

Comparative effect of *Bacillus thuringiensis* endotoxins on the fitness of F₁ sorghum × weed hybrids

Abstract

Background and Objective: Disruptive selection has progressively maintained huge diversity among crop and weedy members of the sorghum genus. Crop improvement in the species has a greater impact on alleles that enhance cultivation and productivity in traditional cropping systems. Similarly, natural selection seems to reward wild sorghums with greater adaptive advantage in given environments. This study evaluated the differential effect of *Bacillus thuringiensis* (Bt) endotoxins sprays on plant performance, fitness and fecundity of two F₁ populations from *S. halepense* × *S. bicolor* and *S. sudanense* × *S. bicolor*, grown under competitive conditions. **Materials and Methods:** Parental lines of *S. bicolor*, *S. halepense*, *S. sudanense* and their F₁ hybrids obtained from weed to crop crosses were grown in close planted plots in varying plant mixtures. Replacement series assays were utilized to evaluate the competitiveness of the F₁ in the greenhouse, field and the presence or absence of (Bt) endotoxins spray. **Results:** The presence of Bt larvicide increased seed production in parental as well as in the F₁ population's between *S. halepense* × *S. bicolor* and *S. sudanense* × *S. bicolor* grown in competition at various parent: F₁ ratios by at least 17%. Bt larvicide sprayed populations showed increased total plant weight from 286-452 g in the hybrid between *S. halepense* × *S. bicolor*. However, there was no significant difference in total plant weight in sprayed or non-sprayed *S. sudanense* × *S. bicolor* F₁ populations. Total seed weight and the total number of seeds increased in *S. halepense* × *S. bicolor* F₁ populations exposed to Bt endotoxins. This significant difference was not seen in *S. sudanense* × *S. bicolor* F₁ populations. **Conclusion:** Results from the study indicate that the effect of Bt endotoxins varies with the genetic background of the parental groups of F₁ exposed to the Bt. Therefore, generalizations of the effect of transgene across all products of gene flow between crop and weedy sorghums may be insufficient. Assays of improved adaptive advantage in segregating populations from Interspecific crosses need to involve several wild and weedy progenitors before the release of improved transgenic varieties in the sorghum genus.

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