

Genetics of leaf rust and stripe rust resistance in spring wheat cultivar 'Kijil'

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INTRODUCTION

Leaf rust and stripe rust caused by the fungi *Puccinia triticina* and *P. striiformis* f. sp. *tritici*, respectively, are important diseases of wheat and represent a significant threat in most wheat producing regions worldwide. Growing resistant varieties and the identification and characterization of new sources of resistance are necessary to combat the threat from the evolving pathogen population. Bread wheat (*Triticum aestivum* L.) line 'Kijil' developed at CIMMYT showed adult plant resistance (APR) to leaf rust (LR) and stripe rust (YR).

OBJECTIVE

- To determine the number of genes involved with resistance to LR and YR in the F₆ Apav#1 x Kijil recombinant inbred lines (RIL) population.

MATERIALS AND METHODS

Plant material

- 198 RILs derived from the cross of Apav#1 x Kijil

Field evaluation

- Mexico: El Batán and Ciudad Obregón (LR) and Toluca (YR), during 2016 and 2017
- LR: races MBJ/SP and MCJ/SP
- YR: races Mex96.11, Mex08.13 and Mex14.191

Molecular analysis

- Markers csLV46 and csLV46G22 for *Lr46/Yr29*
- Markers VENTRIUP-LN2 and cs1Vrga for *Yr17/Sr38*

RESULTS AND DISCUSSION

- Pearson correlation coefficients ($P < 0.0001$) were high for disease severities between two years of evaluations in all environments (Table 1).
- Genetic analyses indicated that 3 to 5 genes of additive effects governed resistance to both rusts (Table 2).

Table 1. Phenotypic correlations among final LR severities (El Batán and Ciudad Obregón LR2016-17) and final YR severities (Toluca YR2016-17) in the Apav#1 x Kijil RIL population.

Environment	LR2016	LR2017	YR2016
LR2017	0.90
YR2016	0.73	0.76	...
YR2017	0.62	0.69	0.83

Table 2. Severity of LR and YR of positive and negative lines to genes *Lr46/Yr29*, *Sr2/Yr30* and *Yr17/Sr38* in the Apav#1 x Kijil RIL population.

Gene	Severity (%)	
	LR	YR
+ <i>Lr46/Yr29</i>	23	41
- <i>Lr46/Yr29</i>	55	78
+ <i>Sr2/Yr30</i>	-	66
- <i>Sr2/Yr30</i>	-	78
+ <i>Yr17/Sr38</i>	-	28
- <i>Yr17/Sr38</i>	-	78

CONCLUSIONS

- Resistance to LR and YR in the Apav #1 x Kijil population is conferred by 3 to 5 genes, including *Yr17/Sr38*, *Lr46/Yr29* and *Sr2/Yr30*.

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