

Optimum Planting Date for Alfalfa Grown in the Columbia Basin

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The production potential and profitability of an alfalfa field can be strongly influenced by planting dates. Seedling development, stand density and forage yield can be negatively affected. The risk of late-summer planting occurs when fields are planted too late for proper plant development. Planting should be completed at least 30 to 45 days prior to the first killing frost. Large plants with a developing crown are able to withstand harsher conditions and provide a higher yield potential the following spring. Both photoperiod and temperature affect the growth and development of seedling alfalfa. Photoperiod may have a larger effect than temperature for dormant alfalfa in the Columbia Basin because of its northern location. Insufficient information on optimum planting dates for alfalfa development is available for the Columbia Basin.

PROCEDURES

Field studies were conducted between 2002 and 2005 near Pasco and Othello, Washington. The variety Colombia2000 was used in all experiments. Plots were arranged in a randomized complete block design with four replications. The planting date treatments for the year 2002 were August 3, 13, 23 and September 2, 12, 22. For the year 2003, planting dates were August 6, 16, 26 and September 5, 15 and 25. The plots seeded in 2002 were cut 5 times in Pasco and 4 in Othello in 2003 and 2004. Plots seeded in 2003 were cut 5 times in Pasco in 2004 and 3 times in 2005 while plots in Othello were cut 4 times each year. Plot size was 4 x 14 feet seeded at about 15 lbs. per acre.

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RESULTS

The 2003 harvest of the 2002 seeded plots in Pasco showed significant yield declines among planting dates (Table 1). The September planting dates had significant lower yields than the planting dates for August. Total yield for the first harvest year ranged from 9.5 tons/acre to 6.2 tons/acre for the first planting date in August and the last planting date in September, respectively.

Table 1: Pasco Date of Seeding Study (2002 seeding)

Forage Yield (Tons DM/Ac)

Year 2003 Entry	2003 Harvests					2003 Total	Percent mean	3-Jun Regrowth
	15-May Cut 1	16-Jun Cut 2	24-Jul Cut 3	20-Aug Cut 4	24-Sep Cut 5			
08/03/02	2.9	2.4	2.0	1.5	0.7	9.5	116.3%	8.5
08/13/02	2.9	2.2	2.0	1.6	0.7	9.4	115.8%	7.8
08/23/02	2.7	1.9	1.8	1.6	0.6	8.6	106.2%	6.8
09/02/02	2.2	1.6	1.8	1.4	0.5	7.6	93.1%	5.5
09/12/02	2.3	1.6	1.6	1.5	0.5	7.5	91.9%	4.8
09/22/02	1.5	1.2	1.8	1.3	0.4	6.2	76.6%	3.5
Mean	2.5	1.8	1.8	1.5	0.6	8.1	100.0%	6.1
LSD 5%	0.42	0.23	0.24	0.18	NS	0.79	9.68%	1.06
CV %	12.0	9.0	9.1	8.7	26.2	6.7	6.7	12.0

Table 2 shows the results for the second harvest year on the 2002 Pasco seeding. Although the trend was lower yields for the September planting dates as compared to the August planting dates, there were no significant differences found among planting dates in 2004. However, the combined analysis for the two harvest years showed significant differences between the August and September planting dates.

Table 2: Pasco Date of Seeding Study (2002 seeding)

Forage Yield (Tons DM/Ac)

Entry	2004 Harvests					2004 Total	Percent mean	2-Year Total	Yield 2-Yr % mean	06/03/03 Regrowth
	6-May Cut 1	11-Jun Cut 2	14-Jul Cut 3	16-Aug Cut 4	12-Oct Cut 5					
08/03/02	2.2	1.5	1.6	1.6	0.8	7.7	106.6%	17.2	111.8%	8.5
08/13/02	2.1	1.7	1.5	1.7	0.9	7.9	109.8%	17.3	113.0%	7.8
08/23/02	1.9	1.5	1.6	1.6	0.8	7.4	102.7%	16.1	104.6%	6.8
09/02/02	2.1	1.3	1.3	1.4	0.7	6.8	94.1%	14.4	93.6%	5.5
09/12/02	2.0	1.2	1.4	1.5	0.6	6.7	92.3%	14.1	92.1%	4.8
09/22/02	2.0	1.2	1.3	1.5	0.7	6.8	94.4%	13.0	85.0%	3.5
Mean	2.0	1.4	1.4	1.5	0.8	7.2	100.0%	15.4	100.0%	6.1
LSD 5%	NS	0.30	NS	NS	0.23	NS	NS	1.59	10.34%	1.06
CV %	10.0	14.8	11.9	16.1	20.7	9.9	9.9	7.2	7.2	12.0

No visual differences in regrowth on 5/20/04

The first cut of the 2003 harvest of the 2002 seeded plots in Othello was harvested with a 10 day delayed harvest of the September planting dates. Due to the delay, significant differences occurred only in the first cut and total yield (Table 3). There was a trend for yield decline among August planting dates and September planting dates with the last planting date of September 22 being significantly lower yielding than the first two planting dates in August.

