Oregon State University

Chris Mundt 541-737-5256
Ryan Graebner 541-359-7151
Christina Hagerty 541-278-4396
Larry Lutcher 541-676-9642

March 1, 2021

Managing Wheat Stripe Rust in Eastern Oregon

Information in this article may be of interest to eastern Oregon growers who produce winter wheat varieties susceptible to stripe rust. The article summarizes the wheat stripe rust situation in eastern Oregon last year and discusses issues of wheat stripe rust management of relevance as we approach spring.

Wheat Stripe Rust in 2020

More than 70% of the eastern Oregon winter wheat acreage was planted to the variety UI Magic CL+ (hereafter called "Magic") in the 2019-20 winter wheat season. This clearly set-up a scenario for increased virulence of stripe rust on that variety. Data collected from replicated trials (Table 1) show that high levels of rust on Magic in 2020 were specific to Magic and not to wheat varieties in general. Though Magic has always been susceptible to stripe rust, its degree of susceptibility was highly elevated in 2020. Table 1 lists stripe rust levels of some well-known non-Clearfield varieties in comparison to Magic, as well as rust reactions of more recently released two-gene Clearfield varieties that may be of future interest to Oregon growers. In the statewide soft white wheat variety trial at the CBARC station outside of Pendleton (Adams, Oregon), the susceptible variety Mary and the moderately resistant variety Stephens had substantially lower levels of rust as compared to the 47% observed on Magic. Similar, but even more striking results were found in an elite soft white winter trial at the "Ruggs site", 5 miles east of CBARC, where much of the OSU wheat breeding work is conducted. Rust was generally low, yet averaged 89% on Magic.

Stripe rust race analyses conducted by Dr. Xianming Chen with the USDA/Washington State University showed that rust collections from Magic in Oregon were the same race (PSTv-37) that has has been dominant in the PNW in recent years. Races are determined by their reaction when inoculated onto a standard set of 18 wheat genotypes carrying different resistance genes or combinations of resistance genes. Thus, there appears to have been a mutation resulting in new strains within race PSTv-37 that now have especially high virulence on Magic. This is supported by the rust levels on Magic in Corvallis. Though overall rust pressure was high in these nurseries due to planting adjacent to an early-seeded wheat and use of spreader rows of the highly rust susceptible variety Foote, Magic showed rust levels similar to other susceptible varieties. This is logical, as Magic is not grown commercially in the Willamette Valley and, thus, there has been no local selection for rust strains specifically virulent to Magic in that region. Note also that Rosalyn is much more susceptible in the Willamette Valley, where that variety has been highly popular, than in eastern Oregon where it is grown much less. As a result,

Rosalyn is gradually losing its resistance in both screening trials and in commercial fields in the Willamette Valley.

Outlook for 2021

Wheat stripe rust has not yet been reported in Oregon this year, except in a rust screening nursery in Corvallis. **Given rust levels present in eastern Oregon in 2020, however, we should assume that it will be present in 2021.** Dr. Xianming Chen periodically distributes predictions of potential rust severity based on weather variables. His prediction published January 7, 2021 was that, "Based on the weather conditions in November and December 2020, stripe rust in the 2021 wheat growing season is forecasted to be in the upper range of moderate epidemic level (20-40% yield loss on susceptible varieties)". These are estimates expected for highly susceptible varieties in absence of fungicide. Warm January temperatures in eastern Oregon should have favored any stripe rust that successfully overwintered, but the cold snap in February should have countered that to some degree. Stripe rust can survive cold temperatures as long as wheat leaves themselves survive the winter, though cold weather does slow the development of rust.

Fungicide Considerations

The "golden rule" for fungicide control of stripe rust is that "timing is everything". Once rust becomes well established in a crop, it is very difficult or impossible to bring it back under control. Fields should be observed regularly from now through mid-grainfill for the presence of stripe rust. Stripe rust can sometimes be found more easily in areas of higher moisture in a field, such as in diversions, the centers of irrigation pivots, and in double-seeded areas.

A large proportion of the eastern Oregon wheat acreage was again planted to Magic last fall due to lack of available seed of other two-gene Clearfield varieties. Fields planted to Magic or other susceptible varieties should receive a fungicide application along with the spring herbicide treatment. Magic may require further spray(s) later in the season if there is heavy rust pressure.

Several fungicide products are available for stripe rust control as single active ingredients or mixtures of two or more active ingredients. The level and longevity of disease control increase with number of active ingredients included in the fungicide, but costs increase as well. Inexpensive triazole products such as propiconazole and tebuconazole are often included along with spring herbicide. Strobilurin fungicides provide very good protection from stripe rust. Fungicides containing azoxystrobin are particularly effective because of the ability of that fungicide to move within leaves and upwards in the plant to younger leaves. Some strobilurin fungicides are now off-patent, with the potential for reduced prices. Newer SDHI fungicides are also available and often sold in combination with a triazole, a strobilurin, or both.

In drier environments, where conditions are less conducive for rust and profit margins are slimmer, there may be no need to apply anything other than an inexpensive triazole. In 2011,

which was the most severe stripe rust year since 1960, growers in drier areas did very well with one triazole application in their spring herbicide treatment, plus a second well-timed triazole application later in the season when rust reemerged. In higher rainfall and irrigated areas, higher returns per acre make use of the more expensive fungicides feasible. Further, higher moisture, denser canopies, and longer period of crop growth may necessitate the stronger protection that these more expensive fungicides provide.

Looking Ahead to Fall 2021

Eastern Oregon growers need to transition to alternative two-gene Clearfield varieties so as to reduce stripe rust inoculum pressure in their fields and region-wide. Newer two-gene Clearfield varieties recently have become available with good stripe rust resistance (Table 1). These cultivars are adapted to different areas of eastern Oregon. The agronomic "fit" of these varieties will be covered in a separate publication later in the season, along with an update on expected seed stocks for the fall.

Table 1. Reaction of selected wheat varieties to stripe rust in four field trial in 2020.

	% Leaf Area Covered by Stripe Rust			
Variety	Adams (CBARC) June 10	Adams (Ruggs) June 11	Corvallis#1 (Trial #1) May 10	Corvallis#2 (Trial #2) May 10
Non-Clearfield				
Mary	19	--	41	--
Stephens	6	12	26	36
SY Dayton	0.25	3	0.25	9
SY Assure	<0.1	1	2	0
Norwest Duet	<0.1	0.3	3.5	9
Bobtail	<0.1	0	0.5	3
Rosalyn	0	0	30	52
LCS Shark	0	0	0	0.25
Norwest Tandem	0	0	0	0
Two-Gene Clearfield				
Magic CL+	47	89	36	60
Appleby CL+	<0.1	0.3	9	21
Stingray CL+	<0.1	0	2	--
OR 2x2 CL+	0	0	0	0

-- = variety not included in that trial.

Contact information:

Chris Mundt
Department of Botany and Plant Pathology
Oregon State University
Corvallis
chris.mundt@oregonstate.edu
541-737-5256

Ryan Graebner
Columbia Basin Agricultural Research Center
Oregon State University
Pendleton
ryan.graebner@oregonstate.edu
541-359-7151

Christina Hagerty
Columbia Basin Agricultural Research Center
Oregon State University
Pendleton
christina.hagerty@oregonstate.edu
541-278-4396

Larry Lutcher
Morrow County Extension
Oregon State University
Heppner
larry.lutcher@oregonstate.edu
541-676-9642