Residue Management in a Field of Lodged Corn

Nearly every year, adverse weather and crop conditions result in lodged corn in some fields. Lodging may be caused by a windstorm, stalk rot or other disease, rootworm activity, or some combination of these. The damage varies considerably depending on the severity of lodging. Lodging not only impacts the yield potential of a corn crop, but also creates a residue management problem, especially in fields where lodged corn goes unharvested. Increasing the rate of residue breakdown can be aided by practices that enhance soil health and soil microorganism populations.

What can I do to manage corn residue in fields with severe lodging?

High levels of corn residue on the soil surface can adversely affect the performance of planting equipment. Tillage is one option for managing corn residue. Tillage incorporates residue into the soil where soil microbes increase decomposition rates. Less residue on the soil surface helps increase soil warming and facilitate planting operations. Most primary tillage implements, including chisel plows, mulch rippers, disk rippers, etc. are designed to incorporate some but not all the crop residue on the soil surface. In addition, the depth and speed of tillage, and type of shovel or point selected will determine the amount of soil moved and residue incorporated. Vertical tillage implements employ narrowly-spaced ripple coulters that help to size stalk and root ball residue prior to primary tillage. Strip tillage combines the soil warming and drying benefits of tillage with the soil conservation benefits of no-till.

One alternative approach to fall tillage is chopping stalks in the fall with a flail-type or rotary blade chopper. Stalk chopping flattens the residue profile and distributes stalk residue between the rows, which can reduce the advantage of planting next year's crop between last year's rows. Flattened residue is also more prone to "matting" on the soil surface, resulting in cool, wet soils in the spring.

Another alternative to tilling the soil is to process the residue with the combine corn head at harvest. Decomposition rates will be significantly increased when the leaves and stalks have been crimped, chopped or crushed at the corn head.

Finally, cattle producers may consider grazing their field or baling some of their corn stalks for feed or bedding.

What environmental conditions facilitate residue breakdown?

Crop residue is composed of lignin, cellulose, hemicellulose, and nutrients. Microoganisms breakdown these compounds, and the decomposition rate is largely affected by moisture and temperature. Some of the conditions that favor decomposition of residue include warm, moist weather, small pieces of residue, and maximized contact between residue and the soil.

If the corn crop was damaged prior to maturity, then the residue may breakdown at a faster rate than residue remaining after harvest. The amount of carbon (C) and nitrogen (N) in vegetative components and grain would be different than at harvest. With the lower C:N ratios, the earlier stage vegetative and grain material should be more easily decomposable. In the instance of dry soils, breakdown would be slowed.

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Is there a benefit to fall-applied nitrogen to help with residue breakdown?

Nitrogen (N) deficiency symptoms can occur during immobilization; however, research has not consistently shown a benefit to fall N applications intended to assist in residue decomposition.[1] Timing, cooler temperatures, and/or dry weather might play a role in the effectiveness of fall N applications.

The decomposition of crop residue is highly controlled by soil moisture and temperature as essential factors for microbial activity for the residue decomposition. In most of the corn growing region, microbial decomposition of residue is limited by low temperature. Therefore, from economic and environmental perspectives, N application has little effect in achieving the intended results of facilitating residue decomposition.

What are other management strategies that can be used to help manage residue?

Residue can be managed by increasing the populations of soil microorganisms. Cover crops provide additional energy, carbon, and nitrogen to sustain activity of a wide range of soil microorganisms. The cover crop can help create a micro-climate under the canopy that is moist and helps increase the rate of decomposition. For fields that remain unharvested and tillage is used to size residue, seeding a cover crop after the tillage operation can provide soil cover and protection. For fields harvested for silage or baled, seeding the cover crop immediately after harvest will provide the best establishment window.

Crop rotation cycles that include legume crops with lower C:N ratios returns N back into soil faster and gives residue with higher C:N ratios (such as corn) more time to decompose. Successfully planting cover crops, such as cereal rye, in fields that are not harvested will greatly depend on increasing seed to soil contact and reducing the size of the corn residue. These can be accomplished through discing, vertical tillage or stalk shredding.

Sources (verified 08/30/2020)

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