Table 3: Othello Date of Seeding Study (2002 seeding)
Forage Yield (Tons DM/Ac)

Year 2003 Entry	2003 Harvests				2003 Total	Percent mean
	20-May Cut 1	24-Jun Cut 2	29-Jul Cut 3	5-Sep Cut 4		
08/03/02	3.2	2.7	2.5	2.1	10.6	111.3%
08/13/02	2.9	2.4	2.6	2.4	10.3	108.9%
08/23/02	2.2	2.2	2.4	2.2	8.9	94.2%
09/02/02	2.9	2.5	2.5	2.2	10.1	105.9%
09/12/02	2.2	2.6	2.5	1.7	9.0	94.5%
09/22/02	1.8	2.3	2.3	1.7	8.1	85.3%
Mean	2.5	2.4	2.5	2.0	9.5	100.0%
LSD 5%	0.59	NS	NS	NS	1.20	12.60%
CV %	16.1	9.6	8.5	20.3	8.8	8.8

Table 4 shows the results for the second harvest year on the 2002 Othello seeding. No significant differences were observed among planting dates for cuts or for total yield in 2004. However, the combined analysis for the two harvest years showed significant differences between the first two August and last two September planting dates. Two-year yields ranged from 19 tons per acre for the August 3 planting date to 16.2 tons for the September 22 planting date.

Table 4: Othello Date of Seeding Study (2002 seeding)
Forage Yield (Tons DM/Ac)

Entry	2004 Harvests				2004 Total	Percent mean	2-Year Total	Yield 2-Yr % mean
	13-May Cut 1	17-Jun Cut 2	19-Jul Cut 3	27-Aug Cut 4				
08/03/02	2.9	1.6	1.8	2.2	8.5	103.0%	19.0	107.5%
08/13/02	2.9	1.7	1.9	2.3	8.8	107.6%	19.2	108.3%
08/23/02	2.4	1.4	1.5	2.0	7.3	89.2%	16.3	91.9%
09/02/02	2.8	1.6	1.8	2.3	8.6	104.0%	18.6	105.0%
09/12/02	2.7	1.5	1.7	2.0	8.0	97.2%	17.0	95.7%
09/22/02	2.7	1.5	1.8	2.2	8.1	98.9%	16.2	91.6%
Mean	2.7	1.6	1.7	2.2	8.2	100.0%	17.7	100.0%
LSD 5%	NS	NS	NS	NS	NS	NS	1.83	10.34%
CV %	11.6	11.2	12.1	10.0	9.0	9.0	7.2	7.2

The 2004 harvest of the 2003 seeded plots in Pasco showed significant differences within cuts and total yield (Table 5). Total yields for 2004 ranged from 8.5 tons per acre to 5.7 tons per acre for the August 6 and September 25 planting dates, respectively. Significant differences were found between the first two planting dates in August and the last two planting dates in September. The yield decline was similar to the previous Pasco study.

Table 5: Pasco Date of Seeding Study (2003 seeding)

Forage Yield (Tons DM/Ac)

Entry	2004 Harvests					2004 Total	Percent mean
	7-May Cut 1	11-Jun Cut 2	14-Jul Cut 3	16-Aug Cut 4	12-Oct Cut 5		
08/06/03	2.5	1.5	1.5	1.8	1.2	8.5	117.8%
08/16/03	2.2	1.4	1.5	1.8	1.1	8.0	110.1%
08/26/03	2.1	1.1	1.6	1.7	1.1	7.6	105.1%
09/05/03	1.9	0.9	1.4	1.6	1.1	7.0	96.9%
09/15/03	1.6	0.8	1.5	1.6	1.1	6.7	91.9%
09/25/03	1.0	0.6	1.4	1.5	1.1	5.7	78.2%
Mean	1.9	1.1	1.5	1.7	1.1	7.3	100.0%
LSD 5%	0.25	0.29	0.13	0.17	NS	0.65	8.9%
CV %	9.1	19.2	6.1	7.0	9.4	6.2	6.2

Table 6 shows the results for the second harvest year on the 2003 Pasco seeding. No significant differences were found among planting dates among cuttings or total yield indicating that there is little carryover of the effects of planting dates after the first year. However, the combined analysis for the two harvest years showed significant differences between the first two planting dates in August and the last two planting dates in September. These significant differences can be attributed to the yield declines in the first harvest year after planting.

