Making the best use of slurry

Research is ongoing into optimising farmyard manure's role in crop nutrition while minimising nutrient losses through new improved application techniques. One of these techniques combines strip till and injection of slurry below the growing area. The State Institute for Agriculture, Forestry and Horticulture (LLFG) Saxony-Anhalt investigates this technique in strip till maize comparing:

- Strip till with autumn application of 20 m³ slurry/fermentation residue in a standing catch crop without and with nitrification inhibitor (Piadin),
- Strip till with spring application of 20 m³ slurry/fermentation residue in frost killed catch crop without and with Piadin. Piadin dosage being in each case 0.4 l per m³ slurry/fermentation residue. With 20 m³, this is 8 l/ha.

Yield results so far still don't permit conclusions on the best technique. But first results with forage maize allow insights into the environmental effect. For instance clear results are available from N_{min} soil tests following strip till and autumn application of fermentation residue. The ammonia N proportion of total crop-available soil nitrogen (N_{min}) reserves 90 days after application was 76 % without Piadin, 96 % with the nitrification inhibitor and 15 % in the uncultivated and unfertilised inter-strip areas. Addition of Piadin slowed down the conversion of stable, although still plant-available, ammonia N into loss-susceptible nitrate N. Ammonia is bound to the soil particles. It's available for cation exchange and still plant-available.

Whether the slurry is injected in autumn or into the catch crop in spring depends on soil and rotation requirements.
Mit dem Strip-Till-Verfahren kann die Gülle im Herbst oder im Frühjahr in die Zwischenfrucht ausgebracht werden.
La technique du strip-till permet un épandage de lisier aussi bien à l'automne que sur culture au printemps.

Through the delayed conversion it remains preserved in the soil crumb overwinter, avoiding unwanted movement of nitrate into deeper soil layers. N_{min} soil sampling was repeated 35 days after the first test, or 125 days after the slurry injection. With increasing warming and mineralisation of the soil the ammonia N proportion within the nitrogen depot altered clearly in the variant without Piadin, but not in the variant with Piadin. The ammonia N proportion of N_{min} (0 to 30 cm) was 10 % without Piadin, 89 % with Piadin and 11 % in the uncultivated and unfertilised spacings 125 days after application. The nitrate in the rooting area is accepted as directly available to the plants and, where the rooting is sufficiently developed, the exchangeable ammonia too. Assessing area-based N_{min} reserves from a point sampling in the strip till field is a method which can lead to overestimation. N_{min} reserves in the soil were around the same level (an average 175 kgN/ha) whether the slurry/fermentation residue was applied with or without Piadin. The difference was that where Piadin was used the plant-available soil nitrogen consisted mainly of ammonia N (approx. 90 %) with nitrate N (approx. 90 %) the main component where the nitrification inhibitor was left out of the equation.

The slurry/fermentation residue depot at 25 cm depth brought out in the spring was reached by the maize roots 35 days after sowing when the maize was at EC 16. Where, on the other hand, the same amount of fermentation residue was brought out in autumn it took 44 days after sowing until the depot was reached.

The Piadin variant was characterised by more root mass and rooting depth regardless of whether the slurry was applied in autumn or spring. The maize roots grew down to 65 cm. Lateral root growth measured from base of the individual plant was greater than half the maize row spacing.

Important for a positive environmental effect: the fertiliser-N must be taken up as completely and as uniformly as possible by the crop. The residual N after the harvest in the strip till area was less than 20 kg N/ha and under 30 kg N/ha in the spacings.

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