Summary of *Puccinia striiformis* f. sp. *tritici* (*Pst*, the Wheat Stripe Rust Pathogen) and *P. striiformis* f. sp. *hordei* (*Psh*, the Barley Stripe Rust Pathogen) Races in the United States in 2023

1. **Samples.** A total of 256 stripe rust samples were collected and received from wheat (225), barley (27), rye (1), and grasses (3) from 13 states. From these samples, 257 *P. striiformis* f. sp. *tritici* (*Pst*) and 27 *P. striiformis* f. sp. *hordei* (*Psh*) isolates were obtained.

2. **Differential sets.** All *Pst* isolates were tested on 18 wheat differential lines each with a single *Yr* gene, and *Psh* isolates were tested on 12 barley varieties.

3. **Number of *Pst* races.** From the 257 *Pst* isolates, 21 races were identified. The virulence spectra of the races ranged from 0 to 13 with a mean of 8 on the 18 *Yr* genes.

4. **Top *Pst* races**

   1) **PSTv-37** (Octal code: 171266) (virulent to *Yr6*, *Yr7*, *Yr8*, *Yr9*, *Yr17*, *Yr27*, *Yr43*, *Yr44*, *YrTr1*, *YrExp2*; and avirulent to *Yr1*, *Yr5*, *Yr10*, *Yr15*, *Yr24*, *Yr32*, *YrSP*, *Yr76*) with 59.5% frequency (No. 1), increased from 50.5% in 2022 (No. 1). This race was detected in all states (ID, KS, KY, LA, MT, NE, NY, OK, OR, TX, VA, and WA) except CA in 2023.

   2) **PSTv-39** (Octal code: 175266) (virulent to *Yr6*, *Yr7*, *Yr8*, *Yr9*, *Yr10*, *Yr17*, *Yr27*, *Yr43*, *Yr44*, *YrTr1*, *YrExp2*; and avirulent to *Yr1*, *Yr5*, *Yr15*, *Yr24*, *Yr32*, *YrSP*, *Yr76*) with 7.0% frequency (No. 2), increased from 12.7% in 2022 (No. 2). This race was detected only in the Pacific Northwest (OR and WA) in 2023.

   3) **PSTv-41** (Octal code: 175766) (virulent to *Yr6*, *Yr7*, *Yr8*, *Yr9*, *Yr10*, *Yr17*, *Yr24*, *Yr27*, *Yr32*, *Yr43*, *Yr44*, *YrTr1*, *YrExp2*; and avirulent to *Yr1*, *Yr5*, *Yr15*, *YrSP*, *Yr76*) with 6.6% frequency (No. 3), increased from 2.47% in 2022. This race was detected only in Washington State in 2023.

   4) **PSTv-47** (Octal code: 571266) (virulent to *Yr1*, *Yr6*, *Yr7*, *Yr8*, *Yr9*, *Yr17*, *Yr27*, *Yr43*, *Yr44*, *YrTr1*, *YrExp2*; and avirulent to *Yr5*, *Yr10*, *Yr15*, *Yr24*, *Yr32*, *YrSP*, *Yr76*) with 6.2% frequency (No. 4), increased from 0.71% in 2022. This race was detected mostly from Washington State, plus one isolate from California and one isolate from Kansas in 2023.

5) **PSTv-35** (Octal code: 171066) (virulent to *Yr6*, *Yr7*, *Yr8*, *Yr9*, *Yr17*, *Yr43*, *Yr44*, *YrTr1*, *YrExp2*; and avirulent to *Yr1*, *Yr5*, *Yr10*, *Yr15*, *Yr24*, *Yr27*, *Yr32*, *YrSP*, *Yr76*) with 4.3% frequency (No. 5), increased from not detected in 2022 and 0.4% in 2021. This race was detected mostly from Washington plus one isolate of Oregon in 2023.

The remaining 16 races were all below 3.1%, and 7 of them each were detected from only one isolate.

5. New race. No new *Pst* races were identified in 2023.

6. Virulence frequencies. High frequencies were found for virulence to *Yr9* (98.8%), *Yr6* (98.4%), *Yr8* (94.2%), *Yr7* (93.4%), *Yr44* (93.4%), *YrExp2* (93.4%), *Yr43* (93.0%), *Yr17* (90.7%), *YrTr1* (90.7%), and *Yr27* (88.3%); and low frequencies for virulence to *Yr10* (16.3%), *Yr1* (13.2%), *Yr24* (8.2%), *Yr32* (8.2%), *Yr76* (7.4%), and *YrSP* (6.2%). No virulence was found to either *Yr5* or *Yr15*, and these two resistance genes are still effective against all races identified so far in the U.S.

7. Races of the barley stripe rust pathogen. In 2023, *Psh* isolates were obtained from Arizona, California, Idaho, and Washington, and 5 races were identified with frequencies ranging from 3.7 to 40.7%. Top three frequent races are: 1) **PSH-33** (virulent on Topper and Abed Binder 12) at 40.7% frequency, decreased creased from 62.5% in 2021, and detected from all four states; 2) **PSH-81** (virulent on Topper, Abed Binder 12, and Bigo) at 29.6% frequent, increased from 4.2% in 2022, but still only in Washington State. 3) **PSH-46** (virulent on Topper, Abed Binder 12, and Trumpf) at 18.5% frequency, increased from 10.4% in 2022 (No. 2) and also only from Washington State. No new races were detected in 2023.

8. Excel data and summary tables:

1) **PSTsum2023 including the following worksheets:**
   a) Summary data of *Pst* isolates sorted by state
   b) Summary data of *Pst* isolates sorted by epidemiological region
   c) All *Pst* races, codes, virulence formulae, frequencies, and distributions
   d) *Pst* races and frequencies in each state
   e) *Pst* races and frequencies in each epidemiological region
   f) Frequencies of virulence factors to the 18 *Yr* single-gene lines used as differentials

2) PSHsum2023 including the following worksheets:

a) Summary data of *Psh* isolates
b) Summary data sorted by races
c) All *Psh* races, frequencies, and distributions