THE EFFECT OF LATE FALL HARVEST ON ALFALFA STAND AND YIELD - A PROGRESS REPORT

Carl Schoner
Farm Advisor
U.C. Cooperative Extension
Woodland, California

Over the years, growers have frequently asked the question, what shall I do with my alfalfa in the fall? Shall I irrigate after the last fall cutting? Shall I try for one more cutting even though chances of rainfall are high? What about green chopping the fall growth or maybe grazing it with animals? What effect will any or all of these practices have on my alfalfa?

The consensus of most researchers is that fall is a time when alfalfa plants should have an opportunity to grow and recover from the constant cutting and trampling given them during the haying season. During the fall (of the year) alfalfa plants have an opportunity to manufacture food and build root reserves unhampered by frequent removal of top growth. Adequate moisture, whether from precipitation or irrigation is one essential element of this rebuilding process.

The effect of fall cutting has been studied in other states (Nevada for example[1/]) but definite information was lacking to answer grower questions for the Sacramento Valley.

In 1978 a relatively simple experiment was established to check the effect of late fall harvest on alfalfa stands and yields. The test was a part of alfalfa variety yield and performance tests conducted in cooperation with Extension Agronomist Dr. Vern Marble and Dr. Larry Teuber, Department of Agronomy.

Alfalfa cultivars with two distinctly different growth habits were chosen for purposes of the experiment. A semi-winter-dormant growth type and a very non-winter-dormant growth type. Semi-winter-dormant alfalfas generally show little if any growth or regrowth during the months of November, December, January or February in the Sacramento area. Non-winter-dormant types initiate vigorous growth in early spring and continue through summer and fall, exhibiting very little dormancy even during the winter season. El Camino Brand WL 318 was chosen to represent a semi-winter-dormant type and U.C. CUF 101 chosen to represent a non-winter-dormant alfalfa type. Three treatments were imposed on the two alfalfa cultivars. (Table 1.)

Table 1. LATE HARVEST TRIAL - 1978-81

Treatment	Cuttings		
	Hay Season	Late	Total
1. WL 318	6	0	6
2. WL 318 A	6	1	7
3. WL 318 B	6	2	8
1. CUF 101	6	0	6
2. CUF 101 A	6		7
3. CUF 101 B	6	2	8

Each treatment was replicated four times. All plots were harvested six times, with a Carter harvester, during each summer hay season. Irrigations were applied after last summer harvest each year and late harvest treatments were imposed in early November and early December each fall. (Table 2.)

Table 2. U.C. LATE HARVEST TRIAL - 1979-81

Treatment	Late Harvest	Dates
		- -
		Nov. 1 -
		Nov. 1 + Dec.
CUF 101	0	
2. CUF 101 A	1	Nov. 1 -
3. CUF 101 B	2	Nov. 1 + Dec. 1

Impact of late harvest on alfalfa hay yields was determined by measuring hay yields during succeeding hay harvest seasons.

Electric hedge trimmers used for fall cutting of the 2.5' x 14' plots allowed close clipping, similar to animal grazing. Because of this close clipping, late harvest forage weights exceeded the amounts that would have been obtained with a swather or green chopper.

Alfalfa regrowth the following spring provided the first observable evidence that fall harvest may be detrimental to alfalfa plants. Either one or two late harvests caused delayed regrowth the following spring. (Table 3.) Two late harvests (November and December) appeared to retard growth more than a single late harvest (November) on the non-winter-dormant CUF 101.

Table 3. LATE HARVEST TRIALS - 1978-81
Spring regrowth following late fall harvests

Treatment	Late Harvests	Inches Regrowth 3/2/79
1. WL 318	0	6"
2. WL 318 A	1	3"
3. WL 318 B	2	2"
1. CUF 101	0	11"
2. CUF 101 A	1	8"
3. CUF 101 B	2	5"

This experiment has been continued through three harvest seasons to date. It is evident that harvests made in early November and early December each year have had a detrimental effect on summer season hay yields. (Figure 1.)

A single, late harvest in the fall of each year reduced succeeding hay yields approximately 8 percent for both cultivars. A second late harvest reduced yields of the non-winter-dormant cultivar an additional 12% but semi-dormant alfalfa yields decreased only 2%.

