

## Previous Crop and Tillage Effects on Barley Variety Performance

### NDSU Dickinson Research Extension Center

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A study was established in 2009 to compare barley variety performance when preceded by canola, corn, field pea, and spring wheat. Three six-rowed (Lacey, Stellar-ND, and Tradition) and three two-rowed (Conlon, Conrad, and Pinnacle) varieties were seeded after each of the four crops in a no-till system. We were unable to detect differences in barley yield across the four different crops in 2012 at the  $P < 0.05$  level of significance, as was also the case in 2011 (Table 1). Higher barley yield was detected following field pea than following corn or spring wheat in 2010. The mean values presented in Table 1 represent a considerable range in yield across the 18 plots that were used to compute them during both 2011 and 2012, and helps explain the inability to detect statistical differences in barley yield across the previous four previous crop treatments during those years. Overall arithmetic mean rank for barley yield across all three years was field pea > canola ≈ spring wheat > corn. Barley kernel test weight was lighter following corn than following canola and spring wheat in 2012. No difference in kernel test weight was detected across the four previous crop treatments in both 2010 and 2011.

Table 1. Previous Crop by Barley Variety Trial, NDSU Dickinson Research Extension Center, 2010-2012.

	Grain yield				Grain test weight			
	2010	2011	2012	Average	2010	2011	2012	Average
Tillage system	-----bu/acre-----				-----lb/bu-----			
Canola	90	57	55	67	48	38	44	43
Corn	70	65	43	59	46	38	42	42
Pea	95	70	57	74	48	38	43	43
Wheat	86	59	59	68	48	38	44	43
LSD 0.05	7	NS	NS*		NS	NS	1	
Varieties								
Conlon	74	53	41	56	49	40	45	45
Conrad	90	58	58	69	47	36	43	42
Lacey	88	66	56	70	48	38	44	43
Pinnacle	86	66	58	70	48	37	42	42
Stellar-ND	89	65	51	68	46	38	43	42
Tradition	84	69	56	70	48	40	44	44
LSD 0.05	6	3	5		1	1	1	

The six-rowed cultivars Lacey and Tradition, along with the two-rowed cultivar Pinnacle, produced equal or higher yields than other barley cultivars in 2012, as well as during the previous two years (Table 1). The two-rowed cultivar Conrad produced comparable yields to those produced by Pinnacle and Tradition in both 2010 and 2012, but less grain than other cultivars in 2011, except for Conlon. Likewise, Stellar-ND produced relatively high yields in both 2010 and 2012, but lower yields than Tradition in 2011. Conlon consistently produced less grain than other cultivars throughout the study.

Conlon and Tradition produced kernel with relatively heavy test weight in each year of the study. Conversely, Conrad and Stellar-ND produced lighter kernels than Conlon or Tradition in both 2010 and 2011, and Conlon in 2012. Lacey produced kernels with a relatively heavy test weight during 2010 and 2012, but not in 2011. Pinnacle produced kernels with a relatively heavy test weight in 2010, while test weight of kernels produced by Pinnacle was relatively light in both 2011 and 2012. Results of this three-year study at Dickinson support production of Tradition in southwest North Dakota, based grain yield and test weight data.

The six barley varieties grown following four previous crops also were grown in long-term (est. 1993) conventional-, reduced-, and no-till plots, beginning in 2010. We were unable to detect an impact of tillage system on barley yield across the six varieties at the  $P < 0.05$  level of significance in 2012, as had been the case in both 2010 and 2011 (Table 2). There was a trend ( $P = 0.09$ ) for higher grain yield following no-till than conventional-till in 2012. Overall mean arithmetic rank for grain yield across the first three years of this study was no-till  $\cong$  reduced-tillage  $>$  conventional-till. Unlike previous years, volumetric water content was similar across the three tillage systems when the study began in 2012, except at the shallowest depth, where moisture content was greater under no-till (data not provided).

Test weight of barley kernels was heavier in no-till plots than both reduced- and conventional-till plots in 2012, as had been the case in 2010 (Table 2). In contrast, differences in test weight of barley kernels was not detected across tillage systems in 2011. These results indicate that test weight of barley kernels can be increased by eliminating tillage during some years in southwestern North Dakota.

The six-rowed varieties Lacey and Stellar-ND along with the two-rowed cultivar Pinnacle produced equal or greater amounts of grain than the other four barley varieties across the three tillage systems in 2012 (Table 2). Lacey, along with Tradition, produced more grain than other barley varieties included in the study in 2011. Lacey along with Pinnacle produced equal or greater amounts of grain than other cultivars in 2010. Conlon tended to produce less grain than other cultivars during the study, although there were a few exceptions in 2010 and 2011. Conrad produced relatively high grain yields in 2010 and 2012, but not in 2011. Likewise, Tradition produced relatively high grain yields in 2010 and 2011, but

Table 2. Barley Variety Performance in Long-Term Tillage Plots, NDSU Dickinson Research Extension Center 2010-2012.

	Grain yield				Grain test weight			
	2010	2011	2012	Average	2010	2011	2012	Average
Tillage system	-----bu/acre-----				-----lb/bu-----			
Conventional	58	66	71	65	44	40	38	41
Reduced	67	65	74	69	45	41	38	41
No-till	63	56	87	69	47	40	41	43
LSD 0.05	NS	NS	NS*		1	NS	1	
Barley varieties								
Conlon	58	54	63	58	48	42	39	43
Conrad	62	57	78	66	45	40	40	42
Lacey	65	69	81	72	45	40	39	41
Pinnacle	67	62	83	71	45	39	39	41
Stellar-ND	60	62	83	68	44	39	38	40
Tradition	63	69	76	69	46	42	39	42
LSD 0.05	5	5	6		1	1	1	

lower yields than Pinnacle and Stellar-ND in 2012. Lacey was ranked consistently among the leaders for grain yield during the first three years of this study.

The 2-rowed variety Conlon produced grain with a test weight that was heavier than grain test weight produced by other barley varieties in 2010 (Table 2). Conlon also produced grain with a relatively heavy test weight in both 2011 and 2012. Conversely, Stellar-ND produced grain with a relatively light test weight during all three years. Tradition also tended to produce grain with a heavy test weight, except in 2010 when test weight was lighter for grain produced by Tradition than that produced by Conlon. Test weight of grain produced by Conrad, Lacey, Pinnacle was relatively heavy in 2012, but was lighter than at least one variety in 2010 and 2011.

Both the previous crop and tillage studies with barley will be continued in 2013. However, results from the first three years suggest that barley response to previous crop and tillage may be subdued compared with spring wheat for grain yield and test weight. Additional research is needed to verify these preliminary observations.

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