

Transgenic sweet corn no more susceptible to Goss's wilt disease

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Experiment showed transgenic sweet corn was not more susceptible to Goss's wilt disease when treated with glyphosate. Credit: Marty Williams

Transgenic crops expressing resistance to the herbicide glyphosate (GR) have been commercialized and planted widely across the U.S. for two decades. The majority of transgenic corn (Bt) also has been engineered to produce toxins effective against certain corn insect pests. In recent years, claims have been made that glyphosate and transgenic traits result in corn plants that are more susceptible to crop diseases.

Such claims have linked the rise in occurrence of corn diseases like Goss's wilt, which causes leaf blight and systemic wilt, to the adoption of [transgenic corn](#) across the U.S. However, a new study from the USDA-Agricultural Research Service (ARS) provides empirical evidence showing no increase in disease susceptibility in transgenic [sweet corn](#) treated with glyphosate.

"Results showed glyphosate use and transgenic traits were not factors in [disease susceptibility](#)," says Martin Williams, a USDA-ARS ecologist and University of Illinois crop scientist.

The team tested a fresh-market sweet corn hybrid varying in the absence or presence of the GR+Bt transgenes; Passion and Passion II, respectively. A subset of both sweet corn lines were inoculated with the bacterium that causes Goss's wilt before or after a label-standard glyphosate application. Passion was not treated with the herbicide because it does not have the transgene that is essential for plant survival in the presence of glyphosate.

Approximately one-half of the inoculated plants developed symptoms of Goss's wilt, regardless of the presence or absence of transgenic traits. Moreover, the timing of disease inoculation with respect to glyphosate application did not influence Goss's wilt incidence or severity.

Williams notes, "The only factor affecting Goss's wilt incidence was whether or not plants were inoculated. We found no evidence of

differential susceptibility to other diseases between the transgenic and conventional lines."

Surprisingly, the application of glyphosate to the transgenic line actually increased yield compared to plants not treated with the herbicide. Yield measures included marketable ear number, marketable ear mass, and kernel mass.

"That was very interesting, because the study was maintained free of weeds," says Williams. "Why would there be higher yields in glyphosate-treated plants when there were no weeds in the plots?"

The explanation may be hormesis, in which plant growth is stimulated as a result of a low, sub-lethal dose of a toxin. Although the mechanisms of hormesis have yet to be determined, similar effects have been observed in glyphosate-treated [plants](#) in other studies.

"One quart per acre of the glyphosate product would certainly be sub-lethal to a glyphosate resistant cultivar. Perhaps this dose stimulated crop growth." Williams notes. "In any event, we know the transgene provided a similar level of resistance to glyphosate, as observed previously in other crops."

In summary, the study showed neither an increased risk of Goss's wilt nor a yield penalty with use of the GR+Bt transgene or glyphosate in sweet corn.

More information: The paper, "Goss's wilt incidence in sweet corn is independent of transgenic traits and glyphosate," appears in the December, 2015, issue of *HortScience*.

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