Research Note

Effect of Time of Final Cutting and Irrigation on Lucerne (*Medicago sativa* L.) Seed Production

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ABSTRACT

The effects of time of final spring cutting (15, 30 March, 15 April) and irrigation (3 to 6 applications) on the seed yield of lucerne (*Medicago sativa* L.) were investigated over two seasons at Ludhiana, India. Taking the final cut on 15 March produced the greatest seed yield (292 and 312 kg ha^{-1}) in both seasons, because flower numbers and intensity of bee activity were higher than for cuts on 30 March or 15 April. The number of irrigations after the final cutting did not affect seed yield or its components in either season. Seed quality (germination and thousand seed weight) did not differ among cutting or irrigation treatments.

Additional index words: **bees, closing date, flowering, seed yield, seed quality.**

EXPERIMENTAL AND DISCUSSION

While lucerne (*Medicago sativa* L.) is one of the world's most efficient crops for protein production for animal feeding, its generally poor seed production and the erratic availability of seed account for it being an unpopular crop amongst farmers in India. One of the problems for lucerne seed production in India is the optimum time to take the last forage cut before closing the crop for seed production. Added to this is the question of when to supply irrigation water, to encourage reproductive growth and not new vegetative growth.

In both the 1983 and 1984 seasons, the effects of time of the last forage cut, and number of irrigations after the last forage cut on lucerne seed yield were investigated at Punjab Agricultural University, Ludhiana (30°C - 56'N, 75° - 52' E). The site in both years was a sandy loam, low in organic nitrogen, medium in phosphorus and high in available potassium. After preparation of a seed bed, inoculated lucerne seed was sown at 15 kg ha^{-1} on 15 October 1982 and 18 October 1983. Rows were 45 cm apart and plot size was 7 x 4 m. Nitrogen (10 kg Nha^{-1}) and phosphorous (40 kg $P_2 0_5$ha^{-1}) were applied by hand at sowing. The final spring cut was on 15 or 30 March or 15 April 1983 and 1984, plus 1 March for 1984 only. Plots were cut to 10 cm and the cut forage removed. Irrigation (7.5 cm per application) was applied three (at the last cut, budding and pod formation), four (at the last cut, mid budding, pod formation and maturity), five (at the last cut, pre-budding, budding, pod-formation and maturity) or six (at the last cut, mid-budding, pod formation, maturity, second flush pod formation and seed maturity) times. The experiment was laid out in a randomised block design with four replicates of each treatment.

Flower numbers were recorded from a 0.5 m row length in each plot at peak flowering. Wild bee activity was recorded within a 1m^2 quadrat in each plot, with the number of bees m^{-2} noted at 10 am and 2 pm each day, beginning at first flowering. Seed was hand harvested and threshed at the end of June each year, and cleaned by sieving. Germination and thousand seed weight were determined using internationally agreed methodology (ISTA, 1996).

Seed yield and its components were not affected by the number of irrigations, so that three irrigations after the final cut appeared adequate in both years. There was no interaction between irrigation and time of closing. These results are similar to those reported by Dhaliwal (1979). However, time of the last cut did significantly affect seed yield (Table 1), with the maximum seed yield (292 and 312 kg ha^{-1}) being produced from the 15 March cut in both years. Yield fell as cutting time was delayed because fewer flowers were produced, and bee visits diminished (Table 1). However in 1984, the yield from the 1 March closing did not differ from that from the 15 March closing. This meant that an extra forage cut could be taken without reducing seed yield, although whether this is correct for more than one season requires confirmation.

Batra and Gill (1967) and Abu-Shakra, Bhatti and Ahmed (1977) have previously reported lucerne seed yield

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Table 1. Effect of time of final cutting on lucerne seed yield and quality

Cutting date	Seed yield kg ha^{-1}			Flowers[1] per 0.5m row length	Bees[1] per m^2	TSW[1,2] (g)	% Germ[1]
	1983	1984	Mean				
1 March	-	299	299	-	-	-	-
15 March	292	312	302	335	35	2.52	86
30 March	269	256	263	322	31	2.45	86
15 April	119	215	157	285	22	2.39	86
LSD P<0.05	32	53		33	4	NS	NS

[1] *data for 1983 only*
[2] *thousand seed weight*

reduction following delays in closing in the spring, because under Indian conditions, the delays lead to higher temperatures during flowering and seed set. Similar results were reported in berseem (*Trifolium alexandrimum* L.) by Saini and Chaudhury (1988). Further studies to determine whether seed yield could be improved by managing the pollination are required, as honey bees are often ineffective pollinators of lucerne (Batra and Gill, 1967).

The quality of all seeds harvested (as recorded by germination and thousand seed weight) was high and not affected by either cutting time (Table 1) or irrigation treatments.

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