

Urban weed control: innovations in kerb and channel weed management

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Summary Weeds in kerbs and channels of roads and in other areas of hard standing continue to be an issue in urban areas from the aspect of visual impact, damage to assets, cost to management and environmental pollution. To address these issues, Brisbane City Council has combined several technologies to develop a spray unit that reduces cost of application, reduces herbicide use, increases operator safety and working conditions and improves recording of operations.

Keywords Combining technologies, kerb, channel, weed management.

INTRODUCTION

The Brisbane City Council is the largest Council in the Southern Hemisphere serving some 1331 km² with over 10,500 km of sealed roads fitted with concrete kerb and channel.

Weeds continue to appear in the concrete kerb and channel throughout the City but more so in the older areas due to construction techniques used in the past as well as the age of the asset. Basically, any cracks within the kerb and channel, as well as the joint between the channel and the carriageway seal, provide sites to be pioneered by weeds. Weed growth affects the road surface and contributes to structural failure through root penetration allowing moisture into the road base.

The presence of weeds draws complaints from residents and requires expenditure of resources for their management. The presence of weeds tends to be perceived as an indicator of the City in decline.

For many years the quest for improved management methods has led to the examination of a number of innovative processes. Hot water treatment has been trialled with disappointing results. Rotary wick wipers were investigated which dramatically reduce the amount of herbicide applied as well as decreasing cost of application and increasing work output. However, these devices were limited to specific kerb and channel profiles. 'Weed Dragon', a flame applicator powered by liquid petroleum gas was also trialled but was rejected on safety grounds.

Hot water treatment and flame treatment increased the cost of application three to four fold, increased hazards both to the operators and the general public, were very slow in their application, covering approximately

20% of the distance covered by a herbicide spray unit in the same time period, and only provided a short lived cosmetic effect.

LATEST DEVELOPMENTS

Spectrophotometry has been used for many years for field analysis of water. It was considered that such technology could be adapted to identify the presence of green plant tissue against a background and then initiate a herbicide discharge to treat detected plants.

In 1996 Brisbane City Council became aware of the research being conducted at the New South Wales Agriculture Research Station at Tamworth by Warwick Felton and Paul Nash. Contact was established with Warwick to assess the likely benefits of this research to Council's kerb and channel Weed Management Program.

February 1999 saw the beginning of a new era in concrete kerb and channel weed management for Brisbane City Council. A vehicle fitted with the 'Weed Seeker' technology entered service as a test bed to assess the performance and reliability of this equipment and to determine the likely benefits of such equipment. This original test vehicle was rather crude but very quickly illustrated the benefits of the technology.

In February 2001 the first test vehicle was withdrawn and a new improved version entered service. This improved version not only used the 'Weed Seeker' technology but was also fitted with an on board computer, a GPS unit and a small weather station.

This then allowed the automatic mapping of the passage of the vehicle against a cadastral background and, within this trace, recording of the location at which herbicide was applied. The map generated is displayed on the computer screen and allows the operator to determine, at a glance, whether the street or a particular side of the street has been treated or not. It also allows the operator to plan ahead the route to follow to treat the area. Cycle times of the solenoids are recorded allowing for the calculation of the volume of herbicide applied at each point of discharge.

The on-board weather station accumulates the atmospheric conditions on a 30 minute cycle and feeds these data to the on-board computer. The computer can then correct for wind speed and direction as well as

taking into account the speed and direction of travel of the vehicle.

All of these data, including the maps produced, are stored in the computer and at the completion of each job, which is based on an individual electoral ward, the 'Record of Herbicide Application' which is a requirement of Queensland's *Agricultural Chemical Distribution Control Act*, is downloaded and stored on the office server. This record must be kept for a minimum of two years and must be made available on request to the Queensland Department of Primary Industries.

The present vehicle is a four-wheel drive van that has been converted to dual control. A small infrared video camera has been mounted externally and images generated are displayed on a monitor to assist the driver maintain the spray heads accurately over the target zone.

The driving compartment is air conditioned and is separated and sealed off from the cargo area by a full size curtain. The cargo area contains an electric powered diaphragm pump, which minimises noise, the solution tank and a flushing tank as well as a small tank for hand washing. Also much of the electronic equipment is housed within the cargo bay.

During operation, constant speed is important to ensure that detected targets are in fact hit by the herbicide discharge. To achieve this a modified cruise control has been installed. The vehicle has been calibrated to run at 10 km h⁻¹. When the cruise control is engaged the speed is maintained with a variance of ± 1 km h⁻¹. With a flick of a switch on the controller, the unit can also operate at 5 km h⁻¹ to treat areas such as cul de sacs.

Night time operations have been assessed and the vehicle has been used to successfully treat kerb and channel weeds in commercial and industrial areas after dark there by avoiding traffic congestion normally encountered in such areas during daytime operation.

Demonstrated benefits of the present vehicle include:

- a reduction in crew from two to one;
- a reduction in herbicide applied by 20% to 80% plus;
- a reduction in cost of treatment by 65%;
- an increase in work output from 16 km per shift to 40 km per shift;
- an increase in operator safety and comfort being enclosed in an air-conditioned cab;
- an increase in the operator's performance as a result of less fatigue;
- an ability to operate safely after dark; and
- consistency of application when compared with traditional application; where the operators became fatigued as the day progressed, they tended not to treat the smaller weeds.

A more advanced unit is now in the design phase. This later model will incorporate improvements that will expand the operational capabilities of the present model. Also on the drawing board is a smaller light-weight model to treat weeds on the ever-expanding walkway/bikeway network within Brisbane.

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