

Mineralization of nitrogen after incorporation in soil of the main types of animal manure produced in Cyprus

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The aim of the study was to estimate the rate of mineralization of nitrogen (N) after incorporating cow, sheep/goat, poultry or pig manure in soil and to establish a relationship between the N mineralization rate and the degree of decomposition/composting of the manure storage pile prior to soil addition.

The rate of mineralization was estimated in soil-manure mixtures after incubating samples at optimal temperature and moisture conditions. The incubations of these mixtures were carried out in small plastic containers which were removed from the incubation chamber at successive intervals up to about three months. Soil inorganic N (NH_4^+ -N and NO_3^- -N), that gradually accumulates in samples, was extracted at each time point with 2N KCl and determined by colorimetric methods. Nitrogen mineralization data were then fitted in a single compartment exponential model of the type $N_t = N_{\text{max}}(1 - e^{-kt})$ to determine potentially mineralizable N (N_{max}) and mineralization rate constant (k). It was assumed that the asymptote of N mineralization curves (N_{max}) obtained during the three month incubation at optimum conditions corresponds to the N release potential in the field during the growing season.

Apart from poultry, samples from the other three manure types, when taken from fresh storage piles, showed significant net immobilization of N, which lasted almost till the end of the incubation. This immobilization phase was progressively shortened when piles remained for decomposition/composting for 3 or 6 months respectively. On the contrary poultry manure showed always a net mineralization phase and an increasingly greater proportion of its initial organic N content to be released as mineral N after 0, 3 or 6 months of manure pile composting.

It is anticipated that data of mineralization of N for the main types of animal manure produced in Cyprus will enable more precise calculation of the necessary quantities of manure that should be incorporated in the field depending on the needs of the crop and consequently will contribute to a more rational use of the resource as a fertilizer and to lessen environmental concerns of nitrate leaching.

More results will be presented during the conference.