

## ***From the Editor***

Recent MAF forecasts have projected horticultural export values to rise 27 percent from \$1.76 billion for the year ended March 2000 to \$2.23 billion for the year ending March 2005, mainly due to growth in processed fruit (mainly wine) and kiwifruit.

The theme of this issue of *RM Update* is sustainable horticulture as a land use, and some of the challenges facing this sector. We export our horticultural products to countries that have their own strict controls with which we have to comply. These controls are designed as biosecurity and food safety measures. In addition, many consumers and supermarket chains are demanding assurances of the safety and environmental integrity of our production systems. Many of the articles in this issue highlight the importance of horticultural production systems being designed to minimise chemical residues. Integrated Fruit Production and Integrated Pest Management practices are extensively used in this sector, with careful monitoring and trace-back systems providing overall quality and safety assurances to overseas customers.

I am sure you will find this issue informative.

**John Vaney, Editor**

# ***The Greening of the Kiwifruit Industry***

*The following article prepared by Sandy Scarrow presents a case study on the use of sprays to control pests and diseases in the kiwifruit industry. Sandy outlines the successful implementation of a spray programme with a focus on food safety and the implementation of a programme that integrates environmental imperatives.*

## ***Historical Perspective***

In 1992 ZESPRI International Ltd (ZIL, the marketing company of the New Zealand Kiwifruit Marketing Board) introduced a new mode of kiwifruit production to the growing systems in New Zealand. This production method required careful monitoring of pest levels and the use of "soft" pesticides to control pests present on the orchard with the overall aim of reducing residues in kiwifruit. This programme, largely developed by HortResearch entomology scientists, is named KiwiGreen.

The aims of KiwiGreen are to:

- retain market access;
- provide "reverse transparency" to ZIL clients;
- reduce the conflict that exists between rural dwellers with respect to the use of chemicals;
- show the kiwifruit industry to be environmentally responsible; and
- replace the calendar spraying system (i.e. spray only where proven need is shown).

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To support growers through the process, the kiwifruit industry developed monitoring systems to be followed. Most of the post-harvest service providers offered a pest monitoring service to their kiwifruit grower clients. These Pest Monitoring Centres (PMCs) conduct the on-orchard monitoring and provide recommendations to the growers regarding appropriate corrective action to take. The cost of this monitoring was subsidised, on a reducing basis, by ZIL as an incentive to get growers involved in the scheme. The full cost of this monitoring is now met by the grower or provided as a part of the service contract by their post-harvest operator. ZIL continues to provide a freephone advice line to enable growers or PMCs to discuss their specific pest and disease problems or emerging issues.

Figure 1 shows the trend in the conversion from conventional kiwifruit production to KiwiGreen and organic production.

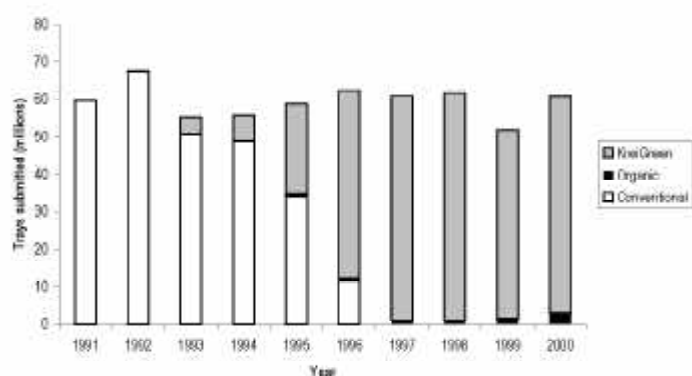


Figure 1 The Trend in Conversion from Conventional Kiwifruit Production to KiwiGreen and Organic Production

The progressive conversion to either organics or KiwiGreen saw a marked decrease in the use of organophosphates and synthetic pyrethroids in kiwifruit orchards. Softer sprays (e.g. Bts and mineral oils), particularly in the later part of the season, are used to a greater degree, if a spray is used at all following the two critical sprays after flowering. The pre-harvest fungicides are no longer applied. The fungal disease that this used to control is now controlled using cultural practices. Prior to KiwiGreen implementation, it was common for orchardists to apply up to nine post-flowering sprays. It is now common for only two applications of the soft products to be used after flowering.

## KiwiGreen Developments

By 1997 all kiwifruit exported by ZIL was grown under either the KiwiGreen or organic production systems. Since then work has been undertaken (partly funded by ZIL, New Zealand Fruitgrowers' Federation Charitable Trust, MAF Policy and the Ministry for the Environment's "Sustainable Management Fund") to develop an Environmental Management System for the production of kiwifruit, named the KiwiGreen 2000 On-Orchard Code of Practice. This programme aims to broaden KiwiGreen to incorporate the use of other orchard applications (e.g. herbicides and budburst enhancers), fertility management, ground cover management, water management and waste management. The aim of the programme has been to consider all aspects of envi-

ronmental impact and endeavour to minimise the negatives and maximise the positives. KiwiGreen 2000 encompasses both varieties (Hayward and Hort 16A) and the two growing methods KiwiGreen and organic.

The KiwiGreen 2000 On-Orchard Code of Practice, at this stage, remains a research project. Decisions regarding its inclusion in the full KiwiGreen 2000 – ZESPRI system have yet to be made.

## Scientific Support

An example of the scientific support that operates alongside the implementation of these programmes is the development of a Disease Risk Prediction System as a management tool for *Sclerotinia*. This project is aimed at reducing fungicides used in kiwifruit orchards for the control of *Sclerotinia*.

*Sclerotinia* is a fungal pathogen that infects senescing (dying) floral tissue during flowering. Where this infected floral tissue adheres to young fruitlets, the fungal mycelium can blight the flower or, later in the season, attack the fruit, causing scarring that may lead to rejection for export or, at worst, cause field rot where fruit drops from the vines mid-season.

