

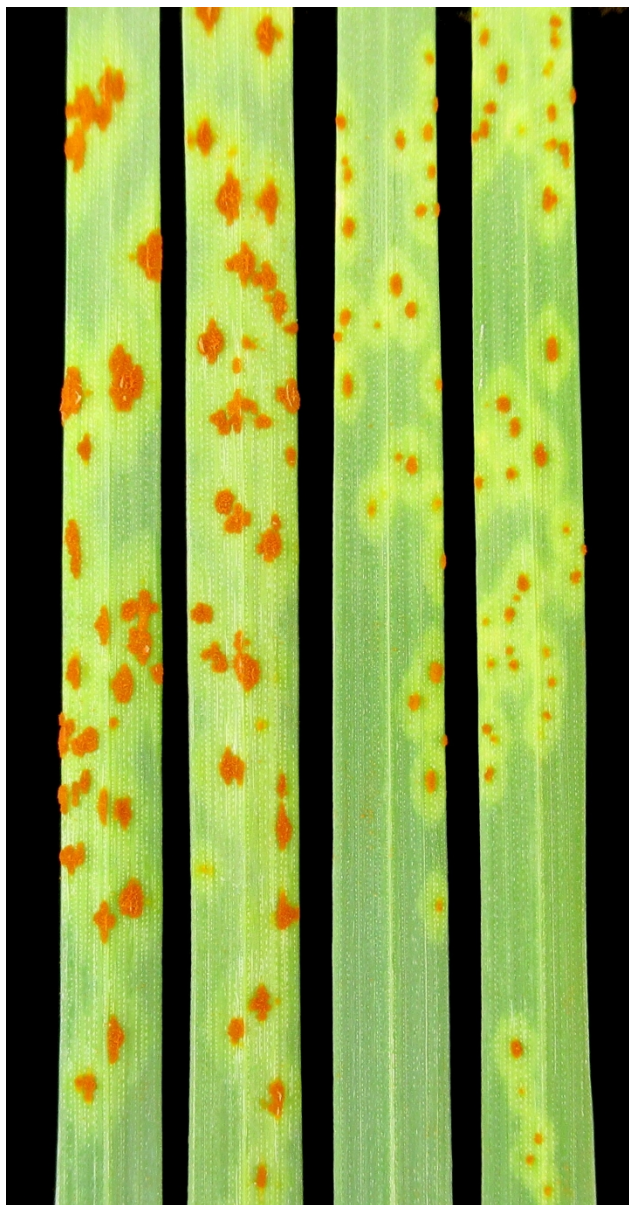
First Report of *Puccinia graminis* f. sp. *tritici* Race PTKSK, a Variant of Wheat Stem Rust Race Ug99 in South Africa

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Stem rust caused by *Puccinia graminis* f. sp. *tritici* (*Pgt*) is an important disease of bread wheat (*Triticum aestivum* L.) in South Africa (SA). The frequent emergence of new *Pgt* races with increased virulence remains a major constraint when genetic control is considered. Monitoring the occurrence, distribution and pathogenicity of *Pgt* is essential to quickly detect and track new races. During the annual rust survey conducted in 2017, a *Pgt* isolate (S42-17) collected from wheat in the Free State province near Bethlehem (28.15603°S, 28.28852°E) differed in its virulence profile from known SA *Pgt* races. Two single-pustule isolates obtained from collection S42-17 were independently phenotyped at the rust laboratories of University of the Free State and ARC-Small Grain, SA. Race analysis was performed using a modified North American (NA) differential set (Jin et al. 2008). In addition to differential lines containing the standard set of *Sr* genes, Barleta Benvenuto (*Sr8b*), Coorong triticales (*Sr27*), Kiewiet triticales (*SrKiewiet*) and Satu triticales (*SrSatu*) were included. Seedling inoculation, incubation and rust evaluation were conducted as previously described (Terefe et al. 2016). Additional tests with lines Cns.T.mono.deriv. and T.mono.deriv/*8LMPG, both containing *Sr21*, were conducted in greenhouse cubicles at mean temperatures of 16.7°C and 20.4°C, respectively. All seedling assays were repeated. The two S42-17 isolates were avirulent (infection types 0; to 2) for *Sr24*, *27*, *36*, *Kiewiet*, *Satu*, *Tmp* and virulent (infection types 3 to 4) on *Sr5*, *6*, *7b*, *8a*, *8b*, *9a*, *9b*, *9d*, *9e*, *9g*, *10*, *11*, *17*, *30*, *31*, *38* and *McN*. The 2 to 3= infection type range produced by Cns.T.mono.deriv. and T.mono.deriv/*8LMPG was not deemed as conclusive evidence for virulence to *Sr21* in the isolates tested. Both S42-17 isolates coded to race PTKSK (2SA42; SA race notation). This is the first report of *Pgt* race PTKSK in South Africa. This race has been previously reported as one of Ug99 variants from Ethiopia (2007), Kenya (2009) and Yemen (2009) (Singh et al. 2015). Except for avirulence for *Sr24*, PTKSK is similar to race PTKST, previously identified in SA. From 112 South African bread wheat cultivars and advanced breeding lines tested in the seedling stage, PTKSK was virulent on 45 entries as opposed to 71 entries being susceptible to race PTKST. Simple sequence repeat (SSR) comparison of PTKSK with twelve other SA *Pgt* races using ten SSR markers, confirmed that PTKSK grouped with all the SA Ug99 race group members, sharing at least 85% genetic similarity compared to the 25% genetic similarity shared with non-Ug99 SA races. At present, it is not known if PTKSK arose from PTKST or whether it represents a new introduction into SA. As PTKSK is less virulent on SA wheat cultivars compared to PTKST, it should not pose a significant threat to local wheat production. Its detection, however, indicates the continued emergence of new *Pgt* races in SA and emphasizes the importance of sustained stem rust surveillance in the region.

References:

- Jin, Y. et al. 2008. Plant Dis. 92: 923. <https://doi.org/10.1094/PDIS-92-6-0923>
 Singh, R.P. et al. 2015. Phytopathology 105: 872. <https://doi.org/10.1094/PHYTO-01-15-0030-FI>
 Terefe, T. et al. 2016. Crop Prot. 86: 9. <https://doi.org/10.1016/j.cropro.2016.04.006>



Supplementary Figure 1. Infection types produced by races PTKST (left) and PTKSK (right) on primary leaves of wheat line LCSr24Ag, containing the resistance gene Sr24

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