' recording 27.31 tons/ha and was significantly superior to all other varieties tested.

Considering the short maturity period and the very high yields obtained in the Jaffna District, the author recommends the cultivation of bush beans in that location during this season. The number of days to first pick was 44 and the final pick was a 63 days after planting.

The same programme with 15 varieties conducted at Rahangala with planting done on 20 February 1974, indicated that 'Wade' from Japan gave the maximum yield of 21.16 tons/ha. The number of days to first harvest was 60 and the last was 81 days after planting. The variety 'Wade', was significantly superior to all other varieties except, 'Provider' (20.64 tons/ha); 'Masterpiece' (20.44 tons/ha); 'Top Crop' (19.66 tons/ha); 'Contender' (19.07 tons/ha); 'The Prince' (19.05 tons/ha); 'Carmencita Osena' (17.50 tons/ha) and 'Richgreen' (17.22 tons/ha).

The varietal screening programme with 10 selected bush bean varieties was continued during maha 1974-75 at Gannoruwa, Rahangala and Thirunelvelly. At Gannoruwa, planting was done on 30 December 1974 and the maximum yield was recorded by 'Top Crop' giving 12.27 tons/ha, with 52 days for the first pick and 67 days for the final harvest. The trial was statistically not significant.

The result from Rahangala showed that the variety 'Canadian Wonder', planted on 14 February 1975 gave the highest yield of 8.17 tons/ha. The number of day to first harvest was 72 and the final pick was at 90 days after planting. The trial was statistically not significant.

At Thirunelvelly, the variety 'Contender' gave the maximum yield of 12.39 tons/ha, when planted on 14 November 1974. The statistical analysis revealed that contender was significantly superior to all other varieties except, Red Pioneer(12.02 tons/ha) and Richgreen (10.60 tons/ha).

In summary, the bush bean varietal screening programme conducted over several years at different locations has revealed that most of the introduced varieties have shown excellent adaptability to local conditions. The major differences in yield can be attributed to seasonal weather fluctuations. There was also very little difference in quality between varieties. The more resistant varieties produced higher yields of a lesser quality eg. Long Tom; whereas the yellow wax beans are superior in quality, but more sensitive to adverse weather conditions. The research finding also indicate that no significant differences were observed in pod characteristics, nor yields between identical varieties from different seed sources, i.e. the variety Contender performs similarly whether seeds were from USA, Kenya or Sri Lanka.

Bush bean cultivation in the Jaffna District is recommended as being very profitable. However, cultivation has to be restricted to the cooler maha season. The up country dry zone with supplementary irrigation is reported as the best area for beans, as far as climate is concerned, while in the mid country, the dry season during late maha is recommended. Based on research findings, the following varieties of bush bean are recommended.

1. Masterpiece : (Kenya) Green, flat and fleshy pods of good quality, about 16 to 18 cm long, very high yields.

2. Long Tom : (Kenya) Green, flat, long and fleshy pods with strings, fairly tolerant to common bean diseases, very high yields, pod length 20 to 25 cm

3. Richgreen : (USA & Local) Dark green, round, fleshy pods of medium length, excellent market quality and very good yields.

4. Top Crop : (Japan & Local) Dark green, round and stringless pods of good quality, pods 12 to 15 cm long, good yields.

5. Cherokee Wax : (Japan & Local) Yellow, slim and long pods, flat to oval, stringless, pod length 15 to 17 cm, good yields.

6. Provider : (USA & Local) Green, round, smooth and stringless pods of excellent quality, measuring 13 to 15 cm, good yields.

7. Wade : (Japan & Local) Dark green, round, fleshy, smooth and stringless pods 12 to 15 cm long and good yields.

8. Contender : (Kenya, USA, Local) Dark green, round fleshy, stringless pods, 16 to 18 cm long. good quality and good yields under adverse.

9. Carmencita Osena : (Denmark) Yellow, flat, attractive pods of good quality, 16 to 18 cm long, fair yields.

10. Canadian Wonder : (Kenya & Local) Green, oval, fleshy pods about 20 cm long, very good yields.

Klaus,(1976) reported that 51 introduced varieties of pole beans were tested for their performance at different locations in observational plots.

Pole Beans: During yala 1972, 31 varieties were planted at 5 locations. The plot size was 1.2m x 5m, with a spacing of 50 cm between rows. 8 to 10 seeds were planted per hill and later

thinned out to 5 to 6. There were 20 hills per plot and the experiment had a randomized block design with 4 replicates. The varieties giving maximum yields at different locations are indicated below.

Station	Variety	Origin	Yield,tons/ha.
Gannoruwa	Phenomenal	Denmark	22.95
Rahangala	Wachs Mago GS	Germany	18.98
Sita Eliya	Perle Von Marbach	Germany	17.02
Gallpalama	Jumagold OF	Germany	31.18
Bindunuwewa	Dade	USA	22.00

The varietal screening programme was repeated during maha 1972-73 with 39 varieties at 3 locations. Those recording maximum yields are indicated below.

Station	Variety	Origin	Yield,tons/ha.
Thirunelvelly	Lazy Housewife	Kenya	11.86
Rahangala	McCaslan 42	USA	10.35
Gannoruwa	Genuine Corn Field	USA	6.73

During maha 1973-74, 14 varieties were included in a screening trial at two locations. The varieties giving maximum yields are indicated below.

Station	Variety	Origin	Yield,tons/ha.
Rahangala	Hiltrud GS	Germany	23.48
Gannoruwa	Hiltrud GS	Germany	16.83

Replicated, randomized trials with 13 pole bean varieties were conducted at Rahangala during maha 1972-73, with the date of planting being 22 February 1973, The data reveal that the variety Kentucky Wonder Wachs Std. from Japan gave the maximum yield of 15.14 tons/ha and was significantly superior to all other varieties.