Scientists in HortResearch have been working with growers over the past five years to develop a prediction system to determine the degree of disease risk a particular block in an orchard may have. Initial work by the scientists confirmed opinion that the use of fungicides on kiwifruit orchards may not necessarily relate to the disease risk within the orchard. It was determined, from a small sample, that almost half of the orchards rated as low risk were applying fungicides for little or no benefit in 1998/99. Similarly, almost half of those rated as having a high risk of disease were choosing not to apply a fungicide.

Work undertaken has provided the growers trialling the disease prediction system with the confidence to not apply a fungicide if they have a low risk rating. That is, in years where weather conditions were conducive to fruit infection, growers with orchards who were rated as low risk and who did not apply a fungicide have not had problems with *Sclerotinia* infection. Further work is being done to refine cultural methods of disease control for growers with orchards considered to be in the medium and high-risk categories. The aim is to reduce further the use of fungicides and provide additional control options for organic growers.

## KiwiGreen 2000 On-Orchard Pilot Programme

A pilot programme of growers, including some large corporate growers, has been operating under the KiwiGreen 2000 On-Orchard Code of Practice for this production season.

Growers involved in the pilot programme have had the opportunity to test the practicality of the KiwiGreen 2000 On-Orchard Code of Practice. They have also looked closely at all their orchard practices in an attempt to improve their environment outputs. An example of the changes made has been the incorporation of ground cover species into orchards to reduce problem weeds. This strategy has allowed growers to reduce, and in many cases eliminate, herbicide use, reduce

the need to mow the orchard and in turn improve the physical and biological health of the soil.

## Keys to Success

The keys to the success of the implementation and operation of KiwiGreen within the ZESPRI system and, it is hoped, the KiwiGreen 2000 On-Orchard Code of Practice are:

- strong market demand for the product;
- industry commitment;
- a single desk marketer enabling regulation;
- sound scientific basis;
- grower support; and
- continued scientific and practical support in implementation.



**Sandy Scarrow (B Hort Sc, Dip Bus Admin)**

**MAF Policy Agent, Tauranga**  
Sandy began work with the Ministry of Agriculture and Fisheries as a Horticultural Consultant in 1987 in the Whakatane office. She has moved through the many restructurings within MAF into Agriculture New Zealand as a Horticultural Consultant in Tauranga. She is

currently contracted to MAF Policy as a Policy Agent.

One of the most significant projects with which Sandy has been involved over the last few years is the development and pilot implementation of an environmental management standard for the kiwifruit industry named KiwiGreen 2000 On-Orchard Code of Practice. The KiwiGreen 2000 On-Orchard Code of Practice is seen as the natural progression of the kiwifruit industry's KiwiGreen programme.

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# Integrated Winegrape Production Scheme

*Promoted internationally as "the riches of a clean green land", New Zealand wine is claimed to be made using innovative practices in the vineyard and winery that deliver quality in a sustainable and environmental manner. To back up these claims, the industry has established the Integrated Winegrape Production scheme, a type of Environmental Management System. Irene Parminter reports.*

The New Zealand wine industry is a high profile sector that has been spectacularly successful in export markets. Wine exports were worth \$168.6 million (FOB) in 2000 – about nine times the value of wine exported in 1990. In addition, New Zealand wines are increasingly being sold in the higher priced segments of our international markets.

The industry identified the need for providing environmental assurances to consumers in the early 1990s, and funded early development work from grower levies, using a working group of growers and scientists. With funding support from the Sustainable Management Fund, the resulting Environmental Management System (EMS) was trialled and grower feedback was incorporated, before the scheme was formally launched in 1998/99. It comprised 145 subscribed members, covering roughly half the land area of the wine industry. Currently there are 267 members representing nearly 60 percent of the winegrape production in New Zealand. Industry support for the Integrated Winegrape Production (IWP) scheme is strong.

The IWP scheme provides guidelines to growers on management practices that are environmentally sustainable and protect vineyard workers, surrounding communities, and wine consumers. It takes a whole vineyard, continual improvement approach.

Some advantages to the grower from the IWP scheme are already being reported. Montana, for example, reports substantial savings in the cost of irrigation water and chemicals, and even an improvement in wine quality, as a result of the adoption of IWP practices (*Mosaic*, Summer 2000/2001). In addition, Montana reports that buyers are

impressed by the environmental reports produced.

The nuts and bolts of the scheme are straightforward. The grower fills out a "scorecard" on his or her own vineyard, which covers soils and fertilisers, sward and irrigation, diseases, pests and a membership criterion. For a grower to comply, they must have no unacceptable scores. External auditors audit each grower every three years.

Growers currently pay \$300 to join the scheme. Membership is voluntary, but some wine companies require their contract growers to be members. The scheme is also financially supported by the New Zealand Grape Growers' Council.

So what is the verdict to date on the IWP scheme, from an environmental management point of view? At first glance, it looks like the answer to an environmental regulator's prayer. Vineyard practices that impact on the environment are steadily improving. More than that, growers are making the improvements voluntarily, without the need for regulation, monitoring, enforcement or education campaigns by local government, with their attendant costs. The practices of growers who do not join the scheme are also improving, as they see the cost savings and other benefits from the IWP practices.

By comparison, factors on the negative side of the ledger are trifling. Given the market-driven approach, it could be argued that the environmental benefits that flow from the scheme are primarily those that are important to wine consumers, which may or may not coincide with those of the regional council and the community where the wine is produced. However, the scheme is not solely driven by

market considerations, and many of the growers in the scheme are more focused on the benefits to themselves and their workers, than benefits to the end consumer.

A second concern arises from the voluntary nature of the scheme – because adoption is voluntary, it is also patchy, so environmental benefits are lower than would occur with full adoption. Also, since few sectors other than winegrapes have established EMS, the benefits to the environment are further diluted.

Finally, many of the items on the scorecard are currently input-based rather than effects-based, although the intention is to develop more effects-based measures and standards e.g. although currently the scorecard evaluates the amount of nitrogen applied, the proposal is to eventually use the level of ground water nitrogen.

