

RESEARCH NEEDS FOR URBAN TREE MANAGEMENT IN AUSTRALIA

Gregory M Moore - Head, School of Resource Management, University of Melbourne, Parkville, Victoria, Australia, 3010

INTRODUCTION

It is difficult to predict what the research priorities should be in relation to the management of urban trees in South Eastern Australia. However, over the last few years two matters more than most have focused research attention. The first is the prolonged period of drought that much of Southern Australia has experienced over the last seven years. This chronic drought has raised the issues of how water effective and efficient native species of plants are in the urban environment, particularly in comparison to widely planted exotics. Attention has focused on the role of water on one of the earth's driest continents.

A second issue that is focusing research attention relates to sustainability. The notion of sustainability has been fostered by the discussion of bio-diversity and the impact of globally pervasive events, such as changes in the earth's atmosphere that have led to the likelihood of significant climatic changes in the decades and centuries ahead. The issue of sustainability has broader impacts than its effects on urban vegetation, but the politics of decision-making based on sustainable environmental concepts will impinge on urban tree management, particularly in light of the Kyoto protocols.

RESEARCH ANALYSIS AND URBAN TREE MANAGEMENT

Method:

In 1999 a research analysis was undertaken for the Garden State Advisory Committee, by Burnley College. The committee supported a research forum, which used the focus group method for establishing a basis for decision-making in a short period of time. The committee identified a number of organisations that would represent various industry stakeholders, and invitations were issued to the Presidents and Executive Officers of a number of industry bodies and to individual stakeholders.

Proformas were used to illicit responses from participants in the program to identify research needs, enablers to the research and research benefits that could be developed into a report. Thirty-five participants were used in the initial focus group program, and feedback on the draft report was provided by an additional fifteen industry representatives. The report focused on the needs that the various sectors of Victorian horticultural industry saw as the top priorities for research that would benefit their particular sectors. The industry sectors and stakeholders surveyed are shown in Table 1. While it was understood that there were likely to be common interests across sectors, there was a possibility that different sectors might have interests and needs that clashed.

Nursery Industry Association of Victoria	Parks & Leisure Australia	Australian Horticulture
University of Melbourne	Flowers Victoria	Landscape Contractors Association of Victoria
Department of Natural Resources & Environment	Royal Botanic Gardens Melbourne	Primary Industry Training Board
Parks Victoria	National Trust	International Society of Arboriculture
Natural Resources Conservation League	Debco Pty Ltd	Australian Landscape Management
Australian Institute of Horticulture	Victorian & Australian Golf Course Superintendents Association	Victorian Local Government

Table 1: Industry sectors and stakeholders represented in the research study forum.

Results:

In this research analysis, consistent short-term needs were identified across most, if not all sectors, for major priorities (Table 2). Short-term research needs were identified as those requiring immediate and sometimes urgent attention. A second group of longer-term priorities was also identified. The first priority for research that industry groups established was the effective and efficient use of water. This priority was not driven by the experience of an ongoing drought, which was in its second year, but by the likelihood of a drought, in combination with a change in government priorities for water pricing. Both the major political parties that were likely to govern were committed to pricing water in a way that reflected its real price and which would gradually remove subsidies. In short, the imperative for research into effective and efficient use of water was driven by the possibility of a scarcity and the perceived inevitability of significant price rises.

Sustainability of non-renewable resources – chemicals, water, nutrients
Effective and efficient use of water resources
Industry data collection and access to the data
Integrated pest management (IPM) – pests and weeds
Higher quality business management and marketing
A commitment to and procedures for quality assurance
Expanded and properly funded plant breeding and selection

Table 2: The top immediate priorities for research established across all industry sectors in Victoria

A second common priority that emerged from the research analysis was the need for firm and unambiguous data that related to sustainability. The sort of information being sought was quite diverse. Some related to the economics of sustainable environmental management,

others related to effective and efficient pest control and integrated pest management, while yet others dealt with practices that would either enhance or at least not reduce bio-diversity.

A second group of priorities (Table 3) was identified as being of second order and related to a number, but not necessarily all of the sectors represented. Many of these second order priorities directly related to sustainable management in urban landscapes, and a number were directly associated with the management of trees in urban sites.