This programme was continued during maha 1973-74, with 7 varieties at 3 locations. The varieties giving maximum yields are indicated below and the planting was done on 7 January 1974.

Station	Variety	Origin	Yield,tons/ha.
Gannoruwa	Perle Von Marbach	Germany	15.16

The statistical analysis revealed that the results were not significant.

Rahangala	McCaslan 42	USA	24.62

The statistical analysis revealed that the variety 'McCaslan 42' was significantly superior to all other varieties except, 'Perle Von Marbach'(23.62 tons/ha); 'Wachs Mago'(22.58 tons/ha); 'Neckarkoenigin'(21.04 tons/ha) and Juwagold(20.96 tons/ha).

Sita Eliya	McCaslan 42	USA	5.26

Yields were low due to heavy wind damage. The trial was planted on 7 March 1974.

The varietal screening programme was continued during 1974-75, with 8 varieties at two locations. The trial at Gannoruwa was planted on 11 December 1974 and at Rahangala on February

1975.

Station	Variety	Origin	Yield,tons/ha.
Gannoruwa	Gallia	Germany	16.31

The results were statistically not significant. First harvest commenced 57 days after planting.

Rahangala	McCaslan 42	USA	15.82

The variety 'McCaslan 42' is significantly superior to all other varieties except, 'Wachs Mago' (15.49 tons/ha); 'Markant' (13.77 tons/ha) 'Wachs Goldelfe' (13.51 tons/ha); 'Kentucky Wonder Wachs' (12.76 tons/ha) and 'Gallia' (12.39 tons/ha).

In summary, pole beans can be successfully cultivated in the up country between the maha and yala seasons with supplementary irrigation. However, the latter season may not be quite suitable due to strong winds. Pole beans are recommended over bush beans, as the pods are of better marketing quality and preferred by consumers. The yields are also higher and the harvest period is longer, 55 to 90 days after planting, than for bush beans. Arising from research findings,the following varieties of pole bean are recommended.

1. McCaslan 42 : Pods dark green, flat slightly round, about 20cm long, stringless when young, very good yields.

2. Perle Von Marbach : Pods green and flat of medium to long size, stringless, high yielding and early maturing.

3. Wachs Mago : Pods golden yellow, roundish of medium size, excellent quality, stringless and very good yields.

4. Neckarkoenigin : Stringless pods, round, green, about 25cm long, fleshy, excellent quality and high yields. It shows tolerance to common bean diseases and is preferred by consumers.

5. Gallia : Green, roundish, stringless pods, resistant to common bean diseases and good yields

6. Markant : Fleshy, Green and long pods, good yields, fairly resistant to common bean diseases.

7. Kentucky Wonder : Green, long, round, curved pods with strings, good yield, little resistance to diseases.

8. Kentucky Wonder Wax : Greenish yellow, flatish, medium sized pods, fair yields and shows resistance to common bean diseases.

9. Kentucky Wonder Green : Green, oval pods of medium size stringless when young. susceptible to bean diseases.

Deputy Director Peradeniya (1976-77) reported that four varieties each, of bush and pole beans were tested at Thirunelvelly. In bush bean, Contender gave the maximum yield of 6.44 tons/Ha; with good pod characters, while Kentucky Wonder Wax, recorded 3.86 tons/ha. for the pole types.

Deputy Director, Gannoruwa (1977-78) reported that 23 varieties of bush bean were tested for

their performance, with Wade and 'Top Crop' as the standard varieties. The following outyielded the controls.

Variety	Yield tons/ha
Olympia	13.83
Catakill	11.75
Burpee Stringless	11.41
Rebel	11.08
Top Crop	9.91
Wade	7.76

The report also states that in the 10 to 11 week age class, the bean varieties YR-500 and 'Summer Autumn' were most promising with yields of 28.70 and 39.91 tons/ha respectively.

In heat tolerant studies, pertaining to bush bean conducted at Gannoruwa 50 varieties were included in the trial. Planting was done in the greenhouse and also in the open, in polythene gags, to study parameters that could be used to evaluate heat tolerance. The greenhouse temperatures were about 5° C higher, than that of the open. Some bush bean varieties behaved like climbing varieties under greenhouse conditions. Results are reported as being inconclusive.

Deputy Director, Peradeniya (1980) indicated that the local selections, 'Peas Butter'; 'Vell Roll' and 'Murunga' were founded to be as good, or even better than the introduced yellow or green 'Kentucky Wonder' types.

Deputy Director, Girandurukotte (1984-85) reported on data from observational trials on 20 varieties of bush beans and 5 varieties of pole beans. Only one harvest was possible due to a severe attack of bean rust disease. The maximum yield was recorded by Flavelo RS-1703, with 5.05 t/ha for the bush type and 'Kentucky Wonder Wax', giving 5.05 t/ha for the pole beans.

PEST AND DISEASES

Doerfler, (1976) reported the susceptibility of beans to eelworm attack, mainly the common root knot nematode (Meloidogym javanica). The most serious pest on bean is the bean stem maggot or Agromyza fly (Melanagromyza phaseoli). Damage to the crop can be well controlled by treating of insecticides will prevent infections during later growth stages. Damage by Agromyza can also be controlled to some extent, by earthing up around the base of the plant.

Seed crops of beans are subjected to several diseases, reducing their market value. The common seed borne diseases are; anthracnose; bacterial wilt; bacterial blight; bean mosaic and halo blight. However, the most important of these are, anthracnose, halo blight and bacterial blight. The other diseases of bean are, root-rot which is mainly soil borne and controlled by rotations; bean rust attacking mainly pole bean, leaf and pod spot and powdery mildew.

