Table 3. ***Monthly export of Mexican vegetables to the United States, 1989–90 season (CNPH, 1990).***

Month	Quantity (1000 t)
October	29
November	69
December	144
January	237
February	238
March	270
April	178
May	134
June	69
July	41
August	18
September	12

and labor. Yet, added agricultural infrastructure is required, and improved roads and communication networks are needed to expand vegetable production in most of the central Mexican states.

Although the majority (83%) of Mexican vegetable exports to the United States occurred during the winter and spring months, there were vegetables introduced throughout the year (Table 3). Even with NAFTA, most of the vegetables crossing from Mexico into the United States will continue to enter during the winter, when vegetable production is low in the United States due to unfavorable growing conditions. However, areas with vegetable harvest from December to May, such as Florida, and southern Texas, can expect more competition from Mexican vegetable imports than other parts of the United States.

Based on importation figures at seven main points of entry, Nogales was the leading point of entry—primarily because of vegetables introduced into the United States from Sinaloa and Sonora (Table 4). All ports of entry most likely will experience increased activity with NAFTA. Present points of entry will be insufficient to handle an increase in vegetable exports into the United States. Therefore, additional ports with agricultural inspection facilities will be needed.

Table 4. ***Vegetable amounts exported to the United States at different Mexican ports of entry, 1989–90 season (CNPH, 1990).***

Port	Quantity (1000 t)
Nogales, Son.	870
Reynosa, Tamps.	218
Tijuana, B.C.	88
San Luis R.C., Son.	81
Mexicali, B.C.	71
Progreso, Tamps.	45
Cd. Juarez, Chih.	15
Others	51

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Export Marketing of Fresh Fruits in New Zealand

Donald H. Turner[1] and Robin G. Brumfield[2]

Summary. The development of New Zealand's economy was based largely on exports to England. With the formation of the EEC, New Zealand was forced to find other markets and concentrate on a wider variety of export commodities. Marketing boards for specific products with monopoly power have been at the center of agricultural and horticultural exports in New Zealand. New Zealand has concentrated on developing new varieties, premium quality, research on postharvest handling, branding, and other marketing procedures to compete in the world market and give producers a good return.

New Zealand lies in the temperate waters of the South Pacific, 1200 miles east of Australia. Called the antipodean paradise by the early English settlers, it spans a distance equal to that from San Francisco to Seattle with a climate similar to that particular coastal region of the United States. The land mass is nearly 108,000 square miles, equivalent to the state of Colorado, and the population is just >3 million. New Zealand is a young country with an indigenous population closely related to native Hawaiians, where few European pioneer families can be traced back more than five generations. New Zealand is known in the United States primarily for the efforts of her yachtsman trying to win the America's Cup in San Diego, as well as some export products such as 'Gala' apples and kiwifruit. Turners and Growers is the leading fruit and produce wholesaler in New Zealand, heavily involved in both exports and imports.

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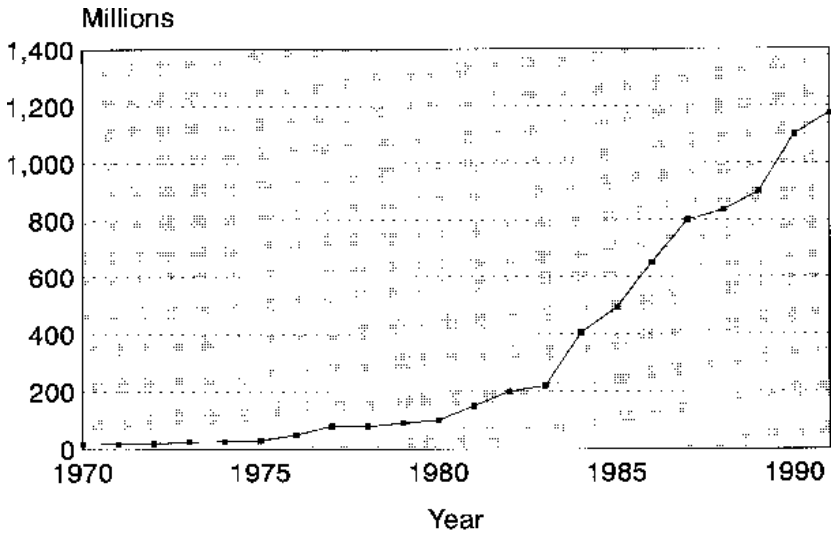

Fig. 1. New Zealand horticulural exports growth, 1970–1991 (New Zealand Ministry of Agriculture and Fisheries, 1975–1992).

