

# International Perspectives in Horticultural Extension—A New Zealand Viewpoint

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**SUMMARY.** The government-funded horticulture extension service, which provided a free service to New Zealand growers for nearly 50 years, was privatized in the late 1980s as part of major reforms to the primary production sector. That service had provided one-on-one on-farm visits, budget advice, provision of technical information, and facilitation of field days, workshops and discussion groups throughout the country. This government-funded service also provided policy advice, acted as an interface between industry and the research and development (R&D) sector, and responded to biosecurity incursions. A decade following privatization, the number of people involved in equivalent consultancy activities has almost halved with very little recruitment of new people into the profession. The emphasis is now much more towards providing advice on the overall management of an individual enterprise to ensure its financial viability, with less emphasis on technical transfer. Large horticultural businesses are increasingly employing specialists in-house who can provide technical solutions and advice on balance sheet management. Private consultancy companies now tend to work more at a local or regional level rather than at a national level and links with R&D providers have markedly weakened as research organisations are increasingly protecting intellectual property for their own commercial advantages and as information provision is now largely on a user-pays basis. In addition, biosecurity incursions over the past decade appear to have increased

as a result of a weakened surveillance effort. Nonetheless, horticultural exports from New Zealand continue to grow at around 10% per annum and many sectors remain very competitive on world markets.

The New Zealand economy has been strongly dependent on agricultural exports since original European settlement in the mid 1800s. The country has always lacked significant natural resources, such as petroleum reserves and valuable minerals, but it does have plentiful water supplies, a moderate climate and highly productive soils. These permit the cultivation of a wide range of pasture species, extensive exotic forests, and a diverse range of horticultural crops ranging from warm temperate avocados (*Persea americana*) and satsuma mandarins (*Citrus unshiu*) to cool climate wines. Kiwifruit (*Actinidia deliciosa*) and apples (*Malus sylvestris* var. *domestica*) dominate fruit exports while buttercup squash (*Cucurbita maxima*) and onions (*Allium cepa*) feature highest in vegetable exports. There are also substantial exports of cutflowers and live plants.

In the 1950s, exports from the agricultural sector comprised 50% of gross domestic product (GDP) whereas by 2002 this had decreased to 16% but was still very high compared to other developed nations. Within the wider agricultural sector, however, horticulture continues to grow in importance increasing from only 1.8% of all agricultural exports in 1970 to 11.8% in 2001.

Furthermore, the horticultural sector contributes strongly to regional development, to employment and to a diverse range of support industries including transport, finance, legal, packaging, agricultural chemical supplies and post-harvest storage services.

Major reforms of the primary sector occurred in New Zealand in the late 1980s and early 1990s as free-market policies were introduced by successive governments. The changes that took place were very significant and impacted on farm subsidies, policy delivery, the organisation of science, and the provision of support services including horticulture extension (i.e., state-funded consultancy services). Cost recovery by charging for these services was progressively introduced from 1984 (Sandrey and Reynolds, 1990).

Changes continued to be made by successive governments throughout the 1990s which were characterised mainly by substantial changes to and even removal of some of the legislation that provided statutory protection for producer boards. These producer boards were organisations that provided for collective and compulsory marketing of sector products such as apples, kiwifruit, meat, dairy and wool.

These reforms were driven by a number of forces including a shift to more conservative politics; a tighter fiscal environment where the role of government focussed increasingly on the provision of health, education, welfare and defence services; and a commitment by government to supporting new sectors in the economy such as electronics and biotechnology. At the same time agriculture commodity prices world-wide progressively continued to decline. Ongoing pressure to achieving global free trade in agricultural products also provided government with an ideal opportunity, in the absence of organised and effective opposition domestically, to remove all forms of subsidies and government-sponsored services.

Any review of the impacts of privatization on extension services; therefore, must be carried out against a background of major and continuous macroeconomic reform to the overall primary production sector in New Zealand, including horticulture.