Deputy Director Bandarawela (1977-78) reported the research findings on the chemical control of rust diseases in bean. Six fungicides were tested and spraying was done at 10-day intervals. commencing 3 weeks after planting. The fungicides, Plantnax and Delsene MX were found to be more effective in controlling the disease, than the other four fungicides tested. The variety 'Canadian' Wonder was used in this trial.

Deputy Director Gannoruwa (1977-78) reporting on the chemical control of the bean fly (Melanagromyza phaseoli) tested two insecticides namely, Omethoate and Monocrotophos, against the recommended Formation at 0.030; 0.025 and 0.025 a.i. sprays, respectively, at two intervals. Results showed that use of insecticide significantly reduced (0.1 level) Agromyza damage and increased pod yields. The pest damage recorded was about 4.2% in the best treatment with insecticides, as against 28.7% in the untreated control.

Deputy Director, Peradeniya (1980) indicated that satisfactory control of bean fly (Agromyza:new name, Ophiomylia phaseoli) was obtained with Furudan granules, Methamidiphos, Dimethoate, Labaycid and Monocrotophos.

Deputy Director, Girandurukotte (1986-87) reported that the bush bean varieties Wade and Top Crop were susceptible to foot-rot disease, at the age of 2 weeks. Bean flies observed at this stage were successfully controlled by spraying Nuvacron, 28ml/1 of water. one month after germination, the disease was very severe and destroyed the crop completely. Recommended sprays of Captan and Danconil failed to no severe disease symptoms and was ready for harvest after 8 weeks and continued over harvesting times, at 5-day intervals. Marketable yields of 12 tons/ha are reported.

NUTRITION

Doerfler, (1976) reports that beans require a good supply of phosphorus. However, since good nodulation can only be expected at flowering, or not at all adequate nitrogen applications are essential during the early growth period. Depending on the natural soil fertility and expected plant populations, nitrogen application may be high as 160 Kg N/ha (160 lbs N/ac), which should be given at planting, as no real benefit can be expected from top dressing a bean crop. All fertilizer should be applied prior to planting. It can be broadcast or placed in bands close to the seedlings. Based on soil fertility and plant population, the following quantities of pure nutrients are recommended by the author.

N	80-160 lbs/ac	or 90-180 g/ha
P_2O_5	80-100 ,,	90-112 ,,
K_2O	0- 50 ,,	0-56 ,,

SEED PRODUCTION

Bean seed production for commercial purposes is a feasible proposition in the tropics, where the maximum day temperature do not exceed 85° F (30° C) at the following and the temperature is not below 50° F (10° C) at the time of emergence. Temperature above 85° F, induce flower drop

The crop for seed purposes is harvested when most of the pods have turned yellow, but before they are completely dry. Bush bean can be harvested in one operation. With pole varieties, it is advantageous to harvest the crop over two or more successive picks. Harvesting is best done early mornings, while the dew is still on the plants in order to reduce losses from shattering. Seeds require 1 or 2 weeks in the pods for curing, prior to threshing. The final moisture content of seed should be reduced to 11%

The recommended seed standard for commercial certified seed are as follows :

Pure seed	98.0% minimum
Other crop/varieties	0.1% maximum
Weed seed	0.25% ,,

Insert matter	2.0% ,,
Germination	80.0% minimum
Seed moisture	13.0% maximum
Seed moisture in vapour proof containers	11.5% ,,
Sample to be submitted for seed analysis not less than	1000g or 36 ozs.

BREEDING

Deputy Director Research, Bandarawela (1977-78) reported that 40 single plant selections were made in the F_2 generation of the cross 'Wade' x 'Vel Roll'.

RECOMMENDATIONS

1. The pole and bush bean varieties recommended by G.R.Klaus (West German Agricultural Team), together with the other varieties mentioned as promising and high yielding based on local research findings, should be tested in the Mahaveli System B for at least 3 seasons, to obtain conclusive data and select the most outstanding varieties.

2. Commercial bean seed production during yala season with supplementary irrigation is the ideal method to obtain quality seed. Considering the fact that a very large quantity of bean seed is required annually for local use, this ambitious programme can be a feasible commercial proposition for the Mahaveli System B.

3. Attempts should be made to plant a pole bean crop towards the end of the rainy season in the Mahaveli System B, between rows of already established corn (maize) planted with early rains. This will considerably reduce the cost of stakes and labour involved for this operation. The object of this exercise is to allow the pole beans to climb onto the existing corn plants which will support its growth. This interplanting will also provide a cooler micro-climate for the bean crop, due to partial shading by the corn crop. With judicious manipulation, this same principle should be exploited to produce a successful bean crop, bush or pole, during the warmer yala season with supplementary irrigation.Depending on market trends, the maize crop can be replaced with baby corn if needed.

4. With the scanty research data currently available for commercial bean cultivation in the Mahaveli System B area, studies on improving soil fertility, better soil management and improved irrigation techniques are both urgent and imperative for launching a successful commercial venture.

5. The collaboration of University students in short term research projects to undertake these studies will hopefully produce quick and meaningful results. The financial implications to the Mahaveli Authority would be amply compensated by the long term benefits accrued by this approach.

I. 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 pioneering 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 trucks. 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 management coordination and even control over

the separately owned enterprises which comprise the production-to-market chain. Figure 9 is a copy of 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 more and more 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.