Table 6: Pasco Date of Seeding Study (2003 seeding)

Forage Yield (Tons DM/Ac)

Entry	2005 harvests				Percent mean	Yield		
	6-May Cut 1	7-Jun Cut 2	12-Jul Cut 3	2005 Total		2-Year Total	2-Yr % mean	05/20/04 Regrowth
08/06/03	3.2	1.8	1.1	6.2	105.8%	14.7	112.4%	9.0
08/16/03	3.1	1.9	1.0	6.1	103.7%	14.0	107.2%	7.8
08/26/03	2.8	1.7	1.1	5.6	95.8%	13.2	101.0%	6.8
09/05/03	2.7	1.7	1.0	5.4	92.8%	12.4	95.0%	5.3
09/15/03	3.0	1.9	1.1	6.0	102.2%	12.6	96.5%	4.3
09/25/03	2.8	1.9	1.1	5.8	99.6%	11.5	87.8%	3.0
Mean	2.9	1.8	1.1	5.8	100.0%	13.1	100.0%	6.0
LSD 5%	NS	NS	NS	NS	NS	1.12	8.57%	0.88
CV %	8.7	11.9	16.1	7.3	7.3	6.0	6.0	10.2

Table 7 shows the yield results for the 2004 harvest on the 2003 seeding in Othello. Significant differences for planting dates were found within all cuts and for total yield. Yields ranged from 10 tons per acre for the August 6 planting date to 5.3 tons per acre for the September 25 planting date. The August planting date treatments were significantly higher yielding than the September planting dates. These results were similar to what was found in the Pasco studies.

Table 7: Othello Date of Seeding Study (2003 seeding)

Forage Yield (Tons DM/Ac)

Entry	Final %Stand	2004 Harvests				2004 Total	Percent mean
		13-May Cut 1	17-Jun Cut 2	19-Jul Cut 3	27-Aug Cut 4		
08/06/03	99.0	3.0	2.1	2.3	2.6	10.0	131.7%
08/16/03	98.3	2.6	2.0	2.2	2.4	9.2	121.3%
08/26/03	96.3	2.0	1.8	2.2	2.6	8.6	113.3%
09/05/03	99.0	1.1	1.2	1.7	2.0	6.0	78.8%
09/15/03	93.3	0.2	1.6	2.1	2.6	6.5	85.6%
09/25/03	91.3	0.1	1.2	1.6	2.4	5.3	69.3%
Mean	96.2	1.5	1.6	2.0	2.4	7.6	100.0%
LSD 5%	7.83	0.41	0.40	0.37	0.17	0.69	9.0%
CV %	5.7	18.9	16.9	12.7	5.0	6.3	6.3

Table 8 shows the results for the second harvest year on the 2003 Othello seeding. No significant differences were observed among planting dates for cuts or for total yield in 2004 indicating recovery of plants after the first harvest year. However, the combined analysis for the two harvest years showed significant differences between the first three August and last three September planting dates. Two-year yields ranged from 16.8 tons per acre for the August 6 planting date to 11.7 tons for the September 25 planting date.

Table 8: Othello Date of Seeding Study (2003 seeding)

Forage Yield (Tons DM/Ac) (2003 seeding)

Entry	2005 harvests				2005 Total	Percent mean	2-Year Total	Yield 2-Yr % mean
	12-May Cut 1	20-Jun Cut 2	26-Jul Cut 3	8-Sep Cut 4				
08/06/03	2.2	1.7	1.5	1.4	6.8	100.9%	16.8	117.2%
08/16/03	2.2	1.8	1.5	1.4	6.9	102.9%	16.1	112.7%
08/26/03	2.2	1.9	1.5	1.3	6.9	102.2%	15.5	108.1%
09/05/03	2.1	1.8	1.4	1.3	6.5	97.0%	12.5	87.4%
09/15/03	2.3	1.8	1.5	1.3	6.8	101.5%	13.3	93.1%
09/25/03	2.1	1.6	1.5	1.3	6.4	95.4%	11.7	81.6%
Mean	2.2	1.8	1.5	1.3	6.7	100.0%	14.3	100.0%
LSD 5%	NS	NS	NS	NS	NS	NS	1.13	7.88%
CV %	8.9	10.8	6.3	8.0	6.5	6.5	5.5	5.5

