

Managing Backyard and Creepline Infestations of Alligator Weed (*Alternanthera philoxeroides* (Mart.) Griseb) in the Hawkesbury-Nepean Catchment, New South Wales, Australia

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Abstract: Alligator Weed, a major aquatic weed in Australia, poses a significant threat to waterways and properties. It has the potential to cause losses of millions of dollars from agricultural, tourism and extractive industries in a major river system in Sydney—the Hawkesbury-Nepean River catchment. The Sri Lankan community had mistakenly grown Alligator Weed as a vegetable in their backyards. Campaigns by NSW Agriculture to inform the community and discontinue this practice were launched during 1996-1999. We surveyed the backyard infestations of Alligator Weed in suburban residences of the Sri Lankan community living within the catchment, to determine the extent of the problem. Overwhelming evidence was found that the Sri Lankan community is no longer a major factor in spreading Alligator Weed in Sydney. The community had ceased growing the weed as a vegetable. The few persistent backyard infestations found were eradicated during 2004. Forty-four infestations, 30 of which originated from the old database were collated for future monitoring.

A second strategic project surveyed the extents and spread of Alligator Weed along two creek lines (McKenzie's Creek and Marsden Park Creek) within the river catchment, and assessed the level of success of recent control efforts. The creek lines were mapped with 3400 m² of Alligator Weed found over 5 km, infesting 50 properties. The study identified deficiencies in the treatment regime that had been used by the Local Control Authority. Guidelines and protocols were developed for improved 'site-specific' control and for inspections and recording of infestations. Given that the minor infestations recorded in 1996 in the creeks had expanded to cover larger areas, a more systematic local control plan is needed to stop the spread. Elements of such a plan include educating the public, obtaining local community support, as well as training of contractors and weed control officers.

Keywords: Alligator Weed, Management

Introduction

Alligator Weed (*Alternanthera philoxeroides* (Mart.) Griseb.) is one of twenty Australian Weeds of National Significance (WONS), and is a declared Noxious weed in all the council areas of the Hawkesbury-Nepean (H-N) catchment in New South Wales (Figure 1). This invader poses a significant threat to waterways and properties, with

potential losses of many millions of dollars to agricultural, tourism and extractive industries in the catchment. Given the seriousness of the threat posed by Alligator Weed and other aquatic weeds in this major river catchment, NSW Agriculture established the 'Hawkesbury Nepean Aquatic Weeds Task Force', which functioned from 1999 to 2004. Addressing a key issue identified by the Hawkesbury-Nepean Catchment Blueprint on Biodiversity- 'Coordinated Strategies and Action to control Aquatic and Terrestrial Weeds', a key objective of the Task Force was to identify strategic gaps in Alligator Weed management, and act to contain the spread of the weed in the catchment.

An outcome of the Task Force's actions was the *Hawkesbury-Nepean Alligator Weed Strategic Plan* (NSW Agriculture 2001). Goal 3.5 of the Strategic Plan is to 'Ensure that the Sri Lankan Australian community is aware of the prohibition on the cultivation and sale of Alligator Weed and is aware of alternative species'.

This paper summarises the key findings of a collaborative pilot project initiated by the Task Force, targeting strategic gaps in Alligator Weed Management, and identifies key issues for future attempts to arrest the spread of Alligator Weed in the H-N catchment. The Local Government Advisory Group (LGAG)- part of NSW Department of Natural Resources (DNR), funded the project, which commenced in November 2003.

Methodology

Objective 1- Suburban Backyard Alligator Weed Infestations

It had been known since 1995 that Sri Lankan communities were growing Alligator Weed as a food source in their backyards (McKenzie 1996; Gunasekera & Adair 1999). The weed was mistaken for a similar species – "Mukunuwenna" (*Alternanthera sessilis* (L.) R. Br. ex DC.), a popular vegetable in Sri Lanka. Some older Sri Lankans had mistakenly grown Alligator Weed for up to 25 years in Australia. Investigations revealed that Sri Lankans living in major cities, such as Sydney, Melbourne, Brisbane and Canberra, and in various regional centres were all doing the same. Previous work by NSW Agriculture raised awareness of the issue in the community and led to the compilation of a database of infestations in Sydney.