Horticultural exports in New Zealand

Starting in the mid-1800s, New Zealand's economy was developed on the premise of being the food basket for England. Formation of the European Economic Community (EEC) shattered this relationship and forced diversification in both marketing and farming in New Zealand. In the 1970s, New Zealand began to focus significantly on horticultural exports. Figure 1 depicts the highly accelerated growth in horticultural exports from NZ$18 million in 1970 to NZ$1.1 billion in 1990. Figure 2 shows the share of various crops in total exports. Exports were boosted with improvements in variety selection, advances in cold-storage technology and ethylene controls, and palletizing. Wide-bodied jets are used for transportation along with charter shipping. Isolation and freight costs pose significant barriers, requiring exporters to concentrate on premium quality, new varieties, and close controls to compete with low-cost producers located closer to export markets. Major growth areas have been in kiwifruit and apples. The biggest export market for New Zealand's horticultural products is the EEC (Fig. 3), followed by Japan, the United States, and Australia. The fastest-growing market is in the Pacific Rim, mainly Japan, Australia, and the United States (Fig. 4). The "marketing board" system is the key to understanding New Zealand's horticultural industry, particularly horticultural exports. Apple and kiwifruit exports both are controlled by their respective marketing boards.

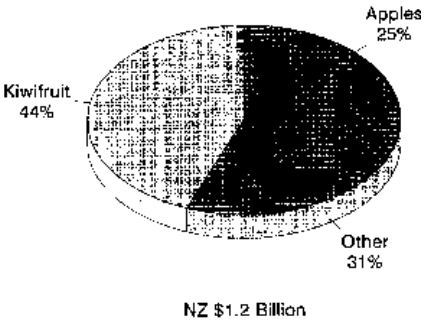

Fig. 2. New Zealand horticultural exports by value, year ended June 1991 (New Zealand Ministry of Aggiculture and Fisheries, 1992).

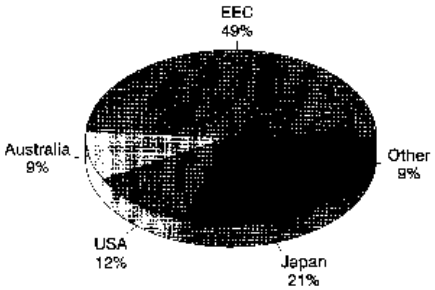

Fig. 3. New Zealand horticultural exports, 1991 (New Zealand Ministry of Agriculture and Fisheries, 1992).

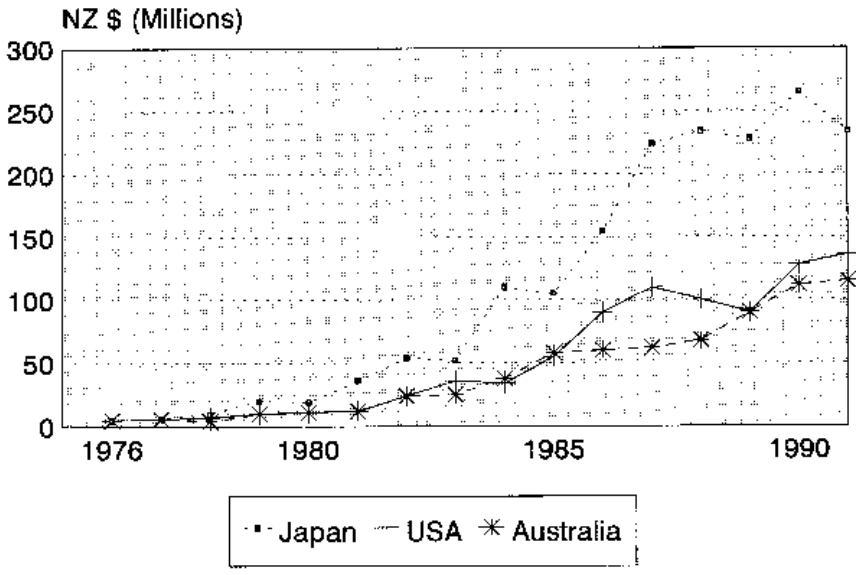

Fig. 4. New Zealand horticultural exports, Pacific rim, 1976–1991 (Halsted, 1990).

