

Should I Reduce Residue To Reduce Disease?

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Question: "Farmer's seem really tired of fighting foliar diseases in corn. Would plowing everything under solve the problem?"

The presence of some foliar corn diseases is partially explained by the presence of "residue." However, that increase is not completely explained by the presence of residue and for some diseases the presence of residue does not even factor into the appearance of disease. This makes a hypothetical "plowing it all under" tenuous at best.

Some foliar diseases overwinter somewhere other than residue. Southern Rust and common rust overwinter in the southern part of North America. Maize Chlorotic Dwarf Virus and Maize Dwarf Virus pass from the fall to the spring within grass weeds (Johnsongrass, in particular). Stewart's Wilt overwinters within the gut of corn flea beetles. Sorghum Downy Mildew overwinters in the soil. Other foliar corn diseases overwinter in residue "plus" another location. Common smut, Crazy Top, and Physoderma all winter in residue, but they also persist in the soil. These two categories of foliar corn disease (those that overwinter somewhere other than residue and those that overwinter in residue and the soil) will not be influenced by variations in tillage. One can destroy all the residue they want, but these diseases "tough it out" somewhere else. This stands in contrast to diseases like Northern Corn Leaf Blight and Gray Leaf Spot that do primarily overwinter in residue.

Growers should also remember that "plowing it all under" brings some potentially devastating consequences. First, eliminating residue can saddle the grower with substantial input costs. One need look no further than U of I Machinery Cost Estimates to find evidence of such costs. Moldboard plowing (the best way to eliminate a lot of residue) is the most expensive option on that sheet. In fact, it surpasses the next most expensive tillage technique (mulch tillage) by roughly \$10 per acre. Second, producers don't "plow it under" because eliminating residue might eventually saddle the agricultural industry with painful consequences. Phosphorus typically passes into surface water as high velocity

water drags phosphorus-laden soil from the field. Residue slows down that velocity and decreases erosive soil loss that contributes to phosphorus-derived water quality issues. "Plow it all under" would quickly translate into nutrient regulation. In other words, "plowing it all under" would cost growers too much, both individually and corporately.

Could other residue reduction methods solve the problem? Some have proposed the application of fall nitrogen to more rapidly degrade residue. The jury is still out on the true effectiveness of this approach, and many wonder if enough residue could really be eliminated pre-freeze to reduce disease? A lower cost, more reliable, and less potentially troublesome method by which to reduce residue would be crop rotation. Rotation, less popular than it once was, would allow corn residue to decay over the course of a season, it would move the field away from host plant material, and it would decrease the amount of material available to overwinter pathogens going into the next corn-growing season.

Would "plowing it all under" eliminate the "real" disease problem? Residue has allowed inoculum to build in corn fields over time, but the presence of disease causing pathogens means nothing unless a susceptible host is present. When one considers the recent rise of once obscure corn diseases (Northern Corn Leaf Blight, Goss's Wilt, Diplodia, Etc.), one is forced to wonder about the industry's recent disease vigilance. Our love for certain hybrids to the exclusion of all others has probably allowed some pathogens to find a niche in which they can reside. The 2005 Field Guide to Corn Diseases notes another potential explanation. That resource states the problem as follows..."In recent years, Gray Leaf Spot, Northern Corn Leaf Blight, and Diplodia Ear Rot have become problems because many elite hybrid germplasm pools" (the stuff from which our hybrids are derived) struggle with "resistance to...these diseases." Yes, residue does provide an overwintering site for some foliar corn diseases, but many of these diseases have reappeared because we have a little work to do on the resistance front. Δ