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

Year: 2008

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 and continued in 2008 to determine whether previous planting-date recommendations are still applicable.

Methods: In 2008, spring wheat (var. Choteau) and barley (var. Hockett) were planted on three dates: May 5, May 14 and May 31. Earlier plantings were not possible due to wet soil conditions, and the last date was delayed a week by rain. Within each date, three rates of seeding were applied: 15, 23 and 30 seeds/sq ft. Nitrogen fertilizer (71 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: Unusually cold temperatures and wet conditions delayed all planting in 2008. Consequently, the calendar dates for the three plantings in 2008 are much later than the analogous treatments in 2007. In 2008, yield, test weight and plant height decreased as planting was delayed beyond May 14 (Table 1).

Yield for the May 31 planting was 10.6 bu/ac lower than for the May 5 planting. Test weight declined 2.3 lb/bu between the May 5 and May 31 plantings, and plant height declined 1.6 inches.

Protein was not affected by planting date in 2008 (Table 1). In 2007, protein increased with delayed planting (Table 2).

Heading dates for the May 14 and May 31 plantings were 3.3 and 12.4 days later, respectively, than for the May 5 planting. Ripening dates for the delayed treatments were 5 and 10 days later, respectively, than for the May 5 planting.

Results, Barley Dates: Yield, test weight and percent plump decreased as planting was delayed beyond May 14 (Table 3).

Yield for the May 31 planting was 11.9 bu/ac lower than for the May 5 planting. Test weight declined 2.4 lb/bu between the May 5 and May 31 plantings, and percent plump declined 2.1%.

Heading dates for the May 14 and May 31 plantings were 5.4 and 15.4 days later, respectively, than for the May 5 planting. Ripening dates for the delayed treatments were 4 and 13 days later, respectively, than for the May 5 planting.

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, test weight and percent plump were not significantly different among seeding rates, but in the previous year (2007) plump significantly increased as seeding rate decreased (Table 4). Heading date was significantly later for the 15-seed rate in both crops.

Conclusion: In the cooler year of 2008, the entire planting season was shifted to a later time frame. Regardless, within the respective planting time-frames for each year, the effect of delayed planting had similar effects on agronomic performance over the two-year study period (Tables 2 and 4). The results indicate that planting early as the season will allow is the best practice.

Future Plans: The study, in its present design, is concluded. It is suggested that future planting-date studies include both day-length sensitive and insensitive varieties.

Table 1. Planting Dates & Rates - **Spring Wheat**, Conrad 2008

Rate** seeds/ft	Planting Date	Yield bu/a	Test Wt lbs/bu	Height inch	Head date	Protein %	Ripening date
15	May 5	51.0	61.9	28.0	188.8	13.1	Aug 26
23	May 5	54.0	61.7	28.8	188.3	13.0	Aug 25
30	May 5	54.7	61.4	29.0	187.0	13.2	Aug 25
May 5	**means:**	**53.3** a	**61.7** a	**28.6** a	**188.0** c	**13.1**	**Aug 25**
15	May 14	46.4	61.7	27.3	191.8	12.7	Sep 2
23	May 14	54.0	62.3	28.3	191.3	12.7	Aug 31
30	May 14	56.1	62.2	28.3	190.8	12.8	Aug 31
May 14	**means:**	**52.2** a	**62.0** a	**27.9** b	**191.3** b	**12.7**	**Sep 1**
15	May 31	41.2	58.9	25.8	201.0	13.5	Sep 7
23	May 31	43.9	59.4	27.3	200.3	13.3	Sep 5
30	May 31	43.1	59.8	28.0	200.0	13.2	Sep 5
May 31	**means:**	**42.7** b	**59.4** b	**27.0** c	**200.4** a	**13.3**	**Sep 6**
15	May 5	51.0	61.9	28.0	188.8	13.1	Aug 26
15	May 14	46.4	61.7	27.3	191.8	12.7	Sep 2
15	May 31	41.2	58.9	25.8	201.0	13.5	Sep 7
rate 15	**means:**	**46.2** b	**60.8** a	**27.0** b	**193.8** a	**13.1**	**Sep 1**
23	May 5	54.0	61.7	28.8	188.3	13.0	Aug 25
23	May 14	54.0	62.3	28.3	191.3	12.7	Aug 31
23	May 31	43.9	59.4	27.3	200.3	13.3	Sep 5
rate 23	**means:**	**50.7** a	**61.1** a	**28.1** a	**193.3** b	**13.0**	**Aug 31**
30	May 5	54.7	61.4	29.0	187.0	13.2	Aug 25
30	May 14	56.1	62.2	28.3	190.8	12.8	Aug 31
30	May 31	43.1	59.8	28.0	200.0	13.2	Sep 5
rate 30	**means:**	**51.3** a	**61.1** a	**28.4** a	**192.6** c	**13.1**	**Aug 31**
LSD (.05)		3.77	3.87	0.46	0.42		
C.V. %		9.07	7.62	1.98	0.26		
Date P		.0000***	.0228*	.0000***	.0000***		
Rate P		.0202*	.4074 ns	.0000***	.0000***		
Interaction P		.4836 ns	.4997 ns	.1645 ns	.2930 ns		