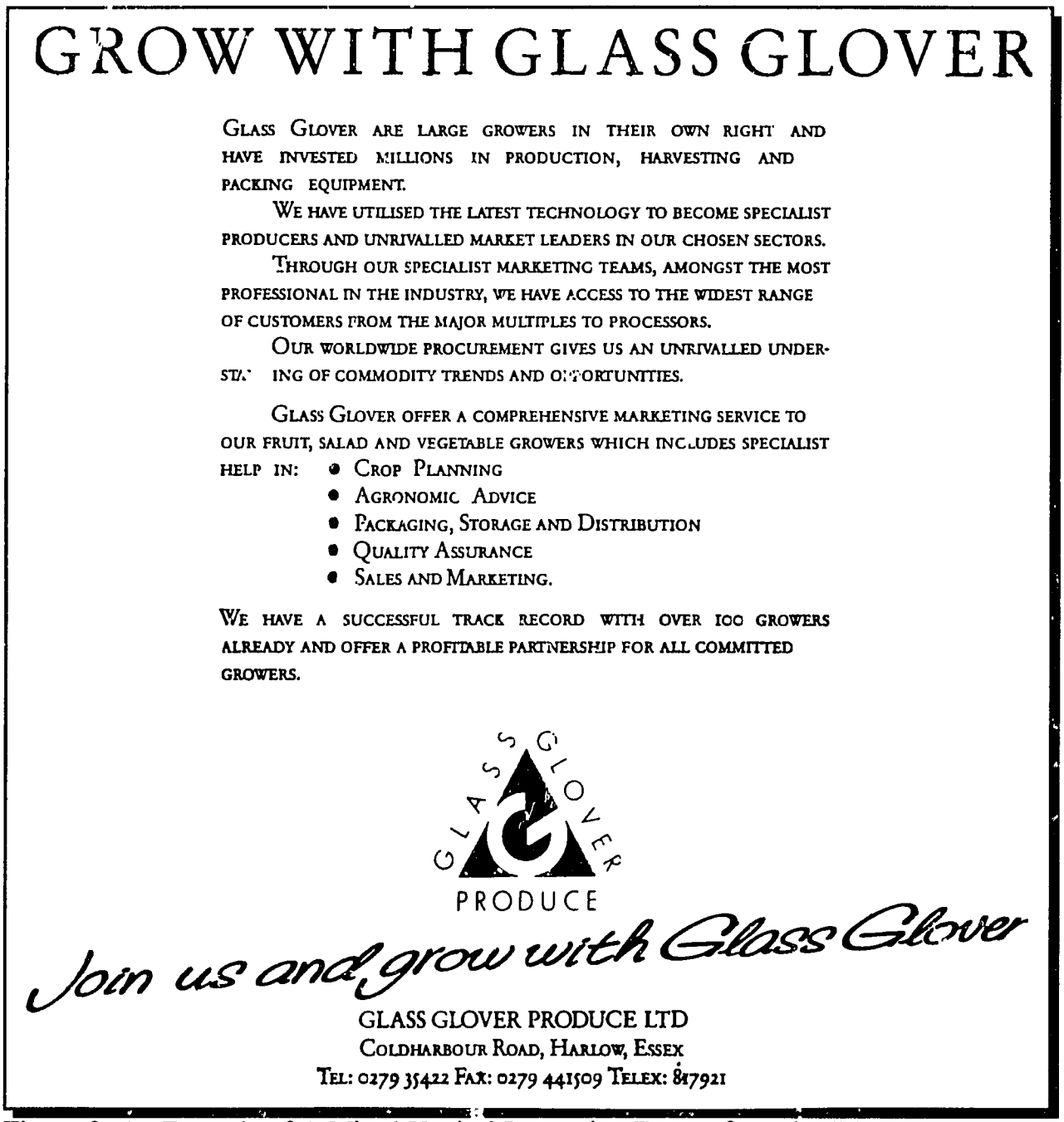


Figure 9: An Example of A Mixed Vertical Integration Format from the U.K.
(From, *Fresh Produce Journal*, 20 October 1990, p. 7)

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

This section describes the basic structure of fruit and vegetable marketing channels in Europe 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 10 is an example ad by a significant importer, Lisons Ltd., which has diversified forward with marketing infrastructure and capability.

Figure 10: Lisons Ltd. Ad (*Eurofruit* Nov. 88 p.69)

2. Wholesale Agents & Markets

Figure 11 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 11 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 12 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 11: 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 12: *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 12, 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 13: Scipio Group, A Major Vertically Integrated German Firm (*Eurofruit* Nov. 1988 p. 88)

3. Vertically Integrated Pre-Packers

Figures 13 & 14 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 14: FTK Holland BV, A Major Vertically Integrated Dutch Firm (*Eurofruit* Nov. 1988 p. 17)

