



## **Nitrogen's transformation in municipal solid wastes as an effect of composting conditions**

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Composting is an oxidation process leads to significant transformation of organic material by microorganisms. The intensity of this process depends on the moisture, and the C/N ratio. These factors influence on the rate of the transformation and can be modified during composting.

In this paper, the changes of different forms of nitrogen running during maturity of MSW compost produced acc. MUT-DANO system were studied.

The investigations were carried out in plastic containers of total capacity about 1000 l for 188 days in the following conditions:

- treatment I: 500 (462-534) g H<sub>2</sub>O·kg<sup>-1</sup> d. m. of compost,
- treatment II: 600 (469-600) g H<sub>2</sub>O·kg<sup>-1</sup> d. m. of compost,
- treatment III: 500 (461-521) g H<sub>2</sub>O + 2,5 g N (in form of urea) kg<sup>-1