

Increasing crop residue decomposition and reducing nitrate leaching with the application of biostimulant Digester

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Key words

Crop residue, nitrate, Digester

Overview

The trial was undertaken by Agrargenossenschaft Weissensee Germany to investigate the impact of Digester on the rate of crop residue decomposition and soil nitrate levels.

Digester overview

The complete decomposition of organic matter over the winter months is critical for maintaining a healthy soil structure and ensuring strong spring growth.

Organic matter can be decomposed in two different directions. If conditions are not ideal organic matter will be fermented firstly into alcohols which are then converted into formaldehyde, a preservative that can prevent biological activity in the soil for years.

Digester ensures organic matter is decomposed and recycled into humus – nature's way of storing nitrogen. Digester uses BioStart's signal molecule technology to selectively activate the microbes responsible for breaking down leaf litter, dead roots, crop trash and prunings.

Digester kick starts the decomposition process by firstly activating dormant saprophytic fungi. These beneficial fungi often referred to as the primary decomposers excrete organic acids that breakdown cellulose, the substance that gives plant cell walls their strength. Once the outer cell walls are broken Digester activates the second wave of decomposers. These beneficial bacteria complete the process by converting the cell's nitrogen contents into amino acids which are then used to build microbial protein, a stable form of nitrogen

Trial design

The following treatments were applied in 1ha blocks of various wheat paddocks after harvest.

1. Untreated
2. 110lt/ha Anhydrous Ammonia
3. 2lt/ha Digester
4. 2lt/ha Digester + 110lt/ha Anhydrous Ammonia

Treatments were not replicated.

Assessments were made:

1. Prior to treatment
2. 6 weeks after treatment
3. Start of growth dormancy in autumn
4. Start of spring growth in the following year

Measurements

N min samples were taken to give an indication of the decomposition process.

Crop residue decomposition results

Decomposition assessment at soil depth 25-28cm 12 May 04

Sample	Untreated	110lt/ha Anhydrous Ammonia	2lt/ha Digester	2lt/ha Digester + 110lt/ha Anhydrous Ammonia
I	Sampling with corer is difficult. Straw is worked into the soil, but rotting process is just starting. Lots of straw is still visible.	Sampling with corer is easy. Rotting of straw is advanced. Less straw is visible, but what's left still shows normal straw structure.	Sampling with corer is easy. Rotting of straw is advanced. Only little straw is still visible, and what's left is black and shows advanced rotting.	Sampling with corer is easy. Rotting of straw is advanced. Only little straw is still visible, and what's left is black and shows advanced rotting.
II	Sampling with corer is difficult. Straw is worked into the soil, but rotting process is just starting. Lots of light coloured straw is still visible.	Sampling with corer is easy. Rotting of straw is advanced. Less straw is visible, but what's left still shows normal straw structure and colour.	Sampling with corer is easy. Rotting of straw is advanced. Only little straw is still visible, and what's left is black and shows good rotting.	Sampling with corer is easy. Rotting of straw is advanced. Only very little straw is still visible, and what's left is well advanced in rotting (black and shows visible fungal coverage).

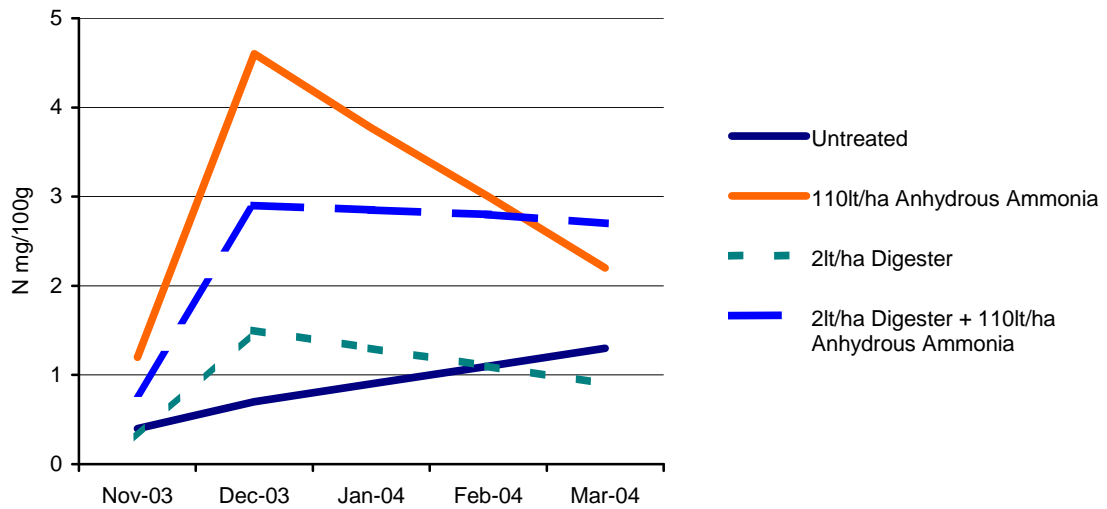


Untreated



2lt/ha Digester + 110lt/ha Anhydrous Ammonia

Nitrate results



Discussion

Digester reduced the amount of nitrogen available for leaching. When Anhydrous Ammonia is applied to the soil it's quickly converted into nitrate. The additional microbial activity stimulated by Digester soaks up the free nitrate converting it into amino acids and microbial protein. Once converted into this form the nitrogen is stored until the microbial populations die back. The result is that the nitrogen release is delayed and happens at a gradual pace and time that coincides with plant demand.