

Title: **Planting Date and Rate Study with Spring Wheat and Barley.**

Year: 2007

Location: Western Triangle Research Center, Conrad, MT

Personnel: Gregory D. Kushnak

Introduction: With warmer seasonal temperatures becoming the trend, it is possible that previously established optimum spring planting-date windows need to be shifted to an earlier time-frame. The optimum window of April 7 to May 7 at Conrad was determined from planting date studies conducted nearly 30 years ago, when seasonal temperatures were cooler than they are today. A planting date study for spring grains was initiated in 2007 in effort to verify whether previous planting-date recommendations are still applicable.

Methods: Spring wheat (var. Choteau) and barley (var. Hockett) were planted on three dates 10 days apart: April 27, May 7 and May 17. Earlier plantings were not possible due to wet soil conditions. Within each date, three rates of seeding were applied: 15, 23 and 30 seeds/sq ft. Nitrogen fertilizer (60 lb/a N) was applied to the spring wheat, but not to the barley in order to enhance plump and test weight for malt quality.

Results, Spring Wheat Dates: Yield, test weight and plant height decreased, and protein increased as planting was delayed beyond April 27 (Table 1).

Yields for the May 7 and May 17 plantings were 1.2 and 9.2 bu/ac lower, respectively, than for the April 27 planting. The rate of decrease was lower for the period between April 27 and May 7, with a non-significant decrease of 0.12 bu/ac for each day of delay. After May 7, yield decreased more rapidly, losing 0.8 bu/ac for each day of delay.

Test weight declined about 0.5 lb/bu for each 10-day period in delayed planting, with the May 17 planting weighing 1.0 lb/bu less than the April 27 planting.

Plant heights for the May 7 and May 17 plantings were 1.4 and 3.4 inches shorter, respectively, than for the April 27 planting.

Protein increased 0.7 and 1.2% as planting was delayed until May 7 and May 17, respectively.

Seedling emergence occurred 10 days after planting the April 27 treatments, and six days after planting the May 7 treatments. Cooler weather conditions occurred after the May 17 planting, delaying emergence time to 8 days.

Heading dates for the May 7 and May 17 plantings were 4 and 10 days later, respectively than for the April 27 planting. Ripening dates were nearly equal for the April 27 and May 7 plantings, while the May 17 planting ripened 7 days later.

Results, Barley Dates: Yield, test weight, plump and plant height decreased as planting was delayed after April 27, while percent thin and protein increased (Table 2).

Yields for the May 7 and May 17 plantings were 3.4 and 21.1 bu/ac lower, respectively, than for the April 27 planting. The rate of decrease was lower for the period between April 27 and May 7, with a non-significant decrease of 0.34 bu/ac for each day of delay. After May 7, yield decreased more rapidly, losing 1.77 bu/ac for each day of delay.

Test weight significantly declined 2 lb/bu for each 10-day period in delayed planting, with the May 17 planting weighing 3.9 lb/bu less than the April 27 planting.

Percent plump for the May 7 and May 17 plantings were 6 and 18% lower, respectively, than for the April 27 planting. The rate of decrease was lower for the period between April 27 and May 7, with a non-significant decrease of 0.6% for each day of delay. After May 7, percent plump decreased more rapidly, losing 1.2% for each day of delay. Percent thin was likewise more sensitive to the latest planting date, increasing 0.5% per day of delay between April 27 and May 7 (non-sig), while increasing 0.9% per day between May 7 and May 17.

Plant heights for the May 7 and May 17 plantings were 0.7 and 2.0 inches shorter, respectively, than for the April 27 planting. Protein increased 0.6 and 3.1% as planting was delayed until May 7 and May 17, respectively.

Seedling emergence occurred 10 days after planting the April 27 treatments, and six days after planting the May 7 treatments. Cooler weather conditions occurred after the May 17 planting, delaying emergence time to 8 days.

Heading dates for the May 7 and May 17 plantings were 4.5 and 13.5 days later, respectively than for the April 27 planting. Ripening dates were nearly equal for the April 27 and May 7 plantings, while the May 17 planting ripened 9 days later.

Seeding Rate: No significant interactions between date and rate of seeding occurred for any of the traits in spring wheat and barley. In spring wheat, the 23 and 30 seeds/ft rates were significantly greater than the 15-seed rate for yield, but not for test weight. In barley, yield and test weight were not significantly different among seeding rates, but plump significantly increased as seeding rate decreased. Heading date was significantly later for the 15-seed rate in both crops.

Conclusion: Yield differences for the April 27 and May 7 plantings were not significant in spring wheat or barley, but significantly lower for the May 27 planting. Test weights were significantly different between the April 27 and May 7 plantings. The results indicate the recommended latest planting date of May 7 may still apply for yield, but not for test weight. Moving the recommended latest planting date to April 27 should be considered if succeeding years of this study prove conclusive.

Future Plans: Continue study in 2008.

