Use Full Nitrogen Rate behind Mixed Cover Crops

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Frequent rains have put everybody behind schedule this spring for terminating their cover crops. Termination timing impacts how quickly cover crops start to break down, potentially releasing nitrogen to corn, however, recent research suggests many cover mixtures are quite limited in their ability to contribute enough nitrogen to warrant cutting fertilizer rates.Growers who plant a single-species cover crop of crimson clover or hairy vetch can reduce their nitrogen fertilizer rate in corn by 60 to 80 pounds/acre(1) if cover stands are uniform and robust, and termination is delayed to early bloom. This can be a significant nitrogen cost savings for corn growers, however, producers often plant either a cereal cover or some mixture of legume, grass and brassica species instead. This has a huge impact on the mineralization of nitrogen and potential nitrogen release by a cover crop to a crop such as corn.

In spring of 2017, six on-farm locations across Tennessee were sampled in order to estimate plant available nitrogen (PAN) which is the amount of nitrogen potentially released to the cash crop when a cover crop decomposes. Aboveground biomass was harvested at the time of spring termination and % total nitrogen was analyzed by a regional lab. PAN amount depended on the % total N of our cover mixture sample and the tonnage of dry biomass production (2). At five out of six locations, we estimated our cover crop would provide little to no nitrogen benefit to the cash crop. Results are summarized below:

- Estimated plant available nitrogen was greatest (43 pounds/acre) at 1 site where the cover mixture contained 25 to 30% legume species, with 2% total N in our composite sample and biomass exceeded 3 tons dry biomass/acre.
- Three of six sites with mixed covers containing 15 to 20% legume species with modest biomass production (less than 1.5 ton/acre) resulted in 12 to 20 pounds of PAN to cash crop.
- Two of six sites resulted in zero N to the cash crop. At these sites, our cover species were either a cereal only or a late planted cover mixture with very thin legume stand where any nitrogen was likely immobilized or tied up during residue decomposition.

An adequate amount of legume species in the cover mixture was essential to getting any PAN in our measurements, and we found our legume stand fluctuated depending on how early the cover crop was planted, seeding rate, and whether the grower inoculated the legume seeds prior to planting. It would be very easy to overestimate nitrogen contribution from a mixed cover without actually sampling the field, and cutting nitrogen fertilizer rates back too much would impact yield in corn. Another thing to consider is that plant available nitrogen from legume breakdown is not available immediately, but occurs over a period of about 4 to 6 weeks

up to 8 weeks after termination. Based on these results, growers should use full nitrogen fertilizer rates in corn, applied as a split timing. Any PAN from a mixed cover might support overall N fertility but should not be relied on as a substitute for urea or UAN.

References used:

1. link to UT corn fertilizer recommendations
2. Sullivan and Andrews, Estimating Plant Available Nitrogen from Cover Crops