On balance, there is little to criticise in the IWP, and much to commend it. Perceived market demands have driven the voluntary adoption of a package of practices that have yielded environmental benefits, at no cost to the wider community. Some other horticultural sectors are also well down the path of developing EMS (e.g. kiwifruit), or at least developing “green” methods of orchard management (e.g. pipfruit, avocados, summerfruit). However, in many other

agricultural and horticultural sectors, “green market signals” are not yet strong enough for the development of EMS to be a priority. The winegrape industry provides a model that may well be of interest to other sectors in the future.

**RM Update would like to thank Philip Manson (Science and Innovations Manager of Winegrowers of New Zealand) for his assistance in preparing this article.**



**Irene Parminter**  
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**Hamilton**

*Irene has worked for MAF for the past five years. Her background is in horticultural and environmental economics. Irene's work areas include forecasting production, prices and exports for kiwifruit and other horticultural crops (excluding pipfruit), e-commerce, e-government, and digital divide policy issues. She is also involved with aspects of sustainable agriculture and forestry, particularly the role of quality assurance and environmental management systems, and economic incentives for farm management changes.*

## **Frost Protection – Resource Consents for Wind Machines**

*In recent years, wind machines to help protect kiwifruit crops from frost damage have been installed in the Bay of Plenty following damaging spring frosts. Unfortunately, their popularity was not anticipated during the formulation of the Western Bay of Plenty District Plan, and noise and resource consents have quickly become an issue. Conflict has arisen between the cost of frost damage to growers and the regional economy and night-time noise from wind machines disturbing sleep. Ruth Underwood reports on the issues and progress with resource consents for wind machines in the Bay of Plenty region.*

Most frosts are radiation frosts that occur during a cool night after a clear, fine day. A low-lying layer of cold air does the damage, but is overlaid by a layer of warmer air. Wind machines or helicopters mix the warm air through the cold air, thus raising the temperature in the orchard and protecting the young flowers, fruit and shoots from frost.



*photo by Ruth Underwood*

*Spring frost damage to a kiwifruit orchard at pollination time in late November 1994. Foliage was burnt and many of the flowers fell off or failed to develop properly due to the frost damage.*



*photo by Ruth Underwood*

*Surviving kiwifruit are often deformed after spring frost damage. Normally developing fruit are shown to the left of the film canister.*

A number of growers have used helicopters for frost control. Because they are mobile, they appear to be exempt from noise levels specified in the District Plan and thus do not require a resource consent. However, helicopters are costly, and the decision whether to have one on standby each night has been described as “gutwrenching” by growers. There have also been failures with the booked helicopter being unavailable on a frosty night.

Thus more orchardists have turned to using permanent wind machines for frost protection. They consist of a fan mounted on a tower around 5m high, with a diesel motor and automated operation. They can be installed without needing to run wiring to the site, and simply require access

by truck and a concrete mounting pad. They cost around \$40,000 and protect around five hectares of crop.

photo by Ruth Underwood



*Wind machine protecting kiwifruit and persimmon crops.*

The wind machines require a building consent for construction and a resource consent for operation, both from the local district council. A number of these machines have been installed without consents, in some instances because growers were unaware of the need. There have also been instances of machines gaining a building consent without growers

being advised of the need for a resource consent, and of growers installing the machines just in time for spring frost protection before seeking a consent. Complicating things, there were no guidelines for issuing consents until mid-2000.

Concerns about operation are due to the noise the fans make and their operation during the night hours. Intensifying noise concerns are the proximity of some orchards to a large numbers of neighbours and the fact that frosty nights tend to be consecutive.

The guidelines for frost control fans issued by the Council, but operating outside the District Plan, include a performance standard. If applications are assessed to meet the standard, including written permission from all neighbours in a specified area, then a non-notified consent is issued. These consents incur Council fees of around \$400. The consents are issued for an unlimited time.

Notified consents are required where a neighbour's permission is not given. These take longer to establish -

three months is likely in addition to the time preparing an application - and only one has so far been issued. Neighbours concerned about noise included farmers concerned about the effect of noise on nearby stock and residential neighbours. Conditions attached to the notified consent included specified temperatures for both starting and stopping fan operation, a maximum of 10 nights' operation per year and an alarm at the orchardist's dwelling to alert them that the fan is in operation. These conditions seem a reasonable compromise between the orchardist's need for frost protection and the neighbours' need for undisturbed sleep hours. A different orchard has used its fan four and five times in the last two seasons so it is unlikely that more than 10 uses will be sought.

For notified consents, Council fees increase to around \$2,000 and the grower is more likely to engage a planning and/or noise consultant to help present their case.

Unconsented fans are being dealt with by the Council as complaints arise and those orchardists are being requested to apply for resource consent. In general, there have been more complaints about unconsented than consented fans, probably due to unconsented fans being sited solely for frost protection rather than also considering noise at nearby dwellings. The most complaints have been about a fan sited 80m away from 20 houses but complaints have arisen about fans three kilometres away.



**Ruth Underwood**  
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**Tauranga**

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*to MAF's Kiwifruit Financial Monitoring, horticultural consultancy and facilitation. She is a Massey graduate, completing an Honours degree in Horticultural Science in the mid-1980s.*

## **Methyl Bromide - the Alternatives for Horticulture**

*The New Zealand horticulture industry will use about 60 tonnes of methyl bromide during 2001. It is an effective broad-spectrum pesticide that has been used for many years in the agricultural industry, yet globally its use is being phased out. Jim Maud looks at why methyl bromide is a problem and what pesticide alternatives are being developed to replace it.*

Horticulture in New Zealand is dependent on soil sterilisation to control pests and weeds. Of the total methyl bromide used in horticulture, approximately 65 percent is consumed by the strawberry industry and lesser amounts by the apple, tomato and cut flower industries. In total, New Zealand will use about 130 tonnes of methyl bromide this

year (including the 60 tonnes used in horticulture), a fraction of the world consumption, estimated to be around 63,000 tonnes per annum.

Methyl bromide is considered to be the most effective general use broad-spectrum pesticide available. When used as a soil fumigant, methyl bromide is injected into the soil at

a depth of about 20 to 30cm before the crop is planted. Covers may be used to retain the gas. Row or blanket fumigation techniques can be used depending on the crop to be planted. This application will effectively sterilise the soil, killing the vast majority of soil organisms. Over the first few days following fumigation 50 to 95 percent of the methyl bromide escapes into the atmosphere.