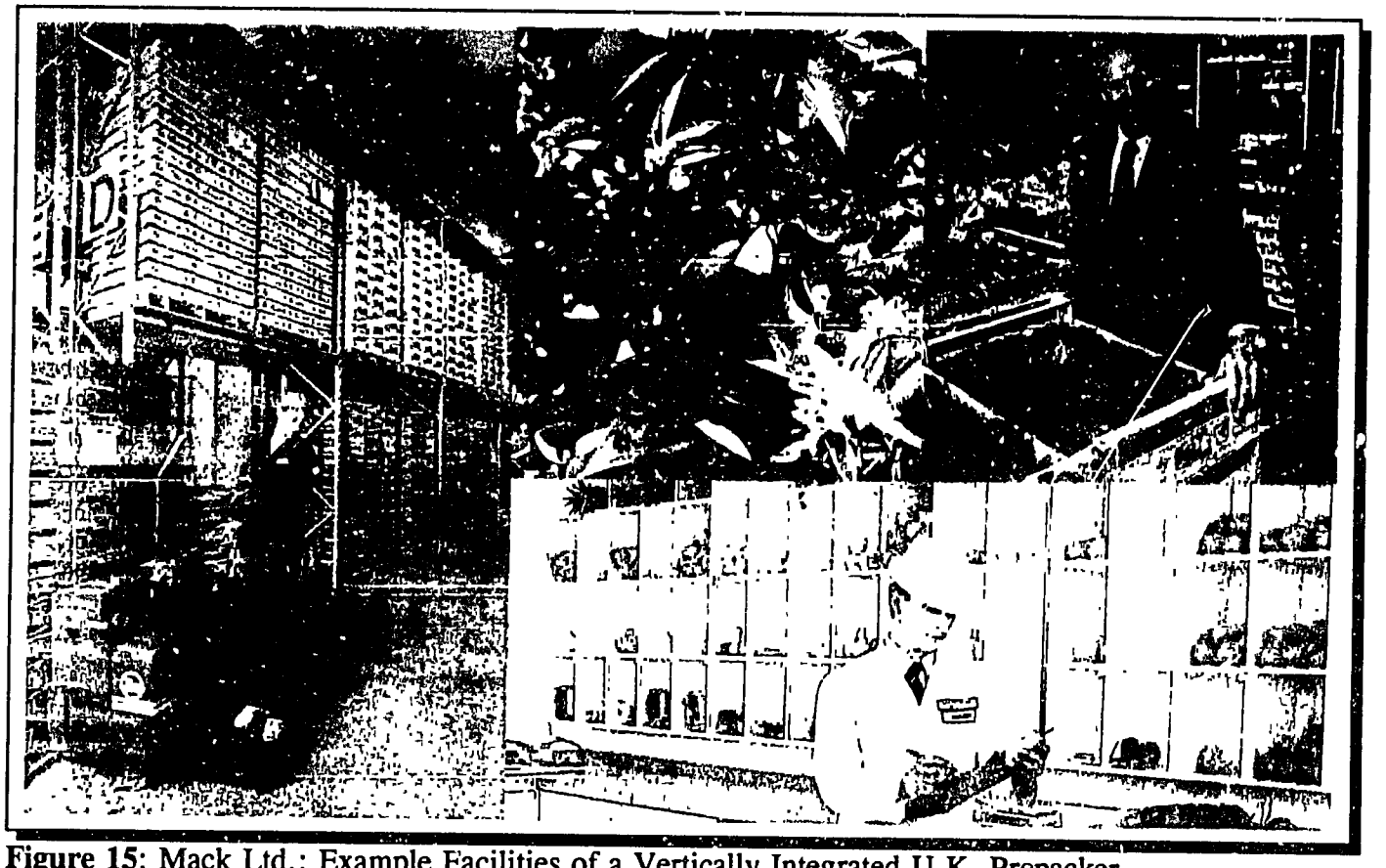


Figure 15: Mack Ltd.: Example Facilities of a Vertically Integrated U.K. Prepacker (*Eurofruit* Oct. 1990 p. 42)

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.