DISCUSSION

The data in this study indicated that the best time to plant alfalfa is during the first two to three weeks in August. Although a good stand can be established in September, yield may not be as desirable the following year. In Othello, the delayed harvest of the September planted plots in 2002 indicated that if a late planting is unavoidable, it would be advisable to not cut on a calendar schedule until a delayed first cut is taken. Growers that like to take a fall cut on new seedings would need to plant no later than the first two weeks of August. The plots were trimmed in November of each year; however, the data was not used in these analyses. The August seedings were observed to have significantly more growth than the September seedings in the fall (Figures 1 & 2). Figure 3 shows the difference in spring growth. The difference in planting the first week in August and the last week in September is a yield difference of about 3 tons the first harvest year and 4 tons over two years for both the mid and lower Columbia Basin in Washington.

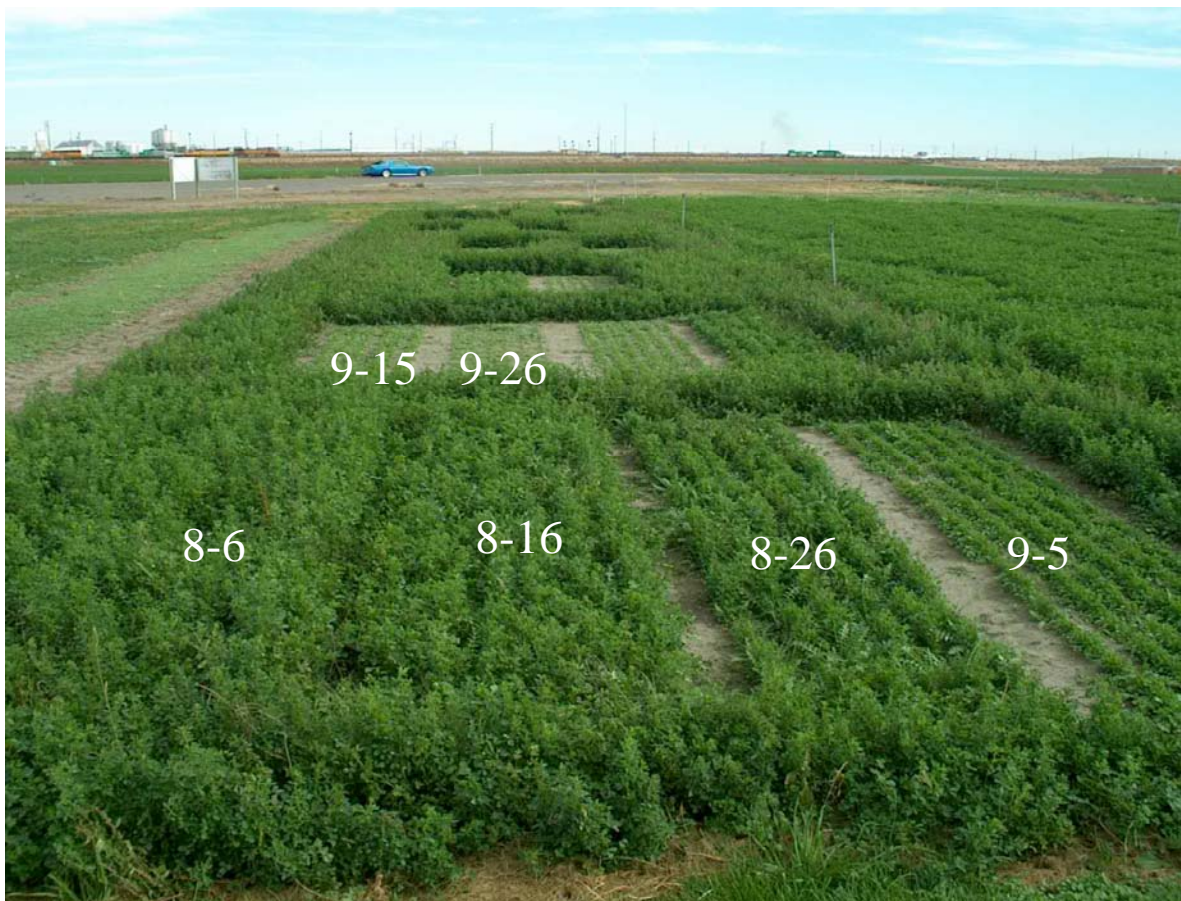


Figure 1: October 10, 2003. Pasco 2003 seeded study.



Figure 2: Growth differences in plants in the fall of 2003 on the Pasco 2003 seeding. Large plant on left is from the first seeding in August. Small plant on right is from the last seeding in September.



Figure 3: Spring growth of seeding date treatments in Othello.