As a result, it has come under scrutiny from environmental scientists in the last 15 years because of the damaging effect it has on the ozone layer. It has been grouped with fluorohydrocarbons as one of the most ozone-destructive gases (although recent studies in the US have tended to lower its ozone-depleting potential rating compared with original assessments). These gases can rapidly escape into the upper atmosphere where they remove ozone and contribute to the formation of "holes" in the ozone layer. Damaged parts of the ozone layer let in harmful radiation, which significantly reduces the burn times of skin exposed to direct sunlight. Agricultural crops can also be affected by this radiation.

There are natural sources of methyl bromide release including net releases from oceans, soil and plants. It is however generally agreed that methyl bromide added to the atmosphere as a result of human activity can significantly upset the delicate environmental balance in the stratosphere.

Because of its ozone-depleting properties, methyl bromide is being phased out under the Montreal Protocol - an international treaty established in the late 1980s with over 160 countries signed on as parties. New Zealand is a signatory and meets its treaty obligations through the Ozone Layer Protection Act 1996. The Protocol controls the manufacture and phase-out of all ozone-depleting substances on a global basis. The phase-out process for general use is being undertaken in a step-wise fashion with the 2001 consumption level now down to 60 percent of what was consumed in 1991. The figure for 2003 will be 75 percent of the 1991

consumption, with a complete phase-out by 2005. Methyl bromide use for pre-shipment and phytosanitary purposes is presently exempt from the phase-out programme, although capped at 1996/98 usage. General use by developing countries is controlled by a longer phase-out programme.

There is considerable concern among general users, including horticulturists, that a cost-effective and environmentally acceptable replacement for methyl bromide will be difficult to find before the end of the phase-out period. Research is underway, however, to find alternatives. Soil sterilisation trials using steam have proved just as effective as methyl bromide and reportedly at less cost. Fumigators in New Zealand are mixing chloropicrin with methyl bromide in an effort to minimise methyl bromide consumption. Possible chemical alternatives include 1,3-dichloropropene, basamid®, chloropicrin, metam sodium, selective contact insecticides and fungicides. Organic amendments, crop rotation, plant extracts, changed management practices, changed cultural practices, heat, biological controls, and plant breeding are all possible non-chemical alternatives. However depending on the crops to be treated and the pests requiring control, alternatives will most likely involve a combination of both chemical and non-chemical controls.



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*Jim is a professional forester with over 40 years experience in forest management, processing and marketing. His experience includes the use of methyl bromide for structural, phytosanitary and pre-shipment treatments. He has worked in both private enterprise*

*and government forestry organisations.*

## **No-Tillage for Sustainability**

*In recent years increasing attention has been directed towards reduced and no-tillage cropping systems by land management practitioners and local government policy makers, in the context of their responsibility to promote sustainable management under the Resource Management Act. Murray Doak reports on the following:*

- 1. the history of direct drilling/no-tillage and present experiences;*
- 2. issues which MAF Policy believes need to be considered carefully in the near future; and*
- 3. some of the no-tillage activities in which MAF Policy has been involved around the country.*

This article separates no-tillage/direct drilling techniques from minimum/reduced/one-pass cultivation. In reality, this separation is very difficult to make, as there is a continuum from over-cultivation (sometimes referred to as "recreational" cultivation) to sowing seeds directly into uncultivated ground. No-tillage drills are generally specially designed, and herbicides are used to remove vegetation before drilling.

### **Been There, Done That**

No-tillage/direct drilling is not new. Many farmers have used the techniques for specific applications for many years. It is dangerous to generalise about what farmers do and don't do, because there will always be at least one who has been quietly and successfully operating a full or partial no-tillage system with a modified conventional seed drill for many years!

There was a period in the late 1970s and early 80s where no-tillage was "in vogue". The triple disc drill was the new technology of the day, providing an opportunity to reduce cultivation costs. Today's farmers have long memories where risk is concerned, and most had first or second hand experience of crop failures under no-tillage during this time.

At the risk of generalising, and with the benefit of hindsight, the primary reason for many failing with this system was because the triple disc drill technology was not suitable for the wide range of situations to which it was put in New Zealand (various soils, climate, crops, and farming systems). The understanding and success of “chemical fallowing” were also not what they are today.

### **The Latest Craze or Here to Stay?**

In recent years, farmers have accessed the most up-to-date machinery, developed both overseas and specifically for New Zealand conditions. Coupled with the reduced total capital employed in a no-tillage system, increasing fuel costs, and a shortage of skilled machinery operators, from any farmer’s point of view the option is worth a serious look. Add specific environmental issues such as wind erosion, climate change, and increasingly soil structure breakdown as crop systems intensify, and the signals appear to be very clear.

Why then, are only about 10-15 percent of crops grown in no-tillage systems? Anecdotal evidence suggests the main reasons are a combination of the following:

- risk of crop failure (whether perceived or otherwise doesn’t matter – risk thresholds are different for everybody);
- the investment already made in conventional cultivation equipment;
- the crop types grown and the tight quality specifications required by customers; and
- the potentially daunting requirement to modify current or adopt new techniques, systems and skills.

In addition, the consumer trend towards reduced chemical use works against no-tillage/direct drilling. It is not yet clear whether enhancement of soil quality via no-tillage is more or less important in consumers’ minds than reduced chemical dependence via cultivation for weed and pest control. The benefit to the environment of no-till systems is also not yet clear in all situations. There are often other management techniques which farmers use to reduce risk of damage.

Given all these uncertainties, those farmers who are not faced with an immediate imperative to choose one system or the other will naturally steer a middle course. This is supported by machinery dealers noting an upsurge in interest in reduced or minimum tillage equipment in general (MAF’s *Arable Farm Monitoring Report*, July 2000). This suggests farmers are moving their whole conventional cultivation system towards the benefits offered by direct drilling/no-tillage anyway, while still retaining the benefits (that they perceive) of cultivation.

