Novel Nutrient Management Method: Applying Poultry Litter in Subsurface Bands

Getting nutrients right in farming is a balancing act. When planning to apply fertilizers and soil amendments, farmers must consider their soil type, climate, the time of year, the crops they are raising, water availability, soil health, water quality concerns, and the nuances of the many different macro- and micronutrients that plants require. The way nutrients are applied is also an important consideration.

A series of research projects have been conducted at the Dale Bumpers Small Farm Research Center in Booneville, AR, to assess a new way of applying poultry litter (the manure and bedding removed from commercial poultry houses) by inserting it into the soil.

Poultry litter is a National Organic Program (NOP) approved fertilizer and is readily available in many parts of the U.S. The litter is often surface applied, but this can lead to nutrient loss through nitrogen volatilization or surface runoff. A novel technology has been developed to reduce nutrient loss from poultry litter. Named the “Subsurfer,” it is an implement pulled behind a tractor that inserts poultry litter into the soil in bands and reduces nutrient losses to the air, soil, and water by over 70%. The Subsurfer was initially developed for use in pastures, but researchers have been conducting studies to determine best practices for its use in organic cropping systems. While not yet commercially available, the results of the studies suggest that it is a promising technology that can help solve nutrient-loss issues while maintaining productivity and improving both crop quality and soil health.

Dr. Amanda Ashworth, Research Soil Scientist with USDA’s Agriculture Research Service (ARS) Poultry Production and Product Safety Research Unit, has conducted research to determine the optimal crop row distance from the poultry litter bands for the greatest crop yield and quality. Planting directly into the litter would damage the plants, so the litter has to be inserted to the side of the plant row. But what distance is best for different crops?

How Litter is Applied

The ARS Subsurfer is pulled behind a tractor, inserting the litter approximately 4 inches beneath the soil surface, with wheels that close the soil up over the litter after it is inserted. The litter must have a moisture content of 35% or less. A seeder can be attached to the Subsurfer so that the fertilizing and seeding can be done in one pass. In these research plots, a GPS was used to ensure accurate spacing of seeds and litter bands.

BEST MANAGEMENT PRACTICES FOR SUBSURFACE POULTRY LITTER BANDING IN ORGANIC CORN AND EDAMAME PRODUCTION

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<th>Corn Recommendations</th>
<th>Edamame Recommendations</th>
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<td>Distance From Row:</td>
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<td>Banding poultry litter five inches from seeds resulted in the greatest grain yield, which was statistically similar to inorganic-N (urea was used), and almost 40 percent greater than surface-applied poultry litter.</td>
<td>Banding poultry litter five to 15 inches resulted in similar yields, all of which were greater than surface-applied litter.</td>
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An additional finding of the research was that the crop quality was improved with the use of the Subsurfer, even as compared to plots that were fertilized with urea. Dr. Ashworth found the additional nutrients contained in poultry litter led to this improved quality. The liming properties of the poultry litter, as well as additional macro- and micronutrients it contains, provide a more complete “diet” to the crop in ways that urea, which only supplies N, could not.

There is potential for the Subsurfer to help with nutrient management on small to medium-sized farms, organic and conventional alike. The equipment can only cover approximately 20 to 30 acres in one day, so it is not likely to work well on farms in the thousands of acres, but for smaller-scale operations, it could provide a way to fertilize efficiently.

Citations

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