

## Late Season Alfalfa Planting: Conventional Versus No-Till

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### INTRODUCTION

The last date recommended for conventional alfalfa (Medicago sativa L.) seeding in southwest Virginia is 1 September. Conventional plantings after this date often do not survive. The last date for no-till alfalfa plantings have not been established but may be later than for conventional plantings because of favorable moisture, quicker germination, and firm soil that resists heaving of seedlings. If no-till alfalfa could be planted several weeks later than conventional alfalfa, seedings could be made following removal of corn silage allowing for greater planting flexibility. The objective of this study was to compare conventional and no-till alfalfa plantings made at several different dates in late summer and early fall.

### MATERIALS AND METHODS

German millet was removed as hay in early August. No-till alfalfa at 15 lb. seed per acre, and conventional alfalfa at 20 lb. per acre were planted on 1, 10, 20, 30 September, and 10 October of 1983 and 1984. A conventional seedbed was prepared prior to each planting date. Conventional treatments were planted with a cultipacker seeder. A no-till drill was used to establish no-till treatments after application of 1 pint paraquat per acre. Plant population counts were made On 16 November and in early April the next year. Top growth weight, root weight, and plant height were measured in mid-November following seeding. Gravimetric measurment of soil moisture was made on 18 Oct. 1984. Yields were obtained from all late season planting dates from a small subplot in the spring at the date when 1 September plantings were ready for first hay harvest. First hay harvest was made from each late season planting date when each treatment was ready for hay harvest. All subsequent hay harvests were made at 1/10 bloom stage of development. Yield data are from 1984 season of plantings made in 1983. Growth characteristics of alfalfa in November following establishment are from 1984 plantings.

## RESULTS AND DISCUSSION

Seeds of conventional plantings made on 1, 10, and 20 September 1984 did not germinate because of dry soil until rainfall on 31 September (Table 1), whereas seeds of no-till plantings germinated and began growth soon after planting. Thus, seedling development by 16 November was similar for 1, 10, 20, and 30 September conventional plantings. Rapid plant development from no-till plantings occurred because seeds were placed at approximately one inch depth where firm soil provided adequate moisture for germination (Table 2). No-till seedbeds are more ideal than conventional seedbeds that are often loose and dry because of machine operations required for soil preparation.

Table 1. Rainfall during late season establishment of alfalfa (1984 data).

Month	Day	Rainfall
		Inches
Aug.	1 to 10	0.4
	11 to 20	2.9
	21 to 31	1.1
Sept.	1 to 10	0.8
	11 to 20	0.0
	21 to 30	0.2
Oct.	1 to 10	1.3
	11 to 20	0.1
	21 to 31	2.2

Table 2. Soil moisture on 18 Oct. 1984 in the top one inch of soil.

Planting method	Soil moisture
	%
Conv.	8.3 +
No-till	11.7

+ This value is less than wilting point and no seed would germinate.

Seeding weight and height in mid-November from no-till plantings were greater than conventional plantings made on 1, 10, and 20 September plantings. Shoot-root ratio of no-till seedlings was considerably less than conventionally established seedlings for all seeding dates except 30 September and 10 October plantings when all seedlings were very small. The low ratio indicates that no-till seedlings diverted much more photosynthetic energy to the development of roots in comparison to the conventionally established plants. These data along with root and top weights indicate that root systems of conventionally planted alfalfa were considerably smaller when compared with no-till plantings (Table 3).

Seedling population in November of 1983 was similar for conventional and no-till plantings even though considerably less seed was used for no-till plantings. Some differences in plant population occurred between planting dates because of environmental conditions following planting. All plant populations on 16 November were sufficient for maximum stands if plants survived through the winter (Table 4). Plant population decline between

Table 3. Growth characteristics of alfalfa planted at 5 dates in late season of 1984 using conventional and no-till planting methods. Data taken on 16 Nov. 1984

Planting method	September				Oct.	LSD
	1	10	20	30	10	
	Height (mm)					
Conv.	88	45	39	32	16	
No-till	182	124	87	42	19	14
	Top weight (mg per plant)					
Conv.	198	64	56	49	11	
No-till	299	200	80	43	18	45
	Root weight (mg per plant)					
Conv.	37	11	10	13	3	
No-till	90	53	17	9	5	9
	Shoot-root ratio					
Conv.	5.4	5.8	5.6	3.8	3.7	
No-till	3.3	3.8	4.7	4.8	3.6	1.3

November 1983 and April 1984 was greater for conventional plantings at all planting dates as compared with no-till plantings. Only the 1 and 10 September conventional plantings had sufficient plant population the following spring whereas all no-till plantings other than the 10 October planting had sufficient plant population in April after late season seeding.

Dry matter accumulation by 19 May decreased with each delay in planting. Both no-till and conventional plantings made on 1 September were ready for first hay harvest on 19 May the following spring (Table 4). First hay harvest in the spring was delayed approximately eight days for each ten days of delay in planting beyond 1 September the previous season. Yields at first hay from no-till plantings were similar to conventional plantings made on 1 September. Yields from no-till plantings at all other dates were much higher than conventional plantings with inadequate stands resulting from conventional plantings made on 20 September or later.

#### SUMMARY

No-till alfalfa can be successfully planted three to four weeks later in the growing season than conventionally planted alfalfa. Firm soil and deep placement of alfalfa seed provides moisture for germination soon after planting, whereas conventional plantings must be made early so that adequate rainfall will occur for plants to become established. Conventional preparation of a seedbed causes loose soil and loss of surface moisture. Small plants resulting from late conventional plantings are subject to

heaving, while the soil in no-till plantings is firm and plants are anchored against heaving. Seeding rates can be greatly reduced in no-till as compared with conventional plantings. Hay harvest in the spring after late season establishment must be delayed approximately eight days beyond typical first hay harvest for each ten days of delay in planting after 1 September the previous season.

Table 4. Yield and plant population of alfalfa (1984)  
no-till and conventionally planted at 5 dates in 1983.

Planting method	Sept.				Oct.	LSD
	1	10	20	30	10	0.05
19 May yield (Tons per acre)						
Conv.	1.38	0.41	0.07	0.00	0.00	
No-till	1.74	0.76	0.56	0.31	0.00	0.22
1st hay (Tons per acre)						
Conv.	1.38	1.19	0.84	0.12	0.00	
No-till	1.74	1.48	1.85	1.41	0.72	0.30
Total season (Tons per acre)						
Conv.	4.04	3.39	2.20	1.28	0.79	
No-till	4.12	3.82	4.13	3.64	2.37	0.46
Plant pop. 16 Nov. 1983 (No. per sq. ft.)						
Conv.	36	50	37	34	50	
No-till	44	52	39	39	54	10
Plant pop. Apr. 1984 (No. per sq. ft.)						
Conv.	20	17	5	1	0	
No-till	38	54	39	28	8	11
Plant pop. (% decline)						
Conv.	44	70	87	97	100	
No-till	14	0	0	28	85	14
Date of first harvest						
Both	19 May	29 May	7 Jun	14 Jun	23 Jun	-
Days delay for 1st cut+						
Both	0	10	18	25	34	-
Days delay in planting++						
Both	0	10	20	30	40	-

+ Delay beyond first harvest of 1 Sept. planting.

++ Days delay in planting after 1 Sept.