

ASSESSING THE COSTS OF BLACKBERRY IN CENTRAL WESTERN NEW SOUTH WALES

D.T. VERE¹ and J.J. DELLOW²

¹Department of Agriculture, New South Wales
State Office Block
Orange. N.S.W. 2800

²Agricultural Research and Veterinary Centre
Forest Road
Orange. N.S.W. 2800

Summary. Blackberry (*Rubus fruticosus*) causes major economic costs in terms of potential production losses and control costs incurred by landholders and public authorities. The weed threatens the productivity of vast areas of New South Wales pastures. In 1982-83 blackberry caused economic costs of \$4.737 million in Central Western New South Wales. These costs could have been four to five times greater on a State basis.

Blackberry has the potential to become a significant economic problem in New South Wales in the absence of an effective control programme. Reliable estimates of the extent and costs of blackberry in each affected region is a prerequisite to extensive control.

INTRODUCTION

Blackberry (*Rubus fruticosus*) is a major pasture weed of eastern New South Wales and is proclaimed noxious throughout the State. Moderate to dense infestations occur throughout the coastal, tablelands and near-slopes areas where average annual rainfall exceeds 760 mm (Watson 1982). Blackberry has negligible grazing value (except for goats) and reduces potential livestock production by restricting pasture accessibility. The weed spreads rapidly and presents major control problems in steep, inaccessible country and along water courses and public thoroughfares.

There are three categories of economic costs caused by blackberry. The most important is the loss of potential livestock production enforced by infestations in pastures; up to 50 per cent with dense blackberry (assumed ground cover between 30 and 100 per cent) and by 15 per cent for moderate infestations (up to 30 per cent ground cover). Second, effective control with herbicide and resowing with improved pastures is expensive. The third is the external cost imposed on landholders by blackberry spread onto their properties from uncontrolled infestations elsewhere. This is equivalent to the expense and effort involved in keeping pastures blackberry-free and varies according to the frequency of re-infestation from scattered seedlings and proximity to uncontrolled seed sources.

This paper reports an estimate of the annual economic cost of blackberry in Central Western New South Wales; a region representative of the State's blackberry problem as it covers large areas of high rainfall tablelands country in which the weed prevails. Data deficiencies and inconsistencies precluded a state-wide loss assessment. Estimates are made of the annual losses of potential livestock production caused by the weed and of costs of chemical control incurred by shire councils and landholders over 1982-83. A partial sensitivity analysis of the results and some necessary qualifications are also reported.

MATERIALS AND METHODS

Data. Data included the extent and degree of blackberry infestations, the main agricultural enterprises affected, the quantities and costs of herbicides used in control by shire councils and landholders, and the spread potential of the weed over time. All data were provided by New South Wales shire councils in response to a survey questionnaire, and related to 1982-83.

Production losses. Annual production losses depend on the extent and degree of infestation, the production potential of the affected country, the weed's impact on production and the value of the affected output. Because blackberry mainly occurs in non-crop areas, the livestock enterprises are those which are most affected.

Following the approach adopted by Vere and Campbell (1979) for serrated tussock (*Nassella trichotoma*), the annual loss of potential livestock production caused by blackberry was estimated on the basis that:

- * losses were equivalent to the gross value of reduced wool production from Merino wethers, resulting from blackberry infestations in improved and natural pastures (Merino woolgrowing is the predominant agricultural activity in the region) (Table 2).
- * wool production potentials were assessed for individual shires; wool was valued at \$3.50 per kg greasy.
- * losses were assessed for dense and moderate infestations; light infestations result in no production loss.
- * areas of infestation were distributed between improved and natural pastures on a 40:60 basis; this ratio was subsequently sensitized.

Control costs. The reported blackberry control costs were the shire councils' expenditure on chemicals plus their chemical sales to landholders. Chemical sales through commercial outlets for blackberry control could not be assessed. Similarly, no estimate could be obtained of the costs of mechanical and other control methods.

External costs. These are the costs incurred by landholders in preventing blackberry infestation from adjoining areas, and will include the costs of digging, spraying pasture improvement and other methods of removal. External costs vary widely between landholders according to proximity to outside infestations, topography and management. They could not be reliably assessed here.

