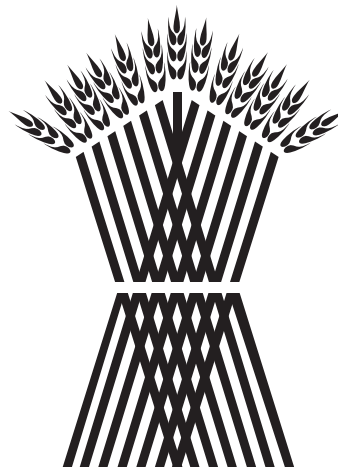

**RECENT DEVELOPMENTS IN
ORGANIC FOOD PRODUCTION
IN NEW ZEALAND:**

Part 2, Kiwifruit in the Bay of Plenty

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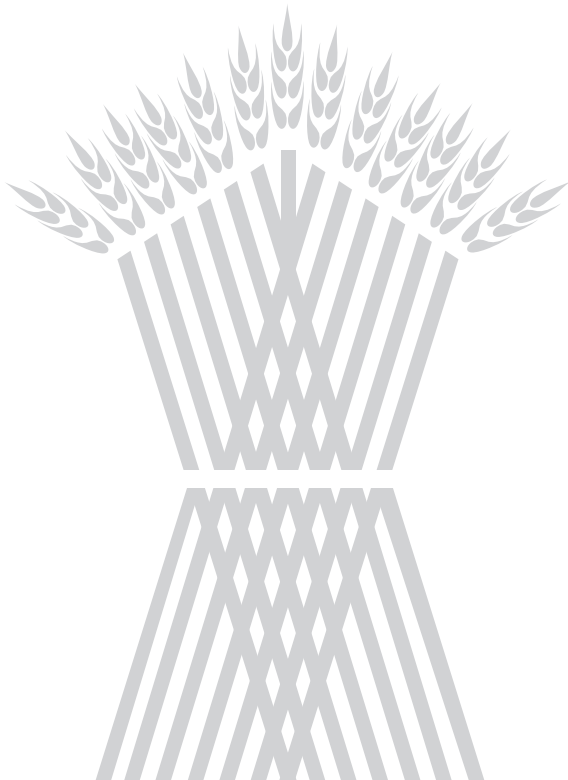
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Authors' Preface

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■ Chapter one

Introduction

This report presents the findings of research into the development of organic kiwifruit production in the Bay of Plenty. These results form the second of four case studies which constitute the Public Good Science Fund programme 'Optimum Development of Certified Organic Horticulture in New Zealand'. The other case study regions are Canterbury (Campbell 1996), Gisborne (to be completed during 1997) and Nelson (to be completed by 1998). The primary objective of this report is to document developments in the organic export industry in the Bay of Plenty. Comparisons between Canterbury and the Bay of Plenty have occasionally been included in this report in order to provide more clarity about the development of organic production in the Bay of Plenty itself. While there is some discussion of the differences between Canterbury and the Bay of Plenty in the Conclusion, these are only brief. Full comparison of the regional factors influencing the development of organic exporting will be set aside until all four case studies have been completed.

The Study Region: why Bay of Plenty?

The overall aim of the PGSF programme is to examine three regions where organic food production and exporting has been successfully developed since 1990. Canterbury, Bay of Plenty and Gisborne were selected to be these case study regions. Nelson was included to provide a contrast – a region where organic horticulture is strong but export development has not significantly developed.

Bay of Plenty is a region where organic horticulture has undergone a major increase in recent years. The growing export market for organic kiwifruit accounts for the major part of this increase. Surveys conducted by the Organic Products Exporters Group (a Tradenz sponsored group) indicate that while total organic food exports in New Zealand totalled \$10.5 million in 1996, organic kiwifruit represented about 50% of this total. About 90% of this organic kiwifruit is produced in the Bay of Plenty. Consequently, the Bay of Plenty had to be included as one of the most important case studies in this research programme.

The Study: why focus on kiwifruit?

In the previous case study – Canterbury – the development of organic vegetable and arable production involved a wide range of products, intermediaries and potential markets. In the Bay of Plenty, organic production is almost entirely concentrated in one sector. During the planning

stage of this research, it was anticipated that kiwifruit production would form only part of this report and that other organic horticultural products grown in the Bay of Plenty would be examined as well. As the field research progressed, however, the range of issues pertaining to organic kiwifruit increased dramatically, and the centrality of kiwifruit to the development of organic infrastructure in the Bay of Plenty became clearly apparent. The other organic horticultural activities were marginal, and almost all were domestically oriented, with the exception of organic avocado and citrus production by a small group of growers. Given the enormous range of issues emerging from organic kiwifruit production, it was decided that two revisions should be made to the original programme design:

- rather than presenting the findings of the Bay of Plenty, Gisborne and Nelson case studies in one report, the Bay of Plenty should have its own research report.
- this research report should be devoted to issues surrounding kiwifruit production. Other issues that arose in regard to organic production would not be ignored, but would be retained for discussion in a later publication from the research programme.

Research process

The analysis presented in this report is derived from three sources.

a) Literature Review: Literary sources of information on the kiwifruit industry tend to come from commissioned reports, industry journals and newspaper/magazine articles. Index New Zealand was used to search for all publications of these types that occurred between 1987 and 1996. These sources were supplemented by a small number of popular publications and books.

b) Strategic Interviewing: In November/December 1996 an interview programme was conducted with 29 participants in the kiwifruit industry. Those interviewed were involved in production, R & D, operations and marketing in the NZKMB, packhouses, the organics movement in the Bay of Plenty and BIO-GRO NZ. These interviews were semi-structured around key issues in the industry, which were developed from the initial interviews and supplemented as the interview programme raised new issues. However, by the time 8 interviews were completed a core group of 26 key issues had been identified that required little modification throughout the rest of the interview programme.

c) Decision Tree Modelling: In August/September 1996, a group of 48 growers was randomly selected and interviewed for the purposes of constructing an ethnographic decision tree. This identified the key factors that influenced

a grower's choice of producing kiwifruit using organic, Kiwigreen or conventional systems. The details of this particular technique, and the results obtained, are discussed in depth in Chapter Four.

■ Chapter two

The Kiwifruit Industry – a review

This chapter presents a review of the kiwifruit industry. Prior to analysing recent developments in organic kiwifruit production (Chapter Three), it is necessary to contextualise these developments within the wider changes being experienced by the industry. These wider developments have often had a major bearing on the development of organic kiwifruit production, as the next chapter will demonstrate. This review will:

- briefly introduce the basic elements of kiwifruit production
- review the historical development of the industry prior to 1988
- outline the key events that have occurred since the establishment of the New Zealand Kiwifruit Marketing Board
- describe the current structure of the industry
- describe the development of the Kiwigreen Programme

Geography and climate

The geography of the Bay of Plenty (BOP) is ideally suited to intensive horticultural production. It is sunny and sheltered from the predominant westerly wind by the Kaimai and Mamaku Ranges. The BOP is the largest lowland area in the North Island, comprising mainly low downland and river flats. The climate typically involves warm summers and mild winters with rainfall averaging between 1000-1500 mm per annum. The predominant soil types are volcanic, with deep volcanic ash covering most of the region, typically resulting in a yellow-brown pumice soil.

The BOP supports three major industries – dairy and sheep production (the predominant form of agriculture throughout the region's history), forestry, and intensive horticulture. The horticultural industry today primarily involves the production of kiwifruit (*Actinidia deliciosa* – cultivar Hayward), with some plantings of avocado and citrus.

Growing kiwifruit: an introduction

The production of kiwifruit takes place on orchards that are almost exclusively devoted to the production of kiwifruit. This differs to kiwifruit production in other countries where kiwifruit are often only one of a number of fruit types produced on an orchard. Another unique aspect of the kiwifruit industry in New Zealand is that new recruits to the industry have often come from

outside horticulture or agriculture (Yerex & Haines 1983). While there are no concrete figures determining the background of the majority of growers, there is a widespread perception in the industry that kiwifruit growers are 'not typical' New Zealand orchardists due to their predominantly urban origins. This contrasts with the higher incidence of long established orcharding families in other fruit growing regions such as Hawkes Bay, Nelson and Central Otago.

In 1993, there were approximately 3,300 kiwifruit growers in New Zealand, with 72% based in the Bay of Plenty (Willis 1994). The average orchard size is small compared to overseas competitors with 78% of all kiwifruit orchards under 5 hectares (Willis 1994).

Kiwifruit vines are grown on support structures which come in two forms – pergola and T-bar – both of which were designed in New Zealand, but have been adopted as the global industry standard. One of the major factors influencing the large-scale development of the kiwifruit industry in New Zealand is that kiwifruit suffer from relatively few pests, with leafrollers and armoured scale insects as the two key pest groups. Leafroller caterpillars (principally the brown-headed leafroller *Ctenapseustis obliquara*, the black-lyre leafroller *Cnephasia jactatana*, and the light brown apple moth *Epiphyas postvittana*) damage the fruit with their feeding; while the armoured scale (greedy scale *Hemiberlesia rapax*, latania scale *H. lataniae* and oleander scale *Aspidiatius nerii*) do little physical damage but can be found infesting the fruit at harvest. The export orientation of kiwifruit production in New Zealand, which developed as the industry expanded in the 1960s, has meant that kiwifruit growers have traditionally used a pattern of calendar spraying for pest control. Early export requirements included a provision that orchards be inspected and declared 'largely free of pests and diseases'. Howard et al. (1992) document that, prior to 1992, the New Zealand kiwifruit industry used seven to eight insecticide spray applications per season, which compared unfavourably to many Chilean and Californian growers who used none or one spray per season (see also Steven et al., in press).

The kiwifruit year starts after the previous season's harvest with winter pruning, during which time growers remove spent and surplus canes in order to derive the maximum production per hectare of high quality kiwifruit. Flowering shoots are produced primarily on one-year old wood, although carefully chosen two-year old canes can also flower well. The actual number and health of flowers that are produced in spring is heavily dependent on the amount of winter chilling experienced by the vines – colder winters give more and better quality flowers. However, freezing temperatures during winter, and both spring and autumn frosts, can adversely affect

kiwifruit production. Since 1988, hydrogen cyanamide (Hi-Cane) has been used as a spray to improve bud burst. This increases flower numbers, especially in warmer areas. It can also limit the formation of small auxiliary flowers, and some floral deformities which give rise to mis-shapen (or small) fruit. The use of hydrogen cyanamide in conventional orchard production has given rise to heavier, more predictable crops.

After bud-burst, early summer is dominated by the pollination and thinning of flowers. Kiwifruit are not self-pollinating, and part of each orchard must be devoted to male vines unless pollen is bought in for artificial pollination. Kiwifruit are also dissimilar to many other fruit in that they need a relatively high level of pollination (15,000 pollen grains per stigma compared to only 12 pollen grains per stigma in apple flowers (Goodwin & Haine 1995)). This difficulty is overcome by either temporarily locating numerous hives of honey bees in orchards, or by artificially pollinating flowers. Thinning of fruit can begin at the flower stage, which saves on pollination costs.

Over summer, the main orchard tasks are fruit thinning to remove damaged or mis-shapen fruit, pruning to remove excessive vine growth and so maintain fruit health, and pest and disease control. The number of sprays used in conventional production has varied (Steven et al. in press) but, before the advent of Kiwigreen, involved 1 to 3 insecticides before flowering and then at 3-4 week intervals from petal fall to harvest. Fungicides were applied during December-January for sclerotinia control (especially in wet weather) and then immediately preharvest to limit botrytis storage rots. Several rounds of summer pruning are usually carried out.

Harvesting of kiwifruit is timed using a standard brix test to determine the sugar content of fruit. Most fruit is picked in May, although some orchards are ready earlier. In recent years fruit from early maturing orchards which meet certain criteria have been picked for the first shipments under the 'Kiwistart' programme. This begins in early April.

Once fruit is harvested, it is delivered to a packhouse/coolstore facility where it is either placed in bin storage in a coolstore (or in some cases controlled atmosphere (CA) store), or immediately graded and packed into trays prior to placement into a coolstore. Fruit are graded according to weight bands set for each size. These are determined by how many fruit can be packed into one tray (weighing 3.6 kg net), with a resultant count size of 25 for the largest fruit size, to 46 for the smallest (now discontinued as an export grade size).

Under the New Zealand Kiwifruit Marketing Board (NZKMB) structure the ownership of fruit passed over to the NZKMB at entry to the coolstore (after grading and packing) and fruit

that passed the quality grading process entered the Class One export pool. A pre-payment was made for Class One fruit on delivery to the coolstore and this was followed up by a series of interim payments as the crop was sold by the NZKMB (Willis 1994: 4). There is a differential payment for fruit size, with very large fruit returning more and very small fruit returning less than the mid sizes. However, an average return per tray is used to compare the market value earned each year.

This structure has changed in the last 12 months. The NZKMB has divided into two organisations; Kiwifruit New Zealand (KNZ), which has the rights to the single desk selling status under government regulations, and a marketing subsidiary Zespri International Ltd (ZIL), which is 100% owned by KNZ. Under this new structure fruit ownership still passes to KNZ at the coolstore, then changes to ZIL (or another collaborative marketer) at the wharf. The research which informs this report was carried out while the industry was still being run by the NZKMB and thus the forthcoming discussion is based on the industry structure under the NZKMB which is substantially unaltered.

As soon as the first fruit are packed in April the new selling season begins. This season stretches from April to the end of the calendar year as the NZKMB times its releases of fruit out of storage onto the global market. As the growers are paid according to the number of trays of Class One fruit that they deliver to the market, there are potential penalties for growers whose fruit is held in cool storage for many months with a consequential rise in the number of spoiled fruit. This is compensated for by the NZKMB's Storage Incentive payment which is adjusted according to the average number of spoiled fruit per tray. This system rewards growers who produce longer lasting fruit and penalises growers whose fruit has greater storage losses.

The vast majority of kiwifruit are of the Hayward variety, with several new varieties established at present. The Hayward fruit has been a solid market performer with its characteristic emerald green flesh, large size, long storage time, relative durability when handled, and distinctive taste. It is only in relatively recent years that alternative varieties to Hayward have been seriously considered. Previously selected alternative varieties were not seen as being sufficiently different from Hayward to warrant separate marketing.

Early history

The kiwifruit was originally known as the 'Chinese gooseberry' and was grown and bred as a novelty around New Zealand until just before the Second World War (Yerex & Haines 1983). The

first moves into exporting of Chinese gooseberries occurred in 1952/53 and involved a small number of orchards around No. 3 Road, Te Puke, in the Bay of Plenty.

Early experiments in Chinese gooseberry production showed that the fruit was both distinctly different to other common table fruits making it a novel product to sell, as well as very durable in storage (especially cool storage). The 1960s saw the Hayward variety emerge as the standard fruit of the export trade in Chinese gooseberries. The name was changed to 'kiwifruit' by one exporting firm in 1959 and soon became the standard appellation for the fruit (Yerex & Haines 1983).

The volume of kiwifruit exports began to rise in the late 1960s and early 1970s. This was later supported by tax incentives effective from 1972 to 1982 (Zwart & Moore 1990). Over this time the number of exporting firms began to increase (from 4 in 1964 to 14 in 1974) and competitive pressures began to cause concern within the industry. Undercutting in markets by competing NZ exporters, and a lack of coordination in timing and destination among export consignments led many growers to suggest a controlling body for the industry (Lees 1993). The exporting companies vigorously opposed any such form of industry control (Yerex & Haines 1983). The ensuing conflict crystallised between 'independent growers' demanding a controlling body for the industry that had no representation from exporters, and exporters/growers supporting the 'free marketing' of kiwifruit and who advocated retention of the status quo. The conflict continued through the 1970s and abated only in 1977 with the foundation of the New Zealand Kiwifruit Authority (NZKA), which represented a compromise between the two parties as it involved a majority of grower representatives in the Authority, but also guaranteed representation for exporters (Yerex & Haines 1983). The NZKA was established in 1977 using the powers of the Primary Products Marketing Act 1953 (Moran et al. 1996). This authority licensed a limited number of exporters to export kiwifruit and coordinated the arrival of fruit into the marketplace.

These years of contested control over the industry also saw considerable increases in kiwifruit returns. Kiwifruit returned NZ\$2.25 a tray in 1970, which increased to NZ\$5.50 a tray in 1976 and NZ\$8.00 a tray in 1980 (Yerex & Haines 1983). The price peaked in 1982 with a return of NZ\$10.13 a tray (Lees 1993). This was reflected in land values which increased over 800% in the Bay of Plenty between 1972-82 (Johnston and Sandrey 1990). Demand for land suitable for kiwifruit peaked between 1983 and 1986 during which time the area of kiwifruit plantings increased by 54% (Lees 1993). Over the whole period, starting from the early 70s, the kiwifruit industry expanded

dramatically from being a small horticultural sector to New Zealand's sixth largest export earner in 1991. The value of kiwifruit exports rose from NZ\$4.3 million in 1975 to NZ\$539 million in 1990 (Lees 1993).

The New Zealand Kiwifruit Authority operated until 1988 when a major restructuring of the industry led to the creation of the New Zealand Kiwifruit Marketing Board (NZKMB) (see later). As well as licensing and coordinating exporting, the NZKA set quality standards for the industry, controlled promotion and packaging, and funded R & D (Willis 1994). Zwart & Moore (1990) argue that the NZKA kept an uneasy control over the industry using the twin threats of delicensing individual exporting companies and of suggesting the formation of a single-desk marketing Board.

Moving into crisis

The Kiwifruit industry experienced a series of crises from the mid 1980s, some of which were peculiar to the kiwifruit industry and some of which derived from wider primary industry restructuring in New Zealand.

The wider primary production sector crisis in New Zealand which accompanied the deregulation of agriculture and the liberalisation of the economy post 1984 had a range of impacts on the kiwifruit industry:

- the value of the NZ dollar rose dramatically after 1987 which impacted negatively on exporters
- interest rates on mortgages rose to extreme levels by 1988 due to the implementation of inflation-reducing policies by the Treasury, while farmland values fell leading to an equity crisis for many primary producers (Lees 1993)
- input subsidies on a range of inputs were removed after 1984
- deregulation of the agriculture/horticulture service industries led to extreme competition as new entrants in servicing and exporting sought to establish market footholds

Alongside these general effects in New Zealand's primary production sector, specific factors within the kiwifruit industry also emerged in the mid 1980s. While the impact of high interest rates and falling land values had an effect on all land-based production sectors, arable and kiwifruit production were most significantly affected. Johnston and Sandrey (1990) reported that a 1987 survey showed 35% of kiwifruit growers had less than 50% equity while 8% had negative equity. Likewise, the instability of the NZ dollar initially buffered growers from many adverse effects, but then moved negatively for exporters in 1987 (Lees 1993).

Another powerful negative factor (with more enduring effects) was the emergence of strong

Table 2.1 Changes in kiwifruit farmgate returns

March Year	Exports (000 tonnes)	Nominal returns cents/kg	Real returns cents/kg*
1980/81	15	221	221
1981/82	22	217	184
1982/83	16	289	229
1983/84	37	195	151
1984/85	48	239	162
1985/86	82	202	124
1986/87	109	280	165
1987/88	162	156	86
1988/89	180	146	79

* inflation adjusted from 1980
Source: Zwart & Moore (1990)

competitor industries in Italy, France, Japan and the USA (Lees 1993). This increased production led to a dramatic decline in the world prices for kiwifruit between 1982 and 1988 (Zwart & Moore 1990). By 1988, an even more potent threat was emerging with the development of a Chilean kiwifruit industry which directly competed with New Zealand's selling season from April to December (Willis 1994).

The twin effects of monetary instability (both in interest rates and exchange rates) and increased world supplies of kiwifruit led to a major crisis for the industry between 1987 and 1989 (Lees 1993).

As Zwart and Moore (1990) show in Table 2.2, exchange rate variations and a decline in the world price for kiwifruit accounted for 67% of the decline in farmgate returns between 1984 and 1989. Lees (1993) documents that this decline was most noticeably apparent in the orchard revenue of growers. Orchard revenue ranged from a high of NZ\$50,000 per hectare to a low of NZ\$31,000 per hectare between the years of 1982 and 1987 (Lees 1993). This then dropped to NZ\$22,000 per hectare in 1989 (Lees 1993).

The establishment of the NZKMB

The crisis in the industry in the late 1980s led to a dramatic restructuring of the industry. Despite the general trend away from producer

Table 2.2: % Contribution to variation in farmgate returns for kiwifruit, 1984-1989

Domestic Costs	Exchange Rate	Offshore Costs	World Price
8	28	25	39

Source: Zwart & Moore (1990)

boards that had gained momentum during the 1980s, kiwifruit growers successfully lobbied the government to re-regulate the industry. The government granted the wishes of the grower lobby against the wishes of the Treasury (Moran et al. 1996: 169) – a rare occurrence for that time. One influential factor in this was a report compiled by Coopers and Lybrand (1988) on the need for structural change in the industry. This report strengthened the position of growers lobbying for a statutory board by arguing strongly against a 'free-market' solution to the kiwifruit crisis. While the report actually recommended a structure slightly different to that which eventuated (what became known as the K2

option), its findings were used by growers to rebut the 'free market' option and establish a general need for change rather than being seen as a directive towards any specific desirable shape for the industry (New Zealand Herald 22/3/93: 9).

The export licensing system was abolished and replaced by the NZKMB in September 1988 (again using the powers of the Primary Products Marketing Act 1953). The NZKMB was granted monopoly powers to purchase, distribute and market the kiwifruit crop in all international markets except Australia. While the domestic market remained competitive (yet insignificant), the NZKMB joined the Dairy Board (NZDB) and the Apple and Pear Marketing Board (APMB) as a single desk seller in the world market. With the monopoly powers, however, went the obligation to purchase all fruit offered which met export standards.