Life cycle costs of vegetation, particularly in public open space
Improved energy efficiency in Australian landscapes
Improved productivity through better management of non-renewable resources
Better plant cultivars for use in low water environments
Performance measurement in landscape maintenance
Develop root management strategies for significant trees and avenues
OH&S risk analysis for long-term industry health related issues

Table 3: Second order immediate research priorities, most of which relate to the sustainability or urban landscapes

The longer-term research priorities (Table 4), once again focused on sustainability as a major concern. It is interesting to note that water was not identified as a separate major priority. Those present at the meeting were of the view that the matters relating to water were so urgent that they should have been addressed by the time longer term (5 - 10 years) priorities rose to the top of the political and funding agenda.

Use and environmental management of non-renewable resources
Benchmarking of industry practices and products
Effective benchmarking of plant materials
Identify changing market access and future market channels, which recognise the service sector is growing at 5-6 times the rate of more traditional sectors
Market survey data on what people want and are prepared to pay for
Plant selection and breeding for urban environments – grasses, trees, others

Table 4: The top long term (5-10 years) priorities for research established across all industry sectors in Victoria

Once again there were a number of second order priorities (Table 5) which were considered significant to more than one sector, but which did not have the same level of cross-sectoral support that the priorities presented in Table 4 gained.

Management of mature trees and other plants after periods of stress
Integrated pest and weed control
Identify fashion trends that affect nursery and amenity horticulture
Make the relationship between horticulture and recreation clear
Street tree root management
Clarify intellectual property issues

Table 5: Second order or long-term (5-10 years) research priorities, most of which relate to the sustainability or urban landscapes

Given that the groups had identified their major research priorities, they were then asked to identify the major obstacles to achieving success in these areas of research. Across all sectors there were five common obstacles (Table 6).

Lack of funding
Fragmentation of effort, and poor communication to industry users
Lack of perception of the real problems, and the level of funding required
Poor tax recognition of industry research
Focus on large national research needs

Table 6: The major obstacles that all sectors and stakeholders identified to achieving successful research outcomes

Other impediments (Table 7) to successful research were identified from one sector or another, and once identified were more generally supported, but were considered to be of less significance than those obstacles listed in Table 6.

Impression that research is costly and so cannot be afforded
The benefits of research are rarely identified and quantified
The small business nature of much of horticultural industry
Lack of knowledge on how to get research done
State parochialism and difficulties crossing State borders
Lack of philanthropic trusts and culture to support research

Table 7: Other obstacles that sectors and stakeholders identified to achieving successful research outcomes

The identification of obstacles to research success was used to prompt discussion about how they could be successfully overcome (Table 8). This would benefit both those undertaking the research and industry that would implement the research findings.

Consolidate the research effort
Support specialisation in areas of research
Desperately need an industry peak body
Undertake relevant and applied research for industry
Improve tax deductibility arrangements for industry funded research
Foster major long-term research projects
Foster industry promotion, ownership and coordination of research effort
Inform industry through expanded extension and outreach programs

Table 8: Suggested solutions to removing the obstacles to successful research

In attempting to provide solutions to dealing with obstacles to successful research, participants identified four matters, which they considered to be essential to achieving success in research for their particular sectors (Table 9).

Prioritisation of research needs relevant to industry
Coordinate effective and efficient research activity
Statutory reporting of report and research results to industry
Appropriate changes to tax and accounting laws

Table 9: Four key elements to successful research outcomes for a specific industry sector

To ensure successful research outcomes, participants identified the key characteristics that any organisation undertaking research into horticulture must possess (Table 10).

These characteristics could then be used to identify likely research collaborators, who would have appropriate expertise to undertake scientific research with the appropriate credibility required by industry and government.

A strong background in plant sciences and horticulture
Independence to undertake the research
A proper infrastructure within which to conduct the research
Researchers interacting in industry workplaces
The need to facilitate research activity relevant to industry
Recognition of the research through refereed publications, marketing and leadership

Table 10: Desirable characteristics of research organisations

When asked to identify the major benefits to their industry, from undertaking research that had been identified, participants saw sustainability as the major benefit (Table 11). Other benefits related to profitability of industry and improvement of public open space.

Effective and efficient use of resources through sustainability
Increased profits and an expanded export component of Australian industry
The development of innovations and new technology
The achievement of industry best practice
Access to germplasm
Improved quality of public open space

Table 11: The major benefits that realising research priorities would bring to horticultural industries

When asked to quantify the benefits obtained from realizing research outcomes, the participants found the task extremely difficult, and some sectors were unable to provide any input to quantifying benefits. However, five outcomes were consistently identified (Table 12), and endorsed by the group as a whole. Two of these gave estimates of benefits while the other three gave an indication of likely trends.

