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The effect of humic substances on nitrogen mineralization

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Many European agricultural regions with high inputs of inorganic fertilizers or organic fertilizer as slurry are faced with decreasing soil organic matter (SOM) content. As the use of fresh organic materials is limited because of their nitrogen and phosphorus content, the use of concentrated humic substances products may act as a solution for the decreasing SOM content. Numerous studies have shown that the addition of a specific amount of humic substances (HS) can enhance the growth of roots, shoots and leaves and encourage nutrient absorption by plants, but there is little information about the interaction between HS added to the soil and nitrogen mineralization.
To examine the interaction between external HS and the nitrogen mineralization process, two laboratory experiments were set up. First, nitrogen mineralization in two different soil types (sandy loam and sandy soil) and with 12 different treatments was measured in an incubation experiment. The treatments consisted of four different HS concentrations (0*RD (reference dose = 50 l/ha HS product), 0,5*RD, 1*RD, 5*RD) whether or not combined with green manure or compost. The product used contained 16,5 % HS of which 13.2 % humic acids and 3.3 % fulvic acids. Nitrate and ammonium concentrations were measured in the soil 7 times during the incubation period of 3 months. Both in the sandy loam and sandy soil, the addition of HS had no significant effect on the nitrogen mineralization. As expected, the incorporation of green manure significantly increased nitrogen mineralization while the joint addition of HS seemed to decrease the nitrogen mineralization again in the sandy loamy soil (non significantly). The incorporation of compost in the soil significantly increased nitrogen mineralization in the sandy soil and had no effect in the sandy loam soil (the C:N ratio of the compost in the sandy soil was lower than the C:N ratio of the compost in the loamy sandy soil). The joint addition of HS resulted in a non significant increase of nitrogen mineralization in the sandy soil and in a non significant decrease of nitrogen mineralization in the sandy loam soil. From above results of the incubation experiment, we may conclude that HS did not interfere significantly with the nitrogen mineralization process in the soils.
In a second experiment the effect of HS on nitrogen mineralization was examined in a pot experiment with Lolium multiflorum L. using 15N enriched ammoniumnitrate. The first results of this experiment seem to confirm the results of the incubation experiment.