INFLUENCE OF FIVE CUTTING FREQUENCIES ON THE PRODUCTION OF MEDICAGO SATIVA CULTIVARS IN THE BOLAND OF SOUTH AFRICA

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ABSTRACT
The use of fixed interval cutting management for lucerne was studied for four cultivars (CUF101, Condor, SA Standard and Alfagraze) of four dormancy classes. Five fixed cutting intervals ranging from two to ten weeks were imposed for three years on irrigated stands at Elsenburg Research Station in the Boland of South Africa. The experimental design was a 4 by 5 split-plot randomised block with three replications. The four main plots were four cultivars split into five subplots containing five cutting treatments. The more winter dormant cultivar, Alfagraze, was least sensitive to cutting frequency and relatively more productive than the other three cultivars at the two- and six-week cutting regime. There was no evidence that cultivars of different dormancy classes require different cutting management to obtain maximum annual dry matter yield. Therefore, a fixed cutting frequency of six weeks throughout the year is an acceptable management compromise for all lucerne grown in the Boland region of the Western Cape.

KEYWORDS
Lucerne, Medicago sativa, cutting frequency, production, Mediterranean climate, irrigation

INTRODUCTION
The appearance of the spotted and blue-green lucerne aphids in South Africa in the late seventies and the extreme susceptibility of the traditionally grown land race, SA Standard, to these two pests, led to the introduction of aphid-resistant cultivars. These, new aphid-resistant cultivars, including winter-active and highly winter-active types, have become widely adopted in the Western Cape. Winter-active lucerne exhibit faster regrowth after cutting and, consequently, reach harvest maturity earlier than the more winter dormant types. Although, there has been considerable work on the effect of cutting interval and dormancy on the yield of lucerne (Lodge, 1986 & Gramshaw *et al*, 1993), no such work has previously been reported for lucerne grown in the Western Cape. As frequency of defoliation is one of the major components of grazing management, the effect of fixed interval defoliation (cutting) management on the yield of irrigated stands of lucerne cultivars, differing in winter dormancy, was studied in the Boland region of the Western Cape.

METHODS
The experimental site was located on a Hutton soil form (MacVicar *et al*, 1977) (USDA: oxisol, FAO : Rhodic Ferralsol) at Elsenburg Research Station, near Stellenbosch in the Western Cape. Before establishment, the site was fertilized with appropriate levels of P, K, lime and trace elements based on soil analyses (Beyers, 1983). The experimental design was a 4 by 5 split-plot randomised block with three replications. The four main plots were cultivars of four dormancy classes (CUF 101 : highly winter active, Condor : non winter-active, SA Standard : intermediately winter-active and Alfagraze: semidormant). The main plots were split into five subtreatments (each 4 by 1.2m) containing cutting treatments : fixed intervals of two-, four-, six-, eight- or 10 weeks. The seeds were sown, during May, 1990 into rows 300mm. apart, at 20kg.ha^{-1}. Irrigation was applied by means of a permanent overhead sprinkler system at a rate of 36mm. per week. The plots were harvested from May, 1991 to May, 1994, using a sickle-bar mower set at a cutting height of 50mm. Dry matter yields were determined after drying cut samples to constant mass at 59°C.

All data were submitted to analyses of variance, with a split-plot design as model. As all analyses produced significant ($p<0.05$) cutting x cultivar interactions, no mainplot or subplot data are presented.

RESULTS AND DISCUSSION
The dry matter yields obtained, under five cutting frequencies, over three seasons are presented in Table 1. The yield of all cultivars was significantly reduced (p£0.05) with cutting intervals shorter than six weeks, severely so at two weeks. Highly winter-active cultivar CUF101 was most affected by frequent defoliation and the most dormant cultivar, Alfagraze, the least. Cutting interval was a more important factor than cultivar type, or dormancy class, or year to year differences in determining yield. Maximum yield over three years was achieved at a six-week cutting interval and production was generally depressed by longer cutting intervals. CUF101, the winter-active cultivar reacted differently to cutting frequency in the second season when maximum yield occurred with the ten-week cutting interval.

Dry matter responses by the cultivars varied between winter and summer (Figure 1). In winter all cultivars reached maximum yield with eight-week cut. In summer maximum yield was reached with six-week cut and yield was reduced by longer cutting intervals. Alfagraze was significantly (p£0.05) higher yielding than the other cultivars at the six-week cut during summer and also at the two-week cut in the summer of the third season.

CONCLUSIONS
There was no evidence that cultivars of different dormancy classes require different cutting management to obtain optimum performance. Therefore, a fixed cutting frequency of six weeks throughout the year is an acceptable management compromise for all lucerne grown in the Western Cape. The data indicate a negative relationship between high winter activity and resistance against frequent defoliation.

