Evaluation of bread wheat genotypes against yellow rust disease at Khumaltar, Nepal®

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INTRODUCTION

Wheat is the third most important cereal crop in Nepal after rice and maize. Yellow rust (YR) also know as stripe rust disease caused by the fungus *Puccinia striiformis* f.sp. *tritici* is considered as the most important threat to successful wheat cultivation in the hills of Nepal. Losses due to YR was estimated to be 27% in Nepal 297 variety (Sharma *et al.,* 2013). Similarly, up to 100% yield reduction was recorded from eastern Nepal on many promising wheat varieties.

Severely infected wheat field by stripe rust disease

Likewise, Upreti and Karki (1988) recorded 30% grain yield reduction in a field experiment on RR21 at Kabre, Dolakha. Management by growing resistant wheat cultivars is the best way in terms of economical and environmental concern. Due to the evolution of new virulent pathotypes, popular wheat varieties are now becoming susceptible to YR disease. Therefore, searching for new sources of resistance is never ending process. This provides materials to wheat breeders for the development of resistant cultivars against new pathotypes in the future. So, screening of wheat genotypes for YR resistance against the prevailing pathotypes is pre-requisite for the development of resistance cultivars.

MATERIALS AND METHODS

In total of 941 wheat genotypes of different pedigree (461 genotypes in 2018 and 480 in 2019) were received from National Wheat Research Program, Bhairahawa and National Plant Breeding and Genetics Research Centre, Khumaltar as National Wheat Disease Screening Nursery (NWDSN). They were evaluated in rod row design (1 m long) in field at Khumaltar, Lalitpur under inoculated epiphytotic condition.

NWDSN field at Khumaltar, Lalitpur

Disease scoring at seedling stage was done using the 0 – 4 scale (McIntosh *et al.* 1995) and adult plant using the modified Cobb's scale (Peterson *et al.* 1948).

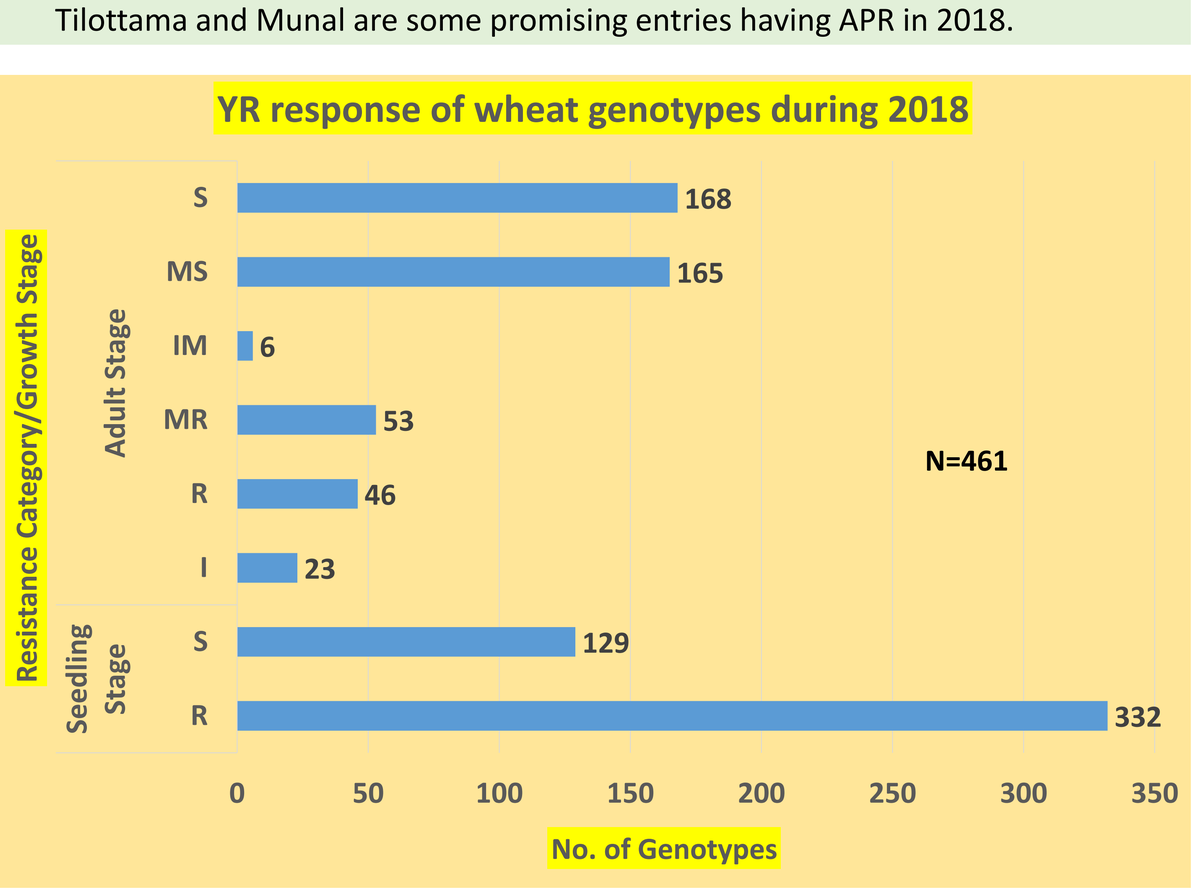
Yellow rust disease scoring at adult plant stage

RESULTS AND DISCUSSION

- ✓ In 2018, most of the genotypes (332) were resistant reaction to YR disease at seedling stage.
- ✓ Twenty three entries showed immune response to the disease while 46 genotypes were resistant at adult stage.
- ✓ Similarly, 53 genotypes were found moderately resistant whereas 168 genotypes were recorded to have susceptible reaction to yellow rust pathogen
- ✓ Two hundred two genotypes showed APR.