## Pre-1990

The nucleus of modern horticultural consultancy services in New Zealand can be traced to the post World War II period when there was priority given to rebuilding the export economy, establishing returned servicemen and women into new employment, and responding to market opportunities in the United Kingdom through New Zealand's membership of the British Commonwealth. The Department of Agriculture, as it was then known, through its Horticulture Division provided a wide range of free government funded services. These involved not only consultancy/extension services but included research and development activities, plant quarantine services, export certification and the compilation of industry statistics. In the early 1970s the Horticulture Division was merged with the Farm Advisory Division to become the Advisory Services Division (ASD). The majority of these services were continued in the new division, with the

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exception of research and development which was set up as a new stand-alone entity within the department.

Specifically ASD provided a wide range of free consultancy services including

- one-on-one farm visits;
- budget advice;
- facilitation of farm/orchard discussion groups;
- technical advice on all aspects of production including soil mapping, fertilizer use, development of spray programmes, preparation of climate and weather summaries, cultivar and rootstock selection and so on, backed up with fact sheets, manuals and technical bulletins;
- field trial/demonstration trials on growers properties; and
- field days, seminars and workshops.

General consultants were located in the many horticultural producing areas across the country. There were also crop specialists nationally in pipfruit [primarily apples and pears (*Pyrus communis*)]; stonefruit [primarily apricots (*Prunus armeniaca*), peaches (*Prunus persica*), and sweet cherries (*Prunus avium*)]; berryfruit [primarily strawberries (*Fragaria ×ananassa*)]; kiwifruit/subtropicals; grapes (*Vitis* spp.); vegetables; and ornamentals. The key roles of these national specialists were to liaise with scientists and industry to identify research priorities and industry trends, to disseminate these to consultants and to communicate feedback on these issues. Significantly some of these specialists were located on the campuses of the government's other main research organisation, the Department of Scientific and Industrial Research (DSIR), which had wide ranging expertise and a long history of involvement with many of the key disciplines—in particular vegetable and fruit research including plant breeding, crop husbandry, fruit physiology, post harvest physiology, and pest and disease research.

As well as specialists and consultants, there were experienced Field Officers who not only carried out their regulatory functions but also provided basic technical advice to growers in areas such as spray chemical use, soil testing and recommendations for fertilizer applications. Most of these people had undergraduate diplomas in horticulture. Up to 30 such Field Officers were operating up until the late 1980s.

The ASD employed ≈60 horticultural consultants in the 1980s. All were

university trained with at least 4-year Bachelor degrees with majors in topics such as agricultural economics, farm management, horticultural production, soil science, entomology, plant pathology, extension methods and agricultural engineering.

Aside from the very obvious benefits that accrued directly to horticultural producers (such as fruit and vegetable growers, flower growers and grape growers) there were a number of other benefits that were less obvious but which were, nonetheless, of considerable significance to the horticultural sector in particular and to New Zealand in general. These included:

**RECRUITMENT AND TRAINING.** Before 1990, ASD recruited a steady number of new staff annually—up to eight per year in the horticultural sector alone. Cadetships were also offered to assist with meeting the costs of undergraduate training as well as post graduate studies. Students entering degree programs had, therefore, some certainty of employment following their graduation together with some financial support during their training.

The occupation had prestige and career paths were identifiable. Significantly, an excellent mentoring program was in place where older established staff were available to support recent recruits, to assist them through this probationary period and to ensure that they were evaluated before being released for full consultancy activities. This finishing school approach ensured that recent appointees were aware of the depth of information available, were technically competent, and had been put through real life scenario-based exercises to ensure that they were appropriate to the tasks and challenges that they were likely to face.

**RECRUITING GROUND.** The existence of a large, fully-integrated network of trained and experienced consultants meant that the wider community had access to a capability base from which to recruit new employees. Typically, many government consultants, therefore, were recruited into fertilizer companies, agricultural chemical companies, plant nursery businesses, producer/marketing boards, tertiary training and research institutes, and into other companies providing related horticultural services such as trading banks and food processing companies.

