2013 "Otto" vs. "Xerpha" Study—With and Without Fungicide Application

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS142E

Abstract

"Otto" is a soft white winter wheat cultivar recently released by WSU with moderate resistance to eyespot (strawbreaker) foot rot and stripe rust. "Xerpha" is a popular, high yielding soft white winter wheat cultivar that is susceptible to eyespot foot rot and moderately susceptible to stripe rust. Four on-farm tests (OFTs) were established across the dryland cropping region of Adams County, Washington, to investigate the performance of Otto in comparison to Xerpha with and without fungicide application. OFTs were conducted as strip-split block designs. Otto yielded 65.4 bu/ac, significantly higher than Xerpha at only 63.0 bu/ac. A significant variety × fungicide interaction shows across locations that fungicide application on Xerpha significantly improved grain yield by 5.7 bu/ac, or 9%, but only improved 2.2 bu/ac, or 3%, on Otto. These results are consistent with higher levels of disease resistance in Otto.

Introduction

Otto is a soft white winter wheat cultivar released by WSU in 2011 that is moderately resistant to eyespot (strawbreaker) foot rot and stripe rust. The Xerpha winter wheat cultivar was released by WSU in 2008, and is a high yielding cultivar that is susceptible to eyespot foot rot and moderately susceptible to stripe rust (Washington State Crop Improvement Association. 2013). The objective of this project is to examine Otto's performance potential in the dryland (< 12 inches of precipitation) winter wheat–summer fallow cropping region in comparison to Xerpha's performance and determine if Otto's higher levels of disease resistance will allow reduced fungicide application.

Materials and Methods

Four on-farm tests (OFTs) were established across the dryland cropping region of Adams County. The LaRitz Farm site was located 4 miles south of Ralston and the LOKO Farm site was located 6 miles north of Washtucna; both had a moderate amount of rolling, uneven topography. The Simonson Farm site was located 10 miles northwest of Ritzville and is nearly flat, while the Taylor Farm site, located 10 miles northeast of Ritzville in the Carico Hills, had a high level of rolling, uneven topography.

Individual plots were 1,000 feet long and 0.7 to 1.4 acres in size, depending on drill width. Otto and Xerpha were each seeded with a split packer deep furrow hoe drill and seeded at densities chosen by each cooperator, but held constant at each location.

Plots were sprayed on March 27–28, 2013, at 10 gallons per acre using a 3-point tractor-mounted sprayer. All plots were sprayed with a grass and broadleaf herbicide tank mix that included 0.33 oz/ac Olympus, 3.5 oz/ac Osprey, 13.0 oz/ac Huskie, 16.0 oz/ac MCPA, 64.0 oz/ac UAN, and 2.0 qt M-90 non-ionic surfactant per 100 gallons of water. A fungicide combination of 10.0 oz/ac Topsin and 4.0 oz/ac Tilt (designated T+T on the plot map and in tables) for eyespot foot rot and early season stripe rust control was tank-mixed with the herbicide for application to fungicide plots. Figure 1 summarizes the design at Simonson Farms; the same design was used at all farms in the study.

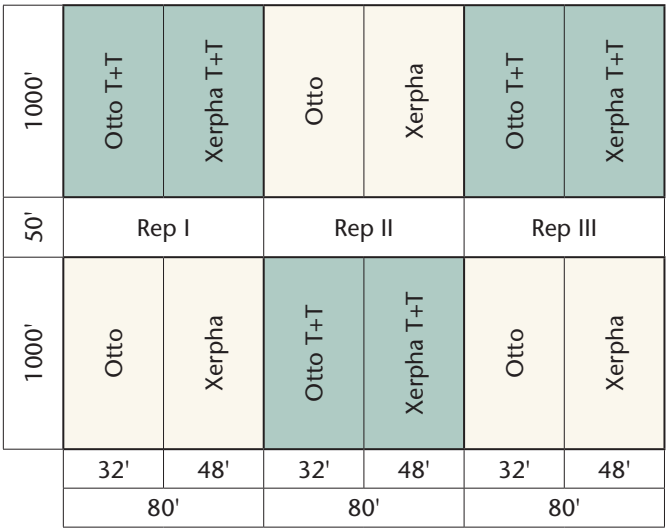

Figure 1. On-farm trial design with four treatments: Otto and Xerpha, each with fungicide application (T+T) and without, and three replications.

On-farm tests were conducted as a strip-split-plot design with three replications. Cultivars were strips and fungicide application was split in each replication. Plots were harvested with cooperators' combines and yield data was

collected using a modified weigh box with a Norac scale system. Grain sub-samples were collected to determine protein and test weight. Economic return over fungicide costs was calculated using the Ritzville Warehouse F.O.B. price on September 15, 2013, less any test weight discounts that were applicable and the standard cost of the fungicides only.

Results

Otto produced greater grain yield than Xerpha and fungicide application significantly increased yield as well (Table 1). Across locations and fungicide treatment, Otto averaged 65.4 bu/ac while Xerpha averaged only 63.0 bu/ac, and, averaged across both cultivars, fungicide increased yield 6%. However, across all locations, grain yield had a cultivar × fungicide interaction for both Otto and Xerpha. With Otto, fungicide application significantly increased yield 3% while with Xerpha, fungicide application increased yield 9%.