However, the NZKMB differed from the other statutory marketing boards by being subject to audit and review. It also has the lowest ratio of growers to other Board members (4 growers:4 others) in comparison to the NZDB (8:5), APMB (6:2), Meat Board (7:4) and Wool Board (6:4) (Moran et al. 1996). The other Board members included: a government appointee and three other members appointed by the Board to represent the industry's commercial participants (Moran et al. 1996).

The NZKMB operates in a form that is slightly different to its equivalent horticultural board for pipfruit – the APMB. The two key differences are:

- The NZKMB only has one major fruit pool – the export standard or 'class one' Hayward pool. This has since been joined by the organic Hayward pool, a class two Hayward pool, and the new pool for the *Actinidia chinensis* (cultivar 'Early Gold') variety. In contrast to this, the APMB administers a considerable number of

variety pools reflecting the wide range of apple varieties grown in New Zealand.

- The NZKMB does not have any capital stake in post-harvest facilities. This differs from the APMB which has considerable investment in processing and cool storage facilities.

The second of these factors – the absence of capital investment in the industry by the NZKMB – results in a distinctly different industry structure to the pipfruit/APMB situation. This can be demonstrated by the grower payment and fruit ownership structures that the NZKMB operates. The NZKMB inherited a system of grower payments that was the clear legacy of competition between the licensed exporting companies that preceded the NZKMB. Prior to 1988, exporting companies competed for grower custom by making generous forward payments in order to secure supply to their company. This prepayment locked growers into one exporting company and allowed that company to use this fruit as security for the funds advanced to growers (NZ Kiwifruit, Feb/March 1995: 4). The legal ownership of fruit was transferred to the exporter when the fruit entered the coolstore. Since 1988, the NZKMB has sought to modify this practice and has attempted to wean growers from the high levels of crop advances (something that became critical during the crisis of 1992). Many growers now fund orchard operations from other financial institutions, while others would like the NZKMB to remain as a provider of seasonal finance.

Industry developments since the establishment of the NZKMB

The establishment of the NZKMB forms the major structural event in the recent history of the industry. From this point on, two other developments have had a major impact on the shape of the industry:

- the Italian residue crisis
- the price crash of 1992

Each of these developments must be discussed in some depth as they are pivotal in understanding the current structure and activity within the kiwifruit industry.

The Italian Residue Crisis

While the surface appearance of the Italian Residue Crisis in 1992 concerned chemical residues in kiwifruit, the key underlying factor was the relative market strength of both New Zealand and Italy as kiwifruit producers. Lees (1993) documents that New Zealand was the unchallenged leader in world kiwifruit production from the inception of the industry until the mid

1980s. However, this dominance came under threat from a sudden rise in kiwifruit plantings, especially in Europe, so that by 1989 the total EC production of kiwifruit surpassed the New Zealand crop (Lees 1993). This development was strongly supported by EC incentive grants, and Italy was the country that most readily adopted kiwifruit as an alternative crop to fruit and wine production (Lees 1993). A major contributing factor was the high prices paid for New Zealand kiwifruit in Europe (especially West Germany) in the early 1980s coupled with an overproduction of traditional crops (eg. grapes). The latter created the political climate for subsidised diversification. At the same time a similar situation saw kiwifruit production established in Japan to shift farmers away from growing mikan-mandarins.

This process of diversification in Europe resulted in Italy, in particular, experiencing a sudden rise in production levels in 1989 as these plantings came into production. It was this sudden rise in Italian production that led to New Zealand being surpassed as the world's biggest kiwifruit producer in 1989. By this time, Italy had surpassed France as the most important kiwifruit producer within the EC, and was exporting a majority of its crop to other EC countries (Lees 1993).

Given the relative volumes of crop produced in the two countries, the most obvious contests in the European kiwifruit trade were going to occur between Italy and New Zealand. However, the clash did not happen in the most important consumer market for kiwifruit – Germany – but in the Italian home market. The first indications of a possible conflict over access to the Italian market emerged in 1990 and 1991, with comments from Italian trade officials over concerns about chemical residues on New Zealand kiwifruit. Italian officials invoked local standards which were more stringent than evolving European-wide regulations governing maximum residue levels (MRL's) to prosecute some sellers of New Zealand kiwifruit. When this occurred for a second season in September 1991, it became the stimulus for the establishment of the Kiwigreen programme (see below). This trial was set up initially to produce residue-free fruit for the Italian market, which at that time consumed 3 million trays of New Zealand kiwifruit. The prospect of not only losing this market but of having to sell this volume of fruit elsewhere, when fruit prices had crashed and trading conditions were difficult, placed serious pressure on the NZKMB's marketing programme. An increasing impetus was given to producing fruit acceptable to the Italian market and in 1993 enough Kiwigreen fruit was available to meet market needs in Italy.

Over time, the differences between the residue levels applied by the Italian authorities and the maximum residue levels adopted at an EC level

were reconciled, and New Zealand kiwifruit could no longer be rejected. However, this incident was seen as being only partly to do with the 'objective' establishment of acceptable residue levels. Rather, it was interpreted by many NZKMB staff as indicative of a trend by some countries towards greater protectionism of their domestic agriculture through 'food safety' barriers – a trend noted as 'green protectionism' by Campbell (1996). The fact that of all EC countries, it was New Zealand's greatest kiwifruit competitor, Italy, that enforced a maximum residue level below that of the encompassing EC, must be interpreted as being less than coincidental.

At the start, it was accepted by many NZKMB staff that while the Italian residue crisis may be relatively short-lived, the trend towards 'green protectionism' was likely to intensify in the future. This became even more urgent as the Uruguay Round of GATT was completed creating the conditions for greater levels of 'green protectionism' to emerge.

The NZKMB was left with two options:

- to maintain the status quo in spray use by the industry and seek to 'educate' consumers that this did not compromise the 'food safety' of kiwifruit
- to seek alternative production systems that would result in lower residues in kiwifruit

While there was support for both these positions within the industry, the NZKMB focused its strategies on the latter option. More specifically, a long history of research into Integrated Pest Management (IPM) systems had been a feature of the kiwifruit industry, and an IPM system was being developed and trialed in order to produce kiwifruit using fewer sprays. This system was called 'Kiwigreen', and under the impetus of the Italian residue crisis, grew to become a major feature of the industry. This particular outcome of the Italian residue crisis will be discussed in more detail later in this chapter.

The Italian Residue Crisis was one of the first major issues to face the NZKMB. However, at the same time that the Italian Residue Crisis was reaching its peak, the kiwifruit industry was faced with a crisis of much greater magnitude – a price crash for kiwifruit in the 1992 selling season.

The price crash of 1992

The NZKMB had inherited one of the key features of the competitive exporting structure prior to 1988 – the high level of pre-payments to growers.

As the 1992 selling season began to unfold, the NZKMB recognised that prices were softening in Europe and estimated a decline in returns of about 10% on the NZ\$6.08 per tray received in 1991

(New Zealand Herald, 22/3/93). Consequently, a prepayment on submission of fruit of NZ\$3.50 was made (The Orchardist, June 1993) with most orchards beginning to harvest in April/May. The standard monthly progress payments of 20c a tray was paid in July, but dropped to 15c in August and then in September all payments suddenly ceased (New Zealand Herald, 22/3/93) as it became apparent that the price for kiwifruit had crashed in the European market.

The cause of this price crash was a fruit glut in Europe (Willis 1994). Kiwifruit formed only a small part of the total collapse in prices for fruit in Europe (which then severely depressed other global markets for fruit). Apples and bananas were the worst hit, with the flow-on effect to kiwifruit causing major producers like Italy to initiate government aid packages for domestic producers and even arrangements to leave large parts of the crop unpicked (New Zealand Herald, 25/1/93). The final payment to growers in New Zealand remained at the average pre-payment of \$3.85 per tray – only 58% of the previous year's payment. What quickly became apparent was that this actually represented a significant overpayment to growers, and that the NZKMB would require heavy borrowing against future grower returns to continue operating or it would require a repayment of some of the NZ\$3.85 advance.

Two things occurred as a result of the price crash:

- debt financing and government intervention to protect the NZKMB, and a restructuring of the grower/Board relationship
- a vociferous debate as to the future of the NZKMB

Debt Financing: The extent of the crisis became clearer when the NZKMB announced in January 1993 that it had a trading deficit of NZ \$80 million (New Zealand Herald, 22/3/93).

When the regulations were established that brought the NZKMB into existence there was no clear provision made as to who was responsible for debt incurred through overpayment. In fact, the NZKMB existed in a form of legal/financial limbo somewhere in between a State Owned Enterprise and a limited liability company (The Orchardist, June 1993). The governing regulations defined the powers and existence of the NZKMB, and these regulations were often amended by government at the request of growers or the Board of Directors itself. Up until the price crash of 1992 six amendments to the regulations had been requested and granted, but none had the implications of the revisions required to cope with the 1992 crisis (The Orchardist, June 1993). Basically, the NZKMB required the government to quickly establish the right of the NZKMB to recover overpayment from growers, and to also be able to

take into account outstanding debts when setting grower payouts in subsequent seasons.

The Minister for Agriculture, John Falloon, made a statement on March 1st, 1993, which headed off a major escalation of the crisis, as his policy decision enabled the NZKMB to come to a suitable debt arrangement with a consortium of 17 banks (The Orchardist, March 1993). This enabled the NZKMB to both cover its 1992 trading deficit, and to offer an initial payment for the imminent 1993 harvest. The consequence of this was that the following two seasons saw growers receive a reduced payment per tray as money was directed towards repaying the outstanding debt.

A beneficial outcome for the NZKMB from this crisis, was that they were able, not only to establish the right to account for overall NZKMB debt in their payments to growers, but to restructure the pre-payment system as well. Previously, the NZKMB had been committed to maintaining the system of pre-payments established prior to 1988, with the initial 1992 payment being \$3.50 per tray. After the crisis this system was reviewed and the NZKMB established a new pre-payment rate of only \$1 per tray with further payments being more closely aligned to market returns.

Given the crisis of 1992, few could argue against this change, which did, however, signal a significant shift in the financial relationship between the NZKMB and growers. Under the new grower payment system, the NZKMB ceased to be the major finance supplier for many of the seasonal costs of running an orchard. Under the old system, the high level of payments early in the selling season and staggered system of progress payments meant that growers could manage with no (or only minimal) outside funding of operational activities. The subsequent effect of this restructuring is that many growers now have to negotiate with banks for seasonal finance packages to cover temporary operating deficits.

The IKS challenge

When the NZKMB was established in 1988, the suggested option recommended by the Coopers and Lybrand (1988) report on the industry was not adopted (the K2 option). This option would have seen the establishment of a second grower-owned marketing body to act in competition with the current statutory marketing authority. It was anticipated that even the threat of the formation of such a body would force the existing Board/ Authority to maintain high levels of efficiency and accountability (Cooper & Lybrand 1988). When the K2 option was rejected, the government instead established that an industry review would take place in 1992 to assess whether the NZKMB was operating as well as it could.

The price crash and resultant crisis of 1992 heightened the issues surrounding producer

control and monopoly marketing of primary products, and led to a vociferous debate about the necessity for the NZKMB's future existence.

While the details of whether the government would intervene to allow the NZKMB to negotiate a debt package and continue operating into the 1993 selling season dominated the government's decision after the 1992 review of the industry, the wider nature of the industry's structure was also under review. The main opponents of the retention of the NZKMB's single desk selling status came from a group called Integrated Kiwifruit Services (IKS) and their consultants. This group was typical of what Moran et al. (1996: 125) called an 'alliance of interests' operating in a range of New Zealand industry sectors. Generally, such an alliance involves large corporate participants in a particular industry sector, the Business Round Table (BRT) lobby group, and sections of the New Zealand Treasury, all united under an ideological commitment to neo-liberal/free market policies (policies that would stand to strongly benefit the corporate businesses supporting such moves). While the position of the Government in relation to such an alliance of interests is complex, it was clear that many sections of the Treasury were strongly committed to this process. General government policy since 1984 had aligned itself clearly with the neo-liberal reform agenda of the Treasury, however, the subsequent events in relation to the NZKMB ran somewhat counter to this trend.

The formation of IKS was a paradigmatic case of 'alliance' as in Moran et al. (1996), which combined large corporate lobbying power with the interests of a small group of large-scale kiwifruit producers. Their argument neatly reversed the findings of the Coopers and Lybrand (1988) report which had provided ammunition against the 'free market' option for the industry. Rather, the IKS approach was to resurrect the 'K2' option endorsed in the Coopers and Lybrand (1988) report which proposed the establishment of a rival exporting organisation to provide competitions for the NZKMB. IKS suggested themselves as the best option to market nearly a quarter of the total kiwifruit crop through three companies – Applefields Ltd., Grocorp Pacific and Chiquita. Of these, Chiquita had already handled some business for the NZKMB, and had entered the New Zealand export scene prior to 1988 on a de facto basis through a share holding in one of the licensed exporting companies Kiwi Harvest (Britton et al. 1992: 26). Such commentators as Bryant (1991) had argued that the relationship between Chiquita and the NZKMB became increasingly strained as Chiquita sought permission to export a proportion of the NZ crop under its own label. The IKS development was simply the most recent in a number of attempts by Chiquita to gain access to NZ fruit for its own marketing purposes. The

other two companies – Applefields and Grocorp Pacific – were also involved in other New Zealand export fruit industries, and both were constant critics of monopoly control by statutory marketing boards (Bryant 1991; Moran et al. 1996).

IKS, to further its anti-Board campaign, hired as consultants Sir Roger Douglas (former Minister of Finance) and Bevan Burgess (Roger Douglas’s former parliamentary press secretary). The Douglas/Burgess report *Options for Kiwifruit: an industry in crisis* used the 1992 price crash as the grounds for calling for the abolition of the NZKMB and a return to unregulated exporting in the kiwifruit industry (New Zealand Herald, 25/1/93: 8).

In response to this, supporters of the NZKMB strongly criticised both the logic and ideological bias of the Douglas/Burgess report (New Zealand Herald, 25/1/93:8; The Orchardist, February 1993; The Orchardist, June 1993; Marketing, December 1993). While the substance of the Douglas/Burgess report was argued over in some detail, pro-Board commentators generally defended the NZKMB’s performance in 1992 by claiming that, while 1992 had been a disastrous year for the global fruit industry, the existence and actions of the NZKMB had meant that the consequences for New Zealand growers had been relatively less severe than that experienced by their overseas competitors operating in less regulated industries (New Zealand Herald, 25/1/93:8).

There were a number of factors cited as being pivotal in the NZKMB’s survival through both the price crash of 1992 and IKS challenge in 1993. One commentator (North and South, May 1993) claimed that the ability of new NZKMB chairman John Palmer to ‘stitch up’ a deal with banks swung sentiment towards the NZKMB being allowed to survive and that the government acted on this sentiment. Moran et al. (1996) took a broader view and argued that the relatively high level of grower control in the industry stymied attempts by the IKS to capture the governmental and industry wide policy-making process and eventually led to the NZKMB being able to survive the attack from IKS. These authors go further by claiming that this was one of many instances where grower control of a primary industry had led to decreased penetration by private corporations into that industry.

The contemporary kiwifruit industry

This section will outline some of the main features of the contemporary kiwifruit industry as it has operated since the 1992 crisis. It will review:

- the changing structure of the industry
- the restructuring plan that emerged from the industry review from 1993-96
- the development of the Kiwigreen programme

Changing industry structure

While the 1992 crisis dominated discussion of the industry throughout this latter period, there were, in addition, major structural transitions taking place within the industry that have manifested themselves over a longer period of time. One of the most significant of these is the changing position/role of post harvest facilities.

During the early stages of the industry, the growers and packhouse owners were fairly difficult to distinguish between. Many of the larger growers owned their own packhouses, and also packed fruit for a few other growers. In terms of industry structure, there was not a clear division between growers and packhouse owners. In the contemporary situation it is still hard to make a clear demarcation between the economic interests of certain individuals who are both packhouse owners and growers, although some have claimed that the packhouse owners are reinforcing this blurring of perceived interests to further their own ends. However, a very clear trend is emerging towards concentration of packhouse numbers and an increase in the scale of packhouse operations.

In 1988, when the NZKMB was formed, there were 620 packhouses in operation (Willis 1994). This number has steadily fallen since this time (see Table 2.3), yet services a similar sized national volume of kiwifruit.

This trend represents a major upsizing of packhouses and a movement away from a family-based ownership structure in many packhouses and towards a more corporate model for packhouse management. This has partly been reflected by a movement from a combined orchard/packhouse business, to some operators who spend the vast majority of their time operating a packhouse and coolstore. Willis (1994)

documents that there were 210 packhouses packing less than 25,000 trays in 1987, and only 35 left in this size bracket by 1993. Most packhouses now also operate a coolstore and the absence of a coolstore was a factor in the demise of many smaller packhouses.

Table 2.3: Number of packhouses

	1991	1992	1993	1994	1995	1996
No. accepting organic fruit	6	6	6	7	8	16
Total no. of packhouses	411	349	265	188	148	138

Source: NZKMB

An article in the NZ Kiwifruit Journal (October 1995: 8) about one of the last remaining family-run packhouses emphasised the novelty of such operations, noting that they retain the family characteristics common to many packhouses 10 years earlier. This article describes what, in 1995, would have been considered to be a small packhouse – packing around 250,000 trays of fruit from between 3-5 orchards. This is in contrast to packhouses now which are only considered to be in the ‘large’ bracket if they pack over 1 million trays of fruit in a season. Yet in Lees’s (1993) analysis of the industry in the 1980s, less than a quarter of all packhouses would have packed as many as 250,000 or more trays, and at least a quarter packed less than 25,000 trays. Despite the fact that total crop volumes in the mid-80s were lower than the 1990s, such a startling disparity indicates the degree to which the size of packhouses has increased.

Part of this process has been by agglomeration. This trend has continued, with one example being the recent formation of an agglomeration of 5 packhouses into the Southern Kiwi grouping, which together will pack an estimated 15 million trays (25% of the total national crop) in 1997.

The other important characteristic of the post harvest sector in the industry is that two competing trends have emerged in terms of ownership of orchards and packhouses:

- increasing levels of management control of orchards by packhouses
- increasing levels of cooperative ownership of packhouses by growers

The major trend is towards increasing packhouse control through the leasing of orchards. The earlier structure of the industry was characterised by family-run operations which simultaneously managed an orchard and packhouse. However, the recent trend has been towards leasing of orchards by packhouses. Packhouses now manage significant numbers of orchards to ensure supply of fruit. They provide the management expertise and organise the work across all leased orchards, generally using labour contractors, in order to gain efficiencies. This development represents increasing corporate involvement in production. Some packhouses have significantly increased the number of their leased orchards recently: in one case the increase has been 20 orchards between 1995 and late 1996.

The opposite trend has been an increase in the number of growers joining cooperative packhouses. This is a considerably less significant trend than the leasing of orchards by packhouses, but it is nevertheless important. For example, one cooperative packhouse leases no orchards but has experienced an increase in members of over 300% in 4 years.

The general explanation given for these trends is that, as the packhouse sector came under extreme competitive pressures in the late 1980s, packhouses have survived by guaranteeing throughput and thus ensuring maximum use of a high capital investment. Leasing orchards is one way to guarantee this throughput, and signing up growers as co-operative members of a packhouse achieves the same end. However, this explanation probably does not account for some of the structural complexities of an industry that has been characterised by power struggles since its inception. A more sophisticated way of examining these developments is to see them as symptomatic of one particular phase in the ongoing development of a complex industry. As such, these developments are part of the emergence of two sectors (growers and packhouses) within the wider industry which no longer have common economic interests. This topic is in need of more detailed research and what is provided here is a preliminary analysis. In the meantime we can examine some important aspects/issues for which data is available, such as changes in packing costs.

Up until the 1990s, the high levels of profitability in the industry and strongly increasing numbers of growers and planting area enabled the packhouse sector to maintain high charges. Lees (1993) shows that costs per tray for packing began to decline significantly after 1987 as the first kiwifruit crisis emerged. This signals the start of increasing competitive pressures in the packhouse sector (moving from a peak in 1988 (Lees 1993)). Such competition would have acted in favour of growers (one of the few things doing so during this period) as packhouses sought to secure throughput in their facilities.

A relevant question is at what point will concentration in the packhouse sector tip the balance of power in favour of packhouses relative to growers. The answer to this can fully be understood only within the context of the industry review to be discussed presently.

Another key dynamic in the evolving industry structure is the relationship between packhouses and the NZKMB. Over recent years the NZKMB has devolved an increasing amount of administrative activity back to the packhouse level. For example, costs of fruit labelling are borne by packhouses but the requirements are set by the NZKMB. As market differentiation increases and labelling specification entails more variety or details, then labelling costs increase. As another example, at one point the grade weight tolerances were decreased by the NZKMB and this required more modern electronic grading with expensive equipment which larger packhouses could more easily afford. This forced smaller operators with older equipment out of the industry. Further, there are moves at present to pay only for fruit which meets the standards when delivered to overseas

destinations, and for the packhouses and ultimately the grower to cover the costs associated with reject fruit. Keeping track of the reject fruit and linking it to a supplier would be yet another administrative cost. The general direction of these developments is towards the packhouse supplying fruit to markets identified by the NZKMB and for the packhouses to be responsible for all functions from the orchard gate to the point of sale.