**BIOSECURITY.** Consultant specialists, having regular contact with a cross-section

of the horticultural community, were able to identify any threats to biosecurity very early. Furthermore, these specialists were available to assist with containment and eradication. Examples of the effectiveness of this network included the eradication of johnson grass (*Sorghum halepense*) within about 10 years of its initial identification in the early 1970s, and the containment of citrus canker (*Xanthomonas campestris* pv. *citri*).

**KNOWLEDGE BASE.** A key role of ASD was to compile the annual statistics that related to the horticultural sector in New Zealand. These statistics included information that underpinned policy advice to government (e.g., value and growth in horticultural exports), industry planning (area of land planted and amounts of nursery stock used), employment forecasting (number of orchard workers employed), and resource utilisation (amounts and types of fertilizers applied and amounts and sources of irrigation water used). Significantly, the data base was consistent and continuous over a long period of time, and applicable to a number of different applications across the economy.

**TECHNOLOGY TRANSFER.** An important role for the consultants within the Ministry of Agriculture and Fisheries (MAF) Advisory Services Division was to maintain a close interface with the horticulture research and development that was taking place in the Research Division of MAF, the various Research Divisions of the Department of Scientific and Industrial Research (DSIR) and the relevant New Zealand Universities (particularly Massey University and Lincoln University).

A Fruit Research Council, comprising representatives from industry, the advisory services, the research community and academia provided an ideal forum to exchange ideas on sector research priorities and to exchange information on latest R&D findings that were of relevance to industry (Bollard, 1996). A similar body existed for the vegetable industry.

A key role for government consultants within the ASD was, therefore, to be aware of the research being carried out within government R&D organizations, to assess and interpret its relevance to New Zealand growers, and to include that information in up-to-date technology transfer activities.

**MECHANISM FOR IMPLEMENTATION OF GOVERNMENT POLICY.** The number and distribution of horticultural advisors/consultants throughout the country

provided a mechanism for the implementation of government policy. For example, during the 1970s and 1980s there was a significant push to increase the foreign exchange earnings of New Zealand. This was supported with tax benefits for individuals and companies investing in products to be exported. Advisors/consultants were able to provide advice on proposed investments and assist in the development of those investments to enhance the potential for success.

## Post-1990

The changes that occurred in the late 1980s and early 1990s with respect to both horticultural extension and research and development were dramatic and immediate. These changes included the following:

**ESTABLISHMENT OF CROWN RESEARCH INSTITUTES.** The assignment in 1992 of all horticultural research previously carried out in MAF and DSIR into two Crown Research Institutes (CRIs): The Horticulture and Food Research Institute of New Zealand Ltd (HortResearch) with a strong emphasis on fruit research and The Crop and Food Research Institute of New Zealand Ltd (Crop and Food Research) with its strong emphasis on vegetable research. The CRIs are government owned and are managed as companies. They are required to operate in a “financially responsible manner”, may be required to pay dividends, and are entirely funded through competitive grants from both the private and public sector for salaries, capital purchases and all operating costs.

The CRIs are not contracted directly to engage in conventional horticultural extension activities but, as an integral part of ensuring that the outputs of government-sourced R&D contracts meet the benefit to New Zealand requirements, scientific and technical staff participate in industry field-days, R&D conferences and workshops, and contribute to tertiary education and continuing education programmes. They also write technology transfer articles in industry publications, including magazines and newsletters, fact sheets and technical books and bulletins, and they interface directly with growers and particularly with grower organisations.

HortResearch in particular has also taken a strong role in advocating the importance of the sector to the economy, in collating and publishing industry statistics, and in promoting the importance

of tertiary education to the sector.

It has also taken a very strong lead, from a long term and high risk perspective, by committing heavily to areas that are likely to lead to major areas of innovation—areas such as biotechnology (including the development of genetically modified cultivars) and the development of industries that will exploit novel bioactive compounds, such as nutraceuticals and over-the-counter health-enhancing compounds, that are extracted from conventional crops. These developments are increasingly engaging new commercial entities to take up these emerging opportunities rather than involving those who currently operate from a traditional fruit commodity base.

