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Genetic Diversity of African *Striga hermonthica* Populations and Pathogenic Effects on Contrasting *Sorghum bicolor* Cultivars

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Abstract

The root hemiparasite *Striga hermonthica* causes enormous yield loss in its dryland staple cereal host *Sorghum bicolor*. Striga-resistant sorghum cultivars could be an important part of integrated *S. hermonthica* control. For efficient resistance breeding, knowledge about the pathogenic diversity of *S. hermonthica* is essential. The aims of this study were therefore to (i) determine the genetic diversity within and between seven *S. hermonthica* populations from East and West Africa using 15 microsatellite markers and (ii) to assess pathogenic main effects and host-parasite interactions of these *S. hermonthica* populations grown on 16 diverse sorghum genotypes in a greenhouse pot trial.

Most of the observed genetic variance (91 %) assessed with microsatellite markers occurred within *S. hermonthica* populations. Only a small portion (8 %) was accounted to differences between regions of origin of the *S. hermonthica* populations. A positive correlation (R^2=0.14) between pairwise geographic and genetic distances reflected the slightly increasing differentiation of *S. hermonthica* populations with increasing geographic distance. East African *S. hermonthica* populations, especially those from Sudan, had significantly greater average infestation success across all sorghum genotypes than West African populations. Some specific host-parasite interaction effects were observed.

The applied markers detected only neutral genetic diversity. To identify any association between *striga* virulence and molecular markers, a high-density marker system covering the whole *striga* genome would be required and a very precise and representative phenotyping system.

The high genetic variation among individuals of each *S. hermonthica* population underlines the high potential adaptability to different hosts and changing environments, and points to the need to manage sorghum resistance alleles in space and time so as to hinder the parasite to overcome resistance.

Combining resistant varieties with an integrated management approach will be essential for effective *S. hermonthica* control.

Keywords: Greenhouse pot trial, microsatellite markers, *striga* aggressiveness, *striga* genetic variability, *striga* resistance in sorghum, striga-sorghum interaction, witchweed

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