YR infection at seedling stage

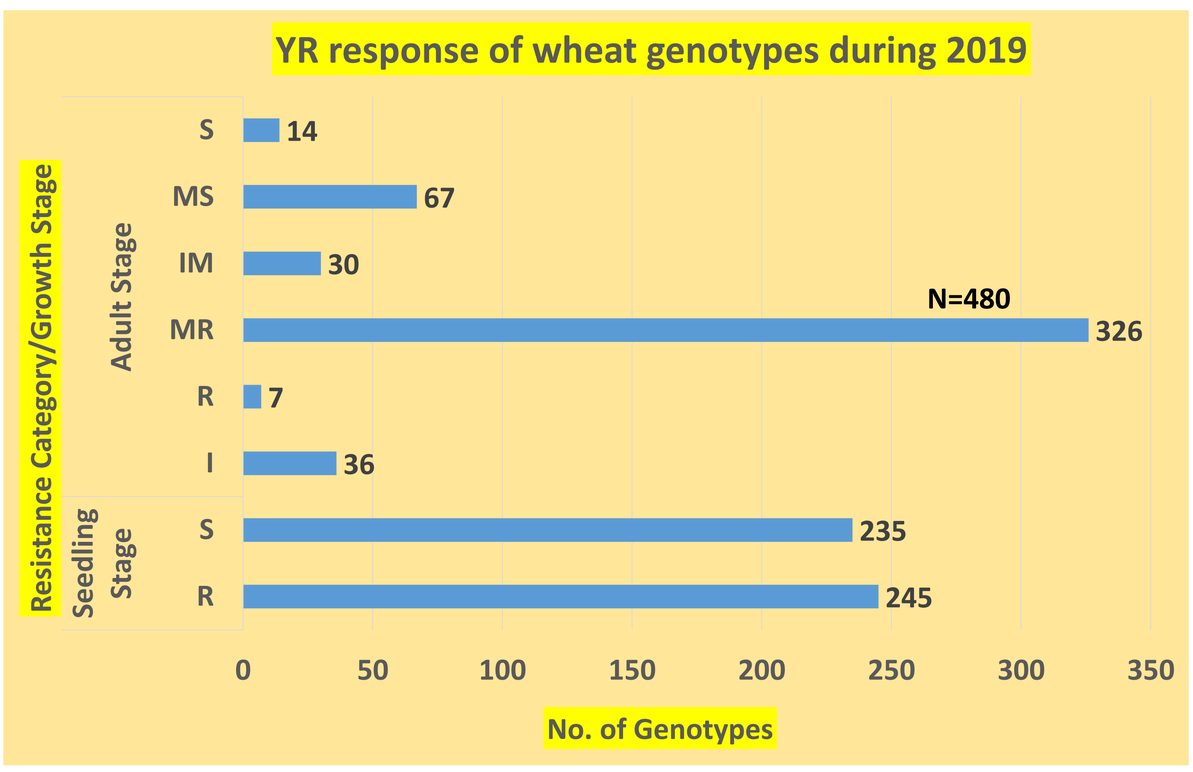
- ✓ BL4872, BL4894, BL4913, BL4922, NL1298, NL1335, NL1357, Dhaulagiri, Tilottama and Munal are some promising entries having APR in 2018.



- ✓ Similarly in 2019, at seedling stage 245 genotypes were resistant and 235 were susceptible to YR pathogen.
- ✓ Thirty six genotypes were free from YR disease at adult stage. Most of the genotypes were moderately resistant (326).
- ✓ Similarly, 7 were resistant, 30 were moderate, 67 were moderately susceptible and 14 were found susceptible to the disease.
- ✓ Two hundred twenty two genotypes showed APR while twenty one genotypes were susceptible in both stages.

YR infection at adult stage

- ✓ Some promising entries having APR in 2019 are NL971, NL1288, NL1327, WK2748, WK2602, BL4837, BL4863, Annapurna-1, Annapurna-3, Siddharth and Tilottama.



- ✓ Varieties such as WK1204, Pasang Lhamu, Dhaulagiri and Bandganga; genotypes like BL 4880, BL 4952, NL 1340, NL 1341, NL 1342, NL 1350, NL 1362 and WK 2787 were found resistant in both years against stripe rust disease at Khumaltar.
- ✓ Several resistant genotypes against stripe rust disease have been developed and released during last decade. But due to the evolution of new races, those resistant varieties became susceptible after years of adaptation like WK 1204, Dhaulagiri and Danphe which were released in 2007, 2012 and 2015 respectively now become susceptible to stripe rust in hills (Thapa, 2020).
- ✓ So, regular screening of wheat genotypes against stripe rust under field condition in different locations over the country should be given priority before releasing any genotypes.

CONCLUSION

- ✓ There were abundant wheat genotypes having APR (#202 in 2018 and #222 in 2019) which can be utilized for developing durable stripe rust resistance varieties in the future.
- ✓ Further confirmation of those APR gene(s) should be done by marker assisted selection (MAS).

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