Marketing boards

Marketing boards have been at the center of agricultural and horticultural exports in New Zealand in 20th century. In 1989, >80% of the value of New Zealand's exports of apples and kiwifruit were influenced by the boards (Zwart and Moore, 1990). Boards for each product function differently from the others; but, there are more similarities than differences among the various boards. For example, both the Apple and Pear Boards and the Kiwifruit Board have the responsibility to acquire virtually all product from producers, to organize export, and to determine final pooled payments to producers. These organizations also have either direct or indirect control over domestic prices, processing decisions, breeding programs, and product development. The producer board industries have tended to follow a cycle as shown in Fig. 5.

Since 1984, considerable debate has occurred about the role of producer boards in the New Zealand economy. Some experts believe that a single selling agency with monopoly over exports can lead to bureaucratic inefficiencies, without any advantages that could not be achieved by competitive firms. Advocates of the marketing boards argue that marketing boards can lead to the implementation of more-sophisticated and coordinated marketing strategies, and increased returns for New Zealand. Some of the opponents of producer boards hold them responsible for New Zealand's slippage in the gross domestic product (GDP) per-capita ratings. In 1960, New Zealand was rated fourth in GDP in the Organization for Economic Cooperation and Development (OECD) countries, but has since slipped to 18th. Some hold the view that producer boards are not suitable to be competitive in today's marketplace (The New Zealand Herald, 1991a).

One of the most controversial issues in mar-

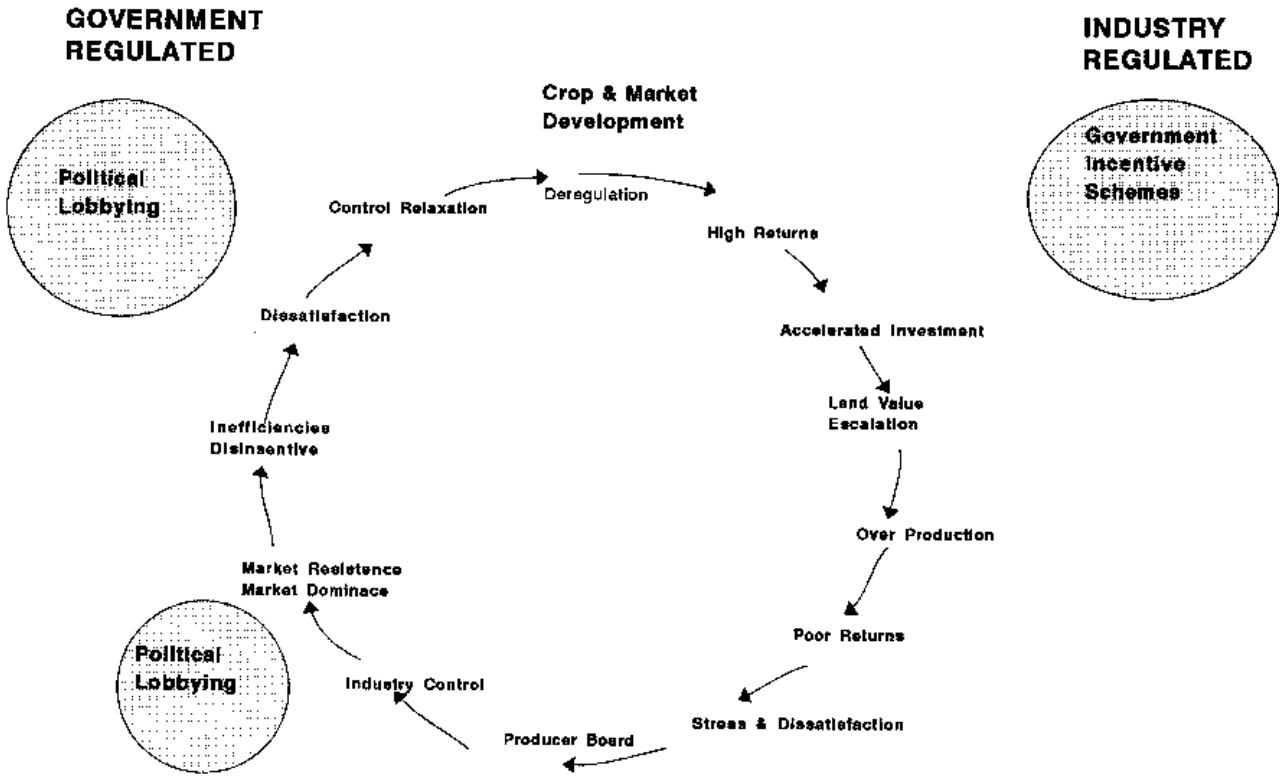

Fig. 5. Producer board cycles.

keting board policy has been the decision by the New Zealand government to allow some boards to assume complete responsibility for the marketing of their product. Initially, producer boards controlled wheat, eggs, poultry, and potatoes. (These boards have since been disestablished.) In 1948, meat, dairy products, apples, and pears were added and, most recently, in 1988, kiwifruit.