Estimates of short-term economic benefits to industry were in the order of 20-25%
Lower plant failure rates were expected (improvements of greater than 10%)
Maximising the horticultural legacy for Australia
Fewer but better businesses
Better rates of enterprise survival

Table 12: Quantification of the benefits provided to Victorian industry by successful research outcomes

A number of matters were raised in terms of national and international competitiveness (Table 13). These were not endorsed by the focus group as a whole, however, the views were strongly held by a sector or particular stakeholder.

Regulatory reform must continue
Finance analysis in horticulture is not strong enough
Attempt to reduce the generation gap in thinking by industry participants
Better training and education is needed as Australia lags the rest of the world
Worthwhile career paths must be established in industry sectors
In some cases there must be legislation for improved practices

Table 13: Suggestions to make local industry nationally or internationally competitive

The focus groups were finally asked whether there were any other matters related to research, education and training that should be prioritised but had not been identified in the previous tables. Five issues (Table 14) were identified as being significant with a medium to long-term time frame.

Establishing a critical mass for the support of research in Australia
Determine appropriate benchmarks for use by industry sectors
Re-evaluate the balance of knowledge verses skills
Increase community awareness of the horticultural profession

Table 14: Remaining issues affecting the research education and training output

Finally the group was asked whether there were other matters that should be taken to the relevant government as a matter of urgency (Table 15). Some of these matters were aimed at a particular state government while others were clearly within the sphere of the federal government.

The issue of workplace training is of grave concern to industry
Training and research must be seen as an investment not a cost
There need to be more incentives for best practice
Exchange programs which allow research and industry interchange
Need to market horticulture as an attractive industry for entrance

Table 15: Issues affecting research, education and training in horticulture that should be brought to the attention of the appropriate level of government

RECOMMENDATIONS

Given the research analysis outcomes that the focus groups established, a number of general recommendations were developed:

- That government provides strong support to industry's attempts to sustainably manage non-renewable resources; and in particular water.
- That industry lobby the Australian Bureau of Statistics and other relevant agencies to increase the scope, detail and frequency of data gathering of the ornamental horticultural industries.
- That industry and government lobby for the segregation of data relevant to ornamental horticulture from the food production and agricultural sectors.
- That industry and government support the policies and practices of integrated pest management (IPM).
- That industry and government foster the collection and dissemination of relevant research to appropriate industry sectors in a format and a level, which is accessible.
- That industry and government determine the value of horticultural leadership of a particular industry sector to the state economy and take steps to secure national leadership in those sectors which are determined to be worthwhile and where leadership can be secured.
- That industry and government need to be aware of the benefits of research, and the various tax and accounting advantages available to industry participants.

It is interesting to note that the research analysis and report were completed and presented to the Garden State Advisory Committee by the middle of 1999. The committee reported to the Premier, the Honorable Jeffrey Kennett, and the report was to be used to inform state government priorities for research and future funding for horticultural industries in the Victoria. Before the report could be published however, the Kennett government lost office in a state election and the Garden State Advisory Committee was disbanded. Subsequently, the University of Melbourne printed and circulated copies of the report to members that had participated in the process, but the document did not receive a wider circulation.

IMPLICATIONS OF RESEARCH ANALYSIS FOR URBAN TREE MANAGEMENT

The research analysis identifies a major interest in sustainability, especially in the management of non-renewable resources. The non-renewable resources include various horticultural chemicals such as herbicides and pesticides, as well as fertilisers and specific tree management tools such as plant growth regulators and hormones. Some industry sectors included water as one of these non-renewable resources, but other sectors saw it as such an important priority that they categorised it separately.

The prolonged drought has rekindled debate about the merits of native versus exotic trees in the urban landscape. In the popular press, there is an assumption that native species are more water efficient than exotics, and should be preferred in planting programs. However, this over simplifies the debate and there is a need for the acquisition of data and the evaluation for native species for water use efficiency, and stomatal behaviour and control. Such data is available for few of the important native street tree species.

The role of trees in urban streets, parks and domestic gardens in the sustainability of the urban environment has been widely studied overseas, but for the Australian context is largely unknown. Research into the economic benefits of Australian vegetation is in its infancy, and there is little data on the role that urban vegetation plays in water infiltration and run off, pollution control or its contribution to carbon fixation and the amelioration of atmospheric pollution. These are some of the issues that go to the heart of long-term sustainability and the contribution that Australian urban vegetation may make.

