Third International Weed Science Congress
Foz do Iguassu, Brazil
6-11 June 2000

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Hess FD, Mathisen F, Galloway F. 2001. The world of off-patent herbicides: their appeal, utility and impact in weed management [abstract]. In: Abstracts of the Third International Weed Science Congress; 2000 June 6-11; Foz do Iguassu, Brazil, p. 98. CD-ROM. Available from: International Weed Science Society, Oxford, MS, USA.

Full text contribution:

Green J.M. 2001. Using adjuvant physicochemical properties to improve herbicide performance. Proceedings of the Third International Weed Science Congress; 2000 June 6-11; Foz do Iguassu, Brazil, Manuscript number 238, 17 p., CD-ROM. Available from: International Weed Science Society, Oxford, MS, USA.

A comparison of control techniques for *Spartina anglica* in a South-East Australian estuary

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Abstract

Physical and herbicide treatments of an estuary infestation of *Spartina anglica* were compared to determine an optimum treatment for medium to long term control of this estuarine weed. Treatment plots (slash/smother, slash, slash/glyphosate/smother, and glyphosate) were compared with a nil treatment in a randomised complete block design with four replicates. Slashing consisted of cutting the grass to ground level; smothering consisted of covering the grass with a black polyethylene cover; glyphosate treatments consisted of applications of 24g ai/L to the plants. After twelve months, *Spartina anglica* was harvested from treated plots. Samples were oven dried at 70 degrees Celsius for 48 hours and then weighed. Data was subject to an Analysis of Variance using MINITAB software. The Fischer's protected Least Significant Difference was calculated at a level of significance of p=0.05. Analysis of results indicated the most effective treatments were slash/smother and slash/glyphosate/smother; these treatments resulted in 97% less biomass than in the nil treatment. As there was no significant difference between these two treatments, it was concluded that the slash/smother treatment was suitable for medium to long term control of rice grass. In practice, this treatment could be combined with follow up smothering and hand removal and would be ideally suited to smaller satellite infestations of *Spartina anglica*.

Introduction

Spartina anglica is a northern hemisphere saltmarsh grass deliberately introduced into Australia in the 1930s to assist in the stabilisation of mudflats primarily to maintain deepwater flow in shipping channels (DPIF, 1997). It belongs to a small genus of plants and comprises 17 species originating in Europe, North Africa and North America (Bridgewater, 1995). In south eastern Australia, this introduced plant is commonly referred to as rice grass or spartina. It is a tough, erect rhizomatous perennial grass that inhabits the intertidal zone of temperate estuaries (Curtis and Morris, 1994). Its distinctive colonising characteristic is its ability to spread rapidly via vegetative reproduction. During this process it also accretes sediments (Hedge, 1998) effectively creating an environment suited to its own establishment at the expense of other flora and fauna on the mudflats.

In the early 1930s to 1940s, several unsuccessful attempts were made to introduce *Spartina anglica* into estuaries around the island state of Tasmania. The first successful introduction occurred in the River Tamar in north eastern Tasmania in a bid to stabilise the mudflats, create 'useful' land and in the process increase stream flow in the centre of the river to scour a deep channel for unhindered navigation of ships (Wells, 1995).

Since its introduction, *Spartina anglica* has steadily spread throughout the Tamar estuary dramatically altering the mudflats and severely impacting on not only the natural environment but also on recreational fishing, water sports, and an expanding off-shore aquacultural industry. These experiments were initiated as a result of concerns expressed by residents of the Port Sorell region in North West Tasmania where the experiments were conducted (Bishop, 1995).

The experiment analyses regrowth of *Spartina anglica* from established plots following a range of experimental control methods. The aim was to determine the optimum treatment for medium to long term control of *Spartina anglica* in Tasmania with application to the rest of south-eastern Australia affected by this weed.

Materials and Methods

The experimental site was located on a large meadow of *Spartina anglica* in the Rubicon estuary in northern Tasmania (Figure 1). Six treatments (Table 1) were tested using a Randomised Complete Block design replicated four times on plots of *Spartina anglica* measuring 4m x 4m.

Table 1: Control treatments for *Spartina anglica* in the Rubicon estuary.

Treatment No.	Treatment
One	Slashing + smothering
Two	Slashing only
Three	Slashing + glyphosate+smothering
Four	Glyphosate only
Five	Bleach
Six	Nil (control)

Slashing

The plots were slashed using a petrol driven brushcutter with a circular metal blade. The plants were slashed to a height of approximately 100 mm and the cut vegetation raked to one side.

Smothering

Black polyethylene sheeting was cut into appropriate sized strips and laid on the plot. Pieces of galvanised wire were cut to size and laid over the plastic extending beyond its outer edge to hold the plastic sheeting in place. Sprung wire pegs were twisted and used as stakes to hold the wire down over the polyethylene sheeting. Sheeting was held in place for approximately six months before removal.

Fig 1. Aerial view of the Rubicon estuary showing location of experimental plots in meadows of *Spartina anglica*. (Aerial photograph courtesy Rubicon Coast & Landcare Group).

Glyphosate

The only herbicide treatment tested, glyphosate (present as the isopropylamine salt) was applied to the test plots at the rate of 24g a.i./L of water with a commercial penetrant used (freeway®) at the rate of 2ml/L of water. A 15L backpack sprayer was used to apply the herbicide.

