

ARBORICULTURE: AN AUSTRALIAN PERSPECTIVE

by G.M. Moore

Abstract. Over the past 15 years Australian arboriculture has enjoyed considerable popularity and there has been a significant improvement in the professionalism of this sector of horticulture. A distinctly Australian arboricultural element, which accommodates local climatic and environmental conditions, has emerged based on the traditions of European arboriculturalists and the modern theories of American arborists. As yet there is no single professional arboricultural association in Australia, but attempts at improving tree management, arboricultural research and professional development auger well for the future of the Australian industry.

Currently, Australian arboriculture is going through something of a boom period. The significant increase in interest in the discipline is due to many factors, not the least of which is the popularity of matters relating to the environment. Australians, as a whole, have greened very quickly, which is perhaps not surprising, given that the Australian environment has rapidly become one of the most widely degraded on earth.

In the past, Australian horticulture has been an influential activity affecting the development and planning of major cities. The discipline has largely followed an English tradition and arboriculture was dealt with as a subset of horticulture, as a philosophy which would best be described as tree surgery. Even today, there is significant confusion about the terms arboriculture and tree surgery amongst those involved in open space management.

In recent times Australian arboriculture, whilst retaining elements of the British tradition, especially those relating to climbing techniques and the use of equipment and tools, has been significantly influenced by the American arboricultural approach. During the 1980's, visits by Alex Shigo and Richard Harris, amongst others, had a profound effect on those involved with the Australian industry. This influence was greatly enhanced by the ready availability of the text books by these arborists. These days, Australian arboriculture,

although influenced by the modern American literature, is developing its own tradition in response to the issues that confront it.

Accordingly, we have accepted the definition that arboriculture is one of the branches of horticulture within the plant sciences (2). Philosophically, we have taken a broad view that arboriculture deals with trees from seed to seed in a way that recognises the full life cycle of the tree. Within this context, we assume that propagation either from seed or vegetatively, planting, establishment, maintenance, seed gathering and ultimately removal, all come within the gamut of the professional arborist.

The Scale and Scope of Australian Arboriculture

Although Australia is a relatively small country in terms of its population, with about 18 million inhabitants, its surface area is massive. The dispersal of the population and the existence of the seven separate States and Territories that make up the federation means that it is difficult to actually obtain data on the size of the industry. However, estimates of its size range from 4,000 to 10,000 employees and the value of the industry to the Australian economy is estimated at about \$0.5 billion per annum.

Included within these estimates of size are the private sector arborists, tree surgeons and loppers, as well as those working in the public sector. The size of the public sector is often seriously underestimated, but includes significant numbers of people involved in local government and state utilities that have responsibility for substantial populations of trees.

Arboriculture does not yet have professional status in Australia, and the prospects of achieving such status in the short to medium term are low. Horticulture itself is an emerging profession and is

yet to gain the recognition associated with the more traditional professions, such as law, engineering or agricultural science. This is not to say that we lack professional arborists. There have been many fine arborists working in Australia for many decades.

Important Issues in Australian Arboriculture

Many of the issues relevant to Australian arborists arise from the species and environmental conditions that exist within the country. Although few eucalypts attain the one hundred metre heights of *Eucalyptus regnans*, many are capable of very rapid growth, which can cause serious problems when the trees are grown near hard structures or underground services. This highlights the need for proper tree selection and breeding programs.

Many of our eucalypts, and even exotics like elms, produce epicormic shoots. Under the favourable climatic conditions found in Australia, these are capable of very rapid growth. It is not uncommon for epicormic shoots of eucalypts to grow at rates of three to five metres per year. These shoots need to be carefully managed, as they are poorly attached to the tree and can easily fall causing injury or damage (Figure 1). The issue of pruning trees to clear a path for power lines has been the cause of considerable debate.

The issues that are significant to Australian arborists have changed over time and are often influenced by broader social concerns. At present, the deep recession which Australia is experiencing, the worst since the Great Depression of the 1930's, is certainly impacting on the working lives of both private and public sector arborists.

