

## WEEDS IN PARKS AND GARDENS - A REVIEW

C.J. Nazer, J.D. Clark<sup>1</sup> and P.W. Weiss<sup>2</sup><sup>1</sup>ACT Parks and Conservation Service, Horticultural Services Unit, GPO Box 158, Canberra A.C.T. 2601<sup>2</sup>Woden TAFE College, School of Horticulture and Agriculture, PO Box 666 Woden A.C.T. 2606

*Summary.* Weed situations in urban parkland and methods of managing them are described. A number of aspects are discussed concerning more effective management of urban weeds. Despite an integrated approach using other management techniques, herbicides will continue to play an important role in urban weed control. The limited work being undertaken in this field in Australia is reflected by the scarcity of published literature. In urban situations, there is a need to investigate the use of herbicides, better herbicide mixtures and improved application methods to minimise environmental problems.

## INTRODUCTION

Urban parkland and gardens encounter a very different situation in relation to weeds and their control to that of agriculture. More than 80% of Australians live in urban areas where a significant amount of land is set aside for amenity and recreation. This land requires considerable expenditures for management including weed control.

Throughout this paper the term parkland will include areas of urban open space not traditionally associated with amenity or recreation, but providing for community services such as floodways, road corridors, etc., and often having secondary amenity values. In this context the area of urban parkland is surprisingly large. For example, throughout Australia more than 100,000 ha is devoted to sporting use alone, and a considerably larger area to passive recreation. These categories of public open space are managed by nearly 800 local government authorities most of which operate with static staff resources whilst their parkland area increases each year.

Weed control is critical to the maintenance of acceptable horticultural standards in parklands and playing fields. The degree of weed control or vegetation management depends on the maintenance objectives for an area. These include:

- . aesthetics
- . optimum growth of amenity plantings
- . protection of engineered facilities
- . clear line of sight for traffic
- . elimination or reduction of the spread of noxious weeds
- . production of a suitable turf sward
- . fire hazard reduction
- . unimpeded water flow
- . reduction in maintenance costs

Weed control in parkland is constrained by a number of factors which limit the actual options available. Among these are:

1. Constant public scrutiny and public concern over the use of chemical weed control

2. The wide range of habitats for weeds created by disturbance and site modification, and consequent wide spectrum of weed types and species
3. The constant and rapid dispersal of weed propagules by humans and vehicles throughout urban areas
4. The close proximity of the public to the operations requires particular care in choosing suitable chemical control options
5. The need for suitably trained staff and the correct equipment is essential for safe and effective application of chemical control agents. Both public and operator safety are of primary concern in determining control measures
6. Choice of chemical control agents must consider residual and non-target plant effects
7. The need to approach weed control as an integrated management strategy, utilising an array of techniques to provide effective, long-term control within budget limitations.

This paper describes common weed situations, management strategies and herbicides used in urban parkland. Some recommendations are made towards improving herbicide technology and integrated weed management for urban parklands.

#### URBAN PARKLAND WEED SITUATIONS

The urban environment provides a diversity of potential situations where weed problems can occur. Depending on rainfall patterns and the use of irrigation, both summer and winter annuals can be major problems along with perennial grasses and herbs, woody weeds and in some parkland situations aquatic weeds.

Typical weed situations in urban open space include:

- . shrub and flower bed plantings
- . single or group tree plantings
- . groundcover plantings
- . sports fields and wickets
- . lawn areas and golf courses
- . hardstanding areas
- . drains and kerbs
- . fencelines and engineered fixtures
- . industrial areas
- . aquatic features and ponds
- . plant nurseries
- . bushland areas

A major problem in parklands is that plants considered desirable in other situations can become serious weeds. Escapes from private gardens are a common weed problem, for example, boneseed, *Chrysanthemoides monilifera*, in Victoria and pampas grass, *Cortaderia* spp., in Southern Australia. The much valued pasture grasses, *Phalaris* spp., can be a serious pest in urban parkland.