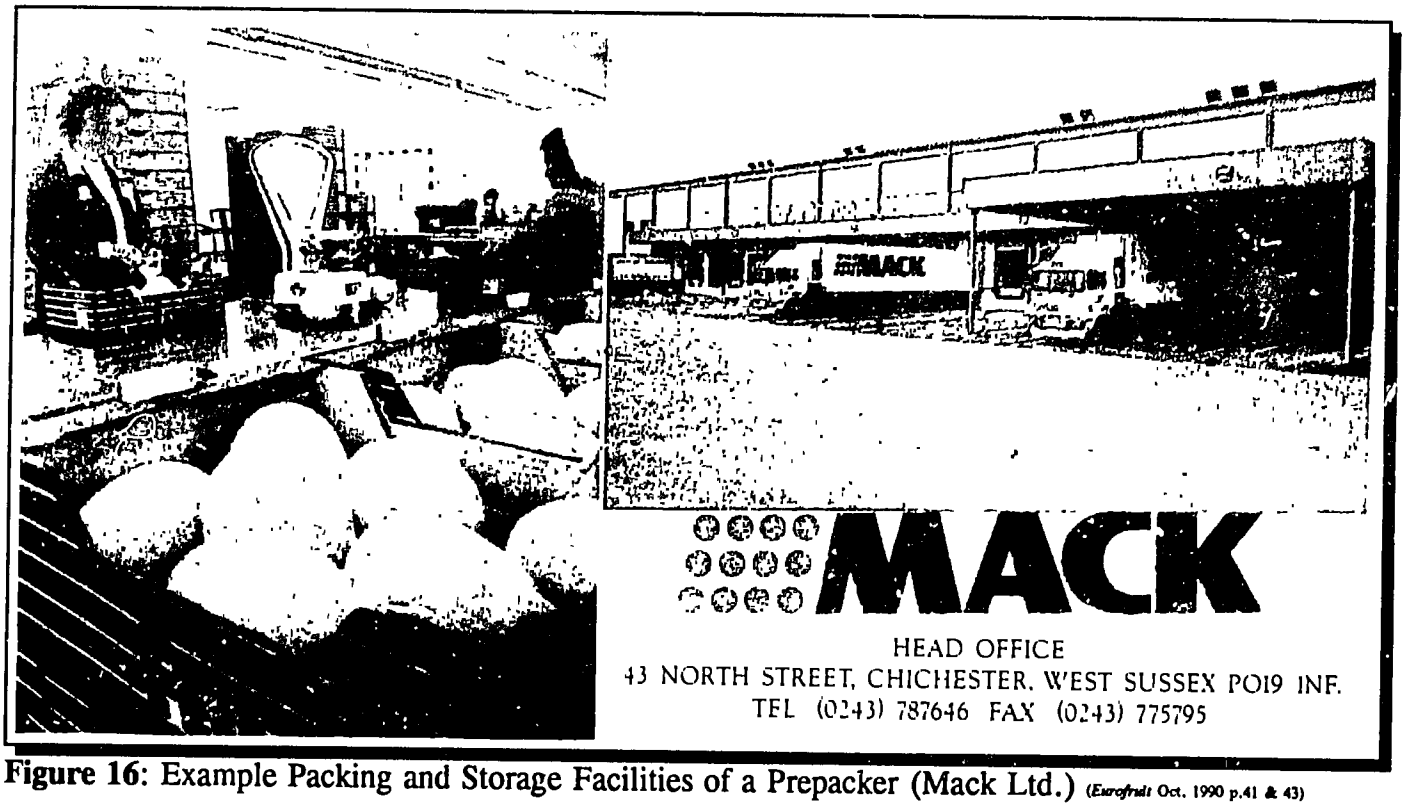


Figure 16: Example Packing and Storage Facilities of a Prepacker (Mack Ltd.) (*Eurofruit* Oct. 1990 p.41 & 43)

4. Retail Specialty Grocers

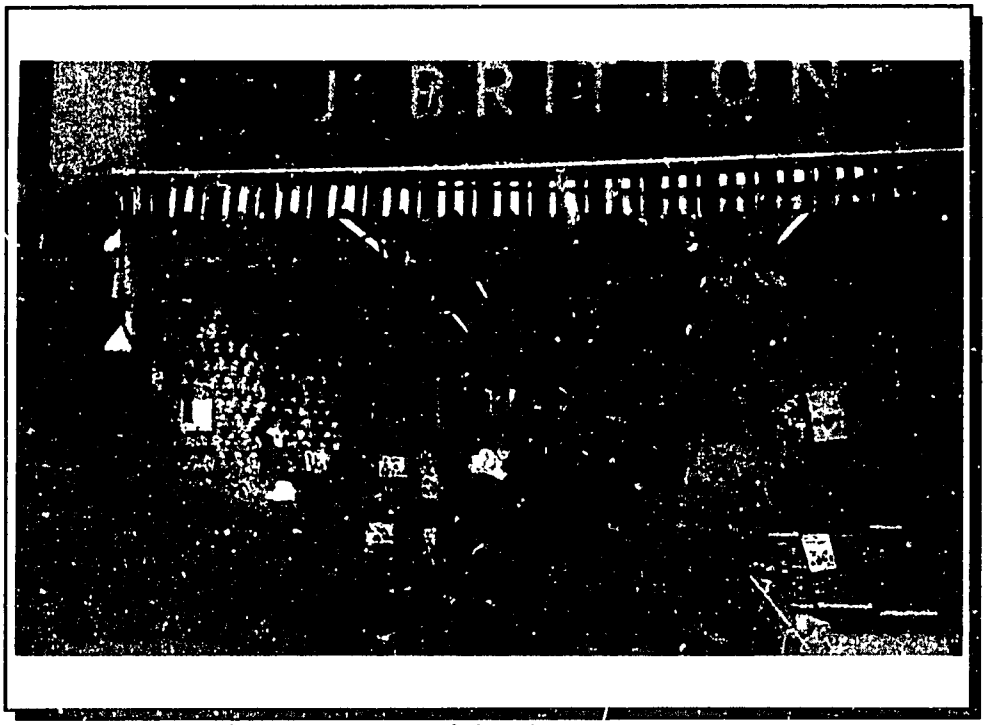


Figure 17: J. Britton; U.K. Specialty Grocer (*Fresh Produce Journal*, Sept. 14, 1990, p. 10.)

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 17 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.

5. Supermarkets & Multiple Outlet Grocers.

Figure 18 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 18: Supermarket (*Fruit Produce Journal*, Sept. 7, 1990, p. 25 by Thompark)

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 19 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. 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 19: New Zealand Marketing Board Ad (Fresh Produce Journal, June 22, 1990, p. 21)

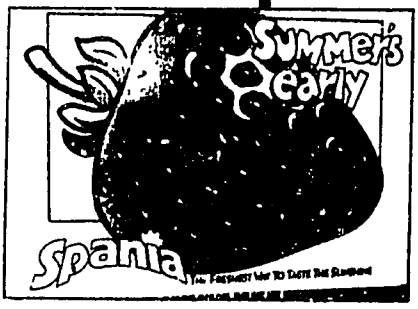
Figure 20 is an example of the type of market information which an association can monitor and communicate to growers. The EEC has a complex set of seasonal regulations on the import of major products, while most minor fruits and vegetables are open. However, the regulatory structure allows the EEC to 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 strawberries will have to apply for export documents.



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 20: 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 important in opening sea transport routes, 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.

Figure 21

One solution is to assist local banks to develop this experience, or work with experienced banks like the one advertising in Figure 21. 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.

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 22 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.