A key initiative undertaken by HortResearch, as early as 1993, was the establishment of new computer-based systems for the horticultural sector. These included the following.

**Orchard 2000**—a decision support system designed to provide quick, accurate information to assist management decisions. It is a PC-based collection of management tools including Met View, an up-to-date weather check; a growing degree-day calculator; a Spray Diary, complete with information on over 300 agrichemicals and an inventory management module; and various other components including, for example, an apple black spot [i.e., apple scab (*Venturia inaequalis*)] predictor.

**HortNet**—a PC-based information system for fruit growers with regular updates of horticultural news, a calendar of horticultural events, and a directory of an extensive range of technical information.

Uptake of this subscription-based service was very poor although feedback on content and quality was excellent. This centralised, domain-protected platform has been discarded by the various sector-based horticultural industries in New Zealand in favour of their own narrower-scope, sector-specific websites. As a consequence, there is considerable duplication of effort, poor resourcing and little technical backup to service subsequent enquiries.

**RESTRUCTURING OF MAF.** The restructuring of MAF occurred in 1994 with the immediate disbanding of all advisory/extension services. Those previously employed by MAF but who remained as consultants either joined existing private sector consultancy companies or established their own. Some joined other horticultural enter-

prises such as major fruit co-operatives or wine companies, to become their in-house technical consultants/advisors. MAF continues to contract some policy advice from these private consultancy companies or individuals.

Two other major changes have occurred very recently. In 2002, the Government re-introduced a census for gathering statistics of relevance to the agriculture sector, including horticulture. This is being managed through MAF and is intended to rebuild the knowledge base about the industry following the absence of such quality information for the previous decade. The most significant change that has occurred, however, has been the rebuilding of capability in the whole area of biosecurity following several incursions of economically-significant organisms including varroa bee mite (*Varroa destructor*), fire ant (*Solenopsis invicta*), willow sawfly (*Nematus oligospilus*), guava moth (*Cosciopycha improbana*), painted apple moth (*Teia anartoides*), and white spotted tussock moth (*Orgyia thyellina*). This activity is managed within a new MAF Biosecurity Authority that has recruited heavily from the Crown Research Institutes, universities and other government agencies in order to provide the human resource capability required.

The advantages and disadvantages of the shift from a state-run extension service to a private sector consultancy business can be summarised as follows:

### Advantages

The relationship between the consultant and the client is now defined within a closely prescribed contractual relationship at the level of the individual enterprise.

The consultant has become an integral and essential part of managing that individual enterprise.

1) There is a strong emphasis on the provision of advice that enhances business profitability and viability.

2) A broad, integrated perspective of the enterprise is assumed where all relevant elements of the business are considered.

3) There is a shift in emphasis that focuses more on total balance sheet management and less on technical/information transfer.

### Disadvantages

1) Individual consultancy companies tend to be small with greater emphasis on local or regional rather than national integration.

2) Profit margins within consultancy

businesses appear to be small providing fewer opportunities to support ongoing training of existing staff.

3) Large production-oriented entities are tending towards employing their own technical experts and less toward employing contracted-in consultancy services.

4) Continuity of revenue from consultancy activities alone can be difficult to achieve. Consequently, diversification of activities is often required to ensure the sustainability of the business. Areas of such diversification can include the provision of R&D services, the management of quality assurance programmes, the provision of industry training and the provision of export certification services.

5) Access to technical information, R&D results, statistical data and other inputs is on a user-pays basis, which means that technical and information renewal can be expensive, and is, therefore, limited.

6) The functional relationship between R&D providers and technology transfer agents has broken down. There is therefore the potential for the flow of information between these agencies and the grower to be restricted because of the "user pays"/contractual nature of the relationships.

