CRC for Australian Weed Management #10
Technical Series

Economic impact assessment of Australian weed biological control: summary

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'Last year Australian biocontrol science turned a $4 million investment into a $95 million return... and did the same the year before, and the year before that, all the way back for 100 years. An average benefit-cost ratio of 23:1 over that time period is simply a brilliant investment.'

Hon. John Kerin, former federal Minister for Primary Industries, Jan 2006

What is biological control?

Often shortened to 'biocontrol', the biological control of weeds refers to the use of insects and pathogens (such as fungus) to attack invasive plants, without the use of expensive chemical or physical measures. These 'agents' are usually sourced from the plant's country of origin. They are carefully screened to ensure that Australian native plants are not affected, and released into weed-infested areas where they establish self-sustaining populations at little or no further cost. The aim is not the eradication of the weed, which is unlikely using this technique alone, but rather its reduction to such low numbers that it ceases to be a problem. The control of prickly pear in Australia is one of the best known examples.

Economic value of biocontrol in Australia since 1903

This new economic study by AEC*group* Ltd published by the Weeds CRC reviews all biocontrol programs conducted in Australia since 1903. Sufficient data and records exist to conduct an economic evaluation on 36 of these, and the study covers the following aspects:

- background and biology
- establishment and impact of the weed, including impact on human health
- biocontrol program, including development costs and results achieved
- cost-benefit analysis
- summary
- references

Main findings

High return on investment

Average investment of $4.3 million/year since 1903 ➤ Average return of $95.3 million/year since 1903

Every $1 invested returns ➤
- $17.40 to agriculture
- $3.80 to society
- $1.90 to government

Example of 2004–05

Taking 2004–05 as an example, with a national investment of $4.3m in all biocontrol projects and staff across Australia, the estimated economic returns and the number of jobs this represents are as follows:

Impact	Gross output ($m)	Value added ($m)	Income ($m)	Employment[(a)]
Direct	$71.8	$38.5	$5.9	871
Indirect	$56.2	$26.9	$13.0	348
Total	**$128.0**	**$65.4**	**$18.9**	**1,219**

[(a)] Persons, full time equivalent

Source: AECgroup

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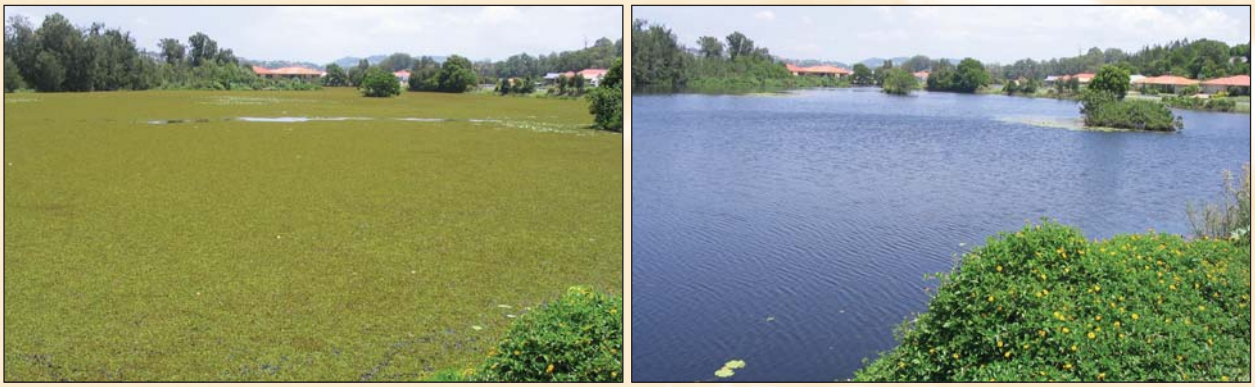
The top ten biocontrol programs, ranked by their final benefit-cost ratio

Weed	No. of years research	Total investment *($m in 2004/05 $$)*	Net present value *($m in 2004/05 $$)*	Benefit-cost ratio
1 Prickly pear	35	21.1	3100.4	312:1
2 Skeleton weed	5–10	12.7	1412.8	112:1
3 Rubber vine	21	3.6	232.5	108:1
4 Annual ragweed	7	0.6	52	103:1
5 Paterson's curse	approx. 30	23 (est.)	1178	52:1
6 Ragwort	29	7.9	94.2	32:1
7 Salvinia/water hyacinth/water lettuce	20	5.1	76.5	27:1
8 Harrisia cactus	5	1	18.6	23:1
9 Giant sensitive plant	11	1.7	20.2	18:1
10 Slender thistle	11	2.1	20.9	14:1

Of the 29 programs assessed, 14 returned a positive net benefit readily measurable in dollars. Over the 103-year review period and across the whole 29 programs, the 14 successful biocontrol programs delivered a total average annual benefit of $95.3 million for an annual average investment of $4.3 million - a benefit:cost ratio of 23:1. A further three successful programs also resulted in very significant economic gains which are not included in the overall benefit-cost ratio because of data limitations. The total loss from the unsuccessful programs over 103 years was $15 million.

Social and environmental benefits of the programs were seldom able to be quantified in the economic study, although substantial value has been delivered by many of the programs in one or both of these areas. Examples include the enhanced amenity for recreation and conservation achieved through the successful biocontrol of bridal creeper, and the partial success with blackberry. As a result of this research, extensive infestations of these two weeds in areas of high conservation value are now being brought under control for the first time. Even without taking these important environmental outcomes into account, a benefit-cost ratio of 2:1 was obtained in pasture and orchard production systems alone.



Infestation of salvinia at Tweed Heads Jan 5 2004, and the situation on 16 Feb 2004 after successful biocontrol by the salvinia weevil *Cyrtobagous salviniae*. The weevil was introduced in Oct 2003. Photos: Karen Cranney, Tweed Shire Council.

Conclusion

Biocontrol in Australia has a long and successful research history resulting in outstanding economic and environmental returns. Although each individual program may be regarded as high-risk, biocontrol has repeatedly delivered valuable and lasting solutions for an impressively low initial outlay. Over the past 100 years, Australian agriculture has received enormous economic benefits from a relatively modest annual outlay.

The major economic and environmental shifts expected to result from peak oil and climate change will reinforce rather than weaken the cost-effectiveness of biocontrol as a long-term weed management tool over large areas. This study underlines the value and wisdom of investing in long-term biocontrol programs in Australia, whether the funds are public or privately raised.

The full report: *Economic impact assessment of Australian weed biological control*, CRC for Australian Weed Management, Technical Series No 10, Adelaide. pp 164.

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This report is available from the Weeds CRC website
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Image: *Zygogramma bicolorata* on parthenium weed.
Photo: Qld Dept Natural Resources & Mines.

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