Fact or Fiction: Do glyphosate resistant cropping systems reduce crop or soil health?

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Summary Over the past quarter century, glyphosate and transgenic glyphosate resistant (GR) cultivars have transformed weed management in major agronomic crops throughout much of the Americas. Bold, unsubstantiated claims have been made that 1) a glyphosate toxicity in GR crops enhances their vulnerability to fungal diseases following glyphosate application, 2) glyphosate causes deficiencies in cationic minerals in GR crops, and 3) glyphosate use on GR crops has a deleterious 'legacy' effect on the soil microbial community. These claims were tested at locations in the USDA-ARS network of research stations in the Eastern, Southern, and Midwestern regions of the United States. Incidence of Goss's wilt, a fungal disease of corn, was very low until the widespread adoption of GR corn. However, field studies in susceptible sweet corn found no relationships between the GR transgene and/or glyphosate application to Goss's wilt incidence. In soybean and corn, neither glyphosate nor the GR transgene affected the mineral content of leaves or seed or crop yield. In order to test the 'legacy' hypothesis, bulk and rhizosphere soils in corn and soybean roots were collected from plots with and without a 15 year history of glyphosate use. Although the 'legacy' effect of glyphosate application on the root-associated microbiome is difficult to disentangle from confounding differences in cropping systems among locations, we observed insignificant changes in root-associated potential fungal pathogens. Claims that glyphosate and the GR transgene are detrimental to crop and soil health appear to be categorical myths.

Keywords Amino acid, corn, *cp4 epsp*, glyphosate, glyphosate-resistant crops, mineral, rhizosphere, soybean.