

Barley Cultivar Performance Following Canola, Corn, Field Pea, and Spring Wheat

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SUMMARY

Previous research indicated a grain yield advantage in some years when spring wheat followed field pea compared with spring wheat in southwestern North Dakota. Our objective is to determine if a rotation effect can be demonstrated for barley, and if cultivar selection affects the impact of previous crop on subsequent barley performance. Six barley cultivars were compared for grain yield and quality following canola, corn, field pea, and spring wheat in 2010. Spike density was reduced when barley followed corn compared with canola and field pea, and this translated into a lower grain yield after corn (70 bu/acre) than canola (90 bu/acre) and field pea (95 bu/acre; $P < 0.05$). More grain also was produced when barley followed spring wheat (86 bu/acre) than corn, even though barley spike density was similar following both crops. We were unable to detect any influence of the previous crop on grain test weight of a subsequent barley crop. Cultivar ranking was unaffected by previous crop considerations for any barley crop parameter. Conlon, produced less grain (74 bu/acre) than the other five cultivars (range 84 to 90 bu/acre). In contrast, Conlon produced grain with a heavier test weight (48.8 lb/bu) than Conrad (46.6 lb/bu), Pinnacle (47.5 lb/bu), and Stellar-ND (46.2 lb/bu). Additional data will be collected in this ongoing study through 2012.

INTRODUCTION

Crop-fallow has been replaced with more intensive cropping systems on many farms in western North Dakota. Barley is a popular small-grain crop in this portion of the state, and questions have been asked on how previous crop affects barley performance. Past research demonstrated that rotating spring wheat with field pea enhanced grain yield of a subsequent wheat crop compared with growing wheat continuously, but this rotation effect was not observed consistently across a 6-yr period (Carr et al., 2006). The objective of this research is to determine if barley performance is affected by the previous crop in a 2-yr sequence, and to determine if cultivar selection affects the rotation effect.

MATERIALS AND METHODS

Three 2-rowed (Conlon, Conrad, and Pinnacle) and three 6-rowed (Lacey, Stellar-ND, and Tradition) barley cultivars were established following canola, corn, field pea, and spring wheat in a no-till system in

2010 at the NDSU Dickinson Research Extension Center. Plots were arranged in a randomized complete block in a split plot arrangement. Tillage system comprised whole plots and barley cultivar comprised subplots. Tillage by barley cultivar combinations were replicated three times. Data were analyzed using PROC GLM from SAS for balanced data.

RESULTS AND DISCUSSION

Barley plant stand and days to heading were unaffected by the previous crop in 2010 (Table 1). However, spike density was greater following canola and field pea (17 spikes/ft²) compared with corn (15 spikes/ft²). Barley spike density following spring wheat was intermediate between those crops. These changes in spike density were reflected in grain yield differences following field pea at 95 bu/acre and canola at 90 bu/acre, compared with corn at 70 bu/acre. Spring wheat was intermediate between the two extremes in grain yield (86 bu/acre). Plant height failed to be a good indicator of grain yield differences in 2010, since barley plants following field pea were shorter than those following canola and similar in height to plants following corn. Differences in grain test weight for barley were not detected across the four different crops.

Barley cultivar rank was unaffected by previous crop consideration for any parameter considered in the field experiment in 2010 (data not presented). Spike density for Conrad was greater than for the other five barley cultivars included in the field experiment, but this did not translate into a grain yield benefit, except when comparing Conrad to Conlon (Table 1). Though relatively low yielding, test weight for grain produced by Conlon was heavier than that produced by other cultivars, except for Lacey and Tradition.

Results of these preliminary data indicate the profound effect that previous crop can have on subsequent barley grain yield in a 2-yr crop sequence. This study will be continued through 2012 to determine if the impacts of previous crop on subsequent barley crop performance are consistent across years. This study also will be continued to determine if cultivar ranking can be affected by previous crop choices in some years.

REFERENCES

Carr, P.M., R.D. Horsley, and G.B. Martin. 2006. Impact of tillage and crop rotation on grain yield of

spring wheat II. Rotation effect. Online. Crop
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Table 1. Previous Crop by Barley Variety Trial, NDSU Dickinson Research Extension Center, 2010

	Plant count	Days to heading	Spike density	Plant height	Yield	Test weight	Moisture
	-no./ft ² -	-d-	-Spikes/ft ² -	-in-	-bu/ac-	-lb/bu-	-%-
Previous Crop							
Canola	18	64	17	34	90	48.0	9.6
Corn	15	65	15	31	70	45.7	9.3
Field pea	17	63	17	32	95	47.9	10.2
Spring Wheat	17	64	16	33	86	48.3	10.0
LSD 0.05	NS	NS	1.8	1	7	NS	NS
Barley varieties							
Conlon	16	60	20	32	74	48.8	9.9
Conrad	16	74	24	31	90	46.6	9.4
Lacey	16	62	12	32	88	47.9	9.8
Pinnacle	16	65	18	33	86	47.5	11.1
Stellar-ND	15	62	12	33	89	46.2	8.6
Tradition	22	63	12	33	84	48.2	9.7
LSD 0.05	2	1	2	1	6	0.9	1