Tropentag, September 19-21, 2012, Göttingen - Kassel/Witzenhausen

"Resilience of agricultural systems against crises"

Effects of High Temperature on R Gene Mediated Resistance to Rice Blast in two Genetic Backgrounds of Rice

Geoffrey Onaga[1], Kerstin Wydra[2], Birger Koopmann[1], Yacouba Sere[3], Andreas von Tiedemann[1]

[1] *Georg-August-Universität Göttingen, Dept. of Crop Sciences, Germany*
[2] *Georg-August-Universität Göttingen, CBL - Tropical and Subtropical Agriculture and Forestry, Germany*
[3] *Africa Rice Center, Benin*

Abstract

Breeding for resistance to rice blast (*Magnaporthe oryzae*), an economically important rice disease worldwide, has relied on broad spectrum resistance mediated by R genes for several years. However, higher temperatures associated with climate change probably modulate the defense response of rice to Magnaporthe oryzae infection. The aim of this work was to evaluate the resistance to rice blast pathogen at two temperature regimes (35°C and 28°C). Five broad spectrum resistance genes (Piz-t, Pib, Pik-h, Pi5(t) and Pita) in two genetic backgrounds; *Oryza indica* type and *O. japonica* type, their background parents (Co39 and Lijiangxintuanheigu (LTH)) and one cultivar from East Africa were evaluated for resistance to two strains, the highly aggressive TAN16 from Tanzania and UgM14 from Uganda. Disease incidence and severity varied significantly between isogenic lines. At high temperature (35°C), three R genes (Piz-t, Pib, Pik-h) conferred resistance in both backgrounds whereas one cultivar, NERICA 4, showed increased susceptibility. At normal temperature (28°C), the *O. indica* isogenic lines showed a shorter incubation period and increased rate of lesion expansion compared to the *O. japonica* isogenic lines. Slow-blasting was observed on LTH, the *O. japonica* background parent, at both normal and high temperature when compared to Co39. These results suggest that the genetic background and temperature play a role in expression as well as effectiveness of R gene mediated resistance in the rice-*Magnapothe oryzae* interaction. The comparison of the green house screening results with the gene expression studies will contribute to determine whether the R genes in the two genetic backgrounds share a common gene regulatory network at high temperature or otherwise.

Keywords: Genetic background, *Magnaporthe oryzae*, resistance genes, temperature

Contact Address: Geoffrey Onaga, Georg-August-Universität Göttingen, Dept. of Crop Sciences, Grisebachstrasse 6, 37077 Göttingen, Germany, e-mail: gonaga@gwdg.de