### **Policy Issues**

There is no room here to go into each and every permutation of soil, capital structure, risk profile and farmer preference that would need to be addressed when deciding on a change in cultivation system. Suffice to say, each farmer would likely have a unique set! I suggest that policy makers bear this in mind when considering the range of techniques available to influence behaviour e.g. education, regulation etc.

MAF Policy strongly believes individual farmers are best left to make these decisions themselves. Agencies can help the process by:

- undertaking appropriate research;
- providing information;
- assisting farmer/community groups find the answers; and
- above all, listening to the farmers’ experiences.

In particular, the decision to adopt no-till or even reduced tillage systems must be put in context of all the other market, financial and social pressures, and the unique risk profile, perceptions and attitudes of any individual farmer.

In future, no-tillage systems also may have to be considered in the context of New Zealand’s response to climate change by reducing CO<sub>2</sub> emissions and increasing organic carbon levels in arable soils.

In general, those who keep an open mind and are receptive to trying new approaches are more likely to achieve a sustainable balance between sometimes conflicting objectives. Extremists at both ends will probably suffer the consequences.

A particular difficulty this issue highlights is the selective application of research results and observations. What works in one area/year/crop may be due to several factors, including:

- soils;
- climate;
- farm system;
- drill type; and
- crop type.

For example, windblow minimisation may be the result of the climate e.g. fewer frost events that season, or may be achieved by other management changes e.g. cultivation patterns to reduce soil structure impacts.

There is considerable knowledge among farmers, both no-tillers and cultivators, about what works and doesn’t work for them, and why. What appears to be needed is some way of more people sharing in this knowledge, with the time and space for farmers to consider all the angles and get comfortable with considering a change. The following activities are known to be broadly aiming to provide this opportunity.

### **Current activities**

A field day in mid-Canterbury in early 2000 led to the formation of No-Tillage New Zealand, which is a national association of farmers, researchers, companies and support agencies with an interest in no-tillage. No-Tillage New Zealand has recently received approval for a \$160,000 project involving the employment of a co-ordinator to run monitor farms throughout the country. Many organisations and individuals have been involved in the practice, research and development of no-tillage techniques over the years. The association’s key objective is to facilitate the exchange of ideas and information on no-tillage in New Zealand. Membership is open to anyone. Contact David Hewson of Environment Canterbury for details on 03 365 3828.

The Hawkes Bay Regional Council, with help from MAF Policy, initiated LandWISE in 1999 to encourage and facilitate links between growers, industry, government, researchers and other organisations. To date, LandWISE has carried out trials on direct drilling sweetcorn into highly wind-erodible volcanic soils with good success, showing that no-tillage can give the same returns and yields as conventional cultivation, as well as improving soil quality and increasing organic carbon content. LandWISE has recently gained funding from the Sustainable Farming Fund to continue its research work and fund a full time facilitator. Contact Dan Bloomer, Hawkes Bay Regional Council on 06 835 9200.

These activities offer good opportunities for policy makers to gain an understanding of the broader issues confronting farmers, and to establish relationships with farmers. After a period of some suspicion, these contacts usually lead to better understanding of all parties' points of view, and ultimately better policy. MAF encourages all those with an interest in the outcomes to get in touch with these groups and participate in the activities.



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**Christchurch**

*Murray has been with MAF Policy in Christchurch since April 1996. He is responsible for monitoring and evaluating key issues affecting the arable industry. After graduating with a*

*Bachelor of Agricultural Science from Lincoln University in 1984, he spent three years with the Ministry of Works on irrigation planning, followed by a year in MAF Head Office on domestic policy issues. This was followed by seven years owning and operating an irrigated mixed cropping and livestock farm in Canterbury. Murray has a broad knowledge of farming systems and rural people, and can offer both a farmer's and a policy maker's perspective. His other activities within MAF Policy include water issues, organic farming issues, monitoring farm performance and health and safety issues.*

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## **Alternatives Needed for Agrichemical Container Disposal**

*New Zealand uses around 1000 tonnes of plastic agrichemical containers each year – all of which require disposal. How can this be done in an environmentally acceptable manner? Dan Bloomer discusses the issue.*

Unlike many countries, New Zealand does not have a system in place to gather detailed statistics on pesticide use, making a full assessment of agrichemical container use virtually impossible. However, estimated volumes are presented in MAF Policy Technical Paper 99/11. It shows over 3,600 tonnes of active ingredients were applied in 1998, with almost two-thirds being herbicides.

High density polyethylene (HDPE) is commonly used as a material for agrichemical container manufacture. Agrichemical manufacturers estimate approximately 1,000 tonnes of HDPE agrichemical containers were produced nationally in 1998. A sample of 20-litre agrichemical containers weighed a little over 1.36kg each, so the equivalent of some 735,000 20-litre agrichemical containers require disposal each year. Interestingly, a sample of 10-litre containers weighed 340g each, quarter of the material for half the volume of chemical, so the smaller package is twice as material efficient!

A Canterbury estimate suggests 200 tonnes of used HDPE agrichemical containers were generated in central Canterbury in the 1998/99 year, which equates to about 150,000 20-litre container equivalents. Based on tonnes of pesticides, a similar number could be generated in Hawkes Bay, equivalent to 31 containers for every rural property.

The amount of HDPE containers requiring disposal may now be significantly less. In pipfruit production there has been a large shift toward cardboard containers and water soluble bags, especially for horticultural chemicals (insecti-

cides and fungicides). In cropping and pastoral farming some evidence suggests a move to large returnable containers for herbicides. In forestry, a very large user of herbicides, there has been increased use of dry formulations in paper packaging. In January 2001, industry sources estimated that Hawkes Bay generated 120,000 20-litre containers, equivalent to 25 containers per year per rural property, and over 160 tonnes of plastic.

A position paper by the Methven Farmers Arable Landcare Group outlines a range of integrated management options for used containers including both on and off-farm disposal. Discussing disposal options from a farmer's perspective they note:

- many district councils will not accept containers at landfills;
- many councils require consents for on-farm landfills; and
- a number of regional councils have a ban on burning plastic containers.