At such a time, the industry tends to go through a period of consolidation. Work and jobs are hard to find, some established businesses fail, and those without commitment exit the industry. Even through this period, however, the interest in trees and arboriculture has continued to expand, and certain matters remain on the arborist's agenda. Amongst these, the following are the most important:

Pruning Practices. Proper pruning practices have long been the topic of horticultural interest in Australia. There is great interest in the concepts of compartmentalisation, and the use of the collar



Figure 1. Poorly attached epicormic shoots of *Eucalyptus cladocalyx* can easily fall causing serious damage or injury.

and branch bark ridge concepts as a guide for final pruning cuts. It is recognised that there are limits to the application of these guidelines, and we have taken a particular interest in the discussions of branch attachment and the works of Shigo (9), Harris (2) and Neely (8).

The significant relationship between tree structure and physiology and arboricultural practices and techniques is becoming better understood, and there is widespread interest in the roles of phytoalexins and polyphenols in the trees' response to disease and decay. The enhancement of callus formation and woundwood differentiation are the objectives of many of our techniques.

We have carried out some extensive trials and surveys of the impacts of different pruning techniques on subsequent tree health. The practice of flush cutting, which was almost universal in Australia prior to 1980, has been virtually eliminated as an acceptable practice due to the massive

columns of decay that result (Figure 2). The use of the BBR is widespread and although it is recognised that we still have some way to go in understanding the complete nature of branch attachment and proper pruning techniques, it appears to be the best method available at present.

Trees and the Law. Perhaps following the American precedent, Australians are becoming more litigious. As a consequence, the interaction of trees, arborists and the Australian legal system has become a major issue in Australian arboriculture. Indeed, a recent study from an Australian city revealed that about 25% of neighbourhood disputes resulting in inquiries or court action, revolved around concern relating to trees and vegetation.

At present, the major focus of the legal action involves suits for damages as a result of the proximity of trees to various hard structures - sidewalks, roads and houses. Many local government authorities are facing suits of \$100,000's each year, as a result of tree root damage to fences, paths, pipes and house foundations. Such actions are forcing a re-evaluation of the role of trees in the urban environment and the development of proper management practices.

Tree Valuation Techniques are also of interest at the present time. As yet, there has been no universally accepted valuation method, although the Australian Institute of Horticulture, our College at Burnley and various others have put forward proposals (3). The Australian Standards Association has just produced a method of tree valuation. The release of the Standard has occurred only in the past few weeks with seminars and conferences held in the nation's major cities. The method has identifiable elements of earlier methods, but has some unique features of its own. Although the method is restricted to use in urban areas and takes account of historical significance, both of which cause some concern, there is hope that the Standard will be widely used across the country. Time alone will prove whether this aim is achieved.

The reason that valuation techniques have become of such vital concern to arborists is that finally, the status of trees as significant assets within our urban environments is being estab-