The ability of the NZKMB to impose these kinds of quality control measures on post-harvest facilities is partly attributable to the long term development of traceability systems within the kiwifruit industry. Pallets of kiwifruit have been barcoded for many years and this allows individual pallets to be traced within an electronic inventory from the coolstore to the market. Coolstores are responsible for electronically submitting the inventory of barcodes to the NZKMB at the time that pallets enter the coolstore. This system allows reject fruit in the market to be accurately traced back to the post-harvest facility that processed them and thus back to the supplier. It is only recently that the APMB has managed to construct a similar system for apples.

Thus, the NZKMB, in responding to marketing pressures and the need for increasing efficiencies generally, has invoked requirements that will improve market returns. In many cases, it is the bigger packhouses which can more readily adapt to meet these changes. With growing sophistication in post-harvest activities, the focus of attention and profit shifts from production to marketing. In some cases former growers have become post harvest facility managers seeing that there are better financial prospects in post harvest handling rather than growing fruit. The packhouse side of the operation entails more capital and therefore the emphasis is on throughput and supply of fruit. From this requirement stems the activity of leasing orchards. When the leasing is conducted on a large scale there are economies of size and other efficiency benefits which reduce production costs per tray for packhouses that lease compared to growers working as owner operators.

The emphasis is not exclusively on economies of scale and maximum throughput. Some packhouses are becoming more active in encouraging growers to produce better fruit using field days and discussion groups. Both the NZKMB and some packhouses are focusing on the keeping quality of the fruit, and greater attention is being given to production conditions that contribute to fruit longevity.

As packhouses have expanded they have differentiated so that some handle mainly organic fruit for example, or have added the facility to pack jumbo (large size) fruit, as well as normal count sizes. Further, expansion in coolstore facilities enables fruit to be stored in bulk for later packing so the packing season has been extended.

The industry review

The crisis of 1992 ended with a review of the NZKMB and the industry in general. The Minister of Agriculture appointed two ex-presidents of NZ Federated Farmers to chair the review (NZ Kiwifruit, October/November 1993: 10). The original group of interested parties which made up the Kiwifruit Industry Working Party included the IKS. However, they quickly withdrew from the process because of a paucity of interest by the wider working party in IKS proposals (NZ Kiwifruit, June/July 1993: 4). While the full glare of media attention was directed at whether the NZKMB would even survive through 1993, the working party eventually outlined a longer-term plan for restructuring certain aspects of the industry. This plan involved three elements:

- grower representation/industry structure
- marketing
- strategic direction

a) Grower representation: All the key historical events in the industry – the establishment of the NZKA, the formation of the NZKMB, and the IKS drama in the early 1990s – indicated that growers have played a major part in determining the structures in the kiwifruit industry. This strongly differs to the pipfruit industry, where the APMB have controlled a long-established industry over many decades with relatively little change. Unlike the pipfruit industry, the kiwifruit industry has experienced almost constant change, with fortunes varying from spectacular success to almost total crisis, with all this occurring over a relatively short period of time. Within this process, growers have played a very important part.

The first stage of the industry review was directly targeted at grower representation in, and control of, the industry. Many people felt that the established formal channels of grower representation to the NZKMB were inadequate and that a new structure should be found.

The previous form of grower representation had been through the dual mechanisms of grower representatives on the NZKMB itself, and through the Fruitgrowers Federation. The Fruitgrowers Federation comprised of eight regional directors each with individual sectoral responsibilities and the responsibility for chairing a sector committee – one of which was responsible for representing Bay of Plenty interests and, as a result, the interests of kiwifruit growers. Sector groups held yearly conferences, and issues were debated and voted on by delegates from local Fruitgrower Associations, who also elected the Sector Committee. The Fruitgrowers Federation had a largely political role in attending to the interests of growers.

Growers were represented on the NZKMB itself by directors who were elected using a voting

system whereby three votes were accorded to growers producing over 30,000 trays, two votes to growers with between 20,000-30,000 trays, and one vote to growers producing less than this. Grower representatives filled 4 out of 8 Board positions.

The new structure of grower representation centred on the formation of NZ Kiwifruit Growers Incorporated (NZKGI). The industry working party decided that the NZKGI voting system should be structured on the basis of 'one tray equals one vote', and that the new body should have considerably more room for grower representation than what had previously been the case with the Fruitgrowers Federation.

This process culminated with the election of 38 NZKGI members in June 1994 (with an executive of 8). The NZKGI then took over the industry review from the Kiwifruit Industry Working Party and undertook to:

- review the onshore activities of the industry
- receive the findings of the marketing review of the industry (stage two of the industry review) and lead industry discussion on their implementation
- develop Stage 3 – an industry strategic plan
- pursue the implementation of the strategic plan through revision of the NZKMB Act (NZ Kiwifruit, June/July 1994: 4)

Effectively, the formation of the NZKGI placed growers firmly in control of the future structure of the overall industry. After restructuring grower representation and control in the industry, two more stages of the overall industry restructuring plan – marketing, and the strategic review – were initiated.

b) Marketing Structures: Only a few months after the formation of the NZKGI, an independent marketing review of the kiwifruit industry (conducted by the University of Auckland) was delivered to the industry in October 1994 (NZ Kiwifruit, December 1994/January 1995).

The review of marketing of kiwifruit came up with clear indications as to what the future strategic direction of the industry should be. The key recommendations were:

- the industry should concentrate on retail marketing strategies and avoid moving the industry towards bulk commodity trading
- that the global scale of the industry should be increased through sourcing of non-NZ grown kiwifruit and establishing linkages to other fruit markets
- that two further developmental steps should take place which would: 1) embrace more collaborative marketing, and 2) split the NZKMB into two different organisations – one dealing with the statutory functions of the NZKMB and

the other concentrating on marketing (NZ Kiwifruit, December 1994/January 1995)

These recommendations were generally accepted by NZKGI (NZ Kiwifruit Journal, December 1994/January 1995: 25), and this marketing review established the next stage of the industry restructuring plan. At the time of writing, Stage Three was still in process, but the following blueprint for the future had been established. This involved the formation of 'grower entities' and the division of the NZKMB into two separate structures – Kiwifruit New Zealand having the statutory functions and Zespri International Ltd solely with a marketing role.

c) Stage Three of the Industry Review: Stage Three is the common title given to a number of legal and structural changes within the industry. These are still under discussion and consultation, but the two most striking features have been the splitting of the NZKMB (in early 1997) and establishment of 'grower entities' (still in progress).

The splitting of the NZKMB has resulted in the retention of statutory powers by Kiwifruit New Zealand (KNZ). Growers are able to vote for both grower representatives on the Board of KNZ and for growers as forum representatives in NZKGI. This has strongly solidified grower participation in the industry. KNZ retains the statutory functions of the NZKMB and will continue to be the monopoly purchaser of Class One export kiwifruit for all markets except Australia. Alongside KNZ, the marketing functions of the old NZKMB have been corporatised into Zespri International Ltd. which will concentrate on the global marketing of fruit from KNZ including the development of new markets.

The term Zespri is now the corporate marketing brand of Zespri International Ltd. New Zealand kiwifruit are now marketed as Zespri New Zealand kiwifruit (with the changeover to the new brand occurring in early 1997). This change was principally undertaken to enable the promotion of New Zealand kiwifruit as distinct from the increasing number of kiwifruit being produced in other countries. Prior to the adoption of the Zespri label, promotional activities by the NZKMB were seen as being too restricted by the generic term kiwifruit, thus enabling other producers to 'free ride' on the promotional activities of the NZKMB.

The other major development is the proposed formation of 'supplier entities'. This concept involves the legal removal of any distinction between packhouses and growers and, instead, encourages the development of a contractual relationship between KNZ and a 'supplier entity' to provide a particular type and quantity of fruit. The supplier entity is proposed to involve both a grower or (group of growers) and a 'post-harvest facility' that would deliver the appropriate grade and volume of packed fruit.

There is some difference of opinion among industry participants as to whether this new entity would result in small groups of growers being dominated by their packhouses, or whether it will generate a structure in which there is greater transparency between growers and packhouses and consequently greater grower control. Which-ever way this is interpreted, the move towards supplier entities confirms the burgeoning role of packhouses as the centres of potential innovation and planning in the industry.

At the time of writing, the industry review process was in its late, but not final, stages. It is not until these changes are solidified in legislation and tested in practice that the full implications for grower control, packhouse power and market development will become clearer.

The Kiwigreen programme

The final important development within the contemporary industry has been the development of the Kiwigreen programme. This occurred in direct response to the Italian Residue Crisis, but capitalised on earlier R&D investment on applying the Integrated Pest Management (IPM) approach to the control of pests on kiwifruit. Traditionally the control of pests on kiwifruit followed a pattern with 1 to 3 insecticide sprays being applied between mid-winter and the start of flowering in November, followed by a regular calendar schedule of sprays every 3 to 4 weeks from the end of flowering until harvest. This gave a total of up to 10 insecticide sprays per season. The recommended spray programme was developed as a recipe that, when followed carefully, would give acceptable pest control even under heavy pest pressure. This implied that it used excessive sprays when pest pressure was not severe.

The development of IPM

During the 1980s IPM research for kiwifruit focused on two strategies:

- developing sprays that were safer and less harmful to the environment than conventional insecticides
- reducing the number of sprays applied by growers each season

The former approach saw products based on Bt (*Bacillus thuringiensis*) being registered for control of leafrollers in the early 1980s. This material is harmless to humans and selective in that it kills only caterpillars and not beneficial insects. The approach has also seen chemicals trialed which mimic the natural hormones occurring in insects. These chemicals are also highly selective, but are not currently used because residues of them are persistent, and many markets

have not yet established what MRLs of these new compounds are permissible on fruit.

Attempts to reduce the numbers of sprays had shown by the mid 1980s that most leafroller damage occurred immediately after flowering, but this information could not be exploited as the spray schedule in total was used to control both leafrollers and scales. Attempts to better time sprays against scales gave inconsistent results, and so it was decided to develop monitoring systems against scale pests. With the implementation of monitoring, sprays could be applied only when really necessary to prevent economic losses.

Scale monitoring techniques and the associated thresholds had been developed and were under trial when the Italian Residue Crisis occurred. These trials used conventional insecticide products. However, there had also been limited research on finding substitute controls which were acceptable under organic certification schemes.

The development of Kiwigreen

In September 1991, when the Italians commenced their harassment of retail sales of New Zealand kiwifruit for a second year, an initiative was launched to produce fruit that the NZKMB could guarantee were free from residues of conventional insecticides. While the Italian Residue Crisis was a major catalyst for change, the NZKMB was also receiving signals from its overseas offices that major institutional buyers were enquiring about the possibilities of supplying 'greener' kiwifruit. From the UK, two major supermarket chains (Sainsburys and Tesco) travelled to New Zealand to examine the 'food safety' of kiwifruit (enquiries were also received from companies such as Migros and Coop Schweiz in Switzerland, Albert Heijn in the Netherlands and Coop Kobe in Japan). The combination of market protectionism emerging in Italy, with strong positive signals from key insitutional purchasers convinced the NZKMB to vigorously pursue an IPM programme for kiwifruit.

The scale monitoring technique developed for IPM was combined with an ad hoc monitoring system for leafrollers that complemented spraying during the critical time for leafroller control. To be sure of the residue-free status only Bt and mineral oil sprays were used from flowering to harvest. Before flowering, conventional insecticides could be used because sprays at this time do not cause residues on fruit.

Although the core of the Kiwigreen programme, the pest scouting and reaction thresholds at which spraying is warranted, has remained the same since then, the system has evolved. In the second season the trial increased dramatically in size and, using accrued information on residue persistence, the use of two applications of the short-lived organophosphate chemical, diazinon, were allowed immediately after flowering during

the critical time for leafroller control. Such sprays would not produce detectable residues at harvest, and gave the industry greater security that the experimental programme would succeed. From January on only Bt or oil sprays were permitted. Since that time a further diazinon spray has been allowed during January, and in this last year growers have been able to substitute one spray of diazinon with a spray of either Attack or Averte. These last materials, if used, must be applied at least 130 days before harvest. Such concessions in chemical choice have been made partly because, as the Italian residue crisis waned (due to their MRL regulations changing to match those of other EU countries), the underlying principle driving the Kiwigreen approach switched from producing fruit free from detectable residues of conventional insecticides, to producing fruit to meet safe food requirements. These changes also were made to encourage more growers to convert to Kiwigreen with confidence. At the same time, NZKMB research showed that concessions in the use of one hard spray 130 days prior to harvest did not result in an increased level of chemical residues on the fruit.

The major supermarket chains, such as Sainsburys in the UK, directed the concern for 'food safety' over and above totally 'green' kiwifruit. A secondary factor in allowing these concessions was that the rapid uptake of the new technology, vigorously led by the NZKMB, created pressure from those growers reluctant to change. These growers wanted the security of materials that they were confident would work. The requirement of the NZKMB, as a corollary to its single seller status, to buy all fruit offered that met the Class I standard, became a political/legal element in the consideration.

Thus, Kiwigreen currently has become a programme in which food safety is assured because any pesticide application is only permitted when there is a demonstrable need for it, and the choice of sprays during the growing season is restricted mainly to benign products. Although a limited number of applications of some conventional chemicals are permitted, usage of these is restricted to ensure that residue levels will be less than 5% of the allowable MRL under the international Codex standard.

The Kiwigreen programme was launched to maintain access to the Italian market, and this objective was achieved within 2 years. In the first season 262,000 trays were produced, in the second this had risen to 4,700,000 and the 1994 harvest included 6,800,000 trays of Kiwigreen fruit. In 1996-97, five years from commencement, the *total* export kiwifruit crop was produced using the Kiwigreen techniques. The only exception was the small percentage grown organically, and even these crops used monitoring techniques and infrastructure developed for Kiwigreen.

Changing industry structures

The Kiwigreen infrastructure has solidified in increments. Pest monitoring involves both sampling in the orchard for leafrollers and the use of stereo-microscopes to determine if live scale insects are present on kiwifruit leaves. Monitoring runs from January until close to harvest, a period when packhouses are relatively under-utilised, and the cost of training and capital expenditure for Kiwigreen is most efficiently used when spread over a number of orchards. Further, packhouses already had people whose employment during the short packing season had given them skills relevant to pest monitoring: namely, quality control and grading table operators. From this base, Pest Monitoring Centres have been established at packhouses.

This subsidiary task for packhouses has increased their pivotal role in the overall industry. It has spread their influence over more of the year, into the production period. Coincidentally, it has provided more employment in the industry, or greatly extended the period of employment, giving some staff extra skills and greater employment security. Growers supplying Kiwigreen fruit in the initial years were paid an incentive payment at varying levels between 4-10c per tray to offset the costs of monitoring. The resulting drop in chemical requirements more than compensated for monitoring costs so the NZKMB ceased to offer the payment in 1997.

The role of packhouses as Pest Monitoring Centres, extending the activity of packhouse/coolstore operations into production aspects, has had dual effects. It has both strengthened the links between grower suppliers and their respective packhouse, and has simultaneously accelerated the trend towards the increasing involvement of packhouses in orchard operations, especially in terms of leasing. Both effects increase the certainty of throughput for packhouses.

Another change in the industry that has increased the trend for packhouses to become focal points for their suppliers during the production period has been the demise of MAF advisory services. Although many of the MAF employees have moved laterally to become private consultants, the low returns of the early 1990s trimmed consultancy activity in kiwifruit. The change to Kiwigreen has meant that there is new information to be disseminated to growers (and even more new information is required in the shift to organic production). During the conversion process to Kiwigreen the NZKMB provided information at area-wide meetings and some technical support through a Field Manager contracted to implement the Kiwigreen programme. Packhouses have also responded to these opportunities for information provision by establishing discussion groups and by improving the informa-

tion returned to each growers concerning his or her performance (production and storage data for that crop compared to packhouse averages). Some private consultants have forged links with particular packhouses, thus enabling the packhouse to extend the service available to its suppliers.

These various initiatives by packhouses have also contributed to the competition among packhouses for throughput, in that they have served to differentiate packhouses on the basis of the service offered to growers.

Interactions between Kiwigreen and organics

The benefits and deleterious effects of Kiwigreen on the conversion to organic production are discussed in more detail in Chapters Three and Four. Both Kiwigreen and organic production systems have developed simultaneously and the interactions have been many and strong. However this account of Kiwigreen has highlighted the main points; namely that the greater investment focus by the NZKMB on Kiwigreen and its implementation has given far greater opportunity for benefits to flow from Kiwigreen to organics than vice versa.

Organic growing is further removed from conventional practice than is Kiwigreen, and the support provided by the NZKMB during the conversion phase to Kiwigreen has meant that Kiwigreen has been used by many as a stepping stone to organics.

Most growers have not been fully confident in the Kiwigreen systems of pest control until they have tried them on their own orchards. This was stated or implied in the comments of many growers interviewed. The bigger jump from conventional to organics must have been even more of a hurdle. Ultimately it could be argued that it was in providing a half-way house, where some of techniques needed to wean a grower from conventional practices can be tried, that the greatest benefit provided by Kiwigreen to organic production could be seen. Now that the entire export crop is produced under either Kiwigreen or organic systems this gap has narrowed appreciably.

■ Chapter three

The Development of Organic Kiwifruit Production

This chapter details the main features of organic kiwifruit production in the Bay of Plenty. This is presented in the following sections:

- historical development of organic production
- the nature of contemporary organic production
- the economics of organic production
- infrastructural development
- development of knowledge systems
- contribution of Kiwigreen to organic production

The historical development of organic kiwifruit production

There has been two phases in the historical development of organically produced kiwifruit in New Zealand:

- experimentation and institutional hostility (pre 1990)
- development of an organic fruit pool (post 1990)

Experimentation and institutional hostility

There were reports of organic growers attempting to grow kiwifruit throughout the late 1970s and early 1980s. During this time, these early innovators found that the organic production of kiwifruit faced some major difficulties, particularly in the damage caused by pests like leafrollers and scales and the threat of fungal activity – particularly *botrytis* and *sclerotinia* (see Desborough & Blakely 1986). The only surviving organic grower from this period is Trevor Caines who experimented with organic growing throughout the late 1970s and early 1980s. Organic growers during this time tended to belong to the Soil Association, and the president of this society – Murray Tanner – acted as the main technical adviser to new organic growers.

Trevor Caines' experience as an organic grower might be seen as typical of early innovators, trying to develop solutions to the main pest and disease barriers with varying degrees of success. First, Trevor Caines found that altered vine husbandry techniques could be used to limit the incidence of fungal diseases in fruit. This was achieved by opening the canopy and exposing the fruit to sun and good ventilation. The next main barrier – leafrollers – was overcome between 1981-

83 with the successful trialing of Bt sprays (containing *Bacillus thuringiensis*) which are a permissible input under organic growing systems. The final barrier was scales, which proved more difficult to overcome and forced Trevor Caines to abandon organic production in 1985 (returning to organic certification a few seasons later).

The same year – 1985 – saw the collapse of a much more high-profile organic orchard – Matahui Orchard – managed by the Sayers family who were the first organic growers to attempt the exporting of organic kiwifruit as a specific product (in 1984). Prior to this, any organic fruit was either absorbed into mainstream exports of conventional kiwifruit and attracted no specific organic premium, or was sold on the domestic market through organic food outlets. Matahui Orchard was both large for the time (8 hectares total orchard size) and directly targeting organic fruit for the export market. The first year of organic production saw some small volumes of organic fruit delivered to one exporting company in the 1983/4 growing season. The following year, Matahui Orchard became highly contentious with a major scale infestation occurring in the Matahui crop. The result was that the Sayers withdrew 90 tonnes of fruit from the export market (Desborough & Blakely 1986: 47). One member of the Sayers family claimed that the NZKA was putting pressure on inspectors to reject organic fruit and, therefore, stifle the 'threat' organic fruit posed to conventional kiwifruit. Other people interviewed, who were working with that specific crop from Matahui Orchard, recollected clearly that the crop was badly infested with scales. Consequently, the scale barrier proved as insurmountable for the Sayers family as it had proved in the same year for Trevor Caines.

Scale infestation remained a major challenge for organic growers and was one probable reason why there was little development of organic kiwifruit during the late 1980s. Organic growers tried a wide variety of control measures, including experiments with scraping scales off fruit with a toothbrush. Finally, in 1990, orchard trials established that spraying with a mineral oil (an input that was restricted but acceptable under organic standards) could control scales, providing the basis for a major increase in organic kiwifruit production.

In conclusion, the early innovators and researchers in organic kiwifruit production had a high failure rate, but by the late 1980s solutions to the major pest and disease barriers for organic kiwifruit production had been found. During these years, the Tauranga Polytechnic established an organic block in its kiwifruit demonstration orchard, and the tutor – Chris May – used this block to extend these techniques of pest and disease control to interested growers. The Polytechnic was also the site for seminars and classes

in organic husbandry that many current organic growers recollected as their main early source of information on organic techniques.

The period prior to 1990 was also characterised by what many interviewees describe as 'NZKA hostility' towards organic production (see also Desborough & Blakely 1986). This varied from a complete lack of encouragement of organic production from the NZKA to activities by the NZKA which would disadvantage organic growers. Although the NZKA had allowed export kiwifruit to be differentially labelled as organic for the 1986 harvest, this was only after much debate. Desborough and Blakely (1986) reported that exporters of fruit grown organically had previously been specifically instructed not to promote it separately. The subsequent failure of the Sayers – the major force behind the establishment of this separate organic pool – to meet export quarantine standards effectively vindicated this position in the eyes of the NZKA.