The primary objective of this project was to determine current occurrences of Alligator weed in Sri Lankan backyards across several suburbs of the Hawkesbury-Nepean catchment, and assist in eradicating these weed populations. This required (a) Conducting a media campaign to raise awareness of the issue; (b) Identifying the extent of backyard infestations across the catchment; (c) Carrying out control free of charge; (d) Substituting Alligator Weed with the real 'Mukunuwenna' or an equivalent; and (e) Updating information for each Local Council to monitor and control future Alligator Weed infestations.

The Government Census (2001) indicated that the Sri Lankan community had an estimated 650 households in the H-N catchment, located broadly in the north-west sector of Sydney (Figure 1). The main suburbs were Kellyville, Castle Hill, Quakers Hill, Baulkham Hills, Plumpton, St. Marys and St Clair. A new list of addresses was

collated from the phonebook, and 610 letters were sent with the leaflet (“Don’t Mistake Alligator Weed for Mukunuwenna”). Households were also contacted by phone. Seventy letters were sent with the leaflet to properties on the old database as well. Other methods used to reach the community were: (a) Posters and leaflets placed in six grocery stores and two buddhist temples; (b) Newspaper articles in five local papers, one Sri Lankan paper and in two Newsletters of Sri Lankan Community Organisations; (c) Webpage banner advertisement on main Australian Internet site for Sri Lankans – www.ozlanka.com.au, with photos; the advertisement ran for three months, 15 Jan-15 April 2004), and (d) SBS radio interview (for Sri Lankan audiences).

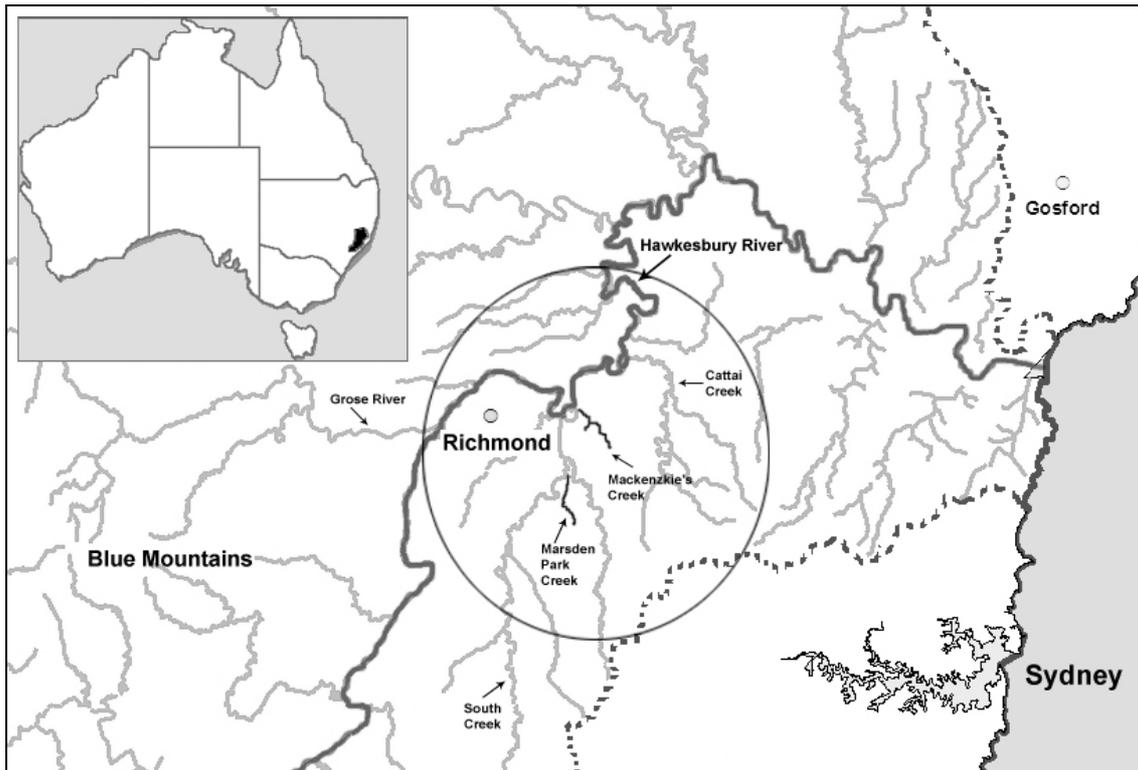


Figure 1. Part of the Hawkesbury-Nepean River catchment in NSW. Australia. Note the H-N River and locations of two small tributaries- Mckenzie's Creek and Marsden Creek