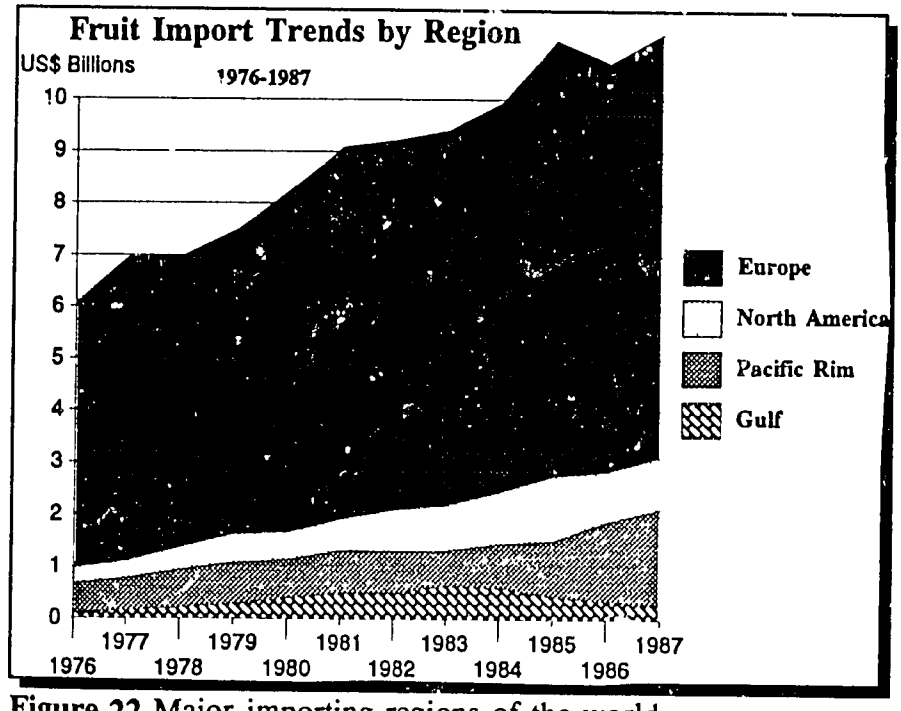


Figure 22 Major importing regions of the world

B. Timing & Depth of Market Windows for Beans i.. the Mahaweli

To provide an in-depth market analysis of fresh green beans, three European markets (Germany, the U.K. and Netherlands), and the major Asian market (Japan) are used. Figure 23 indicates total green bean supplies by week for 1990 in the four major markets in terms of tons entered per week. 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.

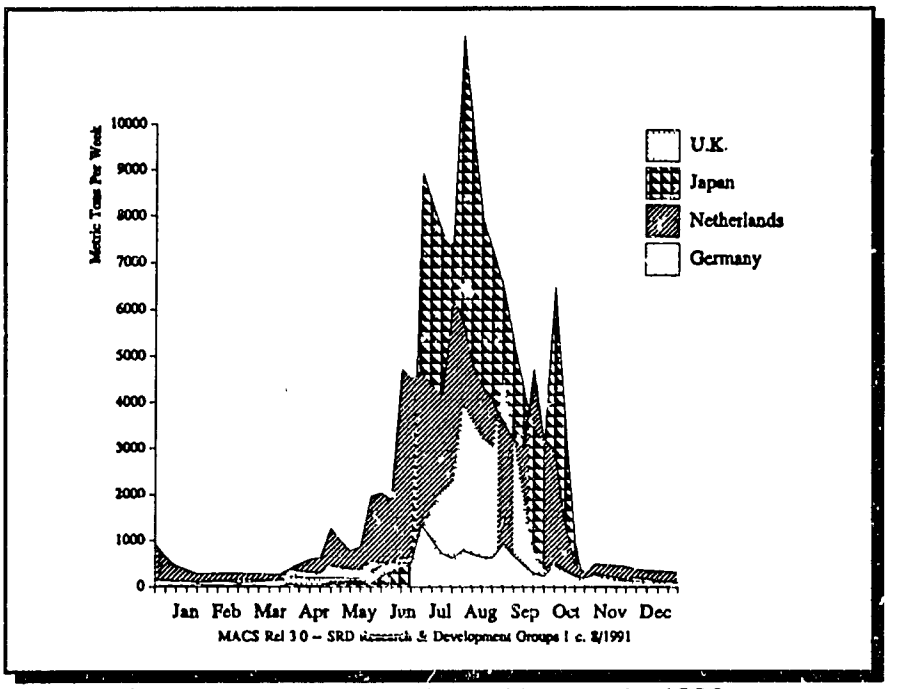


Figure 23 Green Beans - Total Weekly Supply 1990

C. Competitive Suppliers & Comparative Costs

This section of the M.I.P. analyzes the costs of production for Sri Lanka and major world suppliers of beans. Figure 24 outlines SRD's estimates of the costs of production and packing for a reasonably efficient Sri Lankan producer along with selected competitor countries. The U.S. is the major foreign supplier of the Japanese market while the other countries export significant amounts for the European markets. Sri Lanka has a good competitive position because of it's low production costs.