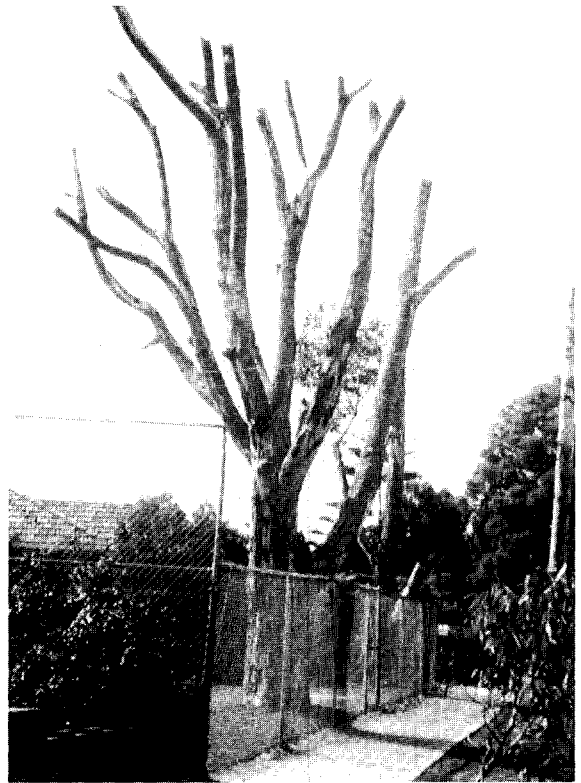


Figure 2. Poor pruning practices often lead to safety hazards. This eucalypt has been inappropriately pruned for its school yard location. Shedding of epicormic shoots is inevitable.

lished. It is essential that an acceptable method of putting a monetary value on trees be established to deal with claims of damage and compensation. More importantly, a monetary value placed on trees identifies them as assets and ensures that they are recognised by those in a position to make decisions that affect not only the future of the trees, but the landscape as a whole.

Tree Roots. Arboricultural interest in tree root systems in Australia now goes back almost two decades. It is widely recognised that for the establishment and maintenance of a healthy tree, a well developed and properly managed root system is essential. As a consequence, there is a profound interest in the development of trees with appropriate root systems. [Studies that have revealed that trees of significant age and size have failed due to plant propagation and planting problems have been widely distributed (6).] The propagation

methodologies of Whitcombe (10) have been tested, but the solutions to the problems of growing Australian native species without deformed root systems are still being investigated (4).

Damage to hard surfaces and underground services is becoming widespread. As a consequence, the interest in how root systems grow and develop has expanded. Similarly, there is widespread experimentation with root containment and root barriers. There is also considerable experimentation in the use of compaction, targeted irrigation, and soil aeration and nutrition systems as a means of managing root systems to achieve the sorts of trees that are suited to the urban context.

Change. In many of the aspects of Australian arboriculture there is an underlying theme of an ageing tree population. Many of the exotics planted in Australian cities are now in excess of 100 years of age and many of our native specimens pre-date European settlement. At first glance, it may seem that these trees are relatively young, but due to our longer growing seasons, many of the exotics are of greater size and maturity than their chronological age would suggest. Consequently, the need to manage substantial populations of aged and declining trees has come upon us more quickly than might have been expected.

The issue of aged trees has many dimensions. They are costly to maintain, but their removal has significant impact on the aesthetics of the landscape. If they are to be replaced, then the debate about replacement species is often fierce and unresolved. It is disappointing to note that there have been relatively few attempts at breeding, or even selecting, native tree species that are suitable for the urban context. Although there is an extensive range of native plants from which to choose, there has been very little in the way of serious study or investment to develop this natural resource into a practically useful commodity. As a result, there is a tendency to use tried and true exotics, or a relatively small number of overworked natives. In either case, there is the likelihood of populations of trees which have a restricted gene pool and low biological diversity.

The debate about the use of native or exotic tree species along streets, in gardens or in public

open space has not yet been, and probably cannot be, settled. The choice of exotic or native species really depends upon the reasons for their use and the contribution that is expected of them in the landscape. The selection of tree species to be used in the redevelopment of one of Melbourne's major streets has recently caused a furore that attracted massive media attention. The debate really highlighted the lack of purpose-bred or selected native plants, and the low priority given to horticultural, and specifically arboricultural, input to the planning of urban public open space.

In our urban landscapes, Australian horticulturalists have sown the seeds for potential disaster. A small number of species, often of even age, have been widely planted and there are relatively few recent plantings in significant parks or streetscapes. This situation is revealed in the current threat to the City of Melbourne's elm population (Figure 3). This city has, perhaps, the finest collection of elms left in the world. However, the elms are ageing, stressed and susceptible not only to elm leaf beetle, but also Dutch elm disease. The arrival of Dutch elm disease in our near neighbour, New Zealand, has revealed just how vulnerable this magnificent asset to the city might be. It would seem that inadvertently, management practices have almost been designed to encourage the arrival of Dutch elm disease. The matter is made all the more serious by the fact that the elm bark beetle has been present in the elm population for about two decades.