RESULTS

A 1983 survey of shire councils by the New South Wales Department of Agriculture indicated that 150,800 ha were densely infested with blackberry and a further 1.22 million ha were moderately infested. Scattered blackberry occurred over 4.38 million ha and threatened the productivity of vast areas of grazing country (Table 1). Many of these infestations occurred in non-arable areas where control can be most difficult.

Blackberry was estimated to cause aggregate wool production losses valued at \$4.251 million in Central Western New South Wales during 1982-83 (Table 3). This loss resulted because blackberry significantly reduced the sheep carrying potential of both improved and natural pastures. It was equivalent to the value of the extra wool which might have been produced in the absence of the weed. Losses in four of the eight shires exceeded 20 per cent of the annual gross value of wool production (averaged over the three years 1979-80 to 1981-82) and in one instance, exceeded 50 per cent. The magnitude of loss was proportional to the quantity of improved pasture infested (Table 4).

A further \$0.486 million was spent by shire councils and landholders in the region on chemical control over the same period (compared with \$1.084 million for New South Wales in total). Adding this cost to the estimated value of potential wool production foregone, the overall economic cost of blackberry infestations in Central Western New South Wales was estimated to be \$4.737 million during 1982-83; ranging between \$3.204 million and \$6.306 million when the pasture distribution ratios were sensitized.

DISCUSSION

Blackberry has long been an important economic problem in New South Wales and there is evidence that the problem may be increasing. Comparison of the 1980 blackberry distribution data of Mears (1982) and the present 1983 survey indicates substantial increases (of up to 50 per cent) in the estimated areas of both moderate and light infestations over the four year period. Whilst we echo Mears' caution as to the reliability of survey data of this nature, the data nevertheless provide a strong indication of the strength and direction of movement in this State's blackberry populations. Particularly, the significant increase in the area of moderate infestation will be of major concern to landholders and weed control authorities because blackberry is proclaimed noxious throughout New South Wales.

This assessment of the economic cost of blackberry to Central Western New South Wales did not consider the cost of controlling existing infestations. The overall economic cost of the weed would escalate if these costs were included. For example, the New South Wales Department of Agriculture currently recommends control by spraying, replacement with improved perennial pastures and long-term pasture maintenance to prevent re-infestation (Watson 1982). At a cost of \$125 per hectare (updated from Vere and Holst 1979), the control of all dense infestations in the Central Western region would add a further \$2.897 million to the estimated economic cost (and some \$18.846 million on a State basis). Hence, the total economic cost of blackberry in the Central West during 1982-83, including the value of production foregone and herbicide and pasture improvement costs, might have been as high as \$7.634 million. However, the long-term annual benefits of control from permanent livestock production increases would far exceed these costs. Annual costs thereafter following extensive control would be those of follow-up treatment where necessary and of the extra stock carried.

An assessment of the annual state-wide economic costs of blackberry was not attempted, as previously stated. These costs can be expected to be far greater than those estimated for the Central West. More than 80 per cent of both dense and moderate infestations in 1982-83 were outside the Central West, so potential production losses to the State might have been four to five times higher (ie, \$17 to \$21 million). Herbicide expenditure and pasture improvement costs would further inflate this estimate. Of course, such an extrapolation must be regarded as a rough approximation only.

Similarly, no estimate could be made of the external costs imposed on landholders from blackberry spread. The current magnitude of this cost and its future potential is evidenced by the 4.383 million hectares now lightly infested in New South Wales.

The discrepancies in the chemical control activity reported relative to the extent of blackberry in various regions are noteworthy. At present, the Northern Statistical Division (comprising the Northern Slopes and Tablelands) carried 29, 62 and 54 per cent respectively of the State's dense, moderate and light infestations (Table 1). However, that Division's 1982-83 chemical expenditure was less than half that spent in the Central West which carried significantly less blackberry. In fact, the Central West incurred 45 per cent of the State's herbicide expenditure. This may be a reflection of the varying economic importance placed on blackberry between New South Wales regions. It also highlights the problems associated with surveys of this type.