The above paper discusses the reduce, re-use, recycle, recover, and dispose hierarchy, and suggests that re-use could potentially deal with about 10 percent of the problem and recycling 40 percent, if a suitable system, such as that used by the US Agricultural Container Research Council ([www.acrecycle.org](http://www.acrecycle.org)), were established. Energy recovery through incineration is possible, although high temperatures are required to meet emission standards and the cost of returning containers to a suitable facility may be prohibitive.

British studies show that an on-farm incinerator burning triple rinsed five-litre HDPE containers in cardboard boxes can produce smoke which is the equivalent of burning wood. A trial using the incinerator design in New Zealand used 20-litre HDPE containers but found the temperatures needed for clean incineration were not achieved sufficiently. It is understood that some regional councils may be allowing this method of disposal but others have rejected the proposition.

Various studies have shown that proper triple rinsing removes all detectable (at 1 ppb) residues. Recycling companies in Hawkes Bay and Auckland suggest there is a ready market for recycled product that has been properly triple rinsed. However, the cost of collecting the materials makes this a commercially non-viable proposition unless some form of subsidy is available. It is believed that if containers were returned to central depots, a truck-based grinder could economically prepare material for the recycling industry. Apart from collection costs, the main issue is guaranteeing the containers are correctly triple rinsed, so a formal checking system would be necessary.

The most desirable situation is reducing the number of containers, through either reduced agrichemical volumes, increased use of re-usable containers, or adoption of alternatives. It would appear from current agricultural practices and technologies that HDPE containers will remain a

component of primary production for some time. Therefore a full economic analysis is recommended to establish the costs and benefits of recycling options. The role of deposit payments on containers should be part of this analysis.



**Dan Bloomer**  
Sustainable Land  
Management Group  
Hawkes Bay Regional Council  
Napier, New Zealand

*Dan joined Hawkes Bay Regional Council in 1998 after a polytechnic career that included several years as chair of the Primary Industries Polytechnic Tutors' Association, and chair of the New Zealand Qualifications Authority*

*National Advisory Group on Environment, Conservation and Resource Management. Prior to that he was a kiwifruit orchardist and worked as a technical representative for an irrigation company. Dan has been instrumental in the establishment of LandWISE, a voluntary land management group focused on sustainable cropping technologies. He is an executive member of the New Zealand No-Tillage Association, and represents regional councils on the New Zealand Agrichemical Education Trust. He has just completed a thesis on the adoption of sustainable cropping practices for an MSc (Tech) in innovation management.*

## **Hawkes Bay Focus Orchard Raises Awareness of Sustainable Management**

*Since its inception in September 1997 the Hawkes Bay Focus Orchard Project has proved to be a highly successful model for introducing sustainable management practices to the area. Local AgFirst consultant Ross Wilson, who was extensively involved in setting up the project, reports on achievements to date.*

The Hawkes Bay Focus Orchard Project was set up as a result of consultation with local growers, researchers and government agencies. The key objective was "to promote sustainable fruitgrowing practices throughout New Zealand". MAF Policy staff were instrumental in getting the show on the road and MAF Policy Facilitation funds were used to initiate the project. Further funding was obtained through The Ministry for the Environment (MfE), Hawkes Bay Regional Council, ENZA and the Fruitgrowers' Federation.

A community group of fruitgrowers and supporting agencies was established to develop and run the programme. The group aimed to debate, research and extend sustainable practices environmentally, economically and socially.

The community group selected Ru and Chan Collin's pipfruit orchard in Hastings as the Focus Orchard. Ru and Chan gave the project their full support and a large part of the project's success is due to their enthusiastic involvement and commitment.

### **Main Results and Successes**

Within the overall objective, the Focus Orchard aimed to achieve:

- widespread adoption of the Integrated Fruit Production (IFP) programme;
- more efficient usage of pesticides, combined with reduced off-target spray drift;
- efficient usage of the water resource;
- enhanced soil quality;
- better profitability; and
- good employer/employee relationships.

Where important information was missing, the project employed the services of the two research institutes, HortResearch and Crop and Food Research. Local consultants AgFirst and Agriculture NZ were also employed to facilitate the programme and monitor key pieces of information.

During the last three years, seven field days have been run, each attracting in excess of 400 people. The field days illustrate the real value of the project, as attendance figures never dropped throughout the programme and fruitgrowers from other parts of New Zealand also participated. A

website – [www.hortnet.co.nz](http://www.hortnet.co.nz) – continues to be used to transfer information.

There have been numerous successful outcomes but a few specific successes throughout the project include:

- identification of irrigation trigger points with software developed for use by all orchardists;
- reduced pesticide application through the introduction of Tree Row Volume (TRV) and low volume concentrate technology;
- reduced off-target spray drift through an intimate knowledge of conditions conducive to drift, avoidance of those conditions and better spray droplet control;
- good knowledge of soil health performance indicators and early indications of practices leading to improved soil health;
- better block redevelopment decisions through accurate gross margin analysis;
- widespread adoption of IFP across the whole Focus Orchard property and industry as a whole; and
- improved tree productivity through improved pruning, thinning and other general husbandry.

## Conclusion

The Focus Orchard has been a successful model for introducing sustainable orchard management practices to the area. It has provided growers with information and

allowed them to participate in identifying and analysing the alternative practices available to assist them in managing their orchards sustainably.

The project has now secured ongoing funding from the MAF Sustainable Farming Fund for an expanded programme, which will include three Focus Orchards. These will provide an excellent opportunity for comparing and contrasting different properties as well as the outcomes from the first programme.



