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Genetic gain for resistance to spittlebugs (Hemiptera: Cercopidae) in the interspecific *Urochloa* CIAT breeding program

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Abstract

Grasses from the genus *Urochloa* are sown worldwide throughout the tropics and subtropics. *Urochloa* grasses have different attributes that make them an important forage resource, however susceptibility to abiotic and biotic stresses are also common. In order to develop a superior forage source, the interspecific *Urochloa* breeding programme was started at CIAT in the late 1980's combining desirable attributes of the three most important species signalgrass (*U. decumbens*), palisadegrass (*U. brizantha*) and ruzigrass (*U. ruziziensis*). One of the main targets of the breeding programme is to continuously improve resistance to spittlebugs (Hemiptera: Cercopidae), which cause high economic damage in livestock systems throughout tropical and subtropical America. In the recurrent selection breeding scheme, seven successive cycles of selection of the apomictic hybrids and the parental sexual lines were screened for resistance to four species at the nymphal stage, measured as damage to plants based on visual scoring (0–5), using a high throughput methodology in the greenhouse. A means to measure the response to selection of a breeding programme is to estimate the rate of genetic gain for the target traits. The assembly of historical data from founders of the breeding programme and seven generations of the synthetic population of female parents in a linear mixed model, allowed the quantification of the rate of genetic gain for the improvement in resistance to spittlebugs. This rate was estimated as the slope of the line obtained by plotting the values of resistance across generations. The analysis shows a rapid and simultaneous increase in the resistance against three species of spittlebug nymphs: *Aenolamia varia, A. reducta* and *Zulia carbonaria* after seven cycles of selection. Resistance to *Prosapia simulans* was screened in only one cycle showing some level of resistance in the genotypes that can be exploited for improvement in the future. The success in the continuous improvement for spittlebug resistance can be explained by the fact that within a breeding cycle, parents are screened and selected based on their resistance level to spittlebug as part of the parental population improvement.

Keywords: Forage breeding, genetic gain, spittlebug resistance, *Urochloa* grasses

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