LONGTERM EFFECTS OF CLIPPING VERSUS HERBICIDES ON FIRST YEAR ALFALFA YIELD

Carl E. Bell[1]
Farm Advisor

Abstract: Data from four trials conducted in the Imperial Valley indicate the consequences, both positive and negative, from controlling weeds in seedling alfalfa. When weeds are controlled, hay quality is increased for the first two cuttings, while total forage yield is decreased. At the third cutting, alfalfa hay yield is significantly higher (P=.01 to .12) for the treated plots, but few weeds are present in any plot. At the fourth, sixth, seventh, or first cutting of the second year, no weeds are present and yields are statistically equal regardless of initial treatment. The decision to use herbicides in seedling alfalfa should consider the potential economic return on investment from three, weed-free, reduced tonnage harvests.

Keywords: Weeds, weed control, alfalfa yield, tonnage, forage yield, herbicides, cost analysis.

Weed control in seedling alfalfa is usually cited as essential for the long-term health of the stand (1-5). Uncontrolled weeds are felt to decrease alfalfa yield (but not total forage yield), reduce crop value, and reduce stand density. Alfalfa growers, however, do not universally use herbicides in seedling alfalfa. In northern California, for example, a survey (1) indicated that 20% of new fields were treated with preplant herbicides and 32% with postemergent herbicides. In the Imperial Valley, based upon numerous conversations and observations with growers and consultants over several years, I would agree in general with these percentages. Reasons for this low level of herbicide use, at least in the low desert, may be: lack of adequate control with currently registered herbicides, high cost of herbicides, use of sheep grazing in seedling stands, and a belief that alfalfa stands do not suffer in the long-run from early weed competition.

Four trials on weed control in seedling alfalfa in the Imperial Valley were designed to explore new herbicides and to determine long-term effects of weeds on yield. Three trials are still ongoing, so these comments should be considered preliminary. Each trial has several weed control treatments. Data collected were samples of alfalfa yield, weed composition and biomass. Results to date are presented (see Table) comparing just the best weed control treatment in each trial to the untreated control. This "best" treatment was selected upon the basis of overall weed control and highest first cutting alfalfa yield.

There are few herbicides registered for use in seedling alfalfa in the Lower Colorado Desert, mostly because of crop phytotoxicity. Those used are Balan®, EPTC, 2,4-DB, and Poast®. In Trial four, the "best" treatment was EPTC preplant, plus 2,4-DB and Poast® postemergent. This combination will control every weed in a seedling stand except little mallow (Malva parviflora). The cost of this treatment, including application, is approximately $54.00 per acre. For trials one through three, the best treatment was Pursuit®, a new herbicide from American Cyanamid Co. that may be registered in California for alfalfa in 1992. Buctril® was also one of the best treatments, but this herbicide does cause some alfalfa injury and is not registered in southern California. Pursuit® plus 2,4-DB also had good results with regard to weed control

---

[1] University of California, Cooperative Extension, Holtville, California

It is apparent that weed control reduces total forage yield for the first cutting (see Table). Alfalfa yield, when comparing treated to untreated plots, is increased. At the second harvest, the situation is about the same. Differences in second harvest yields relate mostly to weed composition and regrowth. Little mallow and grasses survive the first harvest and can be more of a problem in the second harvest, as compared to most broadleaf weeds, such as London rocket or nettleleaf goosefoot. By the third harvest, most weeds are gone, regardless of treatment. Also, alfalfa has recovered from injury caused by herbicide treatment. There is still a difference in alfalfa yield between treated and untreated plots, but it is relatively smaller. At the fourth and later cuttings, even the next winter, there is no difference in yield for treated versus untreated plots.