Apples and pears

The first seedlings of apples and pears arrived in New Zealand in the 1840s. New Zealand's great potential for commercial fruit growing was recognized by the turn of the 20th century. The total fruit export reached 68,000 cases in 1914 (a case weighs 18.5 kg). New Zealand Fruitgrowers Federation was formed in 1916 (New Zealand Apples and Pear Marketing Board, 1992b) "to foster, promote and protect the fruit industry." The apple and pear growers suffered during World War II, when Great Britain restricted transportation of food items from New Zealand and asked for shipping of only meat and other proteins, but not horticultural products. In 1948, the New Zealand Apple and Pear Marketing Board (NZAPMB) was formed. The function of the board has been to give stability and security to a rapidly expanding industry. The board intends to protect the growers' benefits, with the power to acquire and market all apples and pears grown in New Zealand. Today, the NZAPMB's mission is "to maximize the return to its suppliers primarily by the worldwide marketing of apples and pears, horticultural products and related products and services" (New Zealand Apple and Pear Marketing Board, 1992a).

The Board receives ≈80% of New Zealand's total apple and pear production. (In Nov. 1993, legislation was passed that removed the New Zealand Apple and Pear Board's monopoly over domestic marketing and made provision for other exporters, who must be approved by the board.) In acquiring the fruit from growers, the board makes advance payments preset with the final price determined by a pooling of market returns. The Board takes title to the fruit and markets fruit and associated products under its ENZA brand name. The present board is comprised of six members, each appointed for one 3-year term. Four are appointed by the Minister of Agriculture on the nomination of the New Zealand Fruitgrowers Federation, and two are appointed by the New Zealand Government. The board sets policies to ensure a year-round supply of apples and pears for the local market, to develop export markets, and directs processing operations (New Zealand Apple and Pear Marketing Board, 1992b).

New Zealand's export volume of apples is 100 times greater than that of pears. The export volume of fresh apples has more than doubled in the past 10 years (Fig. 6). The volume of the

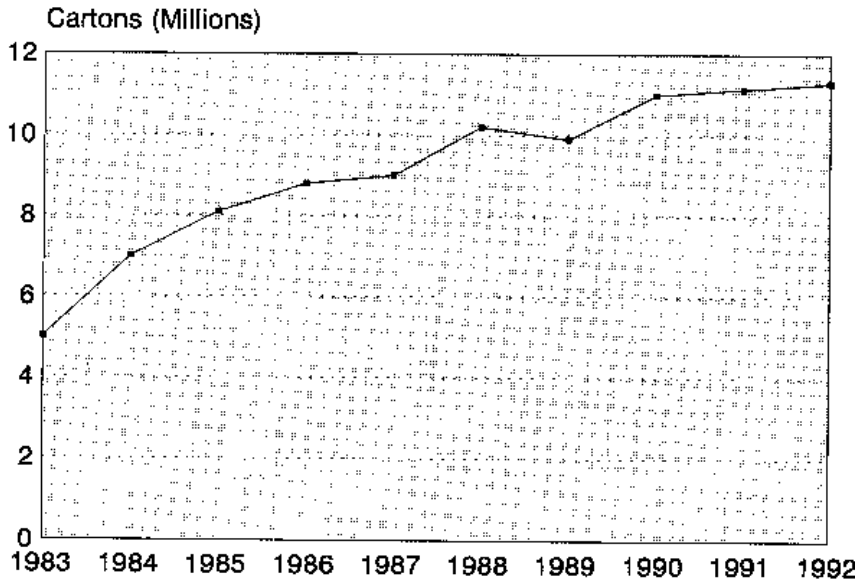

Fig. 6. New Zealand export of fresh apples, 1983–1992 (New Zealand Apple and Pear Marketing Board, 1992).