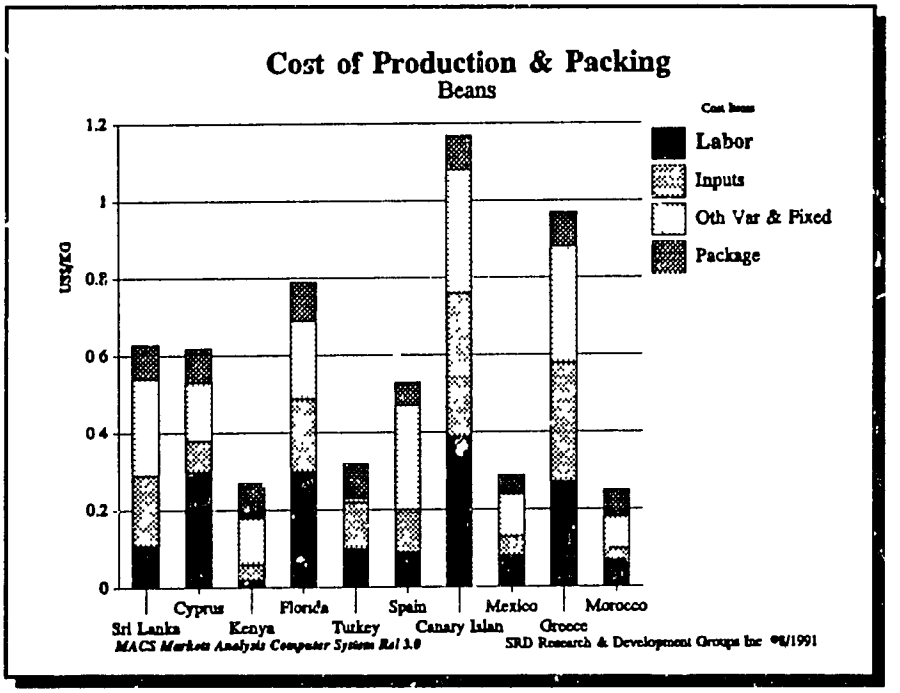


Figure 24 Green Beans - Cost of Production & Packing

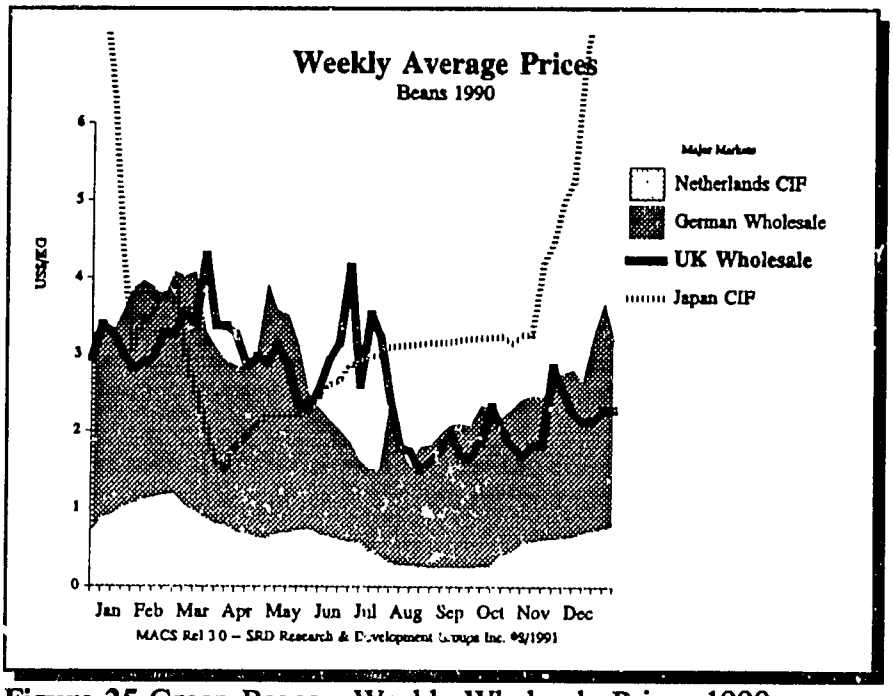


Figure 25 Green Beans - Weekly Wholesale Prices 1990

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. German and U.K. wholesale prices are generally highest in the first few months of the year. Japanese prices are extremely high during the winter months. The prices used for the Netherlands are reported C.I.F. prices which are generally lower, but still useful for analyzing trends. Like Germany and the U.K., Dutch prices are highest during the off-season months before and after the summer.

E. Seasonal Profit Potentials & Competition

The profit potential section of the M.I.P. demonstrates the weekly profitability potential of Sri Lankan bean 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 Sri Lanka must air freight beans to the markets in Europe and Asia, the period in which Sri Lanka can be in a competitive position is limited to the first few and occasionally the last few months of the year. For example, in the German market Sri Lanka can be profitable from about mid-November through May. In the Netherlands, the reported C.I.F. prices show no period of profitability for Sri Lanka, but since wholesale prices are generally at least $.50 to $1.00\kg higher than C.I.F., there may be periods of potential profitability here as well.

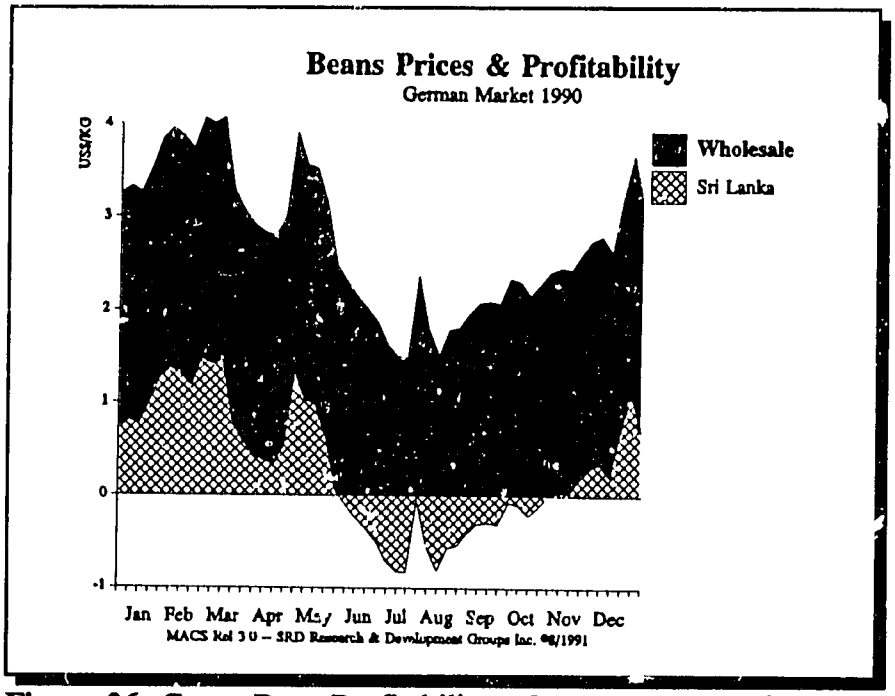


Figure 26 Green Bean Profitability - German Market 1990

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.