The main message in the letters, posters and leaflets was that Alligator Weed is not ‘Mukunuwenna’. Other information comprised: (a) tips on identifying the two species apart from one another; (b) negative effects of Alligator Weed on human health and the environment; (c) its ‘Noxious Weed’ status under legislation (Noxious Weeds Act 1993); (d) dispersal mechanisms; (e) offer of free home visit for control and free substitute vegetable. Feedback from the community indicated that information on human health effects had the biggest impact on them in changing their behaviour.

Providing a replacement vegetable for Alligator Weed, either ‘Mukunuwenna’ itself (*A. sessilis*) or a large-leaf form- *Alternanthera denticulata* R. Brown, was important as part of the strong message given to the Sri Lankan community. *Alternanthera denticulata*, a native Australian species, had been successfully used in both NSW and Victoria, after testing for nutrition and community acceptance (Gunasekera and Bonila 1999).

Property inspections were carried out with landholders, and infestations treated with Wipeout 360™ (Glyphosate), Brush-off™ (Metsulfuron methyl) or Kamba M™ (MCPA/Dicamba), if the infestation was in a grass lawn.

Objective 2- Creekline Alligator Weed Infestations

Alligator Weed spreads predominantly along creek lines. The weed arrives in the creek line mainly through stormwater flows and flooding when stem fragments break off from an infestation and are transported by water to new areas. Dispersal also occurs through human activities (earth moving machinery and movement of sand, soil or mulch contaminated with stem fragments) or through movement of animals. Spread is only via vegetative means, as no viable seeds are set in Australia. Often, infestations occupy the creek bed or shoreline, and spread on to the bank, riparian zones and eventually the floodplains, drainage channels and billabongs. Given the above, the second aspect of the project was to: (a) assess the spread of Alligator Weed along McKenzie's Creek and Marsden Park Creek, and (b) assess the level of success of recent control efforts.

Results and Outcomes

Ten new backyard infestations were discovered through the media campaign. Four new infestations were found by mail-outs and follow up phone calls made to homes. From the 66 properties inspected from the old database of 68 properties, 30 small infestations were found again (45%). Four neighbouring properties were discovered to also have infestations. The database was updated to show 48 new property infestations for future monitoring by relevant Local Control Authorities (Table 1). About 50% of the infestations were less than 1 m², but a few (16%) were large enough to warrant aggressive control action, which was taken (Table 2). Herbicide treatments were carried out in 36 properties; householders treated the remainder (Table 1).

Table 1. Updated database of infestations, 2004

Source	Total	Control actions taken by Project	Control action by Householder
Old database	30	22	8
Neighbouring properties (Old database)	4	3	1
Located by Media campaign	10	8	2
Located by phone calls to mail out list	4	3	1
Total	48	36	12

Table 2. Size of Alligator weed infestations found in Sri Lankan backyard properties

	<1m ²	1-3m ²	4-6m ²	10-25m ²	Total
Old database	17	6	4	3	30
Neighbouring properties (Old database)	1	2	1	-	4
This project	7	7	-	-	14
Updated database	25	15	5	3	48

Metsulfuron methyl, the selective herbicide was used in 80% of infestations (Figure 2). All three chemicals were effective in killing the plant above the ground, but may require some follow-up treatments. A very high proportion (94%) of Sri Lankans contacted do not have Alligator Weed in their properties; none were found to still cultivate the weed.