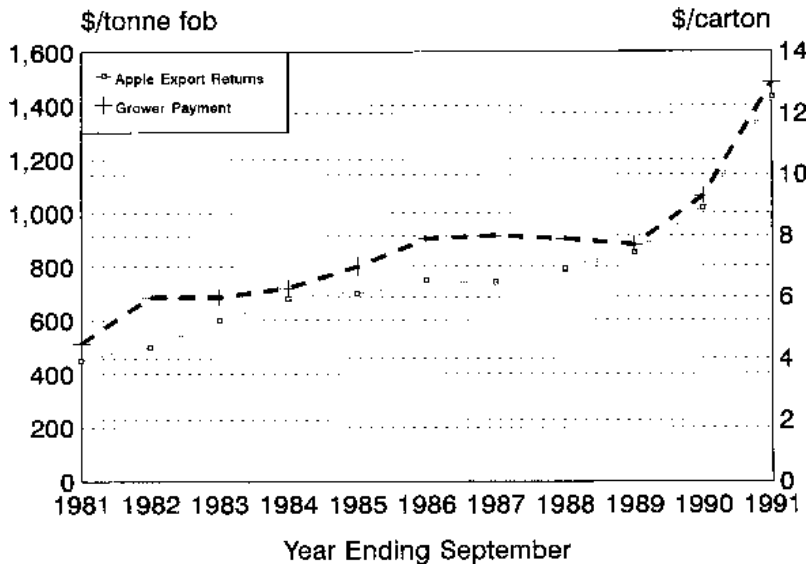

Fig. 7. Export returns and board payments to growers, 1981–1991 (Hussey, 1992).

processed apples grew more than 300% in the same period, while local consumption remained constant. Returns per unit volume of fresh apples also increased in the same period. Figure 7 shows the export returns and board payments to growers during 1981–1991. The following year, 1992, was also a great year, with growers receiving an average of NZ$12.60 per carton of fresh fruit. Thus, New Zealand's apple growers increased their profits and volume substantially in the 1990s. The NZAPMB attributes its success mainly to the board's single-desk operation and its ability to introduce innovative marketing strategies and operational technologies, as stated in their 1991 annual report. A realistic explanation of the apple success story lies in the fact that severe frost damage in Europe during the early 1990s reduced production and stocks; therefore, increased demand for New Zealand's produce occurred in the European market. The EEC is New Zealand's most-important market, purchasing nearly 70% of this country's exports. A strong Deutschmark and English pound also have helped New Zealand's exports. Another reason for the high return in recent years is that the sales of new varieties, such as 'Royal Gala', 'Fuji', and 'Braeburn', which produce high returns per unit, increased. The combined export shares of the new apples varieties were 36% in 1991, compared to 15% in 1990 (Fig. 8).

Kiwifruit

The first Chinese gooseberry plants were raised in New Zealand in 1905. Grahame Turner identified the commercial potential of the Hayward variety, which was first developed in 1924, and improved the methods of transport, packaging, and cold storage (Hussey, 1992). On 20 June 1959, Turners & Growers Limited of New Zealand changed the marketing name of *Actinidia deliciosa* from Chinese gooseberry to kiwifruit. Frieda Caplan sold the produce as an exotic fruit in the United States, and a billion-dollar industry was born. The impact of kiwifruit marketing on New Zealand's economy was not realized until after 1977. New Zealand's kiwifruit export market boomed from 20,000 t in 1981 to 280,000 t in 1990 (Fig. 9). In 1990, New Zealand's total horticultural exports exceeded NZ$1 billion, with kiwifruit constituting about 35% of the total (Bay of Plenty Times, 1991b; New Zealand Kiwifruit Marketing Board, 1991; Wallace and Reynolds, 1990). The biggest export market for New Zealand's kiwifruit are EEC countries, followed by Japan, the United States, and Australia (Fig. 10). By the mid-1980s, other countries rapidly increased production of the fruit (Hussey, 1992). Italy is now the world's largest kiwi producer. Chilean production is expected to meet that of New Zealand by 1995. Greece, the United States, and Japan also have become kiwifruit producers. New Zealand's share of world production is expected to fall to <35% by the mid–1990s. Kiwifruit has a relatively small share of total fruit consumption in all major markets, <2%. New Zealand and Italy have the highest per-capita consumption, at around 2 kg per-capita; the United States, Germany, and Japan consume 0.13, 0.8, and 0.7 kg per-capita, respectively (New Zealand Ministry of Agriculture and Fisheries, 1990).

More than 4000 commercial orchards produce kiwifruit for export in New Zealand, with 60% produced in Bay of Plenty region. Production units are mostly family farm operations averaging 4 ha each. Average yields are around 5000 trays/ha (a tray weighs 3.5 kg). Harvesting and packing occurs between April and June, and most fruit is stored under refrigeration.

