

TC-P_17 Limiting nutrient losses and improving product quality during storage of cattle manure by composting and ensiling

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Objectives

Storage of cattle farmyard manure (CFM) on the field might cause nutrient leaching [1]. Therefore, Flemish farmers are not allowed to store manure (i) on the field between 15/11 and 15/01, and (ii) longer than 1 month during the rest of the year. It is evaluated whether composting and ensiling can reduce nutrient losses, and optimize the quality of CFM as fertilizer and soil improver.

Methodology

Storage experiments were conducted during April-June 2014. Four CFM treatments consisting of the same volume (24 m³) were compared: (1) untreated storage on the field, (2) composting on the field (2 times turned and covered with a semipermeable fabrics cover), (3) composting on a concrete floor (2 times turned and covered) and (4) ensiling on a concrete floor. During the experiment, mineral N enrichment in the soil for the field treatments, gaseous emissions and product quality were monitored.

Results

Composting CFM resulted in a more homogeneous product with a lower volume compared to the untreated CFM. However, the differences in product quality between untreated storage and composting on the field were small. We observed a lower amount of NH₄⁺-N in the 0-30 cm soil layer under the compost pile compared to the untreated pile, possibly due to more leaching and mineralization under the untreated pile. Further research is being conducted to confirm those results.

The composted pile on the concrete floor was wetter than the one on the field, likely because of absorption of run-off water. This resulted in a better composting process and a trend toward higher gaseous emissions. However, little differences in product quality between composting on the field and on the concrete floor were observed.

Ensiling CFM on a concrete floor resulted in a lower temperature compared to composting, due to a limited organic matter decomposition. The losses of organic matter, dry matter and nitrogen were smaller during ensiling the CFM. The silage end-product had a higher NH₄⁺-N and moisture content and was more heterogenic than the compost. High CH₄-emissions were noticed when opening the silage.

Conclusion

Composting CFM resulted in less mineral N leaching from the pile to the soil underneath compared to untreated storage. The composted CFM is more easy to transport and spread than the untreated and ensiled CFM. Ensiling the CFM resulted in a product in which organic matter and nutrients were better conserved during composting. Differences in product stability are currently assessed by an incubation test in which N-mineralization is measured in soil amended with the different products.

References

- [1] Sommer, S.G. (2001): Effect of composting on nutrient loss and nitrogen availability of cattle deep litter, *European Journal of Agronomy*, 14, 123-133