Data on stand were collected only for Trial four. At the second harvest, stand ranged from 18.3 to 38.8 plants per square foot, average was 29.5, for the best treatment. In the untreated plots, the range was 12.9 to 31.4, average 22.7 plants per square foot. These means are significantly different ($p<.01$), but it should be said that stand is very difficult to count. In this trial, for the two times we have counted stand, we have statistically different counts depending on who is counting. Different people can count the same area and get different numbers. Also, the lower stand counts in the untreated areas are producing the same yields as the treated areas after the third harvest. Alfalfa is sold by tonnage, not the number of crowns per ft^2. At present, there is no stand count recommendation for the non-dormant varieties in the low desert. Another stand count will be taken in this trial in January.

Based upon these results, making an economic decision regarding herbicide use in seedling alfalfa is not a simple yes or no. A cost analysis of herbicide use has to include; costs, reduced first and second harvest yield, better quality, some increased third harvest yield, and no increase in later harvest. Clipping untreated alfalfa, rather than using a herbicide, increases yield, but the hay is weedy for the first and second harvest. This hay can be difficult to bale and sell. Some weeds such as wild oats, may be allelopathic to alfalfa and may have a significant effect on stand density. Most weeds, however, do not seem to have a long-term effect according to our preliminary results. Second year stands have few, if any, winter weeds regardless of initial infestation. When the philosophy of LISA (Low Input Sustainable Agriculture) is considered, it does not seem reasonable to recommend herbicide use in the low desert unless particular weed problems necessitate it. Considering that few producers use herbicides, perhaps the alfalfa growers already subscribe to LISA principles.

REFERENCES

1. Canaveri, M. 1986. Weed management in seedling alfalfa. Proc. California Alfalfa Symposium, 16:93-99.

2. Fischer, A.J., J. H. Dawson, and A. P. Appleby. 1988 Interference of annual weeds in seedling alfalfa (Medicago sativa). Weed Science 36:583-588.

3. Orloff, S. B. 1989. Effects of weed competition during stand establishment. Proc. California Weed Conference, 41:84-88.

4. Pike, D. R. and J. F. Stritzke. 1984. Alfalfa (Medicago sativa) Cheat (Bromus secalinus) competition. Weed Science 32:751-756.

5. Canaveri, M., D. Colbert, R. Chavarria, and P. Verdegeal. 1989. Efficacy and yield comparison of herbicides in seedling alfalfa in the central valley of California. Proc. Western Society of Weed Science. 42:70-74.

ALFALFA AND WEED TONNAGE: BEST WEED CONTROL VERSUS
UNTREATED (Clipped) IN THE IMPERIAL VALLEY

TRAIL	HARVEST - (Tons/Acre) FIRST			SECOND			THIRD			FOURTH	SIXTH	SEVENTH	(2nd) FIRST(YEAR)
	ALF	WEEDS	Total	ALF	WEEDS	TOTAL	ALF	WEEDS	TOTAL	ALF	ALF	ALF	ALF
One													
Best	.64	0	.64				1.07	0	1.07		-		.49
Untreated	.29	.67	.96				.86	0	.86		-		.57
	(<.001)[a]								(.04)				
Two													
Best	.53	0	.53	.82	0	.82	.96	0	.96	1.2		.55	
Untreated	.14	.86	2.0	.36	.21	.57	.83	0	.83	1.1		.61	
	(<.001)			(<.001)			(.01)			N.S.		N.S.	
Three													
Best	.71	0	.71	.70	0	.70	.97	0	.97	1.15	-	.51	
Untreated	.49	.76	.25	.23	.87	1.1	.73	.12	.85	1.15	-	.44	
	(.04)			(<.001)			(.1)			N.S.		N.S.	
Four													
Best	.50	0	.50	.71	.01	.72	1.02	0	.02	1.3	.66		
Untreated	.52	.30	.82	.53	.29	.82	.95	0	.95	1.3	.65		
	N.S.			(.02)			(.12)			N.S.	N.S.		

a - Number in parenthesis is probability level that a significant difference does not exists between the two values immediately above. N.S. = No significance.