The introduction of an exotic fruit into the world market in a relatively short time is considered one of the most significant marketing success stories in horticulture. From 1977 to 1988, kiwifruit crop was exported by companies operating under licenses granted by the New Zealand Kiwifruit Authority. Turners & Growers was one of the largest companies exporting kiwifruit. By 1988, Turners & Growers Limited had established a network of 14 branches throughout New Zealand, servicing growers with advice and inputs, and performing marketing functions. Grahame Turner was honored with an industry award in recognition of his significant pioneering role in developing the kiwifruit market into a multibillion dollar industry (Hussey, 1992).

In 1988, growers voted overwhelmingly to replace licensed exporters by a single-desk seller with a marketing board because of a perceived lack of market discipline among the exporters. The New Zealand Kiwifruit Marketing Board was born with the mission "to maximize the return to the New Zealand grower by being the most efficient supplier and most effective marketer of kiwifruit internationally." Establishment of the board deprived exporter companies of the market that they had created.

The Board determines whether or not the fruit is acceptable for exporting. Only Class I Grade is exported as fresh fruit. There are persistent demands that the board create a new export class.

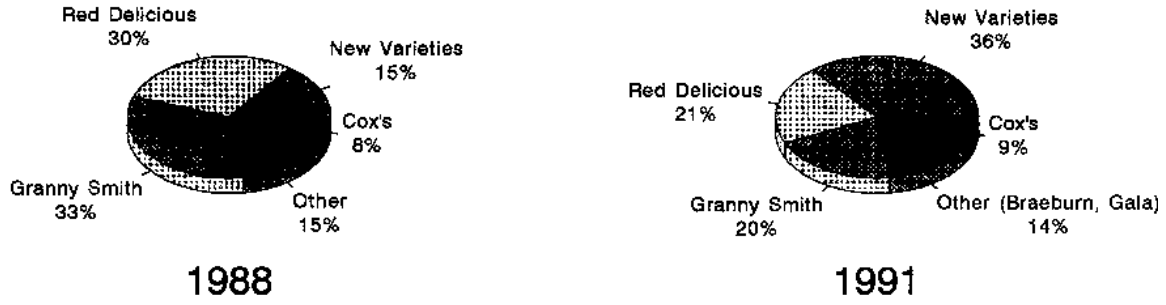

Fig. 8. New Zealand export apple varieties (percent by volume) (New Zealand Ministry of Agriculture and Fisheries, 1992).

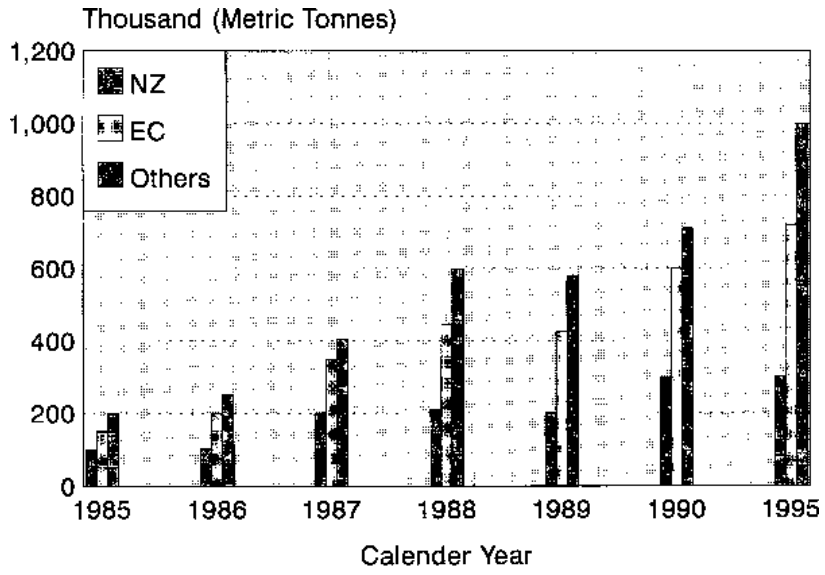

Fig. 9. Kiwifruit production—New Zealand and the world, 1985–1995 (New Zealand Ministry of Agriculture and Fisheries, 1992).