** 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
Spr wheat variety: Choteau. Planted on fallow. Fertilizer, actual: 71-52-0.
Location: Western Triangle Ag Research Center, Conrad, MT.

Table 2. 2-yr Summary, Planting Dates & Rates - **Spring Wheat**, Conrad 2007-08.

Planting date	Yield bu/a	Test Wt lbs/bu	Height inch	Head date	Protein %	Ripening date
Apr 27, 2007	34.9	57.7	26.7	178.3	15.5	Aug 8
May 5, 2008	53.3	61.7	28.6	188.0	13.1	Aug 25
2-yr avg.	**44.1**	**59.7**	**27.6**	**183.2**	**14.3**	**Aug 17**
May 7, 2007	33.7	57.1	25.3	182.3	16.2	Aug 8
May 14, 2008	52.2	62.0	27.9	191.3	12.7	Sep 1
2-yr avg.	**43.0**	**59.6**	**26.6**	**186.8**	**14.5**	**Aug 20**
May 17, 2007	25.7	56.7	23.3	188.3	16.7	Aug 15
May 31, 2008	42.7	59.4	27.0	200.4	13.3	Sep 6
2-yr avg.	**34.2**	**58.1**	**25.2**	**194.4**	**15.0**	**Aug 26**
Rate** seeds/ft						
rate 15	30.0	57.0	25.7	183.5	16.2	
rate 15	46.2	60.8	27.0	193.8	13.1	
2-yr avg.	**38.1**	**58.9**	**26.3**	**188.7**	**14.7**	
rate 23	32.3	57.2	25.0	182.7	16.2	
rate 23	50.7	61.1	28.1	193.3	13.0	
2-yr avg.	**41.5**	**59.2**	**26.6**	**188.0**	**14.6**	
rate 30	31.9	57.3	24.7	182.7	16.1	
rate 30	51.3	61.1	28.4	192.6	13.1	
2-yr avg.	**41.6**	**59.2**	**26.5**	**187.7**	**14.6**	