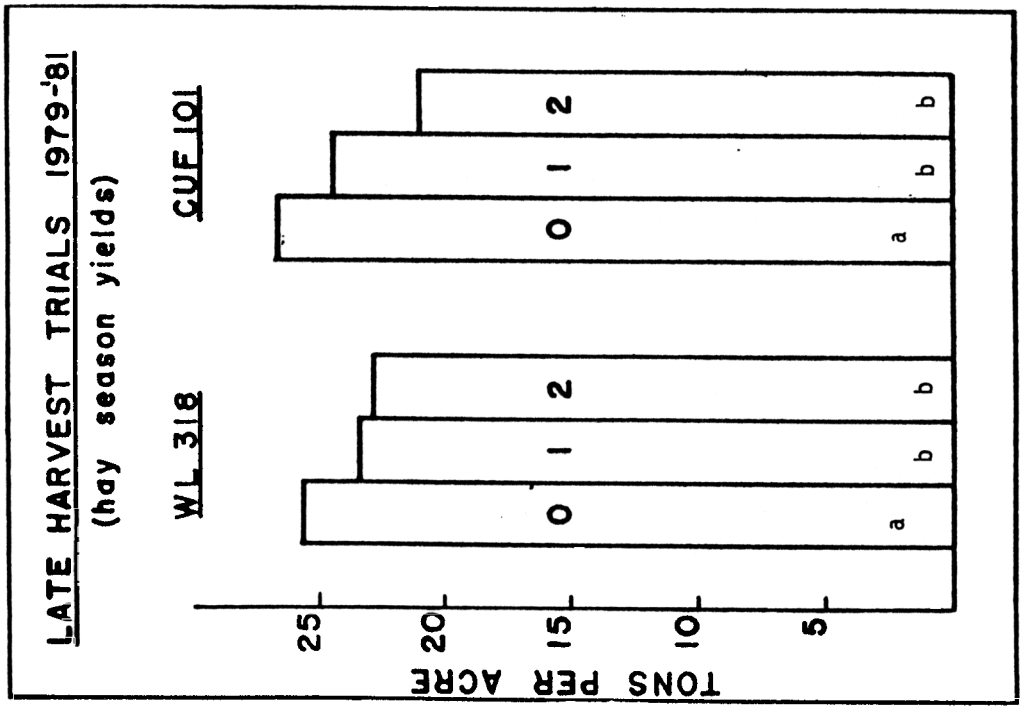

Figure 1. Yield differences between treatments with a common subscript letter (a or b) are not statistically significant at the 5% level of probability.

