

Evaluation of Nepalese wheat germplasm for rust and powdery mildew resistance

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The three rusts (stripe, leaf and stem) are the major biotic stress in Nepalese wheat along with powdery mildew caused by unpredictable weather conditions. Seventy one Nepalese wheat landraces from different parts of Nepal, 14 Nepalese wheat varieties and 11 exotic check wheat lines were tested for the three rusts and powdery mildew resistance at Khumaltar, Lalitpur, Nepal. Natural epiphytotic condition was separately used for stripe rust (normal sowing), leaf rust (late sowing), stem rust (very late sowing) and powdery mildew (increasing humidity). Similarly, spreader rows were sown in screening plots and stripe rust was inoculated on spreader rows of 'Morocco'. Twenty three Nepalese wheat landraces, 9 Nepalese wheat varieties and 5 exotic wheat lines showed powdery mildew resistance at Khumaltar, Lalitpur condition. Chinese spring, Halberd and Bhrikuti were susceptible while WK1204 and BL3623 were resistance to powdery mildew. Microsatellite markers (for PM39, PM-MIAB10 and PM8) of powdery mildew resistance were used and a good association (65.12%) was observed with marker Xwmc44 (for PM39). Similarly, twenty two Nepalese wheat landraces, 6 wheat varieties and 6 exotic wheat lines were resistant to stripe rust. Leaf rust resistance was observed in 53 wheat landraces, 14 varieties and 9 exotic lines. However, 11 landraces, 6 varieties and 6 exotic lines were resistant to both stripe and leaf rust. For stem rust, 69 land races were found resistant.

Based on "Avocet" background isogenic lines; stripe rust resistance gene Yr5, Yr7, Yr9, Yr10, Yr24 and YrSp were effective in Khumaltar condition. Similarly, Sr26, Sr36, Sr31 were effective for stem rust. Yr9 marker allele was present in Bhrikuti (YR=0R), PasangLhmu (YR=0R), Annapurna-1 (YR=5R, Lr=0R) and NPGR# 6720 (YR=0R). Similarly, Annapurna-1 showed marker allele for (YrR61, Qyr.osu-5A, Sr2, Sr22 and Sr31), Bhrikuti (Yr=0R, Lr=0R; Lr34/Yr18); BL3623 (Yr=0R, Lr=0R; Yr48, Lr46/Yr29), WK1204 (Yr=0R, Lr=0R; YrR61, Qyr.osu-5A, Lr46/Yr29, Sr22 and Sr2), PVN76 (Yr=0R, Lr=10R; Lr46/Yr29, Sr2, Sr22), NPGR#10540 (Yr=0R, Lr=60S; Lr46/Yr29, Sr22) and NL1073(Sr=0R; Sr2, Sr22). Nine Nepalese wheat landraces are resistant to all three rusts; however, they did not show any of the tested marker alleles. No linked markers for stripe rust resistant gene showed any association in the newly released resistant wheat variety NL1073 (Francolin#1) although Xwmc44 (for Lr46/Yr29) showed good association (68.75%) in other lines.

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