Also, the development of new value-added products from Class II grade kiwifruit is in the board's agenda. The Class II grade is sold as fresh fruit in the domestic market only. The Board also controls storage and handling of the kiwifruit extensively. Kiwifruit is picked before it ripens, is packed, and placed in cold storage. The fruit will not ripen if stored at low temperatures and cannot be stored with ethylene-producing crops such as apples and pears. Ripening will take 3 to 5 days at room temperature. The Board was successful in reducing the packing costs from $2.50 a tray to $2.00. New Zealand's kiwifruit production increased dramatically in 1990 (Fig. 11), reducing returns to the farmers. The board sold a tray for NZ$4.55, while its cost was NZ$5.00. (Bay of Plenty Times, 1991b). Returns declined for growers over the past decade, disappointing them. Many growers have lost money since the board started to control export marketing. As a result, many growers lost confidence in the board and single-desk concept. The anti-single-desk concept lobby is regaining its power among the growers. They feel that the single-desk concept is against the wind of privatization and deregulation—key economic policies of New Zealand during the past decade. Opponents of the single-desk concept claim that they can sell the fruit overseas at better prices than the board does. Disappointing returns are not the only complaint by the growers. Considerable work has been done by universities and various research organizations to develop new varieties of kiwifruit, some with different-colored flesh. However, the Board has not done much to test-market new varieties.

A study done by Harvard Univ. for the Trade Development Board suggests that the long-term answers to the New Zealand kiwifruit producers' problems are in developing and marketing new varieties. The study indicates that kiwifruit exporting lost its profitability in New Zealand because supply exceeded demand worldwide in recent years. New powers, such as Italy and Chile, have emerged in the marketplace, while the creation of new markets has been slow. Kiwifruit is no longer an exotic fruit that can demand a premium in the marketplace, as it did in the past. On the other hand, kiwifruit is far from being a household commodity such as apples and oranges (Hussey, 1992; Zwart and Moore, 1990).

New Zealand's research and education in horticulture

The New Zealand government has funded almost all horticultural education and scientific research activities in the universities. Two of the seven universities specialize in horticultural and agricultural sciences, offering a full range of studies in research and marketing. Graduates often have limited job opportunities and leave New Zealand to pursue careers in other parts of the world. Some of the technical institutes offer courses in cultivation and farm management. Educational emphasis now is tending to focus on the marketplace as a starting point for students and then working back through the production system. A program of government departmental restructuring in 1991 saw changes designed to make scientific research institutes commercial entities. The government announced the formation of the Public Good Science Fund. More than NZ$40 million of the fund is devoted to horticulture (0.12% of the GDP). The reformation of government agricultural and horticultural bodies has resulted in a number of Crown Research Institutes. These institutes have been set up on a commercial basis, responsible to the Foundation for Science and Technology (the governmental body that provides the bulk of their funding). Two Horticultural Crown Research Institutes were formed in 1992. The Horticulture and Food Research Institute of New Zealand,

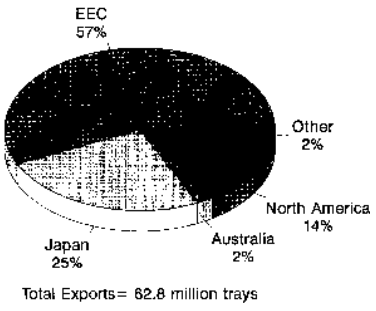

Fig. 10. Export markets for New Zealand kiwifruit, 1990–1991 (Hussey, 1992).

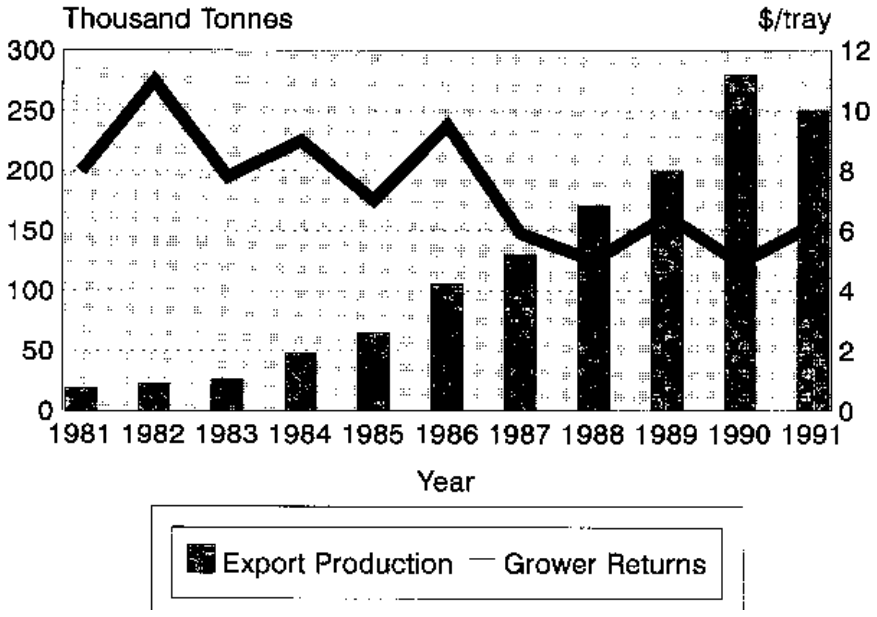

Fig. 11. Kiwifruit export production and grower return, 1981–1991 (Hussey, 1992).

