

CONTROL OF ILLYRIAN THISTLE, *ONOPORDUM ILLYRICUM*, BY GOATSM.H. Campbell¹ and P.J. Holst²¹Agricultural Research & Veterinary Centre, Forest Road, Orange N.S.W. 2800²Agricultural Research Station, Cowra, N.S.W. 2794

Summary. A 40 ha paddock was grazed with goats, sheep and cattle from July 1985 to February 1987 and the effect on Illyrian thistle, *Onopordum illyricum* noted. Goats grazed flowering plants of Illyrian thistle in mid summer and non-flowering plants in late summer and early autumn, but virtually ignored it in other seasons. The total ground cover of Illyrian thistle in the paddock was reduced from 10% to 0.1% during this period, whereas ground cover in adjoining paddocks grazed by sheep remained stable at 10% to 40%. The feed value of young Illyrian thistle was high and that of flowering plants, moderate.

INTRODUCTION

One consequence of the 1982 drought was an increase in area of Illyrian thistle on the southern tablelands of N.S.W. Illyrian thistle is unpalatable to sheep and cattle, competes strongly with annual pastures, adds vegetable fault to wool, and provides physical barriers to animals and man. Because goats graze many fibrous plants that sheep and cattle avoid, investigations were undertaken to assess their impact on Illyrian thistle.

METHODS

A 40 ha paddock near Boorowa, infested with Illyrian thistle was stocked for 19 months with goats, sheep and cattle (Table 1).

Table 1. Stocking rate (animals ha⁻¹) from July 1985 to February 1987

Time	Goats ^a	Sheep ^b	Cattle
July 85 - Jan. 86	3.9	7.0	0.1
Jan. 86 - May 86	3.7	7.5	0.1
May 86 - July 86	3.7	6.2	0.1
July 86 - Nov. 86	3.7	6.2	-
Nov. 86 - Feb. 87	3.7	-	-

^aFemale goats.

^bMerino wethers, except July 85 - Jan. 86 when Merino weaners were used.

The ground cover of pasture in July 1985 was: annual grasses 35%, broad-leaved weeds 28% (mainly Paterson's curse, *Echium plantagineum*), litter 20%, Illyrian thistle 10%, and annual legumes 7%. This varied with season but remained annual grass/broad-leaved weed dominant. The health of the animals was maintained by inspection and regular drenching.

The effect of goats was ascertained by visually assessing botanical composition and recording the number and height of grazed and ungrazed Illyrian thistle plants on six 5x5 m quadrats, three accessible to goats (ramps to exclude sheep and cattle) and three to all animals.

RESULTS AND DISCUSSION

The annual life history of Illyrian thistle at Boorowa follows: late summer - flowering and non-flowering plants; autumn, winter, early spring - death of flowering plants, growth of young plants and establishment of seedlings (after the seasonal break); late spring and early summer - young plants preparing to flower and seedlings growing among pasture which overtops most of them. To simplify expression of results (Table 2) Illyrian thistle plants have been classed as large (flowering and preparing to flower) or small (young and seedlings).

Confirmation that goats ate Illyrian thistle and sheep and cattle did not, was ascertained from: lack of difference between the grazing of Illyrian thistle on the goats-only quadrats and the goats+sheep+cattle quadrats; grazing of Illyrian thistle from November 1986 to February 1987 by goats, when sheep and cattle were excluded; large differences in thistle populations between the paddock containing goats and adjoining paddocks grazed by sheep and cattle.

In both 1986 and 1987 Illyrian thistle was heavily grazed by goats from mid summer to early autumn but only lightly grazed or not grazed in other seasons (Table 2). Grazing began in mid-summer after the plants had begun to flower, the goats felling large thistles c. 30 cm above the ground, eating the fallen tops and pruning the stumps back to ground level. The second phase was grazing small plants and seedlings to ground level in late summer and early autumn.

Table 2. Large and small plants of Illyrian thistle available to, and eaten by, goats^a

Date	Ground cover (%)	Plant density (plants m ⁻²)		Plants eaten (%)		Height of large plants (cm)	
		Large	Small	Large	Small	Grazed	Ungrazed
1985 July 7	10	n.c. ^b	n.c.	0	0	-	5
Oct. 10	14	n.c.	n.c.	0	0	-	12
1986 Jan. 8	13	0.8	5.7	40	0	31	112
Feb. 12	7	0.8	5.6	61	100	30	110
May 2	25	5.3	>200	0	0	-	3
Aug. 1	15	5.3	>200	0	0	-	3
Sept. 11	15	7.0	2.9	2	2	9	10
Nov. 9	15	6.1	2.3	10	2	35	41
Dec. 4	15	4.5	n.c.	10	2	35	45
1987 Jan. 23	2	2.4	0.9	100	87	19	114
Feb. 19	3	1.1	3.6	100	95	7	114

^aMeans of 6 quadrats.

^bn.c. - not counted.

Goats grazed small plants in summer and autumn and virtually ignored them at other times presumably because dry pasture offered an unattractive alternative in summer and autumn. The number of spines on the small plants did not appear to influence grazing as they appeared just as spiny in summer and autumn as in other seasons. Improved palatability and/or high feed value (Table 3) could have influenced goat preference.

Table 3. Feed value of Illyrian thistle sampled on January 8, 1986.

Plant part	Nitrogen (%) ^a	Acid detergent fibre (%) ^a	Digestible dry matter (%) ^a	Metabolisable energy (MJ/kg D.M.)
Flowering plant				
Leaves	1.8	24	69	10.3
Stems and wings	1.3	39	55	8.2
Young seedhead	1.7	38	57	8.5
Mature seedhead	1.9	47	50	7.5
Small plant				
Leaves	2.9	26	70	10.4

^aPercentage dry weight

It was difficult to assess the intake of other pasture species by goats, except Paterson's curse, which was avoided until late summer and then grazed heavily leaving only dead woody stems.

Observations of the grazing preferences of other livestock showed cattle sometimes grazed seedheads of Illyrian thistle in December-January and sheep lightly grazed small plants in dry periods.

The number of plants killed by goats in summer was not recorded but, as most flowering plants die naturally in autumn, the advantages of goats grazing them could be to reduce: viable seed (not proven); vegetable fault in wool; competition with more desirable species; and impeded access. Although heavily grazed small plants were susceptible to pasture competition, many recovered after the seasonal break.

The effect of goats on the whole paddock was to reduce the ground cover of Illyrian thistle from 10% in July 1985 to 0.1% in February 1987. The ground cover of Illyrian thistle in February 1987 in adjoining paddocks grazed by sheep and cattle varied between 10% and 40%. Thus, goats controlled a light infestation in summer but whether they could control a heavy infestation is unknown. Goats controlled a light infestation of serrated tussock, *Nassella trichotoma*, (1) but failed to control a heavy infestation (Campbell, unpublished data). Similarly, goats failed to control a dense infestation of variegated thistle, *Silybum marianum*, (1). It is possible that, for plants only moderately palatable to goats, control will be limited to densities below a critical level. Future work will attempt to define the critical summer density of Illyrian thistle that goats could control at acceptable stocking rates.

Long-term control will depend on eliminating the viable seed pool. Whether goats could accomplish this over time needs to be investigated. Finally, judicious management (spelling or grazing at critical times), herbicides, and/or the establishment of perennial pasture species could improve the effectiveness of control of Illyrian thistle by goats.

REFERENCES

1. Campbell, M.H., Holst, P.J., Auld, B.A. and Medd, R.W. 1979. Proc. 7th Asian-Pacific Weed Sci. Soc. Conf. pp. 201-205.