Bleach

Oxygenated bleach crystals (sodium chlorate) were sprinkled at the base of the plants at an approximate rate of 390 g/m^2.

Once the treatments had been applied, the site was left for a period of 12 months before quadrat harvests (0.25m^2) were made in each of the treated plots. The quadrats were cut to a level of approximately 100 mm. The harvested samples of *Spartina anglica* were oven dried at 70 ^{0}C for 48 hours. Samples were then weighed and the data were subjected to an Analysis of Variance Analysis (ANOVA) using MINITAB® software. The Fischer's protected Least Significant Difference was calculated at a level of significance of p=0.05.

Results

Both smothering treatments (1 and 3) significantly (p=0.05) reduced regrowth of *Spartina anglica* by 97% and 88% respectively (Fig. 2). There were no significant reductions in regrowth due to any of the other treatments. Further more, with the smothering treatments 1 and 3, there was no significant differences in biomass reduction between application of glyphosate (Treatment 3) following slashing and prior to smothering.

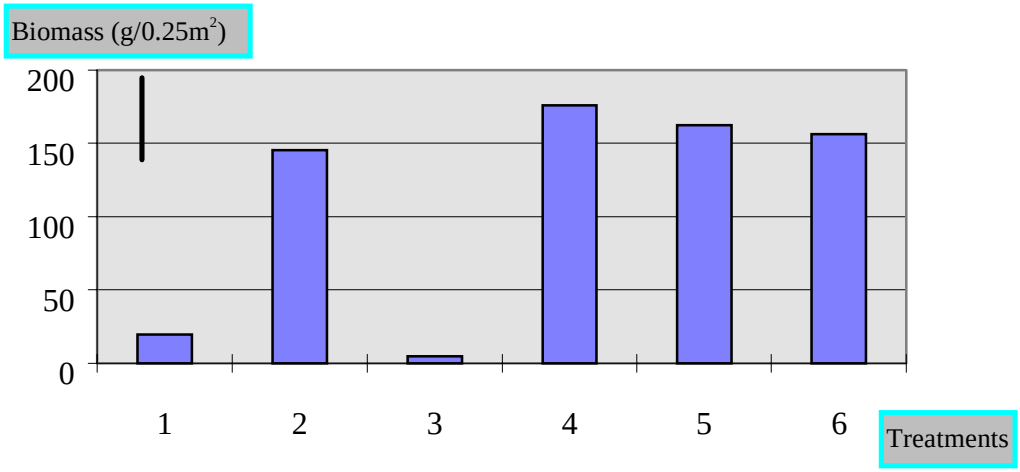

Fig 2. Dry weight of harvested vegetative material (g/0.25m^2) for each of the treatments under test. Bar represents Fischers protected l.s.d. at p=0.05.

Discussion

The results indicate that the most effective component of treatment was the smothering of the *Spartina anglica* using black polyethylene sheeting. When used individually, slashing of the *Spartina anglica* and use of glyphosate had no significant impact on the population 12 months later. It would be reasonable to conclude that the efficacy of treatment 3 was probably due almost entirely to the smothering procedure using black plastic. The mechanism for the effective elimination of the *Spartina anglica* from the plots covered in the black plastic can only be postulated here and deserves further detailed study. Certainly excluding the light, preventing photosynthesis with subsequent failure of the plant's metabolic processes would have contributed to the efficacy of this treatment. The use of glyphosate could not be recommended in this situation due to a total lack of effect after the 12 month period. In conclusion:

- The smothering process was suitable for medium to long term control of *Spartina anglica* providing up to 97% control of regrowth, and could reasonably be combined with follow up treatments of smothering or hand removal of individual plant regrowth.

- There is no additional benefit by incorporating glyphosate into the treatment.

- The Slashing only, application of glyphosate, and application of bleach treatments were not effective for medium to long term control of *Spartina anglica*.

Acknowledgments

Rubicon Coast and Landcare Group volunteers are recognised for pursuing, establishing, and implementing these experiments which has led to an increased awareness and activity in managing *Spartina anglica* in Tasmania. Special thanks to Greg Stokes and David Lane who assisted in profiling the impact of *Spartina anglica* in Tasmania, and many thanks to Julia Butler for her untiring and determined pursuit of rice grass management for the benefit of the Tasmanian environment and community.

References

Bishop, A. 1995. Assessing options for spartina containment in Tasmania. Proceedings of the Australasian Conference on spartina control. 14-19.

Bridgewater, P. 1995. Opening address. Proceedings of the Australasian conference on spartina control. 2-4.

Curtis, W. M. and Morris, D.I. 1994. The Students Flora of Tasmania-Part 4B Angiospermae: Alismataceae to Burmanniaceae. St Davids Park Publishing, Tasmania, Australia.

Department of Primary Industry and Fisheries. 1997. Introduced Species- Rice Grass in Tasmania. Wet Ones Fact Sheet 7.

Hedge P. 1998. Strategy for the management of rice grass (*Spartina anglica*) in Tasmania, Australia. Rice Grass Advisory Group. 16.

Wells, A. 1995. Rice Grass in Tasmania-An Overview. Proceedings of the Australasian conference on spartina control. 11-13.