The policy of non-encouragement of organic production was attributed by numerous interviewees (both growers and ex-Board/Authority members) to the prevailing idea inside the institutional structure of the Board/Authority that organic produce would raise questions in the marketplace as to the 'clean green' qualities of non-organic fruit. Such an idea was consistent with the marketing position of the NZKA prior to the establishment of the NZKMB in 1988: a position which tended to discourage differentiation of product and the retention of a 'one product, one brand, one price' philosophy in the marketplace. The industry crisis, which resulted in the establishment of the NZKMB in 1988, dramatically undermined such a notion and pushed the new NZKMB towards diversifying its product line, although some interviewees remain convinced that some of the new Board members retained (and still retain) their suspicion of the negative impact of marketing organic fruit alongside conventional fruit.

On a more active level of discouragement, one ex-Board member recalled that the Quality Standards Committee (the predecessor to the Operations and Standards Committee) 'unofficially' instructed inspectors to deal more stringently when inspecting organic fruit for pests and blemishes. Such moves were exacerbated by a number of other factors: the

novelty of organic fruit leading to closer inspection, the prevailing image of organic fruit as low-quality and pest-ridden, and the widely-known experience of the Matahui Orchard fruit in 1986. These factors all would have impacted on the activities of orchard inspectors at this time, and likewise were present when fruit was being graded in packhouses. As one pack-house operator described it, prior to the establishment of Kiwigreen, packhouse graders were unused to the sight of any 'livestock' on the fruit and would react with heightened alarm at any presence of any insects at all whether they were permissible in the destination market or not.

Such sentiments by both NZKA and packhouse operators reached their peak in the mid to late 1980s and, as has already been indicated, the crisis in 1988 can be seen as a turning point in the institutional relationship between the wider industry and organic producers.

Development of an organic fruit pool

The pivotal point in the development of the organic kiwifruit industry was the decision by the NZKMB to establish an organic pool for kiwifruit which would pay growers actual market returns less 10% FOB for organic kiwifruit (which is still in operation in 1997). Prior to this point, organically grown kiwifruit had been either sold on the local market (at a price considerably less than that available in export markets) or exported through the conventional kiwifruit pool. The new pool came into effect at the end of the 1990/1991 growing season and the first payout on this pool was made in 1991. In this first year, only 13,069 trays of fully certified and transitional kiwifruit were delivered into the pool. The most significant aspect of this, however, was that the organic kiwifruit once marketed received a payout that was 73% higher than conventional fruit (see Table 3.1).

Table 3.1: Organic and conventional kiwifruit: production and pay out

year	trays – conventional/Kiwigreen	\$/tray	trays - organic	\$/tray
1991	59,848,342	\$6.08	13,069	\$10.45
1992	67,271,811	\$3.85	20,243	\$7.29
1993	54,782,552	\$4.18	51,014	\$7.03
1994	55,914,704	\$4.63	406,665	\$5.88
1995	58,743,401	\$4.22	620,095	\$6.23
1996*	62,437,235	\$4.36	753,000	\$7.39

Source: NZKMB
* the first year in which 'in transition' status fruit were not counted in the pool

It was difficult to obtain comprehensive information on how this important step took place. The recollection of some Board members from the period 1989-1990, and other NZKMB staff, was that a few prominent organic growers – David Skinner and Richard Holmes in particular – put pressure on the NZKMB to establish an organic pool. As well as the pressure from growers applied to the NZKMB there was some NZKMB research and development activity into organics which was contemporaneous with other research into integrated pest management systems. Part of this research activity involved the compilation of a report into the regulatory structure and variety of standards for organic production that existed in New Zealand and in target markets. While this R & D activity was occurring within the NZKMB, HortResearch in Te Puke established a trial block of organic kiwifruit, and the harvest from this block actually provided the majority of fruit delivered to the organic pool in 1991.

The first three years of the organic pool's existence did not build confidence among many NZKMB staff and Board members. The first major concern was that the supply of organic kiwifruit was particularly limited. One Director's recollection of events surrounding the establishment of an organic pool was that certain growers estimated far higher yields than were actually delivered. For the first three seasons the NZKMB received crop estimates for organic orchards that overestimated yields by around 80-100%.

1994 was evidently crucial to the long-term development of organic production. Due to the time delays in applying for and gaining organic certification, a number of larger growers that had been attracted to organic production by the large premiums paid out in 1991 and 1992 entered the pool in 1994. 1994 was also the earliest possible season in which growers could respond to the price crash of 1992 and move towards organic certification. The number of trays produced rose from 51,014 to 406,665 which included both fully certified and 'in transition' fruit. In the same year the errors in yield estimates for organic fruit began to more closely approximate those of conventional orchards.

Since 1994, the organic fruit pool has grown steadily, with the 1996 harvest being the first to only count fully certified organic fruit in the pool. The 1996 organic pool contained 753,000 trays and represented over 1% of kiwifruit exports for the first time. Estimates for the 1997 harvest look set to increase the organic pool to over 1,000,000 trays.

The quantity of organic kiwifruit entering the organic pool from 1994-1997 suggests that kiwifruit is one of the fastest growing organic food products in New Zealand. The Organic Products Exporting Group estimated the total value of exported organic produce at \$10.5 million in 1996.

Approximately 50% of this total figure derived from kiwifruit exports.

To conclude, the organic kiwifruit pool established by the NZKMB forms a striking example of successful development of an organic export industry in comparatively few years. The success of organic growers in maintaining organic systems of production for an extended number of years reflects the development by 1990 of technically and economically viable organic production systems.

Similarly, the increasing number of growers involved in organic production indicates that knowledge about organic production has been successfully disseminated among interested growers. Finally, the development of the organic pool under the auspices of the NZKMB indicates that organic production had developed a viable infrastructural niche. As such, these three factors reflect the main points of interest in the successful development of organic kiwifruit production and should be analysed in some detail. Consequently, the next sections of this chapter will examine:

- organic kiwifruit production
- infrastructural development
- development of networks and knowledge systems among growers

Contemporary organic kiwifruit production

The first key point about organic production of kiwifruit is that it appears to be achievable without many of the difficulties associated with organic production of other agricultural and horticultural products in New Zealand. While there are challenges implicit in the organic production of kiwifruit, they are relatively solvable within the production system that has been developed by organic kiwifruit growers and researchers over the last six years. Another unusual feature of this development is that organic kiwifruit are now produced in a manner that is much closer to mainstream kiwifruit production than would have been the case six years ago. This has not occurred, however, because of any major change in organic methods, but rather because mainstream kiwifruit production has dramatically changed through the arrival of the Kiwigreen programme.

Differences between organic and non-organic production

The key differences between organic production and conventional kiwifruit production occur in four areas. These are pest control, soil fertility, orchard management and disease control. After consideration of these four aspects, results from a growers survey will be examined to provide data

on production differences between organic and conventional growers.

a) Pest control: The previous discussion of the historical development of organic kiwifruit production indicated the way in which the major pest barriers were overcome through the development of spray products based on Bt and mineral oils. This spray regime was different to that used in conventional production in a number of ways. First, the sprays applied are considered benign or 'soft' which are derived from natural (non-synthetic) products. Bt sprays fall into the category of 'permitted inputs' within the organic standards of production provided that they do not use Bt culture that has been genetically modified. This can be contrasted with conventional kiwifruit production which has a high level of reliance on broad-spectrum 'hard' sprays such as organophosphate chemicals. The development of the Kiwigreen system has dramatically reduced the usage of organophosphate sprays while not eliminating them entirely (Howard et al. 1992).

The second important characteristic of organic spray regimes is that they tend to move away from a prophylactic 'calendar' of spray applications – sprays applied in a regimented time frame to pre-empt the development of potential pests. Instead, organic growers have moved towards monitoring the pests present on their vines and only spraying when pests are discovered in significant quantities (the movement towards such methods has not been uniform among organic growers – a factor that will be discussed later). Again, the Kiwigreen programme has moved mainstream production away from calendar spraying every 3-4 weeks during the season regardless of whether or not this was necessary, to spraying only when there is a demonstrable need to spray. Before flowering there are few restrictions on the types of chemical used. Immediately after fruit set the use of up to 3 sprays of selected organophosphates is permitted, while for the rest of the growing season only benign sprays of Bt and oil are allowed.

The final characteristic of organic pest control methods is that they use spray regimes that target specific pests rather than broad-spectrum sprays such as organophosphates. Bt sprays are specifically targeted against leafroller caterpillars while mineral oil is specifically applied to control scales. This kind of spray regime targets particular pests while allowing other insects that might be beneficial (such as predators and parasites) to survive in the orchard. Again, the Kiwigreen programme has moved mainstream production away from sprays that are extremely broad-spectrum towards more targeted pest control.

It is in the area of pest control that the arrival of Kiwigreen has caused the greatest movement of mainstream production towards organic systems. In the area of soil fertility and orchard manage-

ment the organic system remains fairly distinctive from mainstream methods.

b) Soil fertility: Soil fertility is one area where organic kiwifruit producers tend to differ from other organic horticulturalists in New Zealand. The wider organic movement places a great emphasis on composting techniques to maintain soil fertility in orchards, but few organic kiwifruit orchardists have applied these techniques. Historically, the Sayers' orchard developed an extensive compost system, but with the collapse of the venture due to pest problems the composting side of their operation was also lost. Currently, the Polytechnic orchard has developed composting systems (through a staff member who had worked on the original Sayers' orchard). One Polytechnic staff member considered that there were two reasons why composting techniques had not become widespread among organic kiwifruit growers:

- lack of space on many orchards to establish large compost heaps and to provide green matter for composting (which was not a problem for the Polytechnic orchard),
- high returns from organic kiwifruit making the alternative of buying certified organic fertiliser from off the orchard more attractive

Kiwifruit growers, like those of other permanent crops, cannot use crop rotation as a technique to improve soil fertility and structure (or to provide plant material for composting). This also contrasts with the organic production of more traditional annual crops.

Organic kiwifruit producers rely on a small range of certified organic fertilisers in comparison to the broad range of synthetic fertilisers available to mainstream producers. The development of composting techniques is one area where some members of the Organic Kiwifruit Growers Assoc. suggest that more experimentation and expertise should be developed.

The issue of soil fertility is considered by many growers to pose the main limiting factor on organic production. Despite the use of extensive organic fertiliser applications, organic fruit are still slightly smaller on average than conventional fruit. While this is not significant in the mid-size ranges, organic orchards do not produce as many very large fruit, which are highly sought after in the Japanese market, as that produced by Kiwigreen systems. Improving soil fertility is a major research priority for organic kiwifruit production.

c) Orchard management: The final area of comparison between organic and mainstream kiwifruit production is in orchard management – especially vine structure, pruning and weed control. This area is where a striking difference can be found; one that poses a real concern for

Table 3.2: Mean data for the three sample groups

Sample Group (1996 status)*	1	2	3	4	5	6	7	8	9
Conventional n=12 N=577	20,154	25,158	34,246	6	6,152	22	11	87	83
Kiwigreen n=24 N=1,491	28,762	28,238	41,008	6	6,541	19	11	87	58
Organic n=12 N=39	23,105	24,819	24,255	5	4,851	13	14	84	65
Overall average (weighted†) N=2,107	26,299	27,330	38,844	6	6,474	20	11	87	65
*n = sample size, N= total population									
†Note: The weighting procedure sums the averages of each sample after it has been multiplied by the proportion that the sample is of the total to obtain the overall weighted average.									
1 Trays 1992	6 Total ha.								
2 Trays 1994	7 Years growing								
3 Trays 1996	8 % Land income ex kiwifruit (1996)								
4 Canopy ha.	9 Land income as % of household income								
5 Production per canopy ha. (1996)									

mainstream producers contemplating organic production. This is the use of hydrogen cyanamide (Hi-Cane) to promote bud-burst on vines. Hydrogen cyanamide is a prohibited input under organic systems but is applied by approximately 50% of mainstream growers to increase the number of marketable fruit on vines and to regularise the time of fruit set and harvest. It gives more flowers, and eliminates some of the defective flowers that give rise to misshapen fruit.

Some experienced organic growers insist that hydrogen cyanamide is only a substitute for better manual husbandry of vines and, as such, should be viewed as a labour saving device rather than a guarantor of higher yields. Rather, good techniques of vine husbandry can result in similar yields on organic orchards to those obtained on conventional orchards using Hi-Cane. The veracity of such claims will be discussed further in the upcoming section on the economics of organic production.

d) Disease Control: Prior to Kiwigreen, fungicides were frequently used by conventional growers pre harvest to prevent botrytis infection during harvest. They were also used at or soon after flowering to control sclerotinia. However, some difficulties were occurring in the conventional use of fungicides. A previously preferred fungicide – Benlate – used to control sclerotinia caused cross resistance to Rovral and also predisposed the fruit to botrytis by killing beneficial fungi. As part of the Kiwigreen programme, pre harvest fungicide applications were withdrawn and the curing of fruit post-harvest was strongly encouraged. This involved drying fruit under ambient conditions for 24-96 hours after picking and before packing took place. The development of these techniques to combat fungal infection during processing has benefitted both Kiwigreen and organic production.

Survey results comparing organic and non-organic growers

In order to investigate what the above differences between organic, Kiwigreen and conventional production might mean at the orchard level, a survey of 48 growers was conducted in the Bay of Plenty. While the main results of this survey are presented in the next chapter, the survey did provide orchard-level data for the sample groups which provides useful information on the differences between the main production types (organic, Kiwigreen, conventional).

Table 3.2 shows a number of variables for each of the three sample groups. The production levels for 1992 to 1996 were taken from NZKMB records for each orchard (by combining MAF numbers if there were multiple entries under the same name) and not from the growers themselves. The remaining variables are self explanatory except for the land income ex kiwifruit which displays the contribution of kiwifruit to total land-based revenue, and land income as a percentage of household income. This column displays the amount of off-farm income generated by households. The figures in these two columns give a good indication of the character of the growers' overall financial situation relative to their specific revenue from kiwifruit.

Looking at the three samples that make up Table 3.2, the data show that the Kiwigreen growers produced more trays per orchard than the other two, and had higher production per canopy hectare. Organic orchards were smaller, lower producing, with their respective growers, on average, having been in the orcharding business for a longer time. Typically, these organic growers spend more time closely managing vines using organic techniques and produce fewer fruit per canopy hectare. There was uniformity across all

three types with respect to the percentage of land income coming from kiwifruit, but differences in the proportions of land income as a percentage of total household income: conventional growers had land income at 83 per cent while Kiwigreen growers had land income at 58 per cent. This latter point is explained in part by noting that among the 24 Kiwigreen growers sampled, 8 were also involved in packhouse and coolstore operations. It must be emphasised that inferences to the population of growers require that statistical tests be used to test whether these differences are significant at the population level. T-tests on the means showed that none of the differences were statistically significant at the 5% level. This was probably due, in part, to the small sample sizes.

The economics of organic production

When assessing the economic performance of organic production in any horticultural or pastoral product three factors are closely considered: yield, input costs and premiums. For most organic products discussed in the international literature (see Lampkin & Padel 1994) higher premiums have to be balanced against lower yields per hectare, while input costs vary in different product types. A secondary set of factors is the balance between the risk of market failure and price collapse which is higher for bulk commodity production typified by conventional produce, but is also perceived to be a risk for niche markets. On the other hand, the risk of product quality failure is often seen as being higher for organic production because of less chemical control over production.

The survey of 48 growers which informs this section, compared the economic performance of organic with both conventional and Kiwigreen production systems.

Organic kiwifruit production differs from the international expectation for organic production in several respects.

Input costs: unlike most organic horticulturalists, the input costs on organic kiwifruit orchards are slightly higher than on conventional orchards. While organic orchardists save on herbicide costs, the use of 'soft' (but expensive) *Bacillus thuringiensis* (Bt) sprays and mineral oil sprays cancel out any savings that might be made on this kind of input.

Organic kiwifruit producers also tend to buy fertiliser from certified organic suppliers, rather than composting on their own orchards. This fertiliser is applied at 1.5 to 2 times the rate of conventional fertilisers. On top of this, the cost of Bio-Gro NZ inspection and certification must also be considered. The result is that organic kiwifruit orchards bear between 10-20% higher input costs.

Premiums: Premiums paid to organic kiwifruit growers supplying the organic export pool are significantly higher than the conventional payout per tray. Table 3.3 shows that premiums ranged from a low of 26% in 1994 to a high of 89% in 1992. Final estimates for the 1996 harvest indicate a premium of around 72%.

Yields: Yields per hectare can be assessed from two sources: survey data for 48 organic and non-organic kiwifruit growers, and NZKMB figures. Both sources indicate that organic growers experience a reduced yield per hectare – that some growers attributed to the non-use of HiCane on vines prior to budburst by organic growers. The results from the grower survey are shown in Table 3.4.

This table represents three sample groups: purely organic growers, conventional growers, and growers using the Kiwigreen system. Taking conventional producers as the benchmark, the average yield per canopy hectare was 6,152 trays. Relative to this, organic producers were achieving 4,851 trays per hectare, a reduced yield of 21%. Kiwigreen producers were achieving 6,541 trays per hectare, an increased yield of 6% (not statistically significant).

These survey results were referred back to NZKMB staff to assess whether they varied significantly from NZKMB figures. The NZKMB figures suggested that the reduced yield for organic growers was slightly overstated in the grower survey results and that organic producers

Table 3.3 Comparison of organic and conventional kiwifruit pools*

year	trays – conventional/Kiwigreen	\$ per tray	trays – organic	\$ per tray
1991	59,848,342	\$6.08	13,069	\$10.45
1992	67,271,811	\$3.85	20,243	\$7.29
1993	54,782,552	\$4.18	51,014	\$7.03
1994	55,914,704	\$4.63	406,665	\$5.88
1995	58,743,401	\$4.22	620,095	\$6.23
1996†	62,437,235	\$4.36	753,000	\$7.39

Source: NZKMB

* conventional and Kiwigreen fruit have received the same premium

† the first year in which 'in transition' status fruit were not counted in the pool

Table 3.4 Yield figures for three forms of kiwifruit production

Canopy	ha.	Production per canopy ha.
Conventional n=12	6	6,152
Kiwigreen n=24	6	6,541
Organic n=12	5	4,851

tended to have a reduced yield of 15-18% compared to conventional producers.

Returns: The survey did not question growers as to their input costs per hectare so can only provide us with gross returns. This can be compared with industry estimates of gross returns, as is shown in Table 3.5.

Despite the relatively small sample used by the grower survey in order to attain these figures, they are, nevertheless, remarkably similar to the estimates produced from industry sources.

Interpretation

While the survey of 48 growers did not collect data on input costs, in-house industry research has provided some preliminary data on a group of model organic and Kiwigreen orchards. While the details of this information are not publicly available, the bottom line in terms of economic performance was that the organic group outperformed the Kiwigreen group. Net returns per hectare were between \$5500 and \$6500 higher for the organic group.

Storage

Moreover, there is an additional benefit that producers of organic kiwifruit can derive. This is the ability of organic kiwifruit to store better and maintain shelf life longer than conventional fruit. Packhouse records are starting to confirm anecdotal claims that during 1995/1996 organic kiwifruit had a lower rejection rate caused by losses during cool storage in comparison to conventional fruit. The fact that this is exactly counter to what most industry participants expected with organic fruit has meant that this feature of organic fruit has not been generally recognised until this year. Initially, the small volumes of fruit (and the perception that storage

may be worse for organic fruit) meant that organic kiwifruit was marketed over a shorter period than conventionally grown fruit. The ability to store well is a major asset for organic fruit, and means that organic growers can expect greater storage incentive payments.

Ironically, demand for organic fruit in the markets has been such that they sell out much faster than conventional fruit. This also relates to the relative volumes produced as noted above. It means that the benefits of good storageability are not yet as significant as they might be in the future. As a final observation, one senior staff member of the NZKMB noted that marketers in Europe were now requesting organic fruit to fill display stands at trade expositions. This was not only to indicate the existence of an organic product line, but also to ensure that the fruit on display had not perished or lost their firmness in storage.

Comparison with Canterbury results

In order to provide some comparative analysis for the kiwifruit results Lamb's (1994) analysis of organic pea production in Canterbury (contracted to Wattie Frozen Foods Ltd.) is useful. Input costs were slightly higher for organic pea producers on average but this tended to vary widely between producers. Organic pea producers were receiving a considerably higher premium for their peas relative to conventional producers. The third variable – yield – was the major determinant of level of return per hectare for organic pea growers. The results showed that the top quartile of organic growers achieved a significantly higher return per hectare than the top quartile of conventional growers. However, this success was tempered by the fact that the lower quartile of organic growers returned significantly less per hectare than their conventional equivalents. In summary, the organic growers showed a much wider variation of returns depending on their ability to produce good yields. Wattie Frozen Foods Ltd found that the most skilful organic pea growers actually returned a higher yield per hectare than their

Table 3.5: Gross returns (1997 prices) - yield x price per tray

	\$ per canopy hectare (grower survey)	\$ per canopy hectare (industry estimates 1997†)
conventional	\$26,576	N/A*
Kiwigreen	\$28,257	\$29,400
organic	\$35,460	\$36,000

† Industry figures were derived using an average of the 1997 premium and the predicted premiums for 1998 and 1999.
* Industry figures in 1997 no longer discriminate between Kiwigreen and conventional.

conventional counterparts.

While Lamb (1994) indicated that organic pea growers were, on average, outperforming their conventional counterparts, these results must be balanced against the fact that peas form only one part of an organic broadacre crop rotation, and overall farm returns might be considerably more modest for organic producers.