7) The overall primary production sector is seen to be unattractive, with declines in tertiary enrolments and, consequently, there is a rapidly shrinking base for attracting new recruits into the business. In fact, while there were  $\approx 60$  horticultural consultants employed in the late 1980s, there are now only 35 employed in the private companies that emerged from the privatization of the extension services. Of these 35, only 5 have been recruited over the past 15 years. In balance, the number of private sector entities who offer specific advice in targeted areas such as fertilizer use, the selection of appropriate spray chemicals, and the management of fresh produce through the supply chain has increased over the past decade.

8) There has had to be a rebuilding of competency in the areas of biosecurity policy development, the management of incursions and the recruitment of appropriately trained staff, during which several incursions of economically significant organisms have occurred.

Nonetheless, there are currently a number of profitable and viable horticultural consultancy enterprises in New Zealand who serve the sector very well and who are likely to continue to do so into the future.

## Impacts on New Zealand

The major reforms to the primary sector that took place a decade ago do not appear to have slowed the rapid growth in horticulture-based export receipts that have now occurred for  $>35$  years. The figures are impressive: \$NZ33.5 million f.o.b. in 1965 to \$NZ1.952 billion f.o.b. in 2001.

In the past decade—the period of major reform and privatization—the area planted in winegrapes (*Vitis vinifera*) has more than doubled [from 5440 to 11,648 ha (13,443 to 28,783 acres)], in avocados has more than trebled [to 2646 ha (6538 acres)], in berryfruit [primarily strawberries and blueberries (*Vaccinium corymbosum*)] and summerfruit (primarily apricots and sweet cherries) has increased by  $\approx 50\%$  [to 2144 and 3045 ha, respectively (5298 and 7524 acres)], in kiwifruit by about 15% [to 11,533 ha (28,499 acres)] while, in spite of major industry restructuring and depressed global prices, the area in pipfruit has remained almost static [14,200 ha (35,089 acres)]. Areas planted in onions [7044 ha (17,406 acres)], squash [6732 ha (16,635 acres)] and other vegetables [55,514 ha (137,178 acres) in total] have also approximately doubled over this same interval (HortResearch, 2001).

This growth has been characterised by

- strong increases in the number of countries being exported to (83 in 1990 to 102 in 2001);
  - strengthening of brands, such as ZESPRI and ENZA;
  - promotion of products from low pesticide, integrated production methods; and
  - promotion of products produced using organic production methods.
- This growth has, however, also occurred at a time when
- the availability of technical information has become more limited as various entities see value in intellectual property and want to maximise their returns from it for their own gains;
  - there has been remarkably little innovation in the horticulture sector with increasing reliance on outdated cultivars, old production methods and conventional packaging, storage and transportation methods;
  - the attractiveness of the sector to university undergraduates has collapsed with marked reductions in numbers enrolled for various programmes. Furthermore, postgraduate num-

bers have more than halved to reach levels that are not meeting current demand;

- accurate and timely statistical information has been increasingly difficult to obtain; and
- the number of biosecurity incursions has increased as surveillance methods have proven to be inadequate. Further, direct costs of containment and eradication are very high while indirect costs of quarantine zones, threats to product integrity, and impacts on communities (from activities such as aerial spray of pesticides) are considerable.

## Conclusions

The privatization of horticultural consultancy services in New Zealand a decade ago has resulted in a number of significant direct and indirect changes. These have impacted in a number of different ways variously from individual production units through to national considerations. The removal of government intervention has seen a strengthening of the interface between consultant and grower at the level of the individual enterprise with an increase in the quality, relevance and timeliness of advice being provided. Alternative sources for some technical advice have been developed within other service sectors. In balance, information now is not being widely shared, consultancy activities are more regionally than nationally focussed, and recruitment of new staff into consultancy companies has been low compared to a decade earlier. Further, areas such as the compilation of horticultural statistics, the maintenance of integrated biosecurity capability and the provision of leadership and advocacy, such as were provided previously by government-owned advisory services, have been acutely degraded.

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