Otto grain had higher test weight and protein than did Xerpha (Table 2). Otto grain averaged 59.8 lb/bu test weight and 9.3% protein compared to Xerpha grain at 59.1 lb/bu and 9.0% protein. Fungicide application had no significant effect on either grain test weight or protein.

Similar to yield, economic returns over fungicide costs shows a cultivar × fungicide interaction (Table 3). Otto produced greater economic returns than Xerpha and fungicide application also significantly increased returns. Otto averaged $431/ac while Xerpha averaged only $414/ac, and overall fungicide increased returns 6%. However, each winter wheat cultivar responded differently to the fungicide treatment. Fungicide application significantly increased economic returns 3% for Otto and 9% for Xerpha.

Conclusions

Otto is well adapted to the dryland winter wheat–summer fallow cropping region and shows an advantage in comparison to Xerpha, especially in fields with a history of eyespot foot rot. Both cultivars produced a positive response to fungicide application, but response was greater on Xerpha in comparison to Otto, especially on sites with a greater degree of rolling, uneven topography (Table 4). These results are consistent with higher levels of disease resistance in Otto. Additional information can be found at variety.wsu.edu.

Data

Table 1. Grain yield of Otto and Xerpha winter wheat (bu/ac), without and with fungicide application, averaged over four on-farm tests in 2013 across Adams County.

Variety[1]	No Fungicide	With Fungicide	Mean
Otto	64.3	66.5	65.4 a[2]
Xerpha	60.2	65.9	63.0 b
Mean	62.3 b[3]	66.2 a	5

[1]Variety × fungicide interaction is significant (P<0.05). $LSD_{(0.10)}$ = 1.9.
[2] Means within rows assigned different case letters are significantly different (P<0.05).
[3] Means within columns assigned different case letters are significantly different (P<0.05).

Table 2. Test weight and grain protein of Otto and Xerpha winter wheat, averaged over fungicide application and four on-farm tests harvested in 2013 across Adams County.

Variety[1]	Test Weight (lb/bu)	Protein (%)
Otto	59.8	9.3
Xerpha	59.1	9.0
Level of significance	0.01	0.01

[1]The fungicide treatment and the variety x fungicide interaction had no significant impact on test weight and protein.

Table 3. Economic return ($/ac) over fungicide costs of Otto and Xerpha winter wheat without and with fungicide application, averaged over four on-farm tests harvested in 2013 across Adams County.

Variety[1]	No Fungicide	With Fungicide	Mean
Otto	425	437	431 a[2]
Xerpha	397	432	414 b
Mean	411 b[3]	434 a	

[1] Variety × Fungicide interaction is significant (P<0.05). $LSD_{(0.10)}$ =12.
[2] Means within rows assigned different case letters are significantly different (P<0.05).
[3] Means within columns assigned different case letters are significantly different (P<0.05).

Table 4. Base data for Otto and Xerpha winter wheat grain yield (bu/ac) both without and with fungicide application (T+T)[1], at four locations, in a series of on-farm tests conducted in 2012–13.

Taylor Farms (Carico Hills: a high degree of rolling, uneven topography)					
Treatment	**I**	**II**	**III**	**IV**	**Mean**
Otto	80	89	79	71	80 ab[2]
Xerpha	79	80	71	68	75 b
Otto T+T	83	88	87	77	84 a
Xerpha T+T	84	84	82	78	82 a
					$LSD_{(0.10)} = 5$
Simonson Farms (NW of Ritzville: flat)					
Treatment	**I**	**II**	**III**	**IV**	**Mean**
Otto	61	63	63	66	63 a
Xerpha	59	67	66	68	65 a
Otto T+T	64	58	65	66	63 a
Xerpha T+T	66	63	69	68	66 a
					$LSD_{(0.10)} = 5$
LOKO Farms (N of Washtucna: a moderate degree of rolling, uneven topography)					
Treatment	**I**	**II**	**III**		**Mean**
Otto	58	50	51		53 b
Xerpha	55	53	53		54 b
Otto T+T	58	55	55		56 ab
Xerpha T+T	63	59	57		60 a
					$LSD_{(0.10)} = 4$
LaRitz Farms (S of Ralston: a moderate degree of rolling, uneven topography)					
Treatment	**I**	**II**	**III**		**Mean**
Otto	63	57	59		60 ab
Xerpha	46	48	45		46 c
Otto T+T	59	62	64		62 b
Xerpha T+T	57	53	54		55 b
					$LSD_{(0.10)} = 7$

[1] T+T is Topsin (10.0 oz/ac) plus Tilt (4.0 oz/ac) fungicides included with herbicide application.
[2] a, b, c, etc., are case letters denoting significantly different means ($P<0.05$).

References

Washington State Crop Improvement Association. 2013. 2013 Winter Certified Seed Buying Guide. Pullman, WA. http://washingtoncrop.com/wp-content/uploads/2011/11/2013-Winter-Buying-Guide.pdf.

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FS142E