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Corn and Soybean Cover Crop Management

As fall harvest progresses, farmers are looking ahead to next year's crop. Corn and soybean farmers utilizing no-till and/or cover crops may need to make different management decisions than conventional tillage farmers. Enclosed are tips for managing cover crops and making fertilizer adjustments.

Legumes and clover cover crops are usually planted before corn because they make nitrogen (N). Legumes and clovers maximize N production (85-90%) at blooming, so terminate these cover crops before they set seed and the N is ties up. Most organic N is in the leaves and becomes available to the next crop 2-5 weeks after they decompose.

Most no-till farmers add 40-60# N in a corn starter to stimulate early corn growth, when soil microbial communities are lower and recovering after a cold winter. Microbial populations increase exponentially with moisture and warmer soils in late spring and early summer, recycling soil nutrients to the next crop. Long-term N studies show that 20-50% of corn N comes from the decomposition of native soil organic matter (SOM). Starter corn fertilizer should be 25% nitrate to stimulate vegetative growth followed by ammonium forms which stimulate reproductive growth. Add thiosulfate in a 10:1 (N:S) corn starter mixture.

Cover crops increase SOM 0.1-0.15% and require 100-150#N to stabilize the SOM. Soil microbes and decomposing SOM residue ties up N, so in a no-till corn system, adjust N rates to compensate for this N tie up. Legume and clover cover crops before corn may add 50-150# of organic N to your soil profile. Minimize using only high carbon to nitrogen ratio (C:N) cover crops (grass cover crops like cereal rye) in front of corn due to the additional N needed for decomposition.

Cereal rye has certain toxins (allelopathic effects) that comes from cover crop leaf and stalk decomposition under wet soil conditions. To minimize corn planting problems, selectively cut or harvest above ground biomass to reduce toxins and add manure or N fertilizer to reduce the C:N ratio to decompose the residues. If you cannot harvest it, kill it early, and wait three weeks to plant corn. Soybeans are not affected by cereal rye allelopathy. Cereal rye makes phosphorus plant available to soybeans, shades the soil, and reduces weed pressure.

Most corn and soybean diseases (*Phytophthora*, *Fusarium*, *Pythium*, and *Rhizoctonia)* thrive under wet soils. Cover crop roots dry the soil profile to reduce disease pressure. Using glyphosate (Roundup) to kill your cover crops decreases manganese availability and may promote *Fusarium.* Cereal rye before soybeans reduces *Phytophthora* and *Rhizoctonia* while winter oats reduces *Fusarium* and makes manganese available, counteracting glyphosate. Annual ryegrass and cereal rye also reduce soybean cyst nematodes 80-90% if planted early in the fall when soil temperatures are above 50^0F. Some no-till farmers plant green and use crimper crop rollers to terminate cover crops or use alternative herbicides to minimize these problems.

The best weed fighting cover crops are Sorghum Sudan grass, radish, cowpea, buckwheat, cereal rye, annual ryegrass, and oats; which out compete weeds for space, water, sunlight and nutrients and/or have natural herbicides (glucosinates) that bio-fumigate the soil. Farmers should avoid tillage which preserves and replants weed seeds.

To increase predators for destructive insects, plant summer cover crops that flower and provide nectar to beneficial predators. Flowering plants with small open flowers promote nectar for predators in early spring (dandelion, henbit), midsummer (buckwheat, sunflower, flowering legumes and clovers) and late fall (Wild carrot, Goldenrod). Minimize the use of insecticides and fungicides. Beneficial insect predators need long-term no-till and large chunks of residue as shelter to survive the winter. Plant cover crops along end rows, grass waterways, road ditches, creeks, and buffer areas to increase beneficial predator populations. Ground beetles (*Carabidae*) and lightning bugs (*Coleoptera*) are natural predators of soft body insects like aphids, slugs, cutworm, and army worm. Ground beetles eat their weight daily in weeds seed and soft body insects. Slugs like *Daikon* radish but slugs cannot digest the glucosinates and sulfur in radish, so they bloat or “get sluggish” and die!

To get cover crops planted earlier, consider planting earlier maturing corn and soybeans varieties so cover crops can be planted earlier. Ohio corn and soybean research shows that yields are related to timing of precipitation at pollination more than crop maturity. Diverse cover crops and continuous long-term no-till associated with grain crops create a resilient environment for all species to grow and thrive. The improved soil environment efficiently utilizes soil nutrients, protects the soil, and increases crop production.