



IDENTIFYING LEAF RUST RESISTANCE GENES AND ITS RELATIONSHIP WITH GRAIN YIELD OF BREAD WHEAT VARIETIES FOR NORTHWEST MEXICO

J.L. Félix-Fuentes¹, M. Camacho-Casas¹, P Figueroa-López¹, G. Chávez-Villalba¹, A. Borbón-Gracia y G. Fuentes-Dávila¹. Instituto Nacional de Investigaciones Forestales Agrícolas y Pecuarias, Campo Experimental Norman E. Borlaug. Ciudad Obregón, Sonora, México CP 85000. felix.joseluis@inifap.gob.mx

Key words: resistance, pests, crops

Introduction. Genetic resistance is the main strategy for diseases control in wheat. This resistance represents an added value for candidate germplasm for commercial release. After the incorporation of molecular markers in the wheat breeding process it has been possible to modify the current situation of this crop replacing the production of a unique type of wheat in Northwest Mexico.

Methods. One experiment consisting in four bread wheat commercial varieties (Tacupeto F2001, Kronstad F2004, Navojoa M2007 y Roelfs F2007) was established for this study during the crop season 2010-2011 in Ahome, Sinaloa. The aim was to determine the presence of leaf and stem rust genes: *Lr19*, *Lr34*, *Lr46*, *Lr68*, *Sr2*, *Sr22*, *Sr24*, *Sr26* and *Sr36*; and evaluate grain yield. Vegetal tissue was collected and DNA extractions performed using Saghai-Marooof method. For genes identification RED taq from sigma was used together with the next list of primers: *Sr2* (BSPH1), *Sr22* (CFA2123), *Sr24* (Sr24#12), *Sr26* (Sr26#43), *Sr36* (STM773-2), *Lr19* (WMC221), *Lr34* (CSLV34PLUS), *Lr46* (CSLVG22) and *Lr68* (BLNLR).

Results. Two genes, *Lr68* and *Lr48*, were identified in all the varieties included in this study. These genes are responsible for wheat resistance to *Puccinia triticina*, the causal agent of leaf rust. In field experiments Herrera-Fossel et al. (2012) showed that the combination of *Lr68* and *Lr34* genes resulted in immunity to rusts MCJ/SP and MBJ/SP. The *Lr46* resistance is similar to *Lr34* but the first has lower effect because reduces the infection process and delays the appearance of symptoms in the plant. Regarding to the stem rust resistance genes, only the *Sr22* gene was detected in two varieties: Tacupeto F2004 and Roelfs F2007, as showed on Table 1. Olson et al., 2010 indicates that this gene is associated with decreased yield in wheat which supports results observed on Figure 1.

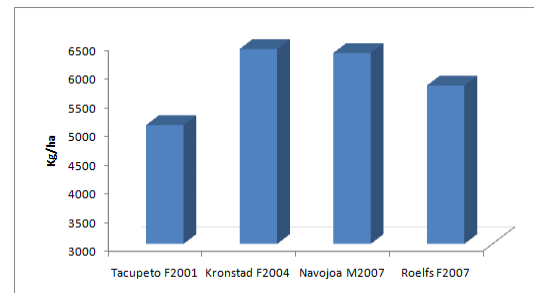


Figure 1 Grain yield for the four bread wheat varieties sown in Ahome, Sinaloa during season 2010-2011

Table 1. Stem (Sr) and leaf (Lr) rust resistance genes identified in the four bread wheat varieties

Genes	Tacupeto F2004	Kronstad F2004	Navojoa M2007	Roelfs F2007
<i>Sr2</i>	-	-	-	-
<i>Sr22</i>	+	-	-	+
<i>Sr24</i>	-	-	-	-
<i>Sr26</i>	-	-	-	-
<i>Sr36</i>	-	-	-	-
<i>Lr19</i>	-	-	-	-
<i>Lr34</i>	-	-	-	-
<i>Lr46</i>	+	+	+	+
<i>Lr68</i>	+	+	+	+

(+) Presence of the gene; (-) Absence of the gene

Conclusions. The application of molecular markers makes possible the prediction of expected scenarios in the selection of germplasm with desirable traits, including highly valuable characters for the release of commercial varieties as confirmed in the current study.

Acknowledgement. This Project was financially supported by “Fundación Produce Sonora”

References.

- Herrera-Foessel SA, Singh RP, Huerta-Espino J, Rosewarne GM, Periyannan SK, Viccaro L, Calvo-Salazar V, Lan C, Lagudah ES.(2012). **Lr68: a new gene conferring slow rusting resistance to leaf rust in wheat.** Theoretical and Applied Genetics, 124:1475-1486.
- Olson EL, Brown-Guedira G, Marshall D, Stack E, Bowden RL, Jin Y, Rouse M, Pumphrey MO(2010). **Development of wheat lines having a small introgressed segment carrying stem rust resistance gene Sr22.** Crop Science, 2010, 50:1823-1830.