The situation for organic kiwifruit growers varies in one important way with the situation of organic pea producers in Canterbury. This is the fact that an organic kiwifruit orchard can devote continuous permanent production to an export product returning a high premium. Pea producers, however, are committed to a broadacre rotation that only includes a high value organic export crop periodically in the rotation. Consequently, the overall performance of a kiwifruit orchard can be extrapolated directly from per hectare return estimates, while this is not possible with organic producers engaged in broadacre rotational systems.

Organic fruit in the marketplace

While organic kiwifruit production appears to have definite economic advantages it is also confronted with both the risk of market failure and the risk of compromised product quality.

The risk of market failure is always difficult to predict, but one might speculate that the long-term market for organic kiwifruit is stronger than the long-term market for conventional kiwifruit (particularly considering the price collapse of conventional kiwifruit in 1992). Influential factors include:

- the move towards greener products. The mere fact that the NZKMB has invested so much time and effort into developing the Kiwigreen programme indicates their strong perception that the long term direction of the market is towards 'greener' products and 'food safety'.
- the move towards niche markets. The long term direction of marketing is also towards differentiable products which can be targeted at niche groups of consumers – a quality fulfilled by organic fruit.
- the maintenance of a premium for organic kiwifruit. After the organic premium dropped in 1994 to give only 26% above conventional returns some industry participants suggested that the organic 'bandwagon had run into the sand'. That year, however, was one in which the volume of organic product suddenly increased by 700% and there may have been difficulties in effectively marketing the fruit. In the subsequent years the organic premium has increased again despite significantly increasing volumes of organic fruit. However, the total organic crop is only 1.2% of kiwifruit exports from New Zealand

(excluding those to Australia), so the size of the premium in future years may well alter.

- a marketing plan for organic fruit. To date the development of organic kiwifruit has taken place without any formal marketing plan by the NZKMB. Such a plan is now proposed for 1997 and should improve the market prospects for organic fruit.

All these factors suggest that the long term market prospects for organic kiwifruit will improve. There is, however, one major risk with organic produce: that the product will be compromised in some way, such as a failure to pass tests for freedom from chemical residues in the marketplace. This has occurred with Chilean organic kiwifruit in Japan, resulting in severe consequences for their organic industry. The solution to this threat can only be to maintain high levels of integrity in the organic certification and inspection process. However, now that the entire Class One kiwifruit crop is to be marketed as 'safe' according to key environmental criteria this risk is now potentially applicable to all producers seeking to sell under the Zespri New Zealand brand as well as specifically to organic growers.

The risk of compromised product quality is an interesting issue for organic kiwifruit. With organic horticultural and agricultural products generally the overall product quality is enhanced in two areas:

- no chemical residues
- 'environmentally friendly' production systems

These enhanced qualities must then be balanced against the risks of organic products having negative qualities such as:

- reduced visual appeal
- reduced size
- decreased storage qualities/shelf life
- high levels of pests on products

Organic kiwifruit provide an exception to many of these generalised concerns with organic produce. They do have the beneficial qualities of no chemical residues and 'environmentally friendly' production systems but the negative quality risks are lessened. The development of a particular quality standard for organic kiwifruit will be discussed later at length. However, it is useful to briefly characterise organic fruit.

- First, visual appearance of organic fruit does not significantly differ from conventional fruit. The main difference that negatively affects organic fruit is in mean size. Since 1992, organic fruit has been on average slightly smaller than conventional fruit. However, the full range of sizes is still available with organic fruit; it is just more

difficult to satisfy markets that prefer larger fruit – like Japan.

- Second, and more importantly, is the improved storage qualities of organic fruit which have already been discussed.
- Finally, the fact that organic kiwifruit are produced without any use of broad-spectrum insecticides, fungicides or growth regulators, coupled with the use of organic fertilisers or compost, has led to more insects and mites being present on organic fruit at harvest. This increase in the fauna encountered at grading can lead to problems in meeting the phytosanitary quality standards imposed for export. The difference between organic and conventional fruit has narrowed since the general adoption of Kiwigreen methods by mainstream growers. Now that mainstream growers are also using far less broad-spectrum insecticide the range and number of insects and mites found on fruit at harvest is increasing. Only a few such species are pests that are subject to quarantine restrictions in foreign markets. The advent of Kiwigreen has meant that quality issues surrounding pests have been examined more closely in packhouses and the gap between organic and mainstream fruit has narrowed. The potential for mechanical systems to remove fauna at harvest needs to be considered.

In conclusion, the potential negative qualities of organic kiwifruit are relatively insubstantial and are more than outweighed by the positive qualities associated with organic fruit.

Infrastructural development

The development of a viable infrastructure for organic production has been one of the most notable features of the development of organic kiwifruit production. In respect of other members of the Organic Products Exporting Group, the situation of organic kiwifruit growers can only be compared to that of growers producing vegetables for Wattie Frozen Foods Ltd. (WFF). In that case, there is also a solid infrastructure underpinning products from the paddock/orchard to the market. The major difference between the two entities – the kiwifruit growers and WFF growers – is that WFF growers only have an organic infrastructure developed for a few of their products, while kiwifruit growers have all of their crop catered for.

Consequently, the nature of the industry infrastructure underpinning organic kiwifruit production is of considerable relevance. Five areas of industry structure will be examined:

- overall industry structure
- organic representation in the industry
- post-harvest facilities
- certification
- quality standards

Overall industry structure

The previous chapter described in detail the formation of the New Zealand Kiwifruit Marketing Board and its statutory role as a single desk seller of New Zealand kiwifruit in export markets (except Australia). As the domestic market for organic kiwifruit was fully supplied at an early stage, and offered only low returns, the exporting of organic kiwifruit, under the auspices of the NZKMB, represents the principal activity of organic kiwifruit growers.

While the developing history of NZKMB-organic grower relations has already been discussed, some wider implications of the single desk selling structure should be considered.

First, the requirement of the NZKMB to purchase and export all kiwifruit meeting Class One quality standards meant that, even when institutional opinion within the NZKMB was not supportive of organic production, the NZKMB was still required to purchase such fruit. Therefore, the NZKMB provided an exporting structure under which the volume of organically produced fruit could steadily increase until it reached a level where the presence of organic fruit was no longer a hindrance or could be ignored, but rather had to be taken seriously. This point was reached in 1994. Prior to this, it was possible that a private corporation may not have persisted with the development of an organic product line because of the low volumes of organic fruit, and particularly because of the unpromising results from the first three years.

A second factor was the way in which a single industry body was able to put into effect the strategic development of the industry in a way that multiple competing companies could not. This is most clearly illustrated by the long time lag between the establishment of an organic pool in 1990 and the emergence of significant volumes of fruit in 1994. Between these dates, the kiwifruit industry experienced its most profound financial crisis, yet the NZKMB persisted with the organic fruit pool. A number of structural factors may have contributed to this. Initially, the organic pool would have been supported due to its implications for producing a premium, green product. The existence of one industry body creating strategic plans for the industry as a whole would have created more space for such experimentation to occur – even in times of crisis like 1992. In comparison, a private company would have been far less likely to have persisted with a non-core activity in an extreme crisis situation like that facing the kiwifruit industry in 1992. As an example, Regal Salmon closed down its development of organic salmon production in 1994 when the parent company came under financial pressure. Organic salmon production showed potential and appropriate production and distribution systems were in development but, in a time of crisis, the

private company retrenched non-core activities, including the organic venture. Similarly, Desborough and Blakely (1986) describe how the independent exporting company associated with the Sayers' organic kiwifruit in the 1995 season became rapidly disillusioned with the prospects for organic kiwifruit.

Organic representation in the industry

The existence of one industry body has undoubtedly had an effect on the way in which the interests of organic growers can be represented at an industry level. The most striking example of this is the way in which organic growers were able to create pressure for the formation of an organic fruit pool at a time when institutional sentiment was opposed to organic production. Such an action would have been impossible in the private sector. At the time of the formation of the organic fruit pool the NZKMB appointed one Director to be responsible for issues pertaining to organic production. It also appointed one NZKMB employee to be responsible for the development of the organic fruit pool. While some organic growers consider that such actions were tokenised, conventional growers also argued that this was more than could be rationally expected considering that organic production, at that time, represented less than 0.2% of total export activity.

From this basis, organic grower representation in the industry developed along two channels. The development of Stage Three of the industry restructuring plan created the opportunity for development of NZ Kiwifruit Growers Incorporated (NZKGI) as a major political force in the management of the industry. As part of this development, the Organic Kiwifruit Growers Incorporated (OKGI) group was also formed, arising out of the previous organic growers association. While only a recent development, the OKGI has proved itself to be more than useful in a 1996 bid by conventional growers to have the payment to the organic fruit pool reduced. The conventional growers contended that the organic fruit pool had been unduly advantaged in 1996 by selling principally in high-value markets like Japan, while conventional growers had to be content with an averaged return from all markets. The OKGI strongly contested this before the Equity Subcommittee of Kiwifruit NZ and the status quo was allowed to remain. Thus, the OKGI has become an important representative of grower interests to the wider industry.

The second conduit of grower interests is the semi-formal Organics Working Party (OWP) organised by the NZKMB staff member responsible for organic development – Stuart Abbott – and including the Chair of the OKGI, a group of prominent organic growers and the local BIO-GRO inspector. The OWP meets monthly to

facilitate the further development of organic production. This ranges from discussion over what the NZKMB's policy should be concerning aspects of organic production to debate over whether certain production techniques would be acceptable under BIO-GRO standards. Effectively, the OWP brings together the three main interest groups in organic kiwifruit production – the NZKMB, BIO-GRO NZ and the organic growers – to discuss issues of mutual concern and develop strategic plans for organic production. An example of how this has worked in practice is the development of a policy for 'market restricted' fruit. A market restriction is imposed if insects are found on fruit which would be unacceptable to some markets while permitted in other. The process of how the OWP developed a market restriction policy for organic fruit will be discussed in detail in the upcoming section on quality standards.

While there is debate between organic and mainstream kiwifruit growers as to whether the NZKMB is doing too much or too little to support organic production, and whether the organic growers have enough voice in the industry, it is clear from a more detached perspective that the situation for organic growers is better in the kiwifruit industry than in any other sector of organic production. Through both the OKGI and the OWP the organic growers have direct input into the formation of policy at an industry level. This contrasts with the distant relations between other organic horticulturalists and VegFed, and organic fruitgrowers and ENZA.

Post harvest facilities

The third important area of industry structure is the post-harvest sector – packhouses and cool-stores. As the previous chapter outlined, these have both reduced in number and increased in size over the last 9 years. These institutions have had an effect on the way that organic production has developed.

Prior to 1990, most packhouses had nothing to do with organic produce. The Sayers' initiative had included building a packhouse with greater provision for grading out pest-infested fruit but, when even this failed, conventional packhouses treated other organic crops with suspicion. As one packhouse owner described it 'we used to look a lot harder at our grading of organic fruit' and graders became over-cautious with organic fruit compared with conventional fruit. This notion led to an increased level of acceptable fruit being inadvertently graded as rejects, thus further increasing the already high rejection rates for organic fruit. A secondary effect of this was that packhouses became more reluctant to accept organic fruit as it was less cost effective to process fruit in which a higher than usual amount was

rejected. The grading and packing of organic fruit also increased packhouse costs due to the need to keep fruit separate. This increased downtime in the processing plant.

Since 1990, the relationship between organic producers and packhouses has improved. There are three main reasons for this:

- a desire for secure throughput
- arrival of Kiwigreen fruit
- fewer losses in storage with organic fruit

First, the concentration of packhouses into fewer, larger operations has greatly increased competition between packhouses – especially in recent years. One consequence of this is that packhouses are increasingly keen to secure the business of orchards to maintain throughput of fruit through the packhouse and into storage. One strategy has been to meet the standards for organic processing as a means of differentiating one's packhouse business. Some packhouses have pursued such a course of action in order not to lose the custom of large orchard clients who are themselves converting to organics. In 1996, there were two packhouses which were already fully certified as processors of organic fruit. Another 14 packhouses have established organic 'protocols' to enable them to process organic fruit. The distinction between a fully certified packhouse and a packhouse adhering to 'organic protocols' (at a greatly reduced cost) is currently subject to some negotiation and discussion among organic growers, packhouse owners and the BIO-GRO NZ inspectorate. The final resolution as to how processing facilities will be inspected and assessed as to their suitability to process organic product will not be established until after the publication of this report.

Second, the arrival of Kiwigreen has done much to alleviate past tensions between packhouses and organic producers. The lower levels of broad-spectrum insecticides used on nearly all kiwifruit in 1996 have meant that packhouse graders have had to learn what markets actually require in a graded product. At the same time, the over-zealous grading of organic fruit has diminished. Accordingly, some packhouses are now more inclined to handle organic fruit.

Third, the improved storage qualities of organic fruit, that have become apparent in recent years, has made organic fruit a more attractive proposition for packhouses that have specialised in having on-site cool storage facilities. Having a lower proportion of fruit perishing in storage has been a way of creating a positive performance profile for one's post-harvest facilities and of minimising costs associated with the repacking of fruit.

However, many packhouses still avoid packing organic fruit. The organic crop is increasing

rapidly, but for the 1996 harvest it only comprised 1.2% of the crop exported (including Class 2 exports to Australia). Thus, many packhouses have not had to vary from simply handling conventionally grown fruit. For these operations, the set-up costs for separate packing of small consignments of organic fruit have been seen as prohibitive, and have discouraged clients from converting. Growers committed to becoming organic producers have had to change to more sympathetic packhouses. As one manager of a large packhouse saw it, such packhouses have relied on cost cutting or economies of scale to maintain their competitiveness over other packhouses and this large scale emphasis does not favour small separate runs of organic product.

Certification

Even in the earliest days of organic production in Bay of Plenty there was a close relationship among organic growers and BIO-GRO NZ inspectors. Principally, this was because both inspectors over the time period 1987-1997 were also organic horticulture tutors at the Bay of Plenty Polytechnic and, therefore, had considerable contact with growers in both their roles.

As the inspectorate in Bay of Plenty has developed, and the number of organic growers has increased, the inspectors have also sought to have contact with the growers in a number of other ways. First, the current inspector is part of the Organics Working Party and is therefore a participant in discussions between the NZKMB and growers on a range of issues. Second, the inspector also attends a discussion group arranged by one packhouse in which established organic producers, new organic growers and conventional growers who are interested in organics meet. This discussion group meets regularly in different orchards that supply the packhouse to discuss organic techniques and issues.

The result is that there is a high level of contact between the inspectors and industry participants in the Bay of Plenty compared to other regions. The inspectors participate in a wide range of industry events, are accessible to growers, and are in a position to be pro active about what they consider legitimate techniques for organic production. While some growers reported that they had experienced some tension with the inspectors, and had disagreed with some of their decisions, this level of tension was considerably lower than that found in other regions. The growers' main concerns with BIO-GRO NZ were the cost of inspection fees and the time delay in administering the certification process.

The final conclusion that can be drawn from the Bay of Plenty case is that the inspectorate evolved through the late 1980s and early 1990s in parallel with the emerging export market for organic kiwifruit. Consequently, the inspectors

have become attuned over a period of time to the specific needs of one large export industry. The local inspector sees himself more in the roles of 'extension officer' and 'recruiting officer' than as a 'police officer'. He argued that the local organic growers were all too aware of the collective risk they faced if someone should abuse the standards and allow chemically tainted fruit onto the market. An example of such a failure is the 1996 Chilean fruit crisis outlined earlier. The fact that all organic kiwifruit is distributed through one channel – the NZKMB – means that all growers would face catastrophic consequences if residues were detected in New Zealand grown organic kiwifruit. The Bay of Plenty inspector considered that this threat made his job as an inspector easier.

The overall cordiality of the relationship between kiwifruit growers and BIO-GRO NZ is reflected in the fact that even though the scale of organic kiwifruit production is large enough to support its own inspection and certification process the OKGI remains committed to BIO-GRO NZ as the arbiter and inspector of organic standards.

Quality standards

Quality standards are an interesting issue because establishing what 'qualities' should be found in a product is generally a subjective process resulting in what we might consider to be 'objective' quality standards. In turn, these are supposedly the embodiment of either the consumer's subjective judgement or the judgement of regulatory authorities governing access to markets. As Campbell (1996) argued, quality can be established or controlled by many different parties in a food system, and uncovering who is driving the quality process is a key to understanding an important part of how food systems operate. The development of a particular quality standard in organic kiwifruit is no exception to this.

Certain attributes of the quality of organic kiwifruit have already been alluded to in this chapter. Initially, the fruit from the Sayers' orchard and other early innovators had substantial quality problems – principally with scale infestation. Yet, by 1996, organic fruit was displayed in trade fairs and expositions because of its exceptional storage quality profile. Somewhere between 1987 and 1997 major quality changes have obviously taken place in organic kiwifruit production.

The primary and most obvious issue in understanding the quality standard expected with organic kiwifruit is that BIO-GRO NZ certification sets a particular standard that establishes the 'organic' quality of the fruit. Beyond this benchmark, however, are a range of other quality issues. In particular, the phytosanitary quality of the fruit demanded by market gatekeepers and the subjective qualities of size, shape, taste and visual

appeal expected from different consumers. These are set by Kiwifruit NZ as the standards for all Class 1 export kiwifruit, and those times when the industry body has altered its Class 1 standards have often led to conflict between growers and the NZKMB/KNZ.

Two main events may be highlighted as having had an influence on the evolving quality standard of organic kiwifruit.

First, when the organic fruit pool was established in 1990 there was some debate between organic growers and the NZKMB as to whether organic fruit exports should be expected to meet the Class One fruit standard set down by the Quality Standards Committee of the NZKMB (bearing in mind that these standards themselves change). Some organic growers argued that organic fruit had a special organic quality that superseded the Class One standards and that the organic fruit pool should have its own Class One standard which was less stringent on blemishes, shape and size. The OSC rejected this argument and maintained that the Class One standard should be the same for all fruit and that this was a condition of the organic fruit pool's existence. The only variation on this was that a small dispensation was granted to the organic pool to allow the export of small organic fruit (count size 46) up to 1993, two years after the minimum permitted size for Class 1 fruit was raised to count 42. This allowed a greater volume of organic fruit to be marketed.

Consequently, the first quality standards for exporting organic fruit were controlled by the NZKMB rather than the organic growers. This in itself might partly explain why organic yield estimates were substantially higher than the amount of fruit actually processed to the Class One standard. Previously, organic growers had supplied the domestic market which demanded a much lower quality standard than that set for Class One export fruit.

While some organic growers considered that the NZKMB's actions were too strict in 1990, it was clear by 1994 that organic growers could produce a substantial amount of fruit to the Class One standard. This fact certainly confounded the expectations of some conventional growers who anticipated that the imposition of Class One quality standards would eventually force the abandonment of the organic fruit pool because they believed that organic methods could not consistently produce Class One fruit.

Although this set of high quality standards was imposed by the NZKMB on organic fruit in 1990, the organic growers themselves participated in a decision to lift the standards for organic fruit even higher in 1995. The Class One quality standard was particularly tough on the cosmetic appearance of fruit. However, any fruit that passed the visual appearance criteria, but had some

minor pest infestation present would be graded as 'market restricted' (the same option exists for Kiwigreen fruit). This fruit was then made available to those markets that did not have restrictions on particular pests. Such fruit was restricted from some of the most lucrative markets with the tightest phytosanitary controls. A market restriction also imposed a logistical cost to the pool in segmenting the fruit and in assembling consignments to various markets. In 1994, 42% of organic fruit was graded as market restricted, and in 1995 this level rose to 53%.

Consequently, in 1995, the OWP discussed how to reduce the level of market restriction on organic fruit. The OWP decided that much of the difficulty was with the newer growers who had recently converted to organics not being skilled enough in the application of soft sprays. Instead of targeting their soft sprays to specific incidences of infestation, the new growers were still using the conventional calendar spray techniques, but substituting soft sprays for hard sprays. The resulting policy, which was unanimously endorsed by the OWP, made compulsory the registration with, and monitoring by, a Kiwigreen pest monitoring centre for all growers wishing to supply the export pool. The cost of monitoring was at that time met by the NZKMB. Also, a late season inspection of all organic orchards would be made to determine whether there were any particularly heavily infested areas which should not be harvested. These instructions were supported by a 10% price penalty on market restricted fruit for 1996.

The results were dramatic with the level of market restrictions dropping from 53% of the crop in 1995 to 9% in 1996. What was also significant was that this change to the quality standards for organic produce was discussed and unanimously agreed upon by the three parties in the OWP – the NZKMB, the growers (including the chair of the OKGI) and the BIO-GRO NZ inspector.

Emerging industry structure: conclusion

The above sections have outlined the way in which a number of different parties have been involved in the evolution of a viable industry structure for organic kiwifruit exporting.

- The NZKMB has provided a particular framework which, while being somewhat antagonistic towards organic kiwifruit production in its earlier manifestations, nevertheless provided key structural factors that advantaged the exporting of organic kiwifruit in comparison to other organic production sectors. It also provided a direct conduit to the marketplace for growers.
- Within this wider industry structure, organic growers have developed political representation through both the OKGI and OWP that has given

them far closer contact with the industry decision-making process than their organic counterparts in other production sectors.

- The relationship between the kiwifruit growers, NZKMB and BIO-GRO NZ has been positive with a high level of interaction between all parties in both the inspection process and in the wider extension of organic ideas and methods.
- Finally, there has been a degree of co-operation that has developed through the OWP which has led to the successful development and implementation of strategic standards and plans at an industry level.