#### URBAN WEED MANAGEMENT

In many instances, weed problems simply reflect poor development and

management of land areas and the lack of an integrated approach to weed control. For example, if the irrigation of turf grass is uneven giving a variable distribution of water, this leads to poor turf density. Weeds easily invade this weakened turf. Correct design and maintenance of turf irrigation systems is essential to overcome turf weed problems. Similarly, practices to prevent weed introduction through importing clean soil, mulches, container plants, etc, all reduce weed problems. Sound landscape design such as the use of groundcover plantings can significantly reduce weed problems and thus maintenance costs.

In Australia, control measures for declared noxious weed species receive some special funding, inadequate as it may be. Despite being a highly visible problem, urban weed control usually receives no specific budget commitment and *ad hoc* resource allocation.

The advent of new herbicides has allowed park managers to reduce their dependency on mechanical control of weeds, a dependency that was doomed by economics. In particular, the arrival of glyphosate on the market brought about cost-effective control of many urban weeds, especially perennials.

The increasing use of herbicides in urban areas has, however, been accompanied by a hardening attitude within the community against all pesticides. We are probably approaching in Australia the same pressure to restrict herbicide usage as has occurred in the U.S.A. and parts of Europe. The concerns for public health and environmental quality are powerful although often misguided arguments.

Compounding the difficulty for the manager, is the dearth of technical information directly applicable to specific urban weed problems. In recent years controversy about certain herbicides has led to further research and improved solutions but all too often a manager still has to choose from a range of chemicals and application techniques, without sufficient information to aid the decision.

In agriculture, decisions on weed control are usually based on short-term analysis of the problem, with careful consideration of the economics of the situation. In urban weed control, there is rarely if ever any detailed analysis made before the problem is addressed. Unfortunately, a 'crisis management' approach is all too common where minor weed infestations are ignored and allowed to develop into major infestations, which incur expensive solutions.

Sound technical training is required to analyse weed problems and plan solutions. The manager must be able to assess levels of weed infestation, measure and predict change, estimate impact and identify control options. Having built the chosen options into a system, they required application and then evaluation of success with modification as necessary.

#### HERBICIDES USED IN URBAN PARKLAND

Since the 1960's park managers have relied on herbicides with short-term or nil residual effects for most weed control situations. These types of herbicides are generally more useful for urban weed control than residual herbicides. Unfortunately, residuals can pose serious phytotoxicity problems when used close to amenity plants.

Diquat, paraquat and amitrole, once extensively used, have over the past 10 years been largely replaced with glyphosate. Indeed, in the A.C.T. and

probably elsewhere in Australia, glyphosate has become the cornerstone of chemical weed control. Its effectiveness has been enhanced by use in mixture with other herbicides.

The ACT Parks and Conservation Service has developed some new approaches to the use of glyphosate. For example, Nazer (1) outlines the use of glyphosate to remove paspalum, *Paspalum dilatatum* from irrigated sports turf by either spot spraying or overspraying methods. This is followed by overseeding of treated areas with turf species. The method has proved more manageable and cost-effective than the selective herbicide approach it replaced.

The use of glyphosate is not without some problems especially phytotoxicity caused by misuse. As shown by Clark *et al.* (2) there is a strong need to not only avoid application of the herbicide onto the foliage of amenity plants, but also onto the bark of young trees. Trained operators with suitable equipment, however, are unlikely to cause problems.

With careful management, the length of weed control can be extended by the use of residual herbicides either separately or in mixtures with non-residuals. Long-term residual herbicides (e.g. ethidimuron) have some potential for wider use in urban weed control. Nazer and Clark (3) showed that for certain weed situations in urban areas these herbicides can be cost-effective.