** 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 3. Planting Dates & Rates - **Barley**, Conrad 2008

Rate** seeds/ft	Planting Date	Yield bu/a	Test Wt lbs/bu	Plump %	Thin %	Height inch	Head date	Protein %	Ripe date
15	May 5	74.7	53.9	97.0	1.0	27.0	186.3	9.1	Aug18
23	May 5	72.9	53.9	96.3	1.0	26.3	186.3	8.7	Aug18
30	May 5	74.9	53.6	95.3	1.2	27.3	185.3	8.6	Aug18
May 5	**means**	**74.1** a	**53.8** a	**96.2** a	**1.1** b	**26.8** a	**185.9** c	**8.8**	**Aug18**
15	May 14	72.6	52.0	97.5	0.8	26.0	192.3	9.3	Aug23
23	May 14	77.2	53.0	97.3	0.9	26.3	191.3	8.7	Aug21
30	May 14	82.2	53.2	97.0	0.9	26.0	190.5	9.2	Aug21
May14	**means**	**77.3** a	**52.7** b	**97.3** a	**0.9** b	**26.1** a	**191.3** b	**9.1**	**Aug22**
15	May 31	56.3	51.4	94.8	1.2	26.5	201.8	8.9	Sep1
23	May 31	65.3	51.4	94.0	1.7	26.5	201.0	9.1	Aug30
30	May 31	65.1	51.5	93.5	1.7	26.3	201.0	9.0	Aug30
May31	**means**	**62.2** b	**51.4** c	**94.1** b	**1.5** a	**26.4** a	**201.3** a	**9.0**	**Aug31**
15	May 5	74.7	53.9	97.0	1.0	27.0	186.3	9.1	Aug 18
15	May 14	72.6	52.0	97.5	0.8	26.0	192.3	9.3	Aug 23
15	May 31	56.3	51.4	94.8	1.2	26.5	201.8	8.9	Sep 1
rate 15	**means**	**67.8** a	**52.5** a	**96.4** a	**1.0** a	**26.5** a	**193.4** a	**9.1**	**Aug24**
23	May 5	72.9	53.9	96.3	1.0	26.3	186.3	8.7	Aug 18
23	May 14	77.2	53.0	97.3	0.9	26.3	191.3	8.7	Aug 21
23	May 31	65.3	51.4	94.0	1.7	26.5	201.0	9.1	Aug 30
rate 23	**means**	**71.8** a	**52.8** a	**95.8** a	**1.2** a	**26.3** a	**192.8** b	**8.8**	**Aug23**
30	May 5	74.9	53.6	95.3	1.2	27.3	185.3	8.6	Aug 18
30	May 14	82.2	53.2	97.0	0.9	26.0	190.5	9.2	Aug 21
30	May 31	65.1	51.5	93.5	1.7	26.3	201.0	9.0	Aug 30
rate 30	**means**	**74.1** a	**52.7** a	**95.3** a	**1.3** a	**26.5** a	**192.3** c	**8.9**	**Aug23**
LSD (.05)		6.85	0.70	1.27	0.30	0.74	0.41		
C.V. %		11.41	1.58	2.22	30.87	3.31	0.25		
Date P		.0003***	.0000***	.0001***	.0005***	.1306ns	.0000***		
Rate P		.1873ns	.6176ns	.1917ns	.1638ns	.8654ns	.0000***		
Interaction P		.6381ns	.4594ns	.9461ns	.7337ns	.5706ns	.0863 ns		

** 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.

Table 4. Two-year Summary, Planting Dates & Rates - **Barley**, Conrad 2007-08.

Planting Date	Yield bu/a	Test Wt lbs/bu	Plump %	Thin %	Height inch	Head date	Protein %	Ripe date
Apr 27, 2007	69.0	50.8	62.1	9.0	25.7	175.3	12.4	July31
May 5, 2008	74.1	53.8	96.2	1.1	26.8	185.9	8.8	Aug18
2-yr avg.	**71.6**	**52.3**	**79.2**	**5.1**	**26.2**	**180.6**	**10.6**	**Aug 9**
May 7, 2007	65.6	48.9	56.1	13.9	25.0	179.8	13.0	July31
May 14, 2008	77.3	52.7	97.3	0.9	26.1	191.3	9.1	Aug22
2-yr avg.	**71.5**	**50.8**	**76.7**	**7.4**	**25.6**	**185.6**	**11.0**	**Aug 11**
May 17, 2007	47.9	46.9	44.2	22.4	23.7	188.8	15.5	Aug 9
May 31, 2008	62.2	51.4	94.1	1.5	26.4	201.3	9.0	Aug31
2-yr avg.	**55.1**	**49.2**	**69.2**	**12.0**	**25.0**	**195.1**	**12.3**	**Aug 20**
Rate** seeds/ft								
rate 15	59.6	48.9	58.7	12.2	25.3	181.9	13.6	
rate 15	67.8	52.5	96.4	1.0	26.5	193.4	9.1	
2-yr avg.	**63.7**	**50.7**	**77.6**	**6.6**	**25.9**	**187.7**	**11.4**	
rate 23	62.9	49.2	56.7	14.1	25.0	181.0	13.5	
rate 23	71.8	52.8	95.8	1.2	26.3	192.8	8.8	
2-yr avg.	**67.4**	**51.0**	**76.3**	**7.7**	**25.7**	**186.9**	**11.2**	
rate 30	60.0	48.6	47.1	19.0	24.0	180.9	13.8	
rate 30	74.1	52.7	95.3	1.3	26.5	192.3	8.9	
2-yr avg.	**67.1**	**50.7**	**71.2**	**10.2**	**25.3**	**186.6**	**11.4**	

** 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.