While the OKGI is a relatively new organisation, one of the future issues it faces will be how much influence the wider group of growers will have on discussions with the NZKMB. The OKGI may evolve to replace much of the activity of the OWP, or the way in which growers are selected to participate in the OWP may need to be reviewed. At the moment, this semi-formal body has an important role in the development of the industry, but the increasing size of the organic pool (and the corporatisation of the NZKMB into Zespri International Ltd and Kiwifruit New Zealand) may demand a more formal structure to represent the demands of an ever widening group of growers.

Development of knowledge systems

The production of fruit according to organic methods required organic growers to develop a new set of production skills. In Canterbury, Liepins et al. (1997) noted that organic growers used a variety of sources of information to learn about organic production. Primarily, growers used books, newsletters and informal networks to learn about organic techniques and skills. When industry bodies organised field days and seminars these were well attended but were not a frequent occurrence. In contrast to this, formal discussion groups and consultants were not widely used by growers to access knowledge about organics. Neither was the Christchurch Polytechnic (which runs organic husbandry courses) considered to be a significant knowledge source by most commercial organic growers (Liepins et al. 1997: 24).

The impetus for developing skills in organic production for kiwifruit in the Bay of Plenty differed from the pattern identified by Liepins et al. (1997) in Canterbury. The most obvious difference was in the prominent role of the Bay of Plenty Polytechnic and industry discussion groups to extend knowledge about organics in recent years. During the formation of the organic kiwifruit pool and in the first years of high recruitment to the organic fruit pool (1990-1994), growers who entered organic production recollected that

they learnt their skills in four basic ways:

- personal experimentation
- polytechnic courses
- Centrepac discussion group
- Kiwigreen programme

One of the defining features of organic production is the need for growers to be able develop skills appropriate to their own local production systems. Organic kiwifruit production is no exception, and many of the techniques that are used by organic kiwifruit growers were developed through personal experimentation by early organic innovators. Many recently converted organic growers found that this was one of the most appealing aspects of organic production as they were taking control over their own orchards again and not simply doing as they were told.

The Bay of Plenty Polytechnic provided a focal point for the development of organic skills for kiwifruit growers, and was particularly crucial during the first three years of the operation of the organic pool. Not only was it actively involved in running organic courses and was the home-base of the local BIO-GRO inspectors, but it was also used as a suitably neutral venue for meetings organised by the NZKMB for organic growers. Subsequent developments, including the formation of both the Centrepac discussion group and the Organic Kiwifruit Growers Association, shifted the focal point for information and skills acquisition away from the Polytechnic. These changes also altered the way in which the NZKMB interacted with organic growers. An Organic Newsletter was used to convey market information to growers, and eventually the OWP came into being.

Throughout this period, the Polytechnic tutor was also the BIO-GRO NZ inspector which meant that the Polytechnic was a forum for both learning about production skills as well as the procedures required to obtain and retain certification. This contrasted with the Canterbury experience where growers found the prospect of dealing with BIO-GRO NZ a disincentive and often relied on WFF staff to negotiate this process for them (Campbell 1996).

The second important initiative in the development of knowledge systems was the discussion group that formed around the Centrepac packhouse. This discussion group initially started in 1993 as a focal point for organic suppliers to the Centrepac packhouse. Since then, the group has consisted of about 30 suppliers to Centrepac who attend the monthly meetings on a regular basis. Other organic growers and interested conventional growers have also been welcome to attend. As the Polytechnic crop is packed by Centrepac, the Polytechnic organics staff have also been members of the core discussion group. Two horticultural consultants who have an interest in

organics also attend. Consequently, some monthly meetings have had between 40-60 persons attending, and it is common for several members of an orcharding family to attend. Meetings are held on a different Centrepac supplier's orchard each month, although some orchards belonging to veteran organic producers such as Trevor Caines are visited on a more regular basis.

This discussion group was often cited by organic growers as the place at which they first became interested in organic production and the forum in which they learnt about the skills necessary for organic production. Given that the Polytechnic tutor also attended and contributed to discussion there was no identifiable conflict between the two learning forums. The tutor/BIO-GRO NZ inspector also considered that the discussion group was invaluable for his role as an inspector because it gave him a chance to hear the views of growers and gauge their level of commitment to organic production in a venue that was less pressured than a formal orchard inspection for certification purposes. As he put it 'you can tell if a grower has attended the last 10 discussion group meetings that their commitment to organics is genuine and that you can be confident in granting them transitional status'. A common theme among members of the discussion group was that they originally attended with an interest purely in how to obtain a higher premium for their fruit, but over a period of time became converted to the wider benefits and philosophy of organic production.

The Centrepac discussion group has been such a success that one major packhouse – Baypak – is now organising its own organic discussion group.

Another way in which growers claim that they learnt skills helpful to organic production was through the Kiwigreen programme. A number of growers argued that they moved away from conventional production initially to Kiwigreen production because the 'jump to organics was too large'. Kiwigreen taught them that pest control could be managed through monitoring and the use of soft sprays and consequently they began to question whether they could also attempt to move further towards organic production by learning about organic soil fertility methods and orchard management. As one grower recalled, 'I was always most concerned about pest management, the rest was easy once Kiwigreen proved that pests could be managed without using hard sprays'.

In conclusion, two features of the current situation require some comment. First, the current structure of knowledge exchange and skills development seems relatively robust, with a number of interested parties meeting on a regular basis. This compares favourably with other regions which tend to rely far more on the personal innovation of growers (and their own informal

networks), or on the corporate participants in the industry such as WFF to organise such events. While this corporate participation is reflected by the dominant role that Centrepac plays in the Bay of Plenty, the unusual feature is the close relationship between the Polytechnic organics programme and industry participants in kiwifruit production. The continued growth in organic kiwifruit production, the emergence of new packhouses dedicated to organic fruit, and the establishment of new discussion groups, means that the knowledge systems operating will continue to evolve. This leads to the second unusual feature of the Bay of Plenty situation: that neither the NZKMB or any formal R & D organisation have played the dominant role in extension and knowledge systems that WFF has for its suppliers in Canterbury. In part, this is due to the fact that successful systems of knowledge exchange have serendipitously developed of their own accord among other industry participants. Although the NZKMB played a crucial support role in the first 2-3 years of the organic pool, much of its contribution (and that of the crown research institute most directly involved in kiwifruit) has come indirectly through the Kiwigreen programme. Considerable effort was invested by the NZKMB in developing the skills and infrastructure needed to implement Kiwigreen, including the establishment of pest monitoring centres employing trained pest scouts. Organic kiwifruit growers have been able to tap into this knowledge and the associated skills and services to meet one vital part of their requirements.

Kiwigreen and organic production

The existence of what might be called an 'intermediary' green production system alongside fully organic production raises some vital questions. These questions are crucial because opinion is divided within the organics movement as to whether intermediary systems should be encouraged as a 'stepping stone' to organic production, or discouraged as a 'compromise' which only partially resolves the issue of long-term sustainability and which also distracts the green dollar away from the more complete solution – organic production. Hitherto in New Zealand, there have been no instances of both organic and intermediary systems existing within one production sector (although current activities such as Project 98 may well increase the incidence of such dual systems). Therefore, the kiwifruit industry is an important test case for how an intermediary system impacts on organic production.

The following section outlines three positive ways in which Kiwigreen has influenced organic production, and then discusses the one potentially

negative threat posed by Kiwigreen. These four influences involve:

- production systems
- infrastructure
- ideology
- the performance of organic kiwifruit in the marketplace

Production systems

This chapter has already outlined the four principal areas in which organic production differs from conventional production – pest control, soil fertility and orchard management and disease control. Of these, conventional growers were most concerned about pest management as the barrier to converting to organics, and this fear was reinforced by the widely publicised experience of the Sayers in the mid 1980s.

Kiwigreen was originally designed as a system that would completely eradicate hard sprays from being applied to fruit during the growing season, as it focussed on producing fruit with zero residues. More recently the emphasis has been modified to a system in which sprays (both conventional and benign) are only applied when there is a demonstrable need for pest control, with residues only 5% of the levels allowed on conventional fruit, and benign sprays as the preferred option. The dramatic reduction in hard spray usage and the transition to monitoring pests rather than calendar spraying convinced a number of conventional growers that pest control could be achieved using benign products. This played a major part in their decision to move to organic production (to be discussed in more detail in the next chapter).

In essence, Kiwigreen became the conduit by which R & D on biological systems of pest control became accessible to organic growers. The fact that Kiwigreen was institutionally supported and funded by the NZKMB meant that the organic growers could benefit from a level of research expenditure that would never have been justified by organic production alone. Thus, Kiwigreen provided a crossover benefit to organics by supporting R & D expenditure into more benign pest management systems and by extending this system to the vast majority of growers.

Infrastructure/cost benefits

The monitoring of pests is an essential feature of good organic husbandry, yet this feature of organic production was not quickly adopted by all new converts to organic kiwifruit production. The 'market restriction' policy developed by the OWP indicated two things. First, that some new organic growers retained the use of calendar spray regimes, or attempted to produce organically using a zero-input approach and, second, that the pest

monitoring infrastructure provided by Kiwigreen could be successfully utilised by organic growers. Pest monitoring is generally considered to be a cost that organic agriculturalists and horticulturalists have to bear compared to conventional producers, but in the kiwifruit industry, the Kiwigreen programme effectively provides pest monitoring at marginal rather than full costing for organic producers, thus reducing the relative costs of organic kiwifruit production.

The other infrastructural issue was the way in which packhouses became more sympathetic to the needs of organic producers once they had experience with the much greater volumes of Kiwigreen produce. Grading of organic fruit became less zealous and graders became more accustomed to examining insects on fruit. Instead of operating in a 'faunal desert' created by an overuse of broad-spectrum insecticides, graders developed new skills at identifying which insects had phytosanitary implications. Techniques to improve the removal of contaminants during packing are also being considered to improve the handling of both Kiwigreen and organic kiwifruit.

Ideological benefits

The above sections have briefly reviewed the way in which actual practices and structures developed through Kiwigreen had crossover benefits for organic production. However, these are perhaps less influential than the ideological benefits. Kiwigreen has changed the way in which industry participants have thought about 'green issues' and, by implication, organic production. The Italian Residue Crisis which finally spurred the NZKMB's full backing of the Kiwigreen programme signalled an end to one of the most pervasive barriers to the development of organic kiwifruit – the idea that a 'green' product would reflect negatively on the mainstream conventional product. The development of Kiwigreen signalled that the NZKMB no longer considered conventionally grown kiwifruit to be its 'peak' product and recognised that the presence of chemical residues (no matter how beautiful the fruit) was a major barrier to the future success of the industry in all markets. Consequently, the single most damaging idea, the core of the institutional culture of resistance to organics, was fatally undermined. It is interesting to note that some institutional sentiment is now expressing a new mode of resistance against the idea of organic production. Instead of claiming that organic product poses a threat to the wider industry, the newer version is that Kiwigreen is a better way forward towards an acceptably green product than organics. This is in no way as damaging an argument. Advocating that organics was a danger to the industry was far more serious and restrictive than debating the various merits of 'green' production systems.

In conclusion, the above three factors have all worked for the benefit of organic production. It must be emphasised, however, that all these factors have impacted on only one part of the overall organic food system – the production sector. To clarify, these benefits have accrued in the general production of organic kiwifruit – its techniques, the number of growers attempting organic production and the infrastructure supporting this kind of production. What none of these factors influences is the performance of organic fruit in the marketplace. It is here that some commentators suggest that an intermediary eco-label like Kiwigreen might pose a threat to organic production (Kristensen 1997).

Kiwigreen and organic fruit in the marketplace

One of the persistent concerns of some members of the organics movement is that intermediary labels will distract green consumers away from fully organic products. Whether Kiwigreen fruit will detract from sales of organic kiwifruit is as yet impossible to determine. This is due to the fact that even though three quarters of the total kiwifruit harvest in 1996 was Kiwigreen, it has never actually been marketed under its own label. The reason for this conforms to the same logic exhibited by some NZKMB members in respect of organics – that a green product would undermine a conventional product in the marketplace. The result is that Kiwigreen can only be marketed now that there is 100% compliance with the system. During 1997, the NZKMB integrated Kiwigreen techniques into a wider promotion of the environmental qualities of the new Zespri brand kiwifruit (as distinguished from a Zespri organic kiwifruit). This new marketing initiative combines Kiwigreen pest management systems with recyclable packaging and electronic traceability systems on all trays of kiwifruit to create what is marketed as 'environmental integrity' in the standard Zespri branded kiwifruit (Zespri International Ltd. 1997). Consequently, the new Zespri brand for all New Zealand kiwifruit is being marketed under what is being constructed as an 'eco-label' which is based on soft technology options and low-residue fruit. Therefore, Zespri branded fruit will fall into two tiers; 99% being Zespri Kiwifruit produced under Kiwigreen systems, and 1% being Zespri Organic Kiwifruit.

It will not be until 1998, however, that market returns will indicate whether Kiwigreen produced fruit under the new Zespri Kiwifruit brand have actually impacted on sales of Zespri Organic Kiwifruit in the marketplace. To simplify discussion of these two tiers, the following sections will refer to them as Kiwigreen and organic fruit.

Four possible scenarios might develop for organic fruit sales:

- *reduced market share*: Kiwigreen will capture some consumers who hitherto have purchased organic kiwifruit purely to obtain a product free of chemical residues. These consumers will prefer Kiwigreen due to its lower price compared to organic.
- *separate niches*: the long term recognition of specifically organic produce in the marketplace will remain as most consumers of organic food will value the organic label above a 'food safety' product like Kiwigreen. Organic kiwifruit will continue to prosper from the rapid increase in consumption of organic foods generally rather than being tied to the specific market for NZ kiwifruit. Thus, the two products will predominantly cater to two different market niches.
- *increased market profile*: as the amount of market promotion for specifically organic kiwifruit has been nearly non-existent, the arrival of a 'green' marketing campaign for Kiwigreen may actually attract consumers to organic kiwifruit who were previously unaware of the existence of such a product. Thus, organic kiwifruit might experience a market spinoff effect from an active promotion of Kiwigreen fruit.
- *market halo*: in this scenario, organic products might prove beneficial for the marketing of Kiwigreen products by operating as a keyhole product that enables marketers to couple highly desirable organic fruit with Kiwigreen product. In this scenario, organic fruit creates a market halo for its supplying company and has a positive spin-off for other categories of non-organic fruit.

It is almost certain that the three predominant organic markets – North America, Japan and Europe – will not react in a uniform manner to the presence of Kiwigreen and organic fruit. On balance, the predictions of one NZKMB marketer that Kiwigreen would 'wipe out' the market for organic fruit seems somewhat negative. The American natural foods stores and natural foods supermarkets are one of the fastest growing sectors of food distribution in the USA (Tradenz 1996), and these stores specialise in having both fully organic and 'residue free' produce side by side on the shelves. Sales of both types of products seem to be increasing in parallel, indicating some justification for scenario two in the USA – *separate niches*. Meanwhile, the complete absence of any significant marketing of organic kiwifruit in Europe suggests that scenario three – *increased market profile* – might be a possible outcome in that market. Scenario one – *reduced market share* – might apply in the Japanese market where food safety is a strong determinant of consumer preferences. However, Campbell (1996) identified in the case of WFF that the relationship between different categories of food product – organic and conven-

tional – in terms of market desirability, did not always conform to the expectations of New Zealand marketers and in fact operated according to scenario four – the *market halo* scenario. Their experience in the Japanese market has led WFF to target a green 'pyramid' as their long term profile in the Japanese market. The green pyramid involves peak products like organics at the top, with an intermediary system in the middle and bulk conventional items at the base. They consider that this profile provides the most benefits when attempting to market food products into Japan. This green pyramid represents a similar profile to the initiatives by Zespri International with Zespri Organic Kiwifruit at the peak and Kiwigreen produced Zespri Kiwifruit in the larger second tier.

A final subsidiary factor is the relationship between Kiwigreen and organic fruit in terms of their storage capabilities. The above discussion is entirely centred around the 'food safety' attributes of the two types of kiwifruit. However, the NZKMB clearly recognises that organic kiwifruit has better storage qualities than conventional fruit and it is this quality which attracts some major institutional purchasers to organic fruit. It remains to be seen whether Kiwigreen produced fruit will have a better storage profile than conventional fruit and thus close this gap on organic fruit.

Conclusion – Kiwigreen and organics

The development of the Kiwigreen programme has had substantial benefits for organic producers – both by creating systems, skills and infrastructure that could cross over into organic production, and by undermining the main ideological resistance to greener products and production systems. Market returns over the next few years will produce a more balanced picture as to whether Kiwigreen is fully beneficial to organic production, but the early indications at the production end of the food chain are almost totally positive.

The question remains as to whether an intermediary system would provide so many benefits within a different industry structure. The existence of an all-encompassing industry body to coordinate the long term strategic development of the kiwifruit industry is undoubtedly a major contributor to the successful situation that is now in place. The ability of the NZKMB to impose an industry wide programme of dramatic change, such as has occurred with the moving of all exports to Kiwigreen (or organic) in 6 years, could not be expected in other, less centrally organised, industries. Thus, the rapidity of the de-escalation of institutional and ideological resistance to green products – a major positive for organics – must be linked with the wider industry structure rather than just with the intrinsic merits of the Kiwigreen programme alone.

■ Chapter four

Grower Decision Making

The previous two chapters have concentrated on issues at an industry level and on developments in industry structure, processing, export structures, and grower activities within these wider structures. This chapter considers more directly issues arising from a survey of growers. Growers have been forced to make decisions about how they will respond to the structural changes and constraints already outlined. Over the last five years, growers have had to decide whether they will continue to produce conventionally, grow organically, or grow using Kiwigreen techniques. The way in which different growers approach such decisions has been of crucial significance in the development of the kiwifruit industry. This chapter is based on a grower survey conducted in 1996 – at a time when growers had three choices of management system for their orchards.

Methods

The results presented in this chapter are derived from a structured interview programme of kiwifruit growers. These interviews were used to form an 'ethnographic decision tree' which identifies key ideas and attitudes held by the growers themselves when making management decisions.

A random sample was taken from each of the three grower groups (conventional, Kiwigreen, organic) so that some of the quantitative elements of the decision tree could be emphasised along with the fundamental characteristics of decision

making. The NZKMB's list of grower names for the 1996 season by MAF number was used as a population from which to draw the samples. Growers were selected from the Bay of Plenty area, but not from Nelson and other North Island locations. Growers in these latter two areas at the time had less freedom of choice regarding the Kiwigreen programme, and consequently less can be learned from them about decision making in terms of choice of production system.

From the complete list of 579 conventional growers a small proportion was taken to yield a sample of 17 cases, and from the complete list of 1,491 Kiwigreen growers a similarly small proportion was taken to yield a sample of 22 cases. From the complete list of 39 organic growers a larger proportion was taken to yield a sample of 13 cases. The samples were drawn from the list by selecting each *n*th grower: That is, the samples were drawn sequentially in order to avoid any bias. Table 4.1 shows the population and sample numbers for each of these groups. The table also shows the sequence from the initial sample to the final sample actually used and the proportion each sub-sample is of its respective population. The number of growers in the preliminary sample (52) exceeded the number in the final sample (48) because of three factors. First, there were two instances of multiple listings in the organic sample. Second, one conventional grower had sold their property and it was not relevant to interview the new owner. Third, there was one grower who was not able to be contacted during the period of the research. It should also be noted that 4 out of 17 in the conventional sample were incorrectly classified and they were in fact Kiwigreen growers. One Kiwigreen grower was a keen organic grower as well, and was included in the organic sample. The table shows that the conventional and

Table 4.1: Population and sample numbers for the three groups sampled

	Population		Preliminary Sample		Interviewed	
	No.	%	Selected	Changes	No.	%
Conventional	579	27	17	less 4 not CV = 13-1 sold = 12	12	2.1
Kiwigreen	1,491	71	22	22 + 4 (above) = 26 - 1 org. = 25 (-1 not contacted)	24	1.6
Organic	39	2	13	13 less 2 doubles = 11+1 = 12	12	30.8
Total	2,047 ¹	100	52		48	

Note 1: This number is not the total number of growers in the Bay of Plenty. It is the total number of MAF numbers.

Kiwigreen samples were about 2% of the population while the organic sample was nearly one third of the population. While the proportions for the first two groups are low it must be appreciated that large samples are not necessary to develop an adequate decision tree. Also, the population numbers given by these data significantly exceed the actual number of growers because many growers submit fruit to the NZKMB under several MAF numbers as they own more than one orchard.

Of the overall sample of 48 growers, most (42 or 88%) were interviewed in person. Field visits were arranged in August and early September, 1996. Each selected grower was telephoned and an appointment made for a time that was convenient, with interviews ranging from 30 to 60 minutes. After the purpose of the visit had been explained to them, growers gave a thumbnail sketch of their property, indicated their land use and reported any other paid employment. They also estimated, in gross terms, the proportion of their income derived from kiwifruit, from other land use and from off-farm work. The interview then moved on to their status as either a conventional, Kiwigreen or organic producer, why they chose to pursue that particular approach to management, and the advantages and disadvantages they perceived in it. Growers enjoyed explaining their approach, and there was little need to ask many questions. However, questioning was used to check or clarify what was being said. Sometimes growers mentioned organic production but typically this topic was raised by the question: "Have you considered organic production?" Finally, towards the end of the interview, growers were asked about what marketing changes they perceived as important, what environmental issues they thought may impinge on their management, and what opinions they had about the NZKMB.