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Figure 1
Effect of cutting interval on (a) winter and (b) summer yields of four lucerne cultivars representing winter-active (CUF101), non winter-active (Condor), intermediately winter-active (SA Standard) and semidormant (Alfagraze) dormant classes. Vertical bars indicate l.s.d. for testing between and within cultivars at p£0.05.

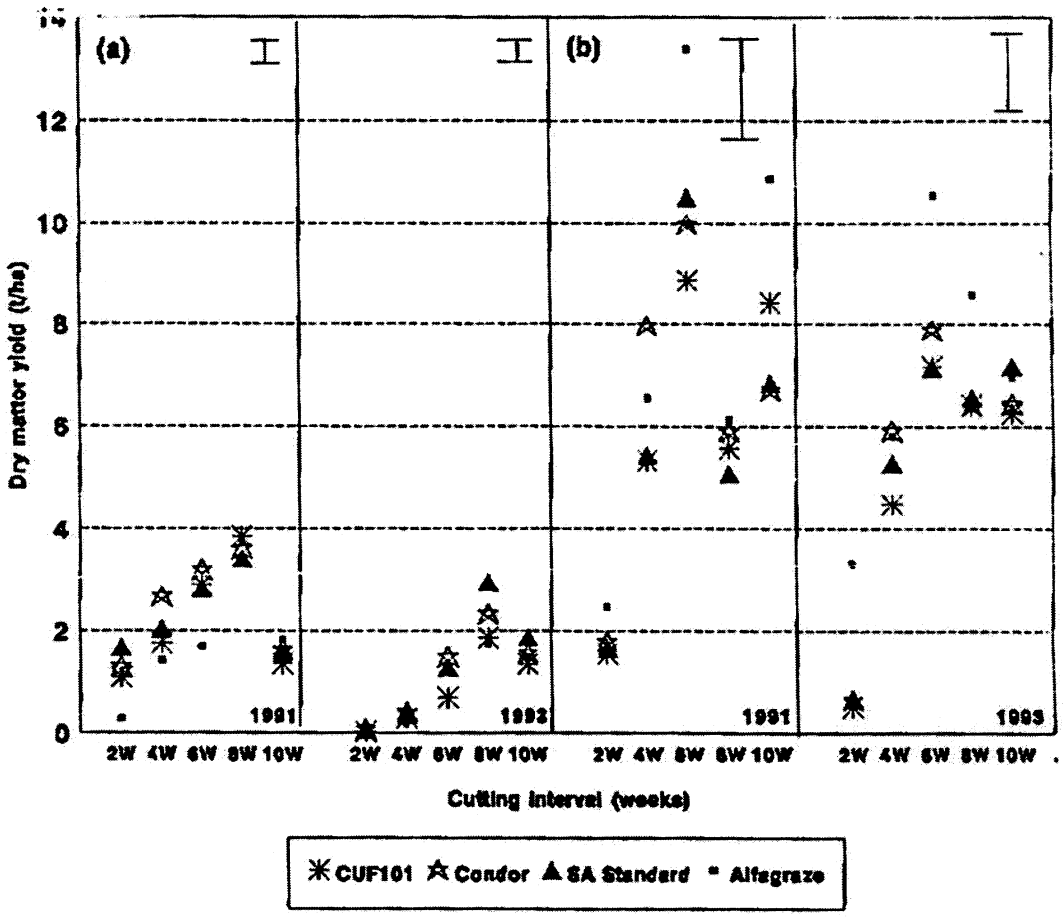

Table 1
Effect of five cutting frequencies on lucerne cultivar yields (t/ha) over a three-year period

		Cutting interval (weeks)				
Cultivar		2	4	6	8	10
				Year 1		
CUF 101		3.71	13.54	22.18	18.11	18.92
Condor		5.17	17.46	24.81	18.55	17.70
SA Standard		4.77	13.81	23.20	20.00	17.36
Alfagraze		6.86	16.07	28.32	18.67	27.10
l.s.d (p=0,05)	3.44					
				Year 2		
CUF 101		1.77	7.32	12.94	13.78	14.99
Condor		2.60	8.87	16.12	12.23	14.13
SA Standard		2.97	7.37	13.91	14.05	13.33
Alfagraze		5.57	8.65	17.23	15.16	15.45
l.s.d. (p=0,05)	1.63					
				Year 3		
CUF 101		1.28	8.33	15.49	16.49	16.92
Condor		1.71	12.30	19.40	18.16	15.74
SA Standard		1.79	10.85	20.03	20.01	18.19
Alfagraze		7.88	12.33	25.80	21.44	16.92
l.s.d. (p=0,05)	2.90					