

Have you ever wondered what happens to grain yields or soil properties when crop residues are continually burned or removed from the field?

The results of a 20-year study from the East Central Experiment Field provides us some answers to this question. In this study the crop rotation was a soybean-wheat-sorghum/corn rotation and it had three residue treatments, which were: residue removed, normal residue incorporated, and 2x normal residue incorporated. Also, there were four fertilizer levels: zero, low, normal, and high for each crop. Interestingly, there were little differences in grain and residue yields (less than 2 %) among the residue treatments. As one might suspect, there were large differences in grain and residue yields among the fertilizer treatments with the normal and high rates resulting in the highest yields.

So, what's the big deal about removing the residue? The big differences among the residue treatments were observed in soil properties. Soil pH, exchangeable potassium (K), and soil organic matter decreased when the residue was removed. Soil pH only dropped 0.1, but the exchangeable K dropped about 20 % and the organic matter dropped by 9 %. However, the 2x residue treatment increased both exchangeable K and organic matter. The incremental increase in fertilizer treatments lowered soil pH incrementally.

Why the changes in soil properties with crop residue removal? Crop residues contain higher levels of exchangeable K than does the grain, so when the residue is removed continually (as with silage) there's a drain on soil K levels. Also, the soil organic matter declines because the crop residue or biomass is being removed. The residue is the carbon source that becomes the soil organic matter.

What's the bottom line? When crop residues are removed plant nutrients are leaving the field. So, continual crop residue removal will reduce soil pH, exchangeable K, and organic matter levels and could lead to less productive soils. Aside from soil erosion concerns, occasional crop residue removal combined with a good fertility program will have little impact on the soil. Increasing crop residues can increase soil organic matter, but it takes a long time.

This long-term, crop residue removal study was not the first one in the state. There was another study in southwestern Kansas at the Garden City Experiment Station conducted during the 1970s and early 1980s that provided similar results.

For details about these studies see:

Field Research 2001. P 12-15. Report of Progress 876 K-State AES & CES.

Kansas Fertilizer Res. Report of Progress-1983. P 33-34. Report of Progress 443 K-State AES

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