**Ross Wilson**  
*Director/Consultant*  
**AgFirst Consultants Hawkes Bay Ltd Hastings**

*Ross has been a horticultural consultant since 1989, with MAF from 1989 to 1995 and since then as a director/consultant with his own company, AgFirst Consultants Hawkes Bay Ltd. Ross completed a B HortSc (hons) in*

*1983 from Massey University. Consultancy services include facilitating the Hawkes Bay Focus Orchard Project, co-ordinating and compiling farm monitoring for horticulture, loss adjustment for pipfruit and kiwifruit crop insurance, orchard supervision and orchard consultancy for individual growers.*

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# Franklin Sustainability Project

*Severe storms, such as in May 1996, resulted in widespread damage to property and infrastructure from the loss of soil from cultivated land in the Pukekohe area, south of Auckland. Apart from the damage to property, the off-site movement of soil resulted in sedimentation and ecological damage to the Manukau Harbour and the streams feeding into it, and the irreversible loss of a precious soil resource. As a result, the Franklin Sustainability Project was born to address issues of sustainable management in cropping systems in the area. Tony Thompson of the Auckland Regional Council discusses the achievements of the project so far.*

The three-year multi-stakeholder Franklin Sustainability Project was established in 1997 to identify and promote best management practices amongst Franklin vegetable growers to protect water and soil resources.

The project involved financial and in-kind contributions from the Auckland Regional Council (ARC), Environment Waikato, Franklin District Council, VegFed, MAF, AGMARDT and the Pukekohe Vegetable Growers' Association. The bulk of funding for the project came from the Ministry for the Environment's Sustainable Management Fund.

Over the course of the project, workshops, field days, trials and demonstrations have been held to promote good practice amongst growers on fertiliser use, surface water management, irrigation, integrated pest management, and soil health. Regular newsletters have also been produced for distribution amongst the approximately 350 growers.

A number of good practices have been identified and trialled over the past three years. These have now been

compiled into a set of guidelines called *Doing it Right*, which was officially launched in October 2000.

The soils of the Pukekohe, Pukekawa and Bombay areas of the Franklin District are some of the best in the country and are intensively cultivated for food production. They are of high agricultural and horticultural value because of their drainage characteristics, suitable texture, natural fertility and structural integrity under repeated cultivation. Such intensive cultivation does however pose potential adverse environmental effects, including off-site movement of soil and subsequent adverse effects on surface water quality.

## Soil Loss

Protection of the soil resource of the district is paramount for ensuring its continued availability and versatility for the future. While the soil remains well aggregated and settles out readily in a water column, high intensity storm events, such as in May 1996 and January 1999, resulted in thousands of tons of topsoil being eroded and mobilised, a large proportion of which was lost off-site. This highlighted to both growers and resource managers the importance of

implementing and maintaining surface-water management works such as silt-traps, contour-drains, raised access-ways and cut-off drains. The benching and contouring of headlands is also important for reducing the energy of storm water and retaining soil within the paddock.

Trials conducted by Landcare Research indicate wheel-track ripping could be one of the most effective tools and operations growers could perform to minimise the risk of soil loss. Compacted wheel-tracks act as impermeable conduits for concentrating storm-water flows, which often scour out the sides of furrows and seed-beds, resulting in substantial sheet and rill erosion.

Another lesson learnt from these storm events is to be sure that storm-water engineering and works are investigated and carried out at the catchment level. In many cases, growers downstream have suffered severe damage and soil loss as a result of drain over-flows and blow-outs.

### **Nitrates in Ground Water**

Regular monitoring of two artesian springs, which provide indicative nitrate levels of the aquifer, reveal that nitrate levels are currently around 85ppm, well above the World Health Organization recommended drinking water level of 50ppm. Whilst the ARC is concerned about potential adverse effects on human health, surface water ecology and long-term sustainability, the wider industry concerns are for sustained and improved market access.

This aquifer is an unconfined system, and with intensive cultivation activities above it, there is a high risk of nitrate impact. Various studies indicate that the nitrate is primarily originating from the mineralisation of soil organic matter, and, to a lesser degree, directly from fertiliser. The decreased soil carbon levels – a result of repeated cultivation – exacerbate the transport of nitrates through the soil profile.

An important message therefore, for the growers and the industry, is the judicious use of fertiliser, i.e. better targeted rates, placement and timing of fertiliser application, but also the use of cover crops. The growing and ploughing-in of cover crops, such as oats or mustard, have a beneficial role

in improving soil carbon (organic matter) levels, improving soil structure and “mopping up” excess nitrate. One challenge facing us is to encourage growers to put in cover crops over the winter period and have them plough the crop back in just prior to re-planting. By doing this, nitrates released from re-incorporation of the cover crop residue will be available to the following crop, and soil will be protected from erosion through the wettest time of the year. This however presents an increased risk for the grower in terms of weather and soil water conditions for cultivation. Nitrate leaching trials conducted during the Franklin Sustainability Project indicated that pre-winter crop/cover-crop incorporation and fertiliser use on winter vegetables pose the greatest risks to nitrate leaching.

### **The Future**

Growers and stakeholders involved with the Franklin Sustainability Project have been successful in securing funding from MAF's Sustainable Farming Fund to engage a field representative on behalf of the Pukekohe Vegetable Growers' Association. The field rep will promote and encourage adoption of practices outlined in the *Doing it Right* guidelines, and facilitate discussion and greater awareness of resource management issues amongst growers in the district and beyond.



**Tony Thompson**  
**Senior Land Management Officer**  
**Auckland Regional Council**  
*Tony works with the rural sector on matters pertaining to soil conservation and sustainable land management. He has been with the Auckland Regional Council since 1990, being involved with water quality issues for the first seven years. He has a background in agricultural science and farm consultancy, working with MAF as a farm adviser in the early 1980s.*

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## **News Brief**

### **Farming Fund's Successful Projects Announced**

The Minister of Agriculture, the Hon Jim Sutton, recently announced that the first contracts for funding from the Sustainable Farming Fund have been signed and the successful projects can now go ahead.

In announcing the successful contracts, the Minister said the event gave him real pleasure because it represented the Government's recognition and his long-held view of the importance of rural communities and their viability.

The aim of the fund is to help rural communities or groups in the sustainable use of land-based resources. It provides money for projects that bring together communities to address problems, enable access to information, technol-

ogy or tools, or improve the community economic base.

Launched last September, the first funding round attracted more than 350 applications. Of these, 34 have been selected and will now receive funding. For more information on the first grants announced, see [www.maf.govt.nz/MAFnet/issues/sustain/other.htm](http://www.maf.govt.nz/MAFnet/issues/sustain/other.htm).

