Effects of differences in the nitrogen composition of paste-like fertilizer applied as side dressing on growth and the nitrate concentration of spinach (*Spinacia oleracea* L. var. *crispa*)

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soil C, and leaching of the PEON was slower than that of the two soil columns filled with soils A and B from fields receiving organic matter. But, in percolated water from 60 cm columns filled with soils B and C from common fields, organic nitrogen was not found. This result suggests that the PEON was increased at the surface soil layer in the case of heavy application of organic matter in a field and some portion of the PEON was leached under rainfall to the deep soil layer. Although PEON exists as fixed forms with iron and/or aluminum in a soil, when a high amount of organic matter was fertilized to a soil, excess free PEONs which are not fixed with iron and/or aluminum in a soil can become water-soluble and leached out.

Key words: HPSEC, leaching of organic nitrogen, limit quantity for application of organic matter, protein-like organic nitrogen, PEON (Phosphate buffer Extractable Organic Nitrogen).

Effects of differences in the nitrogen composition of paste-like fertilizer applied as side dressing on growth and the nitrate concentration of spinach (Spinacia oleracea L. var. crispa)

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To evaluate the effects of differences in nitrogen composition in paste-like fertilizers applied as side dressing, growth and nitrate concentration of spinach (Spinacia oleracea L. var. crispa) grown in containers were examined and compared to standard fertilization using a compound fertilizer (standard, N, P2O5 and K2O applied to the soil at a rate of 120 mg kg−1). Three kinds of paste-like fertilizer, which differ in nitrogen source, i.e., urea, a 1:1 mixture of urea and residual liquid with fermented molasses (RLFM) and RLFM, were applied to the soil as side dressing at a rate that was 20% below the standard. Dry matter production and N uptake in spinach treated with paste-like fertilizers was comparable to that treated with standard fertilizer, while the nitrate concentration in spinach treated with paste-like fertilizers was lower than that treated with standard fertilizer. Among the paste-like fertilizers, the nitrate concentration in spinach decreased with the increasing rate of RLFM, in which the major N sources were composed of proteins and amino acids.

To understand the possible explanation for better growth and low nitrate concentration in spinach treated with paste-like fertilizer despite the lower application rate, N concentrations of ammonium, nitrate and organic N were assessed temporally by leaching water from fallow plots. At the initial time of incubation, the nitrate concentration in the leaching water from the standard fertilizer was higher than that from paste-like fertilizer treatments. The paste-like fertilizer composed of urea, however, showed a higher concentration of organic N which was supposed to be urea. The fertilized-N of the standard and paste-like fertilizer composed of urea might be immediately eluviated by irrigation. However, N concentration in the leaching water after treatments with paste-like fertilizer composed of RLFM was lower than that of the former treatments, suggesting that fertilized-N might remain localized. The amount of N eluviated during incubation showed a negative correlation with the viscosity of the paste-like fertilizer. The highest viscosity was observed in the paste-like fertilizer composed of RLFM, followed by a 1:1 mixture of urea and RLFM, and the paste-like fertilizer composed of urea was the lowest in viscosity. Therefore, it was suggested that the paste-like fertilizer composed of RLFM or a 1:1 mixture of urea and RLFM showed limited N leaching due to the high viscosity. Therefore, spinach could take up N efficiently.

Key words: nitrate, nitrogen composition of paste-like fertilizer, side dressing, spinach.

Behavior of nitrogen in the media supplied with the aqueous phase produced by methane fermentation as liquid fertilizer

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Behavior of nitrogen in the media was investigated when the aqueous phase produced by methane fermentation was supplied as liquid fertilizer. When the aqueous phase was supplied to masa-soil, NH4+ included in masa-soil was nitrified to NO3−. Additionally, in masa-soil, NH4+ absorption was observed. On the other hand, in the case of coconut fiber and rockwool, NH4+ has been hardly nitrified. From above results, it was determined that NH4+ toxic effect from the aqueous phase on tomato plants growth was inhibited by means of the progress of nitrification and NH4+ absorption by masa-soil.

However, nitrification was restrained so that NH4+ was fixed in masa-soil. On the other hand, in the sampled field soil, NH4+ was not fixed, and was nitrified immediately. In the field soil, there was a great deal of generated NO3−. In comparison with masa-soil.

Key words: ammonium fixation, aqueous phase, methane fermentation, nitrification.

Occurrence and survival of coliform bacteria, Escherichia coli and Salmonella in various manure and compost

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Occurrence and survival of fecal-contamination indicator bacteria (coliform bacteria, Escherichia coli and Salmonella) in various manure and compost samples collected from 23 composting facilities mostly in Kyushu were investigated by using...