Table 1. Planting Dates & Rates - **Spring Wheat**, Conrad 2007

Rate** seeds/ft	Planting Date	Yield bu/a	Test Wt lbs/bu	Height inch	Head date	Protein %	Emergence date	Ripening date
15	Apr 27	34.4	57.8	27.0	178.8	15.6		
23	Apr 27	35.3	57.4	27.0	178.0	15.6		
30	Apr 27	34.9	57.8	26.0	178.0	15.4		
Apr 27	means:	34.9 a	57.7 a	26.7	178.3 c	15.5	May 7	Aug 8
15	May 7	32.3	56.6	26.0	183.0	16.3		
23	May 7	35.5	57.7	25.0	182.0	16.1		
30	May 7	33.3	57.1	25.0	182.0	16.3		
May 7	means:	33.7 a	57.1 b	25.3	182.3 b	16.2	May 13	Aug 8
15	May 17	23.4	56.5	24.0	188.8	16.6		
23	May 17	26.1	56.6	23.0	188.0	16.9		
30	May 17	27.6	57.1	23.0	188.0	16.7		
May 17	means:	25.7 b	56.7 b	23.3	188.3 a	16.7	May 25*	Aug 15

15	Apr 27	34.4	57.8	27.0	178.8	15.6		
15	May 7	32.3	56.6	26.0	183.0	16.3		
15	May 17	23.4	56.5	24.0	188.8	16.6		
rate 15	means:	30.0 b	57.0 a	25.7	183.5 a	16.2		
23	Apr 27	35.3	57.4	27.0	178.0	15.6		
23	May 7	35.5	57.7	25.0	182.0	16.1		
23	May 17	26.1	56.6	23.0	188.0	16.9		
rate 23	means:	32.3 a	57.2 a	25.0	182.7 b	16.2		
30	Apr 27	34.9	57.8	26.0	178.0	15.4		
30	May 7	33.3	57.1	25.0	182.0	16.3		
30	May 17	27.6	57.1	23.0	188.0	16.7		
rate 30	means:	31.9 a	57.3 a	24.7	182.7 b	16.1		

LSD (.05)	1.79	0.55	0.20
C.V. %	6.75	1.15	0.13
Date P	.0000***	.0044**	.0000***
Rate P	.0356*	.4065 ns	.0000***
Interaction P	.2851 ns	.1900 ns	.7501 ns

* Emergence of May 17 planting date was preceded by several cold days.

** Seed rates are pure live seeds per square foot:

15/ft = 653,400/acre; 23/ft = 1,001,880/acre; 30/ft = 1,306,800/acre

Spring wheat variety: 'Choteau'. Planted on fallow. Fertilizer, actual: 71-52-0.

Location: Western Triangle Ag Research Center, Conrad, MT.

Table 2. Planting Dates & Rates - **Barley**, Conrad 2007

Rate** seed/ft	Planting Date	Yield bu/a	Test Wt lbs/bu	Plump %	Thin %	Height inch	Head date	Protein %	emerge date	Ripe date
15	Apr 27	67.1	51.2	67.0	7.3	26.0	176.0	12.5		
23	Apr 27	68.8	50.8	60.7	8.5	26.0	175.0	12.4		
30	Apr 27	71.0	50.5	58.5	11.3	25.0	175.0	12.3		
Apr 27	means:	69.0 a	50.8 a	62.1 a	9.0 b	25.7	175.3 c	12.4	May 7	July31
15	May 7	64.1	48.6	60.0	11.5	26.0	180.3	12.9		
23	May 7	70.5	49.4	63.1	10.7	25.0	179.5	12.9		
30	May 7	62.4	48.6	45.3	19.6	24.0	179.5	13.3		
May 7	means:	65.6 a	48.9 b	56.1 a	13.9 b	25.0	179.8 b	13.0	May13	July31
15	May 17	47.6	46.9	49.1	17.8	24.0	189.5	15.4		
23	May 17	49.4	47.2	46.1	23.0	24.0	188.5	15.3		
30	May 17	46.7	46.6	37.5	26.3	23.0	188.3	15.7		
May17	means:	47.9 b	46.9 c	44.2 b	22.4 a	23.7	188.8 a	15.5	May25*	Aug 9

15	Apr 27	67.1	51.2	67.0	7.3	26.0	176.0	12.5		
15	May 7	64.1	48.6	60.0	11.5	26.0	180.3	12.9		
15	May 17	47.6	46.9	49.1	17.8	24.0	189.5	15.4		
rate15	means:	59.6 a	48.9 a	58.7 a	12.2 b	25.3	181.9 a	13.6		
23	Apr 27	68.8	50.8	60.7	8.5	26.0	175.0	12.4		
23	May 7	70.5	49.4	63.1	10.7	25.0	179.5	12.9		
23	May 17	49.4	47.2	46.1	23.0	24.0	188.5	15.3		
rate23	means:	62.9 a	49.2 a	56.7ab	14.1 ab	25.0	181.0 b	13.5		
30	Apr 27	71.0	50.5	58.5	11.3	25.0	175.0	12.3		
30	May 7	62.4	48.6	45.3	19.6	24.0	179.5	13.3		
30	May 17	46.7	46.6	37.5	26.3	23.0	188.3	15.7		
rate30	means:	60.0 a	48.6 a	47.1 b	19.0 a	24.0	180.9 b	13.8		
LSD (.05)		3.67	0.79	11.02	6.25		0.39			
C.V. %		7.17	1.92	24.17	49.18		0.26			
Date P		.0000***	.0000***	.0089**	.0007***		.0000***			
Rate P		.1585 ns	.3457 ns	.0888 ns	.0854 ns		.0000***			
Interaction P		.2266 ns	.7898 ns	.8304 ns	.8599 ns		.8600 ns			

* Emergence of May 17 planting date was preceded by several cold days.

** Seed rates are pure live seeds per square foot:

15/ft = 653,400/acre; 23/ft = 1,001,880/acre; 30/ft = 1,306,800/acre

Barley variety: 'Hockett'. Planted on fallow. Fertilizer, actual: 11-52-0.

Location: Western Triangle Ag Research Center, Conrad, MT.