New Technology. Australian arborists have shown a willingness to accept new technology. These days, tree access using elevated platforms or modern rope and harness techniques is almost universally practised. The folly of free climbing has been amply demonstrated in accidents and deaths.

Most Australian arborists are familiar with the Shigometer, which has been in use in one context or another for about a decade and a half. It is also fair to say that the instrument has not always been used in accordance with the guidelines and methodologies prescribed. Indeed, the misuse of technology and research data is always a significant risk when the scientific and technical backgrounds of many arborists is weak. The Plant



Figure 3. The city of Melbourne still has major parks, avenues and boulevards dominated by elms. Management practices of the past have increased the risks of major pests and diseases affecting the trees.

Impedance Ration Meter (PIRM) has also proved useful (2) and is a development from an earlier electrical device developed in the 1950's (5). There is a general perception that better diagnostic tools are required in a more sophisticated approach to tree care and maintenance.

The computer age has well and truly struck the modern arborist and, in particular, those involved in local government tree management. Tree inventories are proving to be a popular means of documenting, valuing and locating trees. They provide a register of the assets and can form the basis of successful long-term plans and management strategies.

Revegetation. The degradation of the natural environment in Australia has been of serious concern to many people for some two decades. Public interest, however, has only been fanned for the past few years through issues such as deforestation, erosion, serious salinity problems and

the striking effects of forest and rural decline. There is widespread acceptance that there is a real problem with the environment, and solutions are being demanded of our politicians.

One of the most popular and widely supported solutions has been revegetation programs, often on a massive scale. Such programs are even more attractive if they can provide opportunities for the very large pool of unemployed youth. The focus of many revegetation schemes has been tree planting, although in more recent times a more sophisticated approach involving community or habitat restoration has become increasingly popular.

There is clearly a role for arborists in these revegetation activities. There is considerable interest in planting and establishment techniques, with direct seeding attracting particular interest and support. Post-planting care and maintenance are also issues of concern as costly plantings have often failed just a few years after planting due to a lack of rudimentary maintenance.

The Australian government aims to have over one billion trees planted in Australia in the decade of the 1990's. No one seems to have considered the ongoing maintenance costs associated with such a massive planting program. Many of the plantings have taken place in urban areas and as the trees age, mature and decline the role of urban-based arborists is likely to expand. An unexpected consequence of this greening of Australia would seem to be the brightening of career prospects for young arborists.

Training and Education

Until recently, arboricultural training was seen as being a minor component of general horticultural education. This reflected the fact that arboriculture was not seen as a significant segment of horticulture. This situation changed dramatically in the mid to late 1980's, when arboriculture was identified as a significant area of horticultural activity in its own right and where trained staff were difficult to obtain.

For many years courses in horticulture included minor components of arboriculture as parts of their structure. However, those who sought further and specialist training as arborists were required

either to learn from their own experience and reading, or to go overseas for further education. Once again, there was a tendency for Australians to take up places in English institutions, such as Merrist Wood.

In 1985, the first Australian tertiary course in arboriculture was offered at the VCAH-Burnley. It was a two year Associate Diploma, similar to the American Associate Degree, requiring a good pass in the final year of high school to gain entry. The course has a maximum of 18 students in any given year, and already some 60 people have graduated. In 1987 a two year Advanced Certificate program in Arboriculture was also made available at Burnley. This program is available on a part-time basis for those involved in the arboricultural industry. It has proved particularly popular, as it is taught at night, has high retention rates and provides education for those who have entered the industry without an appropriate background.

The Degree course at Burnley also has a small arboricultural component, as does the Forestry course at the University of Melbourne. However, several of those who have completed the Associate Diploma have gone on to further study and completed the Degree. These are currently the best qualified arborists in Australia, but they often lack any significant industry experience.