“The large number and wide variety of applications showed the extent of the activity among rural groups and communities for innovative, practical and problem-solving proposals,” the Minister said.

The fund provides a percentage of the costs and individual projects can be up to three years' duration. The total

amount provided per project, per year, is up to \$200,000. Total funding allocated in the first funding round was over \$4 million.

A second funding round was opened in February for projects ready to become operational from July 2001. This round was open to smaller projects under \$10,000 and water management issues previously funded from other sources. This year over \$8 million is available for projects of up to three years' duration. **The deadline for applications for the second funding round was 5pm on Thursday 15 March 2001.**

"I am delighted with the response so far to the Fund, as it confirms this Government's policy of commitment to support rural New Zealand," Minister Jim Sutton said.

Copies of the application form and guidelines will be sent to potential applicants on request by contacting the fund at tel: 0800 100 087, fax: 04 460 8781, email [sffund@maf.govt.nz](mailto:sffund@maf.govt.nz), or from MAF's website at [www.maf.govt.nz/MAFnet/issues/sustain/sff2001.htm](http://www.maf.govt.nz/MAFnet/issues/sustain/sff2001.htm).

Sustainable Farming Fund  
C/- Ministry of Agriculture and Forestry  
PO Box 2526, Wellington  
Tel: 0800 100 087 Fax: 04 460 8781 Email: [sffund@maf.govt.nz](mailto:sffund@maf.govt.nz)

## Sustainable Resource Use Policy Studies

As part of the package of funding provided to MAF in 2000/01, which included the Sustainable Farming Fund, funding was also provided to carry out a series of policy studies on sustainable resource issues.

The following table provides a summary of the range of topics being investigated. The studies have been contracted out to a range of providers. The majority of the studies will be completed by 30 June 2001. Gerald Rys, Sustainable Resources Use Policy, is responsible for the contract management of the projects, with individual MAF sponsors responsible for project content and ongoing provider liaison. Should you wish to find out more about a topic, please contact the MAF project sponsor identified in the table (see contact details below).

Area	Project	Sponsor	Funding Level (GST exclusive)	Provider
Water Projects	Assorted Water Projects	Suzanne Baird, MfE, Wellington	\$350,000	Various
	Canterbury Strategic Water Study	Grant McFadden, Christchurch	\$94,500	Lincoln Ventures
	Economic Efficiency of Water Allocation	Phil Journeaux, Hamilton	\$41,550	Agriculture NZ/OPUS
Climate Change	Land Use Change and Water Use	Chris Ward, Wellington	\$50,625	Nimmo-Bell
	Climate Change and Water Use	Gerald Rys, Wellington	\$75,375	Lincoln Ventures
	Irrigation Energy Efficiency Promotion	Grant McFadden, Christchurch	\$50,000 for 2 yrs	Lincoln Ventures
	Climate Change Abatement Technology Assessment	Gerald Rys, Wellington	\$60,000	AgResearch
	Ruminant Methane Workshop	Gerald Rys, Wellington	\$10,000	Crop and Food
	Nitrous Oxide Workshop	Gerald Rys, Wellington	\$10,000	Lincoln University
Environmental Issues	Nitrous Oxide Field Measurements	Gerald Rys, Wellington	\$15,188	NzOnet
	Biodiversity – CBD (Ag & F)	Elaine Pearse, Wellington	\$97,875	Ecosystems Consultants
	Sustainable Forest Mgt.– Montreal Process	David Rhodes, Wellington	\$23,000	Pacific Eco-Logic
Biological Threats	East Coast Forestry Land Use Capability Information	Ian Cairns, Wellington	\$15,000	Ecological Research Assoc.
	Emerging Weed Issues	Peter Kettle, Wellington	\$56,250	AgResearch
Market Issues	Forestry Investment	John Novis, Christchurch	\$50,625	Forest Research
Business Structure	Cost and Risks of Organics	Murray Doak, Christchurch	\$80,000	AgResearch
	Emerging Ag Industries	Ken Armstrong, Wellington	\$56,587	Lincoln University
Legislation Issues	Maori Farming and Forestry	Bill Sutton, Wellington	\$50,000	Various
	Agricultural Chemicals — Compliance Costs	Bruce Burdon, Wellington	\$50,000	NZIER
Role of Govt.	Sustainable Resource Development Extension	Phil Journeaux, Hamilton	\$63,840	Landcare/ NZIER
MAF Info. Capacity	Rural Demographics Update	Parnell Trost, Dunedin	\$16,402 stage 1	OPUS
	IT and Rural Digital Divide	Godfrey Gloyn, Wellington	\$49,302	AgResearch
	Agricultural Skills/Labour Requirements	Fiona Duncan, Wellington	\$59,778	Massey University

Further information can be obtained from: Gerald Rys, Ministry of Agriculture and Forestry, PO Box 2526, Wellington Tel: 04 474 4100

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<b>WHANGAREI:</b>	Cnr Dent & Finlayson Sts PO Box 503, Whangarei	64 9 430 7305	64 9 430 7390
<b>HAMILTON:</b>	Ruakura Research Centre, East St Private Bag 3123, Hamilton	64 7 856 2832	64 7 838 5921
<b>ROTORUA:</b>	Forest Research Campus, Sala St PO Box 1340, Rotorua	64 7 348 0089	64 7 347 7173
<b>HASTINGS:</b>	5th Floor, Tower Building, Cnr Lyndon & Railway Rds Private Bag 9024, Hastings	64 6 870 6304	64 6 870 6305
<b>PALMERSTON NORTH:</b>	Batchelar Agriculture Centre, Tennent Dr PO Box 1654, Palmerston North	64 6 351 7925	64 6 351 7929
<b>WELLINGTON:</b>	ASB Bank House 101-103 The Terrace PO Box 2526, Wellington	64 4 474 4100	64 4 474 4206
<b>NELSON:</b>	Village Mall Queen Street PO Box 3318, Richmond	64 3 543 9182	64 3 544 6826

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