The ethnographic decision tree model approach was used in order to develop an understanding of growers' attitudes and decision making regarding kiwifruit management. Decision tree research examines real world decisions where any choice is made and, while it is based on individual interviews, the decisions of a group of people are examined and interpreted to develop a decision tree model. The method uses ethnographic interviewing to elicit from the decision makers themselves their own decision criteria. Ethnographic interviewing involves approaching farmers or growers in a way that acknowledges their expertise in managing a farm or orchard, and is attentive to what they believe and why they manage in the way that they do. Interviews explore farmers' or growers' thinking and record in their own terms their reasons for actions, and constraints that determined some outcomes. It is this kind of approach which distinguishes ethnographic decision tree modelling from other ways

of analysing decision making. Other approaches have tended to form decision making models prior to surveying growers with the consequence that – 1) growers are forced to answer according to categories that conform to the researcher's expectations, and 2) the researcher is unable to assess unexpected or unanticipated factors that the growers themselves can immediately identify.

Once the interviews are completed the decision criteria identified in the interviews are then combined in the form of a decision tree, or a set of 'if-then' rules. Ethnographic decision tree modelling seeks to develop a complete decision tree comprising a series of connecting decision criteria. The decision criteria are discrete questions, the answers to which are either true or false for any particular interviewee. The tree must allow each interviewee to move progressively through a series of criteria to arrive at an outcome which is true for that interviewee. In addition the tree must combine criteria for all members of the sample group in a logical way. The tree thus tells why a particular outcome is reached because the outcome is preceded by a particular set of criteria relevant to that particular interviewee. However, the criteria are not imposed by the researcher but are derived carefully from analysis of the open-ended interviews to record what the farmers or growers themselves state and believe. The interview data must be carefully examined to learn what criteria motivate the subject's decision making, and then these criteria are gradually integrated into a complete decision tree. The completed tree is predictive of outcomes once decision criteria are known: That is, for anyone for whom a certain set of criteria is true, the tree predicts that person's decision, in advance of observing what they will do. Decision trees thus represent the logical structure that underlies the decision process used by the group being studied.

After completing two field trips to the Bay of Plenty, and interviewing 42 growers in person, the remaining 6 growers were telephoned from Christchurch. These telephone interviews worked well with all growers readily explaining their situation. The basic property data were recorded, along with their views on conventional, Kiwigreen or organic production. Sufficient detail was available to determine where these growers fitted into the largely finalised decision tree. While opinions about future trends in marketing and on the NZKMB were canvassed, it was not possible to cover these, and any other issues that arose, in the same depth as was possible in the personal interviews.

Results

Analysis of decision making

The decision tree representing the decision making of conventional, Kiwigreen and organic growers is presented in the next three figures, but it is in effect one decision tree. Figure 1 focuses on the decision criteria that relate to organic farming and identifies why organic growers were following this production system, while leaving the 36 remaining cases to go on to the next part of the tree. It also identifies other factors that impinged on the decision to grow organic kiwifruit. Starting the tree with the organic criteria is somewhat arbitrary – they could have been included elsewhere in the tree. However, this would have required reworking the tree to show why some of the Kiwigreen criteria did not apply to them. It is easier to start with the organic criteria and note at criterion 7 that the Kiwigreen programme was a factor. It is also appropriate to start with organic criteria because, historically, a few of the organic growers were growing organically before Kiwigreen started – meaning that for these growers the decision to grow organically preceded the Kiwigreen decision.

Figure 2 depicts the Kiwigreen decision tree, which shows the specific criteria which encouraged growers to follow the Kiwigreen programme. The figure also shows why conventional growers have persisted with conventional production, and that two conventional growers had decided to leave the industry.

Finally, Figure 3 adds to the basic data in the Kiwigreen decision tree by showing how many Kiwigreen growers had considered organic production and what they thought about it. In this figure there are only two outcomes: to grow fruit using Kiwigreen techniques with some organic production, or use Kiwigreen systems alone.

Focusing on the motivations for growing organic kiwifruit, five are expressed (criteria 1 to 5). Criterion 1 refers to organic philosophy and the environment, and rests on an appeal to a general principle which guides behaviour, in this case to grow organically. Criterion 2 refers to a personal experience of ill health that was sufficient in itself to motivate a move towards growing organically. It must be noted that out of the total sample of 42 growers personally interviewed, 11 (26%) mentioned that they had experienced chemical poisoning in the past. However, for most of these growers this experience had not been sufficient in itself to motivate a change to organic growing. Criterion 3 refers to the premium returns paid to organic growers. For two of these three cases, organic production had been a response to the low prices received in the early 1990s. The other grower wanted a product that was differentiated from conventional kiwifruit. Criterion 4 refers to growers who had disliked chemicals sufficiently for this

factor to be decisive in the decision to grow organically. Finally, criterion 5 relates to one grower who had a perspective on soil health which had led to following organic methods. There were 12 growers who agreed with any of criteria 1 to 5 and thus had been motivated to grow kiwifruit organically.

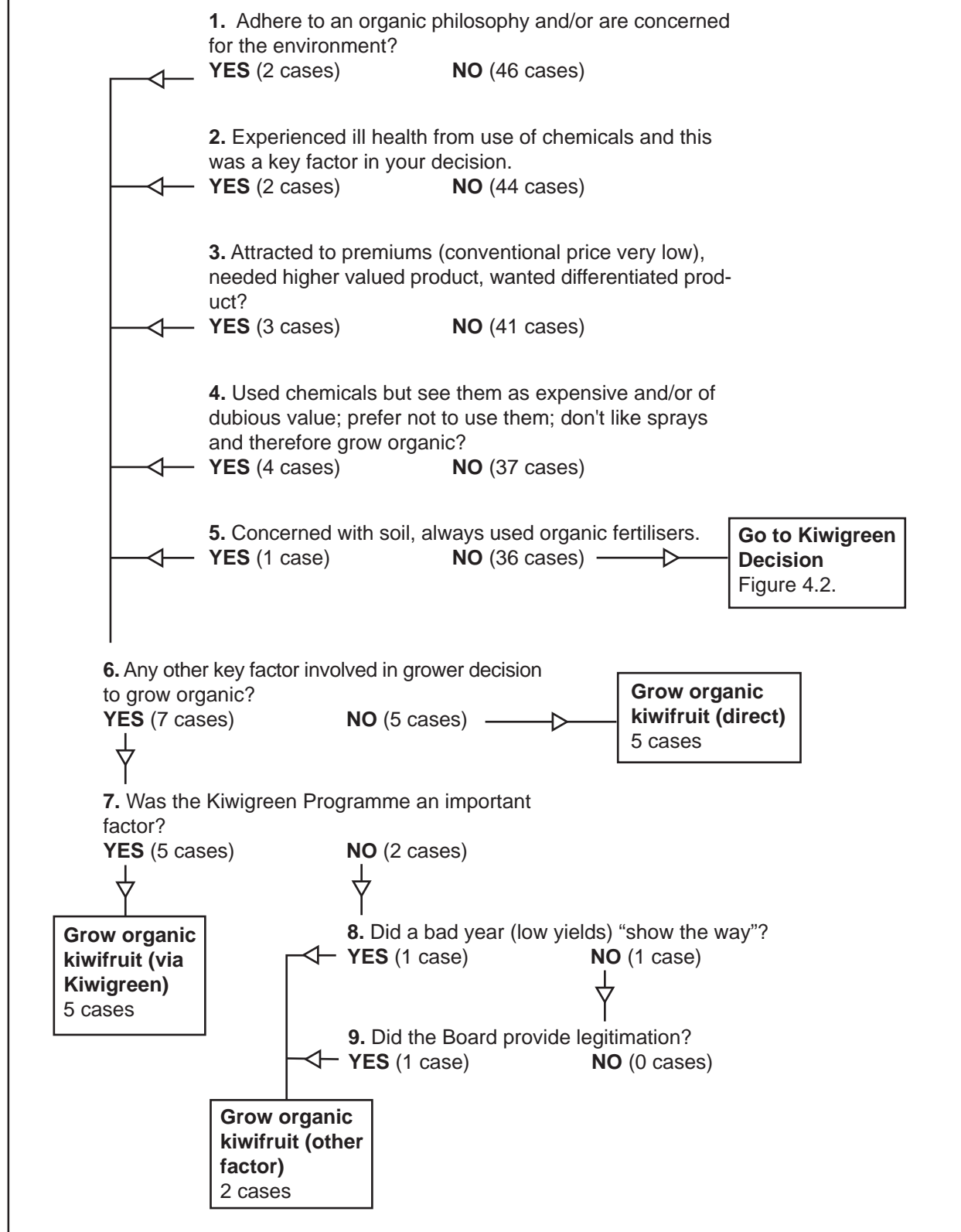
Of these 12 growers there were seven for whom another factor played an influential, but not decisive, role in their decision making. Most important was the Kiwigreen programme itself (criterion 7) which, for five growers, had provided a good means of entry into organic production. One grower found that a ‘bad’ year (criterion 8) with low production under conventional management, but better quality fruit, had given a good net return and this had indicated to him that the lower yields under organic production were potentially economically viable. Finally, there was one grower for whom the NZKMB’s literature on organic kiwifruit provided proof that organic production was credible and acceptable, and in effect provided legitimation to the organic system for producing kiwifruit (criterion 9).

The 12 organic growers were well committed to organic production with 10 saying that they would still prefer to produce organically if premiums were to reduce, and two saying that they would settle for Kiwigreen production or a mostly organic regime. Under such a scenario, some of the committed growers said that, if they had to ‘go broke’, they would prefer to do so growing organically rather than conventionally.

Data on the number of years involved in growing organic kiwifruit are available. The average length of time involved for the 12 organic growers was 4.4 years.

Figure 2 shows the criteria relevant to the decision to participate in the Kiwigreen programme. This decision tree is relatively simple: it lists six criteria which identify distinctive reasons for joining the Kiwigreen programme. Criterion 10 refers to the largest group (ten cases) who had followed the lead of the NZKMB and had accepted Kiwigreen. These growers referred to market need and to their preference for fewer chemicals, or its obverse: that there was, or had been, too much spraying. Criterion 11 refers to the second largest group who had decided to grow Kiwigreen, but were reluctant for some reason. This reluctance stemmed from a number of sources. In some cases these growers were sceptical of Kiwigreen methods or they saw it as introducing unacceptable levels of risk. In one case a grower had been guided by his packhouse which was not keen on Kiwigreen. Two observations can be made: first, many longer-standing Kiwigreen growers acknowledged that initially they had been sceptical, but in the light of experience they had found that Kiwigreen was not as problematic as first thought. To some extent there has been an

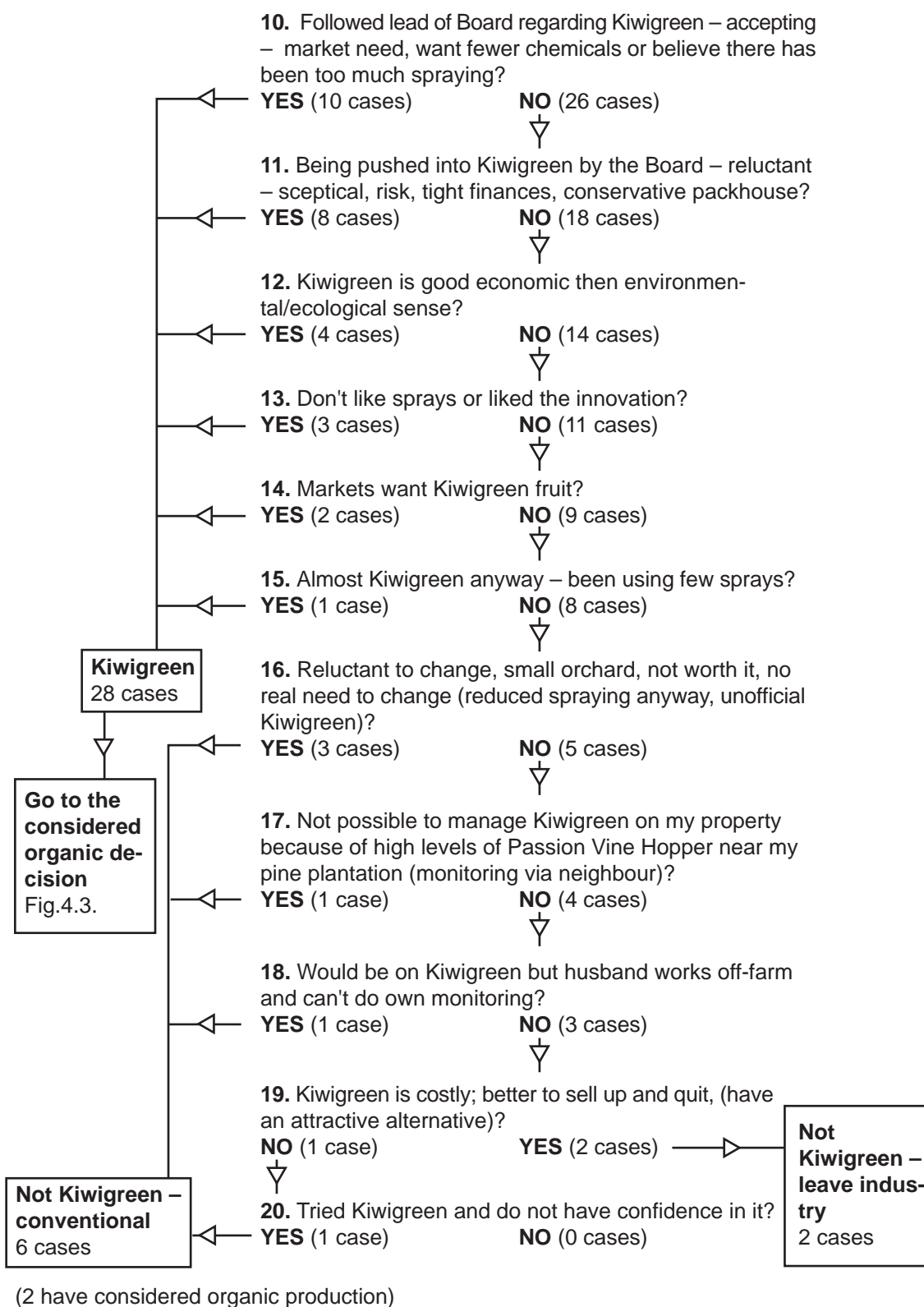
Figure 4.1 The Organic Decision (48 cases)



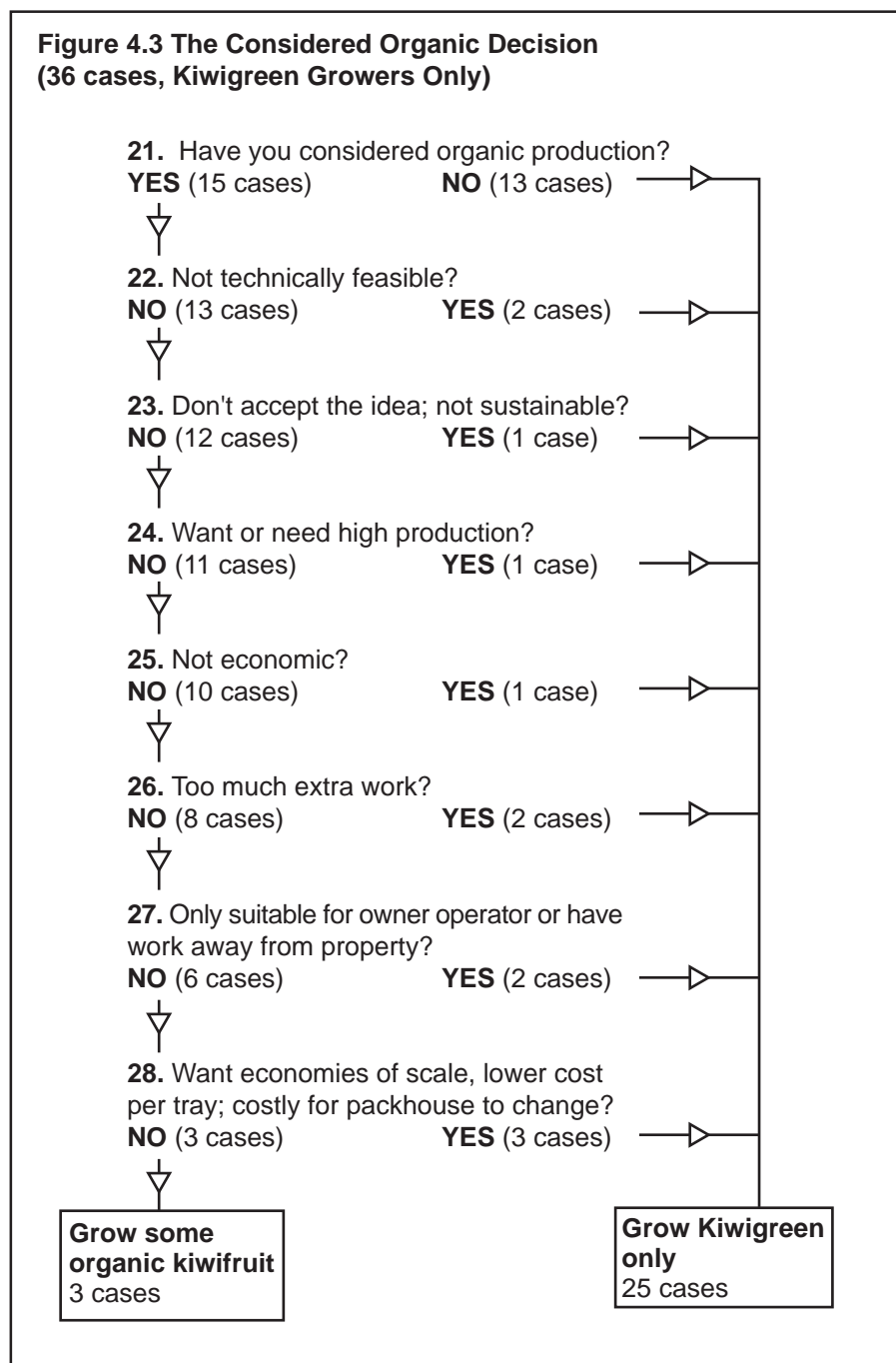
evolution in growers' appraisal of Kiwigreen: as they have had more experience with it, their acceptance of it as a successful system has increased. This prudence or caution is entirely understandable and it is only reasonable to expect growers to firmly endorse a change in management techniques after they have had first-hand

experience of it. Data are available on the number of years each grower had been in the Kiwigreen programme. The average for growers agreeing with criterion 10 was 3.3 years, while for those growers agreeing with criterion 11 it was 1.0 years. Some growers who now agree with criterion 10 may have agreed with criterion 11 a few years previously.

Figure 4.2 The Kiwigreen Decision (36 cases)



**Figure 4.3 The Considered Organic Decision
(36 cases, Kiwigreen Growers Only)**



Kiwigreen. They also liked the environmental benefits, which were seen for both workers on the orchard or other people living on or near the orchard who may be influenced by chemicals. Criterion 13 refers to sprays and by implication the chemicals used under conventional regimes, and criterion 14 refers to market needs for Kiwigreen fruit. Both of these criteria are relatively forthright and simple and refer to concepts entailed in criterion 10 which have been part of the rationale used by the NZKMB to promote Kiwigreen. The last criterion (number 15) in this suite of reasons given for growing Kiwigreen included the one case where there had been little perceived need to officially change because they had reduced their spraying anyway. This grower was planning to enter the Kiwigreen programme in the upcoming season.

In general, there were six different reasons given for growing Kiwigreen fruit, with most growers accounted for by criteria 10 and 11. Of the 28 growers who had chosen to use Kiwigreen tech-

The second observation relates to the perceived risk of Kiwigreen, and how this risk is increased if the grower's financial situation is very tight. Some growers, who may be sympathetic to Kiwigreen, are nevertheless unable to introduce any uncertainty into production when they need every kiwifruit they can produce.

Criteria 12-15 were less frequently used by growers to explain their decision to grow Kiwigreen fruit. The first four of these have parallels with criterion 10, but they do not mention the NZKMB explicitly. It is likely that the NZKMB had influenced these growers to some degree, but this was not acknowledged in their current thinking. Criterion 12 refers to economic, first, then environmental benefits. These four growers (including two packhouse operators) had found that there were cost savings in using

techniques, four were changing to Kiwigreen in the upcoming season and 12 had changed to Kiwigreen the previous year and were continuing with it. The remainder had been using Kiwigreen since before last season. The average length of time involved in Kiwigreen for all of these growers was 2.5 years. Packhouse operators typically have adopted Kiwigreen. In the overall sample 10 packhouse operators were interviewed, eight of which were Kiwigreen: four of these selected criterion 10, two selected criterion 12 and two selected criterion 13. (One packhouse operator had tried Kiwigreen and did not have confidence in it - see criterion 20.)

It is now possible to consider the decision making of growers who had chosen not to be part of the Kiwigreen programme. Figure 2 shows that most of the remaining eight cases are accounted

for by criterion 16. This criterion specifies that these growers were reluctant to change because they had a small orchard and considered that the change to Kiwigreen was just not worth it. In one case the grower had no real problem with insects and could not see the need for Kiwigreen. The average orchard size for these three growers was two canopy hectares compared with six canopy hectares for all the conventional growers interviewed. Criterion 17 refers to one case with a pine plantation adjacent to the kiwifruit: this grower believed that the pines harboured passion vine hopper. Criterion 18 refers to a grower who was sympathetic to Kiwigreen and wanted to change, but who could not afford monitoring and was unable to do it with family labour because the farm man worked off farm. Criterion 19 refers to two growers who had decided to quit the industry, pointing to the costs of Kiwigreen. It is possible that other factors, such as wanting to realise land value by subdividing their orchards, were more important in their decisions. Finally, criterion 20 applies to one unusual case where the packhouse operator had processed Kiwigreen and did not have confidence in it because there were high levels of leafroller damage. This operator was also under financial pressure to ensure that he had secure volumes of fruit to process. Thus, from the eight cases who had decided no to grow using the Kiwigreen system, there are six who remained conventional producers and two who were leaving the industry. Two of the six conventional growers had considered organic production.

