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Resistance Evaluation of Common Wheat Varieties/Lines to Leaf Rust and Stripe Rust at Seedling and Adult-Plant Stage in China, Gansu Province

Authors : Shelin Jin, Jin Huang, Shiqin Cao, Qiuzhen Jia, Bo Zhang, Zhenyu Sun

Abstract : Stripe rust and leaf rust, caused by Puccinia striiformis f.sp. tritici and Puccinia recondita f.sp. tritici are two of the most damaging diseases of wheat in China. In recent years, leaf rust has migrated to some wheat growing areas previously suitable for stripe rust, resulting in a mixture of the two diseases occurring in the same area and at the same time, and seriously damage wheat production in China, Gansu Province. The most effective method of prevention those two diseases are through the use of resistant cultivars. However, many studies have only carried out of resistance of wheat varieties for a single disease; resistance to both diseases is unknown. In order to definite the resistance composition of wheat varieties to these two diseases, 715 wheat varieties/lines from 8 breeding units in Gansu province were collected to test for the resistance to stripe rust and leaf rust at seedling stage in greenhouse and at adult plant stage in field in 2016-2018, respectively. Spore suspensions with the fresh mixture races of CYR32, CYR33, and CYR34 of Puccinia striiformis f.sp. tritici and mixture races of THTP, THTT, TKTT, and THTS of Puccinia recondita f.sp. tritici were used for inoculation separately. The result shows that only 4.74% of the varieties/lines show comprehensive resistance to strip rust and leaf rust at all growth stages, and there are 34 wheat varieties/lines including Tianxuan 67, 2006-1-4-1-4-2-7-2-3-10, 03-139-1-2-2-1-2-1, Qingnong 21, Lenghan 5, 04-203-1-1-1 and so on. In seedling stage, the frequencies of resistant varieties/lines to wheat strip rust and leaf rust were 56.64% and 30.23%. While the materials were susceptible to these diseases were 43.36% and 69.77%. 71 varieties/lines were resistant to those two diseases, accounted for 9.93%. 10 varieties/lines, accounted for 1.4%, were highly resistant (including immune/near immune) to those two diseases. In adult-plant stage, the frequencies of resistant varieties/lines to wheat strip rust and leaf rust were 76.53% and 36.11%. While the materials were susceptible to these diseases were 23.47% and 63.89%. 137 varieties/lines were resistant to those two diseases, accounted for 19.16%. 59 varieties/lines, accounted for 8.25%, were highly resistant (including immune/near immune) to those two diseases. Overall, the 715 varieties /lines had high resistance to wheat strip rust, but poor resistance to leaf rust. This study found out some resistant materials which had better comprehensive resistance to leaf rust and strip rust, also pointed out the resistance characteristics of 715 varieties/lines to those two diseases at the seedling stage and adult-plant stage, which will be of great guiding significance in wheat resistance breeding and comprehensive control those two diseases in China, Gansu Province in the future.

Keywords : Puccinia striiformis f.sp. tritici, Puccinia recondita f.sp. tritici, resistance of variety, wheat
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