One of the difficulties in raising the level of arboricultural education and training has been the recruitment of skilled and qualified staff. There are very few arborists with the appropriate mix of tertiary education and practical experience. Even if they are available, they may not be attracted by the salaries and conditions offered in Australian teaching institutions. This matter should resolve itself as those who have completed their education in the mid 1980's establish themselves in the discipline.

Depending upon the State, there is arboricultural training available through trade level apprenticeship schemes and, in some instances, certificate level programs are offered. The Ryde Horticultural College in NSW is another institution that offers this sort of training. In many states there is a sound core of horticultural training taught through the Technical and Further Education Systems.

Many of those working in Australian arboriculture recognise the need for adequate training and education. Many of the poor practices, accidents, and even deaths, highlight the fact that arboriculture is a dangerous discipline which requires skilled and educated operators. It is likely that the education profiles currently available in Victoria will eventually be made available in a number of other states.

Industry Interest Groups

Arborists began to organise themselves into interest groups in 1970-80. It is unfortunate that in such a small country there has as yet been no national group established to represent and support the interest of arborists. In some ways this can be explained by the degree of isolation of the major cities, but, sadly, sectional and parochial interests have also played a part. In Victoria the Arboricultural Association of Australia is a strong and active group. A similar but smaller group with links to the Victorian group exists in Perth, while in NSW, a Guild of largely private sector arborists has been established.

It is in the interests of Australian arboriculture that a single national body be established to promote the aims and objectives of professional arborists and arboriculture. There is a strong need for a code of ethics for professional practice, which could apply to all those working with trees. Improved safety practices are essential, as each year there are a number of accidents and occasionally deaths. It is preferable that the industry regulates itself before the government intervenes, and, as has happened in many other industries, imposes regulations through law or act of parliament.

Currently, Australian arboriculture has virtually no research base. The industry is missing out on an opportunity to qualify for government funding and support because it is not properly and professionally organised. Topics of major research interest can be easily and quickly identified. These might include tree selection, plant breeding, propagation and establishment procedures, safe climbing and pruning techniques, as well as many others.

Conclusion

Arboriculture in Australia is going through a period of unprecedented expansion and popularity. There has been considerable progress in the past decade, often with leadership originating from Victoria. It is interesting to note that an Australian arboricultural literature is beginning to emerge with a number of articles, papers and more recently, basic texts (1,7) being published. Tree care and management practices have improved substantially, however, there is still scope for improvement.

It will be some years yet before the benefits of having tertiary trained arborists become apparent. It is to be hoped that amongst the benefits will be an improvement in professionalism, the creation of a national arboricultural interest group and the establishment of a sound research base. Given its current popularity, the future of arboriculture as a discipline looks bright, and those involved in the Australian industry look forward to a closer co-operation in the future between our American and European colleagues.

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Résumé. Au cours des 15 dernières années, l'arboriculture en Australie a connu une popularité considérable et il y a eu une amélioration significative du professionnalisme dans ce secteur de l'horticulture. Une arboriculture australienne a émergé, basée sur les traditions des arboriculteurs européens et les théories modernes des américains, et qui s'accommode avec les conditions locales de climat et d'environnement. Les tentatives pour améliorer la gestion de l'arbre, la recherche en arboriculture et le développement professionnel augurent bien pour l'avenir de l'industrie australienne.

Zusammenfassung. In den letzten 15 Jahren erfreut sich die Behandlung von Bäumen in Australien erheblicher Beliebtheit; zudem hat eine bedeutende Verbesserung der fachlichen Qualifikationen in diesem Bereich des Gartenbaus stattgefunden. Es hat sich dabei ein ausgeprägtes australisches Element entwickelt, das auf die Tradition in Europa und den modernen Theorien aus Amerika aufbaut. Es bezieht das heimische Klima und die spezifischen Umweltbedingungen mit ein. Die Verbesserungen bei der Baumpflege, der Forschung und der fachlichen Entwicklung sind ein gutes Zeichen für die Zukunft der australischen Wirtschaft.