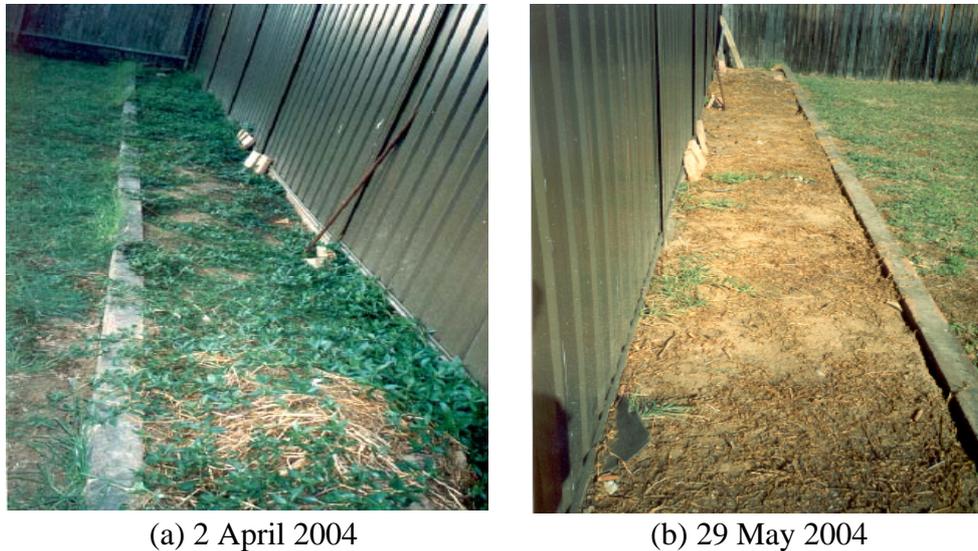


Figure 2. Control of a backyard infestation, among grass, by Metsulfuron-methyl

The targeted creeklines- Mckenzie's Creek and Marsden Park Creek (Figure 1) were surveyed over several days and the infestations mapped. Approximately 3400 m² of Alligator Weed was found over 5 km of the two creeks and in 50 properties associated with the creeks. Being relatively new infestations, the patches were not dense. Evidence of significant activity of the biological control agent - Alligator Weed flea beetle *Agasicles hygrophila* was recorded from both creeks, surveyed in February-March 2004. In some patches, grazing damage caused by the beetle had reduced visible biomass by as much as 50%; yet, the weed survived and recovered.

Minor amounts of Alligator Weed had been first noticed in Mckenzie's Creek around 1995, mostly in the upstream areas of the H-N catchment. From these upstream areas, infestations had quickly spread down to infest the rest of the creek, covering some 45 properties (generally 2 ha lots). A few heavily infested properties had received treatments by the control authority, but these once or twice yearly herbicide applications were found to be ineffective. In Marsden Park Creek, the infrequent treatments carried out in recent years by the control authority were found to be ineffective. Although the infestations were not very dense, the mapping indicated that Alligator Weed had spread more than 1 km from its original infestation location in this creek, over a few years.

Conclusions

It appears that Alligator Weed is not widespread in backyard properties of the Sri Lankan community anymore. However, as evidenced by the small number of new infestations found, the community can still be a 'vector'. The campaigns since 1996 have been effective, and our project estimated that a very high proportion of Sri

Lankans are aware of the problem, and do not contribute to spreading of the weed. The fact that a small % of infestations from this source is still in the catchment means that occasional property inspections are required to eradicate this source of infestation.

The creekline infestations are much more serious, and managing these are the legal responsibility of the local control authority- Hawkesbury River County Council (HRCC), which has weed spray operators, inspectors and supervisors, to conduct management activities. Given that minor infestations found in Mckenzie's Creek and Marsden Park Creek in 1996 have grown so large, more effective management action by the control authority is essential.

A key lesson learnt from the project is that it is necessary to prioritise Alligator Weed funding for control works at the head of catchments and sub-catchments. Mapping of infestations, creating a database of infestations, contacting landholders and providing advice on management are all essential for an integrated management effort. Experience has shown that follow-up inspection and treatment is also essential. Guidelines for Alligator Weed management in rural and semi-urban properties have been developed, and these need to be widely published for use by landholders. In all cases, it is necessary to detect early and investigate the sources of a new infestation (such as suppliers of mulch, sand, soil and heavy machinery), so as to prevent further spread.

It is also necessary for strategic Alligator Weed management to place the onus of control on the landholders. The Local Councils are required to conduct diligent education and awareness campaigns, and regular monitoring of landholder eradication efforts. Letters of non-compliance may follow these.

Whilst private landholders may be asked to play an increased role in managing Alligator Weed in their properties, other landholders, such as the Local Councils and government agencies also need to be held accountable for more effective management of infested road culverts, creeklines and drainage lands. Stakeholder consultations during the project confirmed the view that local communities need to be more closely involved in Alligator Weed management, and this can be achieved through the formation of local Landcare groups.

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