

Disease Note

Diseases Caused by Fungi and Fungus-Like Organisms

A New Virulent Race of Wheat Stripe Rust Pathogen (*Puccinia striiformis* f. sp. *tritici*) on the Resistance Gene *Yr5* in Turkey

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The gene *Yr5* in wheat has generally been known to confer resistance to *Puccinia striiformis* f. sp. *tritici* (*Pst*) races worldwide. However, a few reports indicated that some isolates of the stripe rust pathogen were virulent on the wheat genotypes with the *Yr5* gene in India, Australia, and China (Nagarajan 1986; Wellings and McIntosh 1990; Zhang et al. 2020). In April 2020, a stripe rust infection with higher virulence was observed on *Triticum spelta* 'Album' (TSA), the *Yr5* donor, provided by Turkey Seed Gene Bank in a wheat breeding field at the experimental station of Akdeniz University in the Antalya province of Turkey. The sample was tested on the seedlings of the *Yr* single-gene lines in the Avocet S (AvS) background including *Yr5* near-isogenic line (AvSYr5NIL), and TSA with susceptible bread wheat variety 'Morocco' according to the procedure reported by Wan and Chen (2014), and found to be highly virulent on Morocco with infection type (IT) 9 and virulent on AvSYr5NIL and TSA with IT 7. To confirm this novel finding, single-pustule isolates derived from this sample were obtained from TSA and retested on the differentials and TSA. The *Yr5*-virulent isolate yielded similar infection types on these plants, further verifying previous results. The single-pustule isolates were determined to be avirulent (Avr) (IT0

to 6) on AvSYr1NIL, AvSYr8NIL, AvSYr9NIL, AvSYr10NIL, AvSYr32-NIL and AvSYr43NIL and virulent (Vr) (IT7 to 9) on AvSYr5NIL, AvSYr6NIL, AvSYr7NIL, AvSYr17NIL, AvSYr24NIL, AvSYr27NIL, AvSYr44NIL, AvSYrSpNIL, and TSA. The isolate was identified as a new race and temporarily named TRVR20-5 based on its Avr/Vr pattern. Furthermore, to confirm the presence of *Yr5*, the genomic DNA of fresh leaves of AvSYr5NIL and TSA used in the virulence testing were isolated using NucleoSpin Plant II (Macherey-Nagel, Germany) according to the manufacturer's procedure. The genomic DNA was amplified with the primers STS-7 (5'-GTACAATTACCTAGAGT-3') and STS-8 (5'-GCAAGTTTTCTCCC TATT-3') (Chen et al. 2003) using a thermal cycler (T-100, BioRad, U.S.A.), and the resulting PCR products were digested with *DpnII* and visualized on an agarose gel. AvSYr5NIL and TSA had the fragment linked to the resistance allele (308 bp), whereas AvS and Morocco had the fragment linked to the susceptible allele (181 bp). In this manner, both the wheat genotypes carrying *Yr5* gene and the new stripe rust race virulent to *Yr5* were confirmed again. To the best of our knowledge, this is the first report of a *Pst* race virulent to *Yr5* in Turkey, where the epidemics caused by stripe rust have occurred in two out of every five years, averaging 1 to 5% crop losses in over 25% of the wheat growing areas (Chen 2020). In a nutshell, monitoring the *Pst* races virulent to *Yr5* with a potential to cause devastating epidemics worldwide is crucial because international wheat breeding programs conducted for resistance to stripe rust have especially been on the basis of the resistance gene *Yr5*.

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