LITERATURE CITED

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TABLE 1
Estimated Areas of Blackberry Infestations
in New South Wales Statistical Divisions; 1982-83^a
(thousand ha)

Statistical Division	<u>Degree of Infestation</u>		
	Dense	Moderate	Light
Mid North Coast	3.05	8.10	18.55
Hunter	25.85	60.70	366.44
Sydney	0.08	0.23	20.13
Illawarra	1.66	8.75	23.60
South-Eastern	3.41	5.63	775.75
Central West	23.18	188.32	649.87
North Western	4.39	19.88	49.72
Northern	43.62	751.47	2262.48
Murrumbidgee	1.62	88.01	119.71
Murray	43.91	89.12	96.96
Totals	150.77	1220.21	4383.21

^a Excludes Forestry, National Parks etc.

TABLE 2

Assumed Production Levels and Reductions Enforced by Blackberry; Central-Western New South Wales

Shire	Stocking Potentials		Wool cut per head (kg/head)	Enforced Reduction in Stocking Potential			
	improved pasture (d.s.e./ha) ^c	natural pasture (d.s.e./ha)		improved pasture (d.s.e./ha)	natural pasture (d.s.e./ha)	improved pasture (d.s.e./ha)	natural pasture (d.s.e./ha)
Blayney	15.0	2.0	6.0	6.75	0.9	2.25	0.3
Cabonne	15.0	2.0	6.0	6.75	0.9	2.25	0.3
Cowra	12.0	1.75	5.5	5.4	0.8	1.8	0.26
Evans	12.0	1.75	5.5	5.4	0.8	1.8	0.26
Lithgow	10.0	1.25	5.5	4.5	0.56	1.5	0.19
Oberon	15.0	2.0	6.0	6.75	0.9	2.25	0.3
Orange City	15.0	2.0	6.0	6.75	0.9	2.25	0.3
Rylstone	8.0	1.0	5.0	3.6	0.45	1.2	0.15

a Reduce pasture availability by 45%;

b Reduce pasture availability by 15%;

^c dry sheep equivalents per ha.

TABLE 3

Estimated Annual Value of Potential Wool Production Loss from Blackberry in Central Western New South Wales; 1982-83

Shire	Dense Infestations ^a		Moderate Infestations		Wool Production estimated wool loss value; 1982-83 (\$ millions)	Loss average gross value of wool production 1979-80 to 1981-82 value (\$ millions) ^b	Proportions loss value/ production value (%)
	improved pasture (ha)	natural pasture (ha)	improved pasture (ha)	natural pasture (ha)			
Blayney	320	480	1280	1920	0.127	5.022	2.53
Cabonne	2800	4200	1600	2400	0.567	2.617	21.67
Cowra	-	-	570	854	0.023	6.506	0.35
Evans	880	1320	24000	36000	1.124	7.941	14.15
Lithgow	1200	1800	17600	26400	0.728	1.436	50.69
Oberon	112	168	20000	30000	1.153	3.742	30.81
Orange City	200	300	280	420	0.051	0.509	10.02
Rylstone	3760	5640	7880	11820	0.478	1.970	24.26
Totals	9272	13908	73210	109814	4.251	29.743	14.29

^a Distributed on a 40:60 basis between improved and natural pasture

^b Source: Australian Bureau of Statistics

TABLE 4

Sensitivity of Production Loss Estimates to Varying Blackberry Infestation Ratios Between Improved and Natural Pastures;

Central Western New South Wales; 1982-83

(\$ millions)

Shire	20:80	Infestation ratio between improved and natural pastures ^a		
		30:70	40:60	50:50
Blayney	0.081	0.104	0.127	0.151
Cabonne	0.362	0.465	0.567	0.669
Cowra	0.016	0.021	0.023	0.027
Evans	0.729	0.926	1.124	1.321
Lithgow	0.460	0.594	0.728	0.862
Oberon	0.736	0.945	1.153	1.361
Orange City	0.033	0.042	0.051	0.059
Rylstone	0.301	0.389	0.478	0.565
Totals	2.718	3.486	4.251	5.015

^a Improved to natural pasture