Limited, specializes in fruit and berry fruit and the New Zealand Institute for Crop & Food Research specializes in vegetables, floriculture, fish, and other arable crops. Both organizations have a number of specialist research cells operating in various locations where crops applicable to their research activity are grown principally. These institutes have long-established international links from their previous structures and no doubt will continue to maintain international technology transfer links. A new relationship between the scientific community and the horticultural community is continuing to emerge as roles are defined on a more commercial basis; i.e., "user pays."

Research also is conducted by private companies in New Zealand. The export company Turners & Growers has conducted programs on specific breeding programs and, since World War II, has introduced a number of varieties of fruits to New Zealand, especially from California. Turners & Growers has a current scientific breeding program to produce firm, high-yielding crack-resistant high-sugar and -acid strawberry varieties. Recently released 'Orion' and 'Donna' strawberries are promising selections.

The academic community plays a major part in meeting the needs of an even more-discerning consumer who demands products that are grown from natural nutrients, are residue free, have a good shelf life, have high color and flavor quality, are new and interesting, and meet stringent hygiene requirements. The challenge to the New Zealand scientist is therefore to reduce synthetic chemicals in the produce, to develop new and better varieties especially tailored to New Zealand's growing conditions and international market demands, to improve postharvest techniques, to improve storage and transport, and to improve yield. All elements of the distribution and marketing system must be understood to determine how existing technology might be applied to changing horticultural marketing conditions, which change daily.

Researchers and educators who best understand the trends in marketing are positioned best to apply new technology to gain marketing advantages. Students' interests can be activated by having local trade leaders provide classroom guest lectures. Student field trips to local markets, leading growers, and export companies also show students current industry trends. Also, trade conferences give students insights to the markets. New Zealand has seen many successful examples of greater contact between students and industry leaders.

To ensure a return to the farmer, New Zealand's products must command a premium in the market place. With the emerging worldwide power of supermarkets, promotion, presentation, packaging, and pricing strategies require constant tuning. For some products, name perceptions play a key role. For example, changing the marketing name of *Actinidia deliciosa* from Chinese gooseberry to kiwifruit has been credited as part of the reason for the success of kiwifruit.

Today, as the world becomes more conscious of health and the environment, production methods become more important than ever in the consumer's mind. New Zealand's unique topography and climate, its vast coastline free from pollution, abundant mountain streams that flow through native bush into fertile growing areas, devoid of many of the pests and disease prevalent in the other parts of the world, enhance this country's image as a clean, green producer.

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Global Horticulture and the Quest for Seed Varieties

Francois Korn

Additional index words. markets, international trade

Summary. During the 1980s, the large consumer markets in the northern hemisphere came to expect a year-round supply of high-quality fresh vegetables. This has given farmers in many countries of the southern hemisphere and the tropics an opportunity to diversify into lucrative export crops. However, finding cultivars adapted to the local growing conditions is often difficult because commercial varieties usually are bred for highly specialized growing and farming conditions. As a result, local horticultural research institutes are playing a crucial role in the development of suitable genetic material.

We live in a world of *global horticulture*, where onions grown in southern Australia can be marketed halfway around the world in northern Europe, and where the Japanese market can source fresh fruits and vegetables in four continents. Many consumers have come to take it for granted that their favorite vegetables are available year-round at the local supermarket. This has been made possible by modern transportation and container technology, as well as by the diligent efforts of plant breeders.

Global supply is predicated on four important factors. There evidently is a direct correlation between *freight costs* and *crop value*, but both become less important as the *standard of living* increases. *Tourism* increasingly exposes consumers to new types of food and to new windows of produce availability, raising their expectations at home.

Initially, global horticulture meant that the main consumer markets in the northern hemisphere imported exotic produce. Then, during the past 20 years, these consumer markets have started exporting their own horticulture during the cold

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