The final part of the decision tree (Figure 3) explains Kiwigreen growers' attitudes to organic production. Typically, conventional growers had not considered organic production and Figure 2

notes that this was true for four of these six growers. For the 28 Kiwigreen growers, 15 had considered organic production (criterion 21). However, most of these growers had definite views about organic growing, ranging from the belief that it was not technically feasible (criterion 22), not sustainable in terms of providing enough food world wide (criterion 23), not economic (criterion 25), or too much extra work (criterion 26). One grower wanted or needed high production (criterion 24) and two growers saw it as only suitable for those who had time to work on the property, but not for those with significant off-farm work or for those packhouses who leased orchards and organised management by employing contract labour (criterion 27). Similarly, packhouse operators typically wanted economies of scale or low cost per tray (criterion 28) and for these reasons were unwilling to grow organic kiwifruit. The decision tree for those who had considered growing kiwifruit organically shows that, of the 28 Kiwigreen growers, only three had no reason not to grow organically and they produced both organic and conventional kiwifruit.

The numerical data used in constructing the decision trees can be analysed statistically because a random sample was used. A calculation of standard errors shows that the 95% confidence limits for the proportion who separate out as using Kiwigreen techniques is 78% (plus or minus 15%). For subgroups the smaller sample sizes involved mean that the error factors are even larger, so that none of these differences are statistically significant.

Table 4.2: Frequency of growers' responsiveness to market requirements

	Frequency			Average Score
	Very Responsive (3)	Responsive (2)	Not Very Responsive (1)	
Conventional (577)*	3	3	1	2.3
Kiwigreen (1,491)	15	4	0	2.8
Organic (39)	6	1	1	2.6
Overall Frequency (Weighted) (2,107)	11.6	3.7	0.3	2.7

* population size for this category

Grower Opinions

Tables 4.2 and 4.3 report on the assessments of growers' attitudes to market requirements and to the NZKMB respectively. These assessments were made after the interview by reading the interview notes to assign an appropriate score. (Assessments were not made for the six telephone interviews.) The results are, therefore, not the direct comments of growers, but the authors' interpretation of their comments. At best, they are broadly indicative of actual opinion among the growers in the sample.

The issue of market requirements was addressed by asking growers about their responsiveness to market demands for fruit produced in an environmentally sustainable way. Some growers were introduced to this topic by pointing out that there was a trend towards increased accountability on the part of growers and processors to do things in an environmentally responsible and accountable way. Each grower's response was assessed on the following scale:

3=Very responsive, this is an important issue.

2=Responsive, but reservations:

- has NZKMB got it right?
- requirements may be political.
- non-tariff barriers.
- finding an insect may lead to rejection from export.

1 =Not very responsive.

Generally, growers were very aware of this issue and evinced support for this topic. The scale ratings were typically '3' (very responsive) so that the overall weighted average score was 2.7.

Kiwigreen and organic growers appear to be more responsive than conventional growers although a Chi-square test to examine whether conventional growers were different to Kiwigreen growers showed that differences were not statistically significant.

Opinions about the NZKMB were also assessed, allowing growers to take up any issue they liked. The tape recorder was turned off at this time

to encourage frank expression of opinion (this was the last question asked). Again, a simple three point scale was used:

3=Generally favourable and positive, accepting of some imperfections

2=Favourable, but performance assessed as reasonable only

1=Critical, not good performance.

Table 4.3 shows a broader spread of opinion compared with Table 4.2. The overall average weighted score was 2.5 – basically near to the mid point meaning some reservations. However, there were many Kiwigreen growers who gave a generally favourable assessment so that their average score was 2.6. Conventional and organic growers were consistently more critical of the NZKMB, their average scores being 2.0 and 1.8 respectively. A Chi-square test to examine whether conventional and organic growers responded differently to Kiwigreen growers was significant at the 5% level. Other comparisons were not statistically significant.

Discussion and Conclusion

Summary of Results

The analysis of how growers decided which production system to follow produced one long decision tree, albeit with a relatively uncomplex structure. Five main reasons were isolated as the determining factors for those choosing to grow kiwifruit organically, and the Kiwigreen programme had a definite influence in five of 12 cases. The choice of Kiwigreen depended on six main reasons, but typically the majority either have followed the lead of the NZKMB or perceive that they have been pushed by the NZKMB, with slightly more giving the former reason. Conventional growers said they used one of four reasons for persisting with this form of production and in most cases were reluctant to change because they had a small orchard which they perceived was not

Table 4.3: Frequency of growers' opinions about the NZKMB

	Frequency			Average Score
	Generally Favourable (3)	Some Reservations (2)	Critical (1)	
Conventional (577)*	4	1	4	2.0
Kiwigreen (1,491)	12	2	2	2.6
Organic (39)	4	0	6	1.8
Overall Frequency (weighted) (2,107)	9.7	3.4	3.2	2.5

* population size for this category

worth changing. Finally, the decision tree shows that some Kiwigreen growers had considered organic production, but most of these growers gave one of seven reasons for not pursuing this approach.

Grower opinions on market requirements showed that most were very responsive, seeing that it was important to manage their orchards to meet market needs. Regarding the NZKMB, opinions were more widely spread, with some growers holding favourable opinions while others were critical.

General Discussion

The decision tree shows a relatively simple structure with sequential listing of reasons or motivations for determining each of the main outcomes. There is no apparent balancing, or trading off, of costs and benefits that typify more complex decision trees. However, implicit in the responses is growers' maximisation of financial returns and/or safety. For example, some organic growers have responded to premiums (criterion 3) or believe that smaller yields of higher value product give the best returns. For their part some Kiwigreen growers believe that their returns are maximised by responding to market needs. Some conventional growers now use less sprays and avoid the costs of monitoring in order to maximise returns. These findings illustrate that growers need to secure a return on their investment. On the issue of safety, growers are keen to make growing safer by not using toxic sprays, but for most this is only considered once profit is maximised. About one quarter of growers in the sample said that they had experienced ill health brought about by toxic chemicals, but for only two was this a decisive factor in determining their production system. It appears that the need for profit outweighs the need for safety, or putting it another way, the perceived risk from lowered profits is greater than the perceived risk from poisoning.

It is evident that there are different perceptions as to how profit is maximised, with growers following each type of production (conventional, Kiwigreen or organic) holding a distinctive viewpoint on this topic. Not one grower volunteered, admitted or made reference to any gross margin analysis which would clearly show the relative profitability of each production system. It appears that adherents of each system largely used non-economic factors in their decision making (as indicated by the decision tree) while pointing to economic and other problems with the alternative production systems. Furthermore, some growers appeared to be poorly informed about their alternatives. For example, conventional growers that were less sanguine about the Kiwigreen programme, pointed to 'horror stories' or cases of high rates of fruit rejection. They confidently asserted examples that showed Kiwigreen produc-

tion to be problematic. In another example, Kiwigreen growers were aware that there was a premium for organic kiwifruit, but this was deduced from their knowledge that organic growers produced fewer fruit – few reported accurately what the premium actually was. They typically guessed that it was about \$1.00 per tray when for the last five years it has been on average \$2.21 per tray.

The results suggest that attitudes to Kiwigreen change over time. Those for whom it is new are more likely to perceive it with trepidation, while those with experience of it are more likely to judge it favourably. Criteria 10 and 11 in the decision tree clearly showed that the former included growers with longer experience of Kiwigreen. Also supporting this view is criterion 12, reflecting that some growers had found that Kiwigreen actually saved money. The fact that the growers' perception of Kiwigreen is dynamic means that this programme, and probably any other, will always take time to be accepted by a majority.

Generally the criteria listed in Figure 1, which identify reasons for growing organically, are similar to those identified in earlier research in Canterbury. In that earlier research the same criteria were found, plus two others, namely – 'Don't want chemicals in food', and 'Experienced basic problems with conventional production'. There are also parallels with the reasons given for not accepting organic production, especially when growers refer to a lack of technical feasibility or the belief that organic production is not economic.

The decision tree does not explicitly contain criteria that can be seen as constraints to action, as is typical of other decision trees. However, some of the conventional growers said that they were favourably disposed to the Kiwigreen programme but were constrained from adopting it (eg. criteria 17 and 18). Further, some of the criteria that apply to those who have considered organic production can be likened to constraints (eg. criterion 27). The recent research on the decision making of organic growers in Canterbury identified four constraints on organic production, but three of these applied to part-time farmers or smallholders – a group not really included in the present study. In the case of kiwifruit growers the decision to adopt the Kiwigreen standard has been an important option followed by many growers, and this has meant that few have actually been constrained in their decision making.

In the present study of kiwifruit growers' decision making, a random sample of growers was used in order to make statistical assessments of population characteristics. However, as the results have showed, the comparisons of means for the sample data showed that the quite large differences were not statistically significant. Further, the standard error estimates of the population proportions were only useful for the larger

sub-samples. These limited results from statistical analysis stem from the small sample of 48 growers of three different types. Larger numbers for each group would be needed in order to undertake a more precise statistical analysis.

The decision tree shows that very few growers have serious objections to the Kiwigreen programme. For those growers who intended to follow conventional production in the current season there was one for whom there was a very particular reason against it (a pine plantation nearby which purportedly harboured pests), and one who was supportive but whose husband worked in Auckland. The two conventional growers intending to leave the industry were small growers each with alternative incomes. The remaining conventional growers were reluctant to change to Kiwigreen because they had small orchards and they see few, if any, benefits in changing. It is probable that no innovative policy would suit these three cases. They constitute a very small group of growers in total. In the final event, these growers had no choice as a decision was subsequently made by the NZKMB that there would be no exporting of kiwifruit in 1997 unless it was grown under Kiwigreen or organic production systems.

Generally, growers as a whole accepted the Kiwigreen programme. Even those who expressed some reservations still accepted that the industry had to change towards Kiwigreen. Most of the growers not already using Kiwigreen accepted that it would become compulsory in the near future – as it did.

Most Kiwigreen growers use hydrogen cyanamide (Hi-Cane) in order to encourage and regularise flowering. This management tool is also favoured by packhouses which manage orchards, since it contributes to their objective of ensuring consistent throughput. In contrast, organic growers do not use hydrogen cyanamide and believe that it is not necessary to ensure profitable production. If future marketing requirements lead to new management programmes which exclude the use of hydrogen cyanamide, then some Kiwigreen growers and most packhouse operators may find it hard to adjust to such a regime. Organic growers, however, are not faced by this challenge as they have already eliminated the use of hydrogen cyanamide.

It is likely that future management techniques that lend themselves to growers that are owner operators rather than those using contract gangs will be favoured by organic growers and some Kiwigreen growers, especially those living and working on their property. Such management techniques may contribute to a reversal of the current trend towards using contract labour. However, the profitability of growing kiwifruit, and the reliance of individual growers on 'off-orchard' income also strongly influence such a change.

Conclusion

Analysis of decision making supports the observation made in Chapter 2 that the development of the Kiwigreen programme has had substantial benefits for organic producers. The decision tree confirms that at the grower level, Kiwigreen provided a stepping stone to organic production. However, this was but one factor in the decision making process: at least five other reasons provided a direct motivation to grow organic kiwifruit, and for some growers the NZKMB provided legitimation for organic production. The influential role of the NZKMB was also illustrated in that part of the decision tree that related to the Kiwigreen decision. Growers either clearly followed the lead of the NZKMB directly, or took up the rationale for Kiwigreen that the NZKMB promulgated. Further, many conventional or Kiwigreen growers were aware of the organic option and had considered it. Most of these growers, however, had a definite reason for not growing organic fruit either because they thought it was not technically or financially possible or because they did not want to spend greater time to produce fewer fruit.

Conclusion

This report forms only the second of four regional case studies into the development of organic food exporting in New Zealand. Consequently, any significant comparative analysis of factors working for and against the development of organic exporting should appropriately be addressed once data is available from all four case studies. Therefore, these concluding remarks must serve only as a preliminary analysis of information emerging from both the Canterbury and Bay of Plenty case studies. The following discussion will examine:

- key findings of the Bay of Plenty study
- comparisons between Bay of Plenty and Canterbury

Key findings of the Bay of Plenty study

1) Speed of Organic Kiwifruit Development:

The most striking feature of the development of organic kiwifruit exporting is that since 1990 the growth of this sector has been very rapid. Prior to this point pest control provided a major barrier to developing successful organic production techniques. Once the technical barriers to production had been overcome and the NZKMB had established an organic pool the number of growers converting to organic production has been high compared to other sectors and the growth in volume of organic kiwifruit exporting has been even higher. The growth in organic kiwifruit exporting has provided a major component of the overall growth in organic food exporting in New Zealand, especially between 1993 and 1996. In 1997, organic kiwifruit growth rates have remained high while data from OPEG would suggest that some other sectors have also begun to experience rapid expansion in the exporting of organic products.

2) Infrastructure – the NZKMB: While there is clear evidence to suggest that the NZKMA hampered the development of organic kiwifruit in the 1980s, the establishment of an organic fruit pool by the new NZKMB in 1990 marked a major turning point in the development of organic kiwifruit production. The NZKMB effectively provided a 'total infrastructure' for the exporting of organic kiwifruit and growers could produce fruit knowing that (provided it met quality standards) it would be guaranteed to find a market. In this way, the marketing board structure worked to the advantage of organic production, especially as

the NZKMB persisted with the organic fruit pool for three years when the volumes of fruit suggested it would not be viable. While the kiwifruit industry structure did work to the advantage of organic exporting this does not support the idea that all producer boards might do likewise. The experience of organic exporting in the Dairy and Meat industries suggests the exact opposite – that institutional resistance to organics by a producer board provides a very effective barrier to the development of organic production. Consequently, producer boards are in a powerful structural position to either strongly help or strongly hinder the development of organic exporting.

3) Infrastructure – Post Harvest Facilities:

While the NZKMB provides an overall industry structure which directs organic fruit into suitable markets, organic producers also faced barriers in the grading and packing of their fruit. The emergence of a number of post harvest facilities that specialise in packing organic fruit has been a significant positive development for organic exporting. The storage qualities of organic fruit have been a major incentive for some post harvest facilities to pack and store organic kiwifruit.

4) Infrastructure – Grower Organisation, Education and Representation: Organic kiwifruit production is characterised by a high level of grower interaction and knowledge exchange. A politically active grower organisation, pro-organic packhouses, the Bay of Plenty polytechnic and the NZKMB itself have all provided venues for growers to interact and exchange information about organic production. Despite the small scale of organic production relative to the entire kiwifruit industry, the current structures of organic grower representation in the industry are quite strong. The NZKMB, BIO-GRO NZ and the organic growers all participate in the formation of NZKMB policy relating to organic production.

5) Certification and Quality: For the whole period from 1990-1997, all parties involved in the development of organic kiwifruit exporting have supported the existing BIO-GRO NZ standards for organic production, and the local BIO-GRO NZ inspector has been a participant in all industry policy decisions regarding organic production to ensure that the certified standards are maintained. The recent experience of Chilean organic kiwifruit being expelled from the Japanese market due to false certification has reinforced to all parties the need to maintain high levels of integrity in the inspection and certification of organic kiwifruit. What has been more contested is the nature of industry quality standards for Class One organic fruit. In 1990, despite some resistance from organic growers, the NZKMB insisted that the existing Class One standards be applied without modifica-

tion to organic kiwifruit. While some organic growers thought this strategy overly draconian and disadvantageous to organic production the strategy has been vindicated as the vast majority of organic fruit now meets the Class One standard. In fact, the combination of better storage quality in organic fruit, and unblemished cosmetic qualities has meant that organic fruit is now being used in trade expos as a generic representative of New Zealand kiwifruit.

6) Organic and Kiwigreen: perhaps the most intriguing area of the kiwifruit industry examined in this study is the emerging relationship between organic and Kiwigreen production systems. This is the first situation in New Zealand where a low-input regime has emerged alongside a fully organic system. As the initial stages of this development are now complete (with the Class One crop now totally Kiwigreen or organic) it is possible to make some assessment as to the influence Kiwigreen has had on organic. The positive effects of Kiwigreen on organic were:

- the presence of Kiwigreen pest management systems encouraged growers to convert to organic production by building confidence that they could manage their orchard without hard sprays.
- research investment by the NZKMB into pest management systems for Kiwigreen were equally applicable to organic growers.
- the pest monitoring infrastructure created for Kiwigreen proved very useful for organic producers.
- the presence of Kiwigreen fruit in packhouses meant that packhouse graders became more accustomed to dealing with insects on fruit. Previously, organic fruit had been stringently graded by packhouses accustomed to dealing with insect-free fruit produced under broad spectrum insecticide spray regimes. Subsequently, graders became more skilled at identifying which insects were actually undesirable.
- the development of Kiwigreen involved an institutional admission that the standard conventionally produced kiwifruit had undesirable qualities for some of its key consumers. This admission undermined some of the ideological resistance to the idea of an organic 'green' kiwifruit in the industry.

Alongside these positive effects Kiwigreen poses one major negative threat to organic kiwifruit – that it will undermine sales of organic kiwifruit by capturing the 'green' consumer. The performance of the two types of kiwifruit in the market is not yet able to be assessed. Four possible scenarios might develop:

- *reduced market share* – as Kiwigreen captures some 'green' consumers.

- *separate niches* – with both types developing in parallel.
- *increased market profile* – as generic marketing of all kiwifruit as environmentally friendly attracts some consumers to the organic fruit.
- *market halo* – with organic fruit being used as a keyhole product attached to Kiwigreen to gain access to difficult markets or institutional customers.

Three of these scenarios are positive for organic and one is negative. The experience of Wattie Frozen Foods Ltd. in Japan suggests that the fourth scenario – market halo – may be operating in that market, while natural foods stores in the USA tend to experience scenario two – separate niches. While preliminary analysis of the markets indicates the emergence of these two positive scenarios, and there is no evidence yet to support the negative first scenario. This scenario may emerge in the next few years, although the recent decision by Zespri International Ltd to market Kiwigreen fruit as a 'safe' rather than 'green' food makes this less likely.

Comparison with Canterbury

1) Regional Profile of Organic Industry: The two regions supported different systems of production. Canterbury was predominantly broadacre production of mixed stock and crops with the organic export market being serviced by vegetable production within these rotations. Alongside this, a smaller market garden sector provided vegetables to the local market. In contrast to this, Bay of Plenty was almost entirely dominated by intensive horticultural production of kiwifruit with only a very small group of market gardeners and orchardists supplying organic produce to the local market. While the predominant production system was different in the two regions, they both were characterised by one dominant form of production targeted to the export market. This was also reflected in the dominant position of one organisation in each province, although, in relative terms, the NZKMB was even more dominant in the Bay of Plenty than Wattie Frozen Foods Ltd in Canterbury.

2) The Economics of Organic Production: the production of organic kiwifruit is, at the present time, economically very viable. The development of a reliable organic production system coupled with strong niche markets and a solid premium means that organic kiwifruit production is not only viable but extremely lucrative for some growers. This differs to pea production in Canterbury. The profile of the two crops on a per hectare basis is quite similar. The yields for both are slightly below conventional, input costs are slightly higher than conventional and the pre-

mium above conventional is appreciably higher in both peas and kiwifruit. While the premium paid by Wattie Frozen Foods Ltd. (WFF) is much higher for some vegetables than that attached to organic kiwifruit, this only partly compensates for the fact that these lucrative vegetable crops form only one component of a full broadacre rotation. In conclusion, while organic vegetable production is profitable in Canterbury, organic kiwifruit production is even more lucrative and shows the potential for economic solidity beyond the short term as it does not rely on future development of new organic products to support the whole farm operation – as Canterbury does.

3) Infrastructure: The NZKMB structure surrounding organic kiwifruit production is legally quite different to the position of a large company like WFF. However, the two do have similarities. While the NZKMB has a full monopoly over the export crop (excepting Australia), WFF also controls a majority of the export volume in processed vegetables making it the largest and most dominant player in processed vegetable exporting in New Zealand. Both these organisations can bring the benefits of large scale to their activities in particular sectors. Consequently, when both organisations adopted organic production as a byline to their main products, they were in a strong position to foster this kind of development. These organisations already had infrastructural links to overseas markets. Unlike these large organisations, smaller companies moving into organic production have faced much larger infrastructural barriers to successfully developing overseas markets for organic products.

4) Corporate Strategy: There are clear similarities between the strategies developed by both WFF and the NZKMB. Both have targeted a 'product pyramid' with a peak product – organic – at the top, and a product group that meet environmental or food safety criteria in the middle. While this idea has been a more long term feature of WFF's corporate strategy, the NZKMB has used its position of monopoly power to move more rapidly towards this ideal. Both companies also indicated a rationale behind such a strategy that was very similar. Organic products (and the second tier of low-input products) provide an exporting company with dual benefits – consumer benefits and market access benefits. First, they are sought after in lucrative niche markets. They are also acceptable to important institutional buyers like some British supermarket chains and Japanese consumer cooperatives. Consequently, they have a very desirable consumer profile. But there is an equally important second characteristic to organic and low-input foods. This is that environmentally friendly foods will be immune from emerging green protectionist barriers. Both organisations

identified that green protectionism was emerging in their major markets and that long term access for conventionally produced fruit and vegetables was under threat. The recent decision by Zespri International Ltd to orient the marketing of Kiwigreen fruit toward 'food safety' rather than 'environmentally friendly' indicates strongly that market access is a dominant issue in their corporate strategy.

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