Linked to sustainability is the maintenance of an appropriate level of biodiversity, and in the analysis of research priorities, issues such as tree breeding and selection, and the appropriate use of energy efficient practices in managing Australian landscapes were clearly identified. There is an important role for integrated pest management in urban tree management, which impacts not only on biodiversity, but the efficient use of energy and non-renewable resources. A specific concern about performance and management of urban tree root systems was raised as a significant priority. It is clear that life cycle costs in terms of long-lived vegetation, such as trees, is an inherent component of efficient and sustainable urban landscape management.

Apart from the general research needs that impact on urban tree management, there were some specific matters that related to mature tree management. Root system management has been, and remains a major research concern for those managing urban landscapes. While valuable work has been done on the root behaviour and architecture of some important horticultural species, many other species remain un-researched. Another specific research need was the identification of efficient management practices of trees both during and after periods of significant stress. Again this aspect of tree management has been recently emphasised by the prolonged drought.

A consistent theme from many industry sectors was the need for accurate data. This need is apparent in urban arboriculture where there is little basic data on species growth rates in

different parts of Australia and for different soils. Scant information is available on such important matters as the propensity of native species to shed limbs or develop co-dominant canopy structures. Other information on life spans, maintenance costs and replacement costs is hard to obtain and is rarely available in a consistent format that makes comparisons and analysis meaningful. In short, the basic information that is required to inform proper tree management decisions is rarely available. It is an amazing situation given the value that urban trees have as assets in our urban environments.

The difficulty in undertaking meaningful research on tree species has always been a disincentive to research. Often the responses of trees to research treatments are measured over years and perhaps decades. However, many research projects have a time frame of two or perhaps three years, and so many of the important issues relating to tree management research are not addressed under the current research funding and management regimes that apply in Australia.

Another aspect of researching into urban tree management is the fact that many of the trees are in public ownership, and so are unlikely to attract funding from private or government research bodies. Furthermore, the tax regime that applies in Australia to research funding does not provide a strong incentive to the private sector to invest in research that is related to trees, and in particular those that are growing in public open space under the management of local government.

As is to be expected from a focus group process of this sort, there was a plea for a national body to represent the interests of Australian horticulture in a meaningful way with government, unions and industry. There was also recognition that many of the issues of concern cross state borders and that a national approach would be a more efficient and effective use of research funding than small piecemeal efforts undertaken in isolation across the country. The fragmentation of effort itself is an impediment to the research effort and the efficient use of necessarily limited funding.

There is also a problem in that good work is being done by researchers, but potential users fail to hear of it, because the communication channels are fragmented and poor. An abstracting service that provided brief summaries of urban tree related research, perhaps twice per year, has been identified as a major need by industry. However, despite an estimated cost of less than \$20,000 per annum, it has not been possible to attract funding for such a well-supported need.

Often in undertaking research into urban vegetation the costs of the research can be accounted for to the dollar, but the benefits that might flow from improved decisions and a better management are never fully quantified. In short the costs of researching and managing urban vegetation are well known, but the benefits are rarely fully identified and properly costed. This explains the importance given to obtaining proper financial information and effectively benchmarking various aspects of urban tree management.

CONCLUSION

The focus on the sustainable and efficient use of non-renewable resources, particularly water, crosses all sectors and levels of ornamental horticulture industry. It is clearly linked to environmental awareness, which is also expressed in the issues of integrated pest management and plant breeding and selection. There is a clear message that research to meet specific industry needs is insufficient. Furthermore, there is an emphasis on a lack of coordination between industry needs, research priorities and the research providers. The failure to communicate research results to relevant industry sectors, in a language that they can understand is also seen as limiting the future prospects of ornamental horticulture.

The changing nature of the industry is exemplified by the request for high quality information on industry statistics, market surveys and future marketing channels. There is a generational mind-shift taking place among those in industry, but also amongst the clients, customers and users of horticultural products and services. Expectations are changing and the industry is becoming increasingly more progressive. The structure of industry is of concern, especially the lack of a whole of industry representative peak body at State and Federal levels. Similarly a lack of understanding of tax and accounting laws relevant to research in conjunction with appropriate reporting and publication strategies was raised as a major concern.

ACKNOWLEDGEMENTS

The support of the individuals and organizations listed in Table 2 is acknowledged, as is the role of the Chair of the Garden State Advisory Committee, Dr Philip Moors, and its research officer, Dr David Beardsell, in making the research forum under which the focus groups operated possible. I thank Ms Geraldine Fay for her assistance in preparing the manuscript and my colleague Dr Peter May for his advice and suggestions.