In amenity plantings such as screen plantations, shrub beds and parkland, several methods are used to control weeds, including mulches, hand or mechanical cultivation and repeated use of non-residual herbicides. Pre-emergence herbicides offer the potential to provide a weed-free area for longer periods than the other methods. In evaluation trials conducted in the 1970's, Nazer and Clark (4) showed the advantages of several pre-emergence herbicides in combination for long-term weed control around trees. Some recently developed pre-emergence herbicides have been evaluated for nursery container plants, cut flowers and bulbs (5, 6, 7, 8) and warrant investigation for use in amenity plantings.

Of the selective post-emergence herbicides, fluazifop, developed for grass control in certain crops, has gained widespread use in landscape maintenance. It is particularly useful for removing unsightly perennial grasses from amenity groundcover plantings.

#### DISCUSSION

The development of herbicides is rarely directed specifically towards urban weed control situations. Products are usually adapted to urban use after development for use elsewhere. In economic terms, one could wonder what the urban weed control market is worth. Of equal or greater importance is the industry's concern with the attitudes of the general public towards weed control and herbicides. Manufacturers should approach the urban market with the same enthusiasm and creativity as they do the agricultural market. Obviously, if a herbicide or control method attracts adverse publicity in either urban or rural areas it can seriously affect overall sales. A major consideration must be the environmental aspects including public and operator safety.

Compared to agriculture, the urban weed control market does not appear to be viewed as an important market by most manufacturers of herbicides and other weed control products. An example of this is the small range of herbicides available in Australia for weed control in sports turf and home lawns. A survey of the literature reveals a wide range of chemicals being evaluated

overseas for the control of various weeds in turf, but due to market size and other factors, very few of these chemicals could be expected to be registered in Australia specifically for turf weeds.

In the field of weed control research most of the work in Australia has been directed towards agriculture and forestry. This effort has produced few answers directly applicable to problems of control of weeds in urban situations. For example, in the 'Directory of Turf Research and Development in Australia and New Zealand, 1985' (9) only 10 of the 82 current projects addressed weed control or weed biology. Of these only four had been published. Felton (10) also noted the lack of published research on weed control in Australian turf culture. This lack of information is even more serious for weed control in other aspects of parkland management.

Clearly, further research is required into the development of suitable herbicides and application methods for use in public areas. With herbicide formulations, the change from wettable powders to flowables has shown advantages in both convenience and operator safety. Judging by their widespread use overseas, granular formulations of herbicides deserve consideration for further development in Australia.

Other recommendations for research and development with regard to herbicide technology in parklands are:

1. Develop a greater range of application methods to minimise off-target hazards and problems
2. Develop herbicide mixtures which broaden the knockdown effect, residual properties and the spectrum of weed control
3. The use of pre-emergence herbicides for amenity plant and turf culture under Australian conditions
4. The development of growth regulating or vegetation suppressing chemicals for use in certain parkland situations.

To meet the requirements of an integrated approach to urban weed management many factors need to be addressed. For instance, the training of park maintenance staff in weed control practices is often minimal at tertiary education institutions, and neglected by many employers.

There are a large number of urban weed species for which detailed biological and ecological studies have not been carried out. This information is required to improve the integrated management of such weeds, and weed scientists should be given the resources to do more in this area.

Recently, there has been increasing public concern with the establishment of alien plant species in native bushland and other non-agricultural land. The extent of the problem presented by these plants and how to effectively deal with them have yet to be resolved. Programs to educate the public in the problems posed by weed species should be expanded to ensure a better appreciation of the contribution the public can make in preventing the establishment and spread of weeds.

In urban planning more emphasis on prevention of weed problems would lessen the need for control measures. Landscape planners and designers should recognise that design skill and use of appropriate development technology to produce effective landscape features can also reduce weed problems and

maintenance costs.

Weed science could play a useful role in reducing the substantial costs involved in maintaining amenity landscapes. This will require greater efforts by the manufacturers of herbicides and their technology, government funded weed scientists, educators, planning authorities and local government organisations to fund and develop weed management in amenity horticulture. The fragmented nature of local government in Australia probably means that the major source of funding for any of the recommended investigative efforts will have to come from state governments and industry.

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