Treatments: 0 = none; 1 = 1 late harvest
2 - 2 late harvests

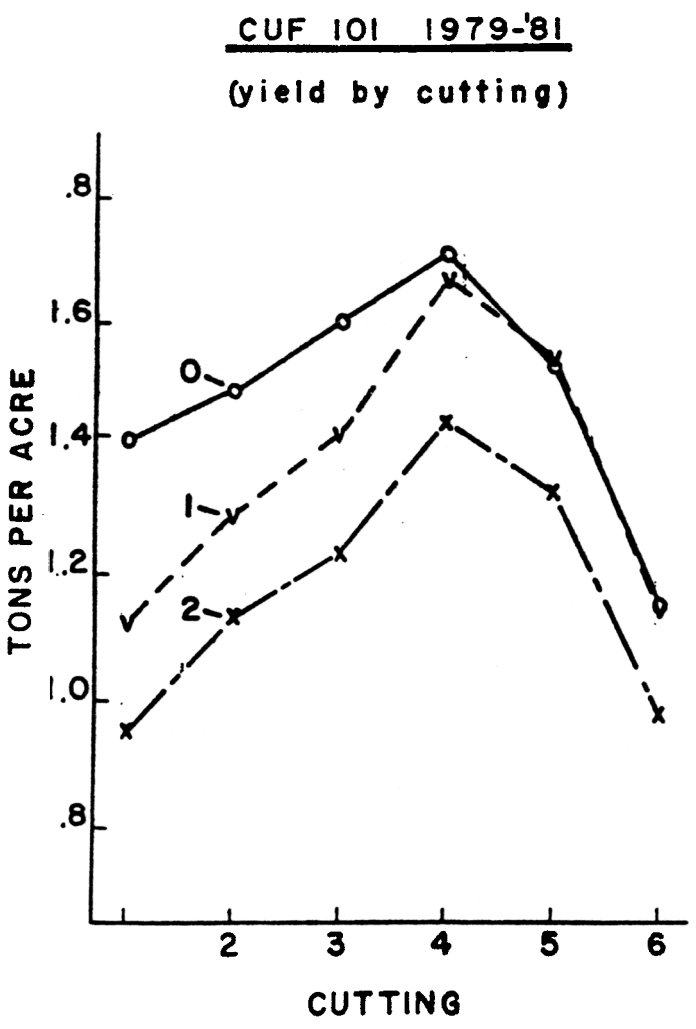

Figure 2. Hay season yields, by cutting, of a non-winter-dormant alfalfa following 0, 1 or 2 late fall harvest treatments. Yields are the average of 3 seasons 1979-81.

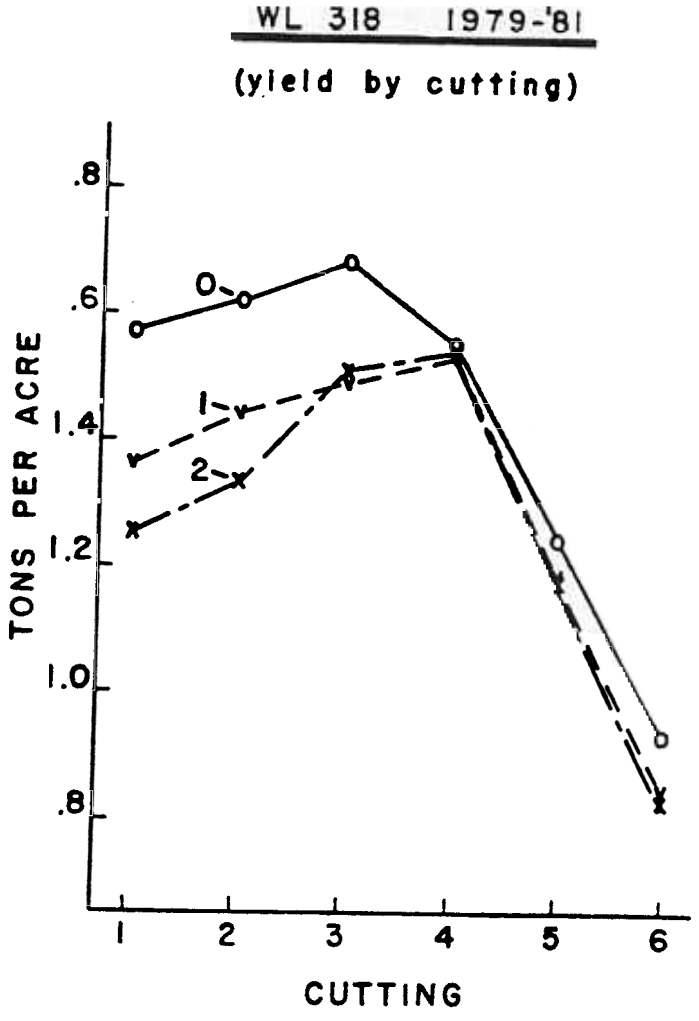

Figure 3. Hay season yields, by cutting, of a semi-winter-dormant alfalfa following 0, 1 or 2 late fall harvest treatments. Yields are the average of 3 seasons 1979-81.

The difference in yield reduction between the two cultivars was attributed to differences in their fall and winter growth habits. The non-winter-dormant CUF 101 utilized root reserves to send out new regrowth following the November 1 harvest. This seven inch tall regrowth was clipped in December and the plants attempted to regrow again in December. The semi-winter-dormant WL 318 had nearly ceased growth by November and suffered little additional damage from December clipping.

Summer hay yields, plotted by cutting (Fig. 2 & 3) tell an interesting story of when summer yields are affected by late fall harvest. The major yield depression occurred at the first three cuttings with both non-dormant and semi-dormant types. By fourth cutting, alfalfas from late harvest treatments had recovered and were yielding nearly as well as the untreated controls. It is again evident that two late harvests had the greatest impact on the non-winter-dormant cultivar.

Even when forage yields from the November and December cuttings were added to summer hay yields there was a disadvantage to late cutting. (Table 4.) Alfalfa allowed to grow unhindered throughout the fall season yielded 2 to 5% more than alfalfa harvested only in early November and 7% to 13% more than alfalfa harvested on both dates.

Table 4. LATE HARVEST TRIALS - 1978-81
Hay Season + Late Harvest Yields

Treatment	Yields-Tons/Acre Hay Season	Late Harv.	Total
WL 318	25.7	0	25.7
WL 318 A	23.5	1.0	24.5
WL 318 B	22.9	1.1	24.0
CUF 101	26.7	0	26.7
2. CUF 101 A	24.5	1.8	26.3
3. CUF 101 B	21.1	2.1	23.2

Alfalfa plant density (stand) counts were made at the end of the third season. (Table 5.) Late harvest treatment had no effect on plant density of the semi-dormant WL 318. Although plant counts of the non-dormant CUF show a trend toward stand reduction with late harvest, the differences are not statistically significant. This leads to the speculation that late harvests weaken plants rather than reducing stand. The result is early spring growth that is less vigorous than if plants had been allowed to restore root reserves during late fall and winter.

Table 5. LATE HARVEST TRIALS - 1978-81
Plant density counts falls of 1981

Treatment	Plants/square foot
1. WL 318	5.4
2. WL 318 A	5.3
3. WL 318 B	5.5
1. CUF 101	3.5
2. CUF 101 A	3.2
3. CUF 101 B	2.4

A second set of late harvest experiment was initiated in 1979. Alfalfa cultivars with slightly different growth characteristics were chosen for these tests. Pioneer Brand 581 was chosen as an intermediate-winter-dormant type and Ferry Morse's AS-13R Brand chosen as a non-winter-dormant type. As in the previous instance, this late harvest experiment was part of a larger alfalfa variety yield trial conducted on the Agronomy Farm at U.C. Davis.

The experiment was planted in the fall of 1979 and harvested five times during the 1980 summer season. In the fall of 1980 the experiment was irrigated and late harvest treatments imposed on the two alfalfa cultivars. (Table 6.)

Table 6. LATE HARVEST TRIALS - 1980-81

Treatment	Late Harvests	Dates
1. Pioneer 581	0	- -
2. Pioneer 581 A	1	Nov. 1 -
3. Pioneer 581 B	2	Nov. 1 + Dec. 1
1. AS - 13R	0	- -
2. AS - 13R A	1	Nov. 1 -
3. AS - 13R B	2	Nov. 1 + Dec. 1

As in the previous test, retarded spring growth was the first visual evidence that late harvest might have detrimental impact. (Table 7.)

Table 7. LATE HARVEST TRIALS - 1980-81
Spring regrowth following late fall harvests

Treatment	Late Harvests	Inches Regrowth 3/2/81
		12
		8
		7
AS - 13R	0	
AS - 13R A	1	
AS - 13R B	2	

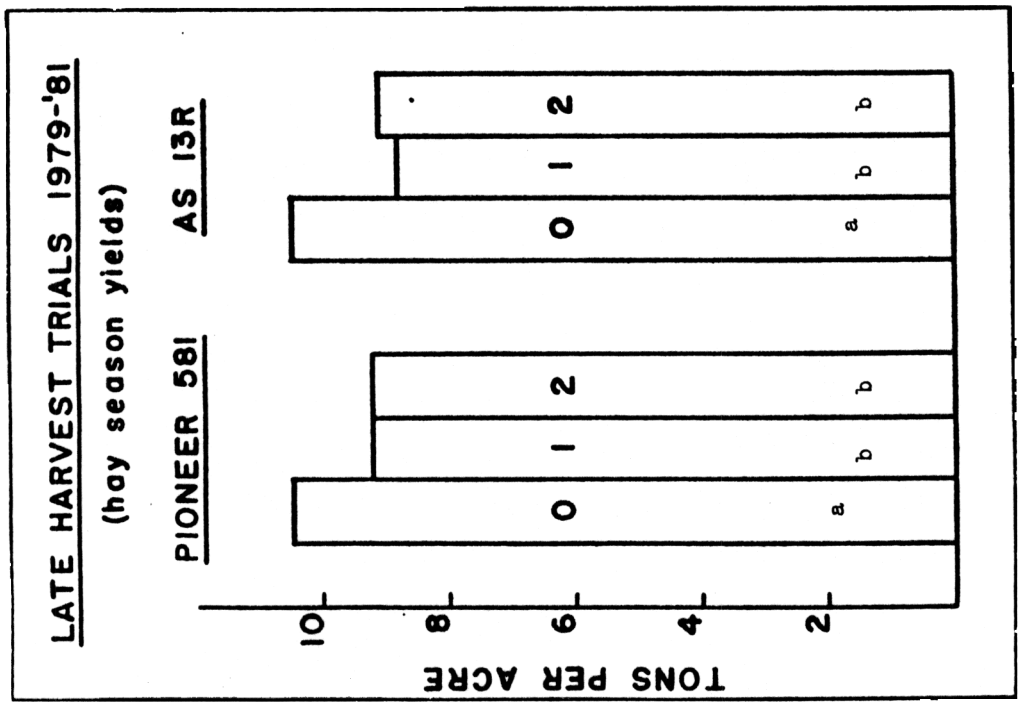

Figure 4. Yield differences between treatments with a common subscript letter (a or b) are not statistically significant at the 5% level of probability.

Treatments: 0 = none; 1 = late harvest; and 2 = two late harvests.

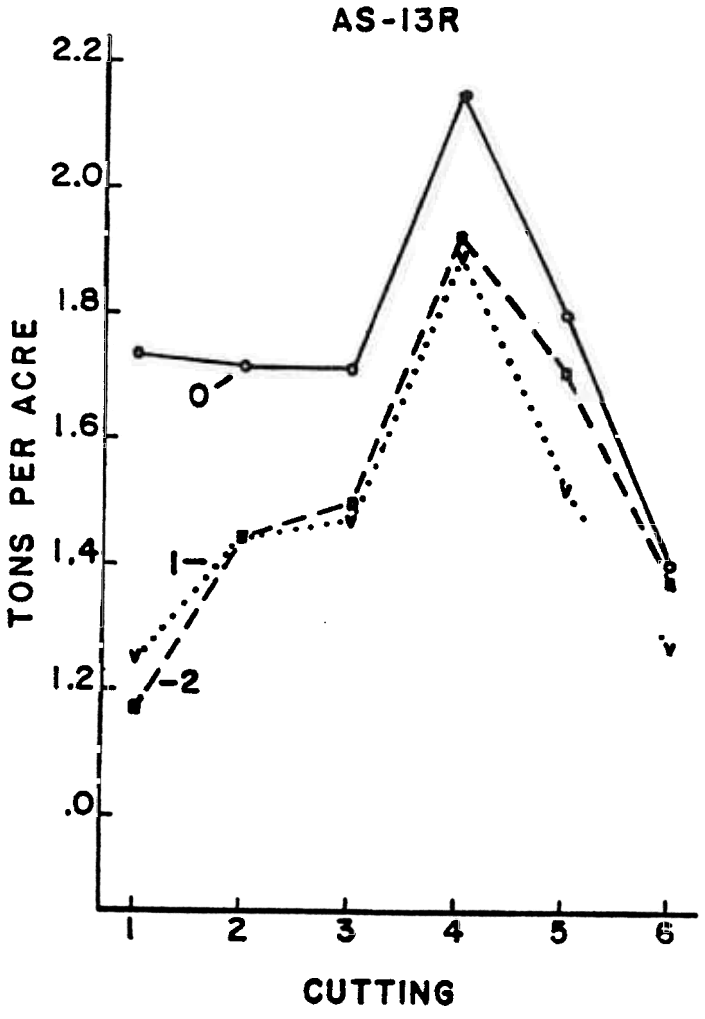

Figure 5. 1981 hay season yields, by cutting, of a non-winter-dormant alfalfa following 0, 1 and 2 late fall harvest treatments.

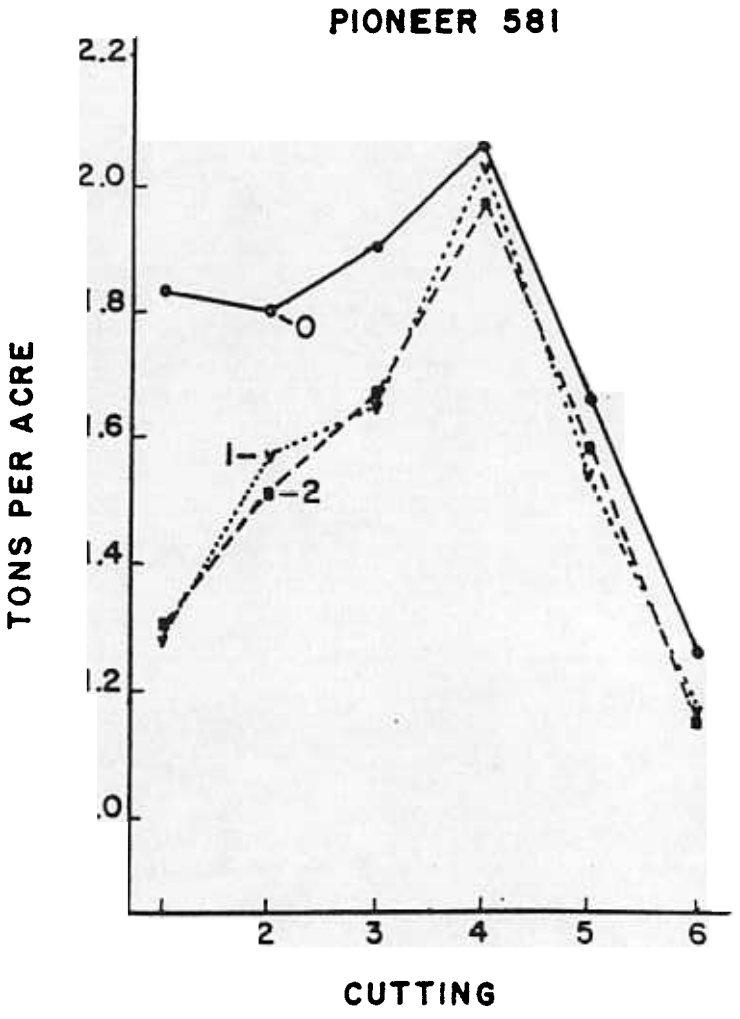

Figure 6. 1981 hay season yields, by cutting, of an intermediate-winter-dormant alfalfa following 0, 1 or 2 late fall harvest treatments.

Regrowth measured in the spring of 1981 showed an advantage in height for alfalfa with no late harvests. There was, however, little difference between the one and two harvest treatments.

As in the previous experiment, the greatest loss of hay yield occurred during the first three cuttings of the following hay season. (Figures 4,5 & 6) it is speculated that both cultivars in this test had nearly ceased growth by December 1 and therefore were not greatly affected by the second clipping. This is in contrast to the very non-winter-dormant CUF 101 of the previous experiment. CUF continued to grow slowly throughout most of the winter season and was considerably damaged by a second cutting in December.

It is unfortunate that an additional treatment (a single harvest on December 1) was not included in the two experiments. It is likely that a single harvest or grazing after alfalfa plants have ceased growth, would not have decreased yields during the succeeding hay season. Evidence of this has been shown in University of Nevada grazing tests where no loss of hay yield occurred when alfalfa plants were grazed during the winter after they had ceased growth.

What conclusions can be reached based on information developed in these experiments? First, conclusions must be tentative because test results have raised additional questions concerning the number and timing of late harvests. Secondly, this information applies directly only to Yolo County or a portion of the Sacramento Valley neighboring Yolo County. Other alfalfa growing areas may have different climatic conditions, harvest regimes and use varieties that may give different results.

For the Yolo County area, however, it is evident that a harvest in early November, following a six cutting hay season did decrease yields the succeeding year. A second harvest in December did or did not cause additional yield reductions depending on time of cutting and dormancy of the variety. Finally, it is possible that a single cutting or grazing in December, after alfalfa has ceased growth, may not cause reductions in succeeding hay yields, but this conjecture must be borne out by further investigations.

1/ Jensen E.H., Skivington R.R., and Bohman V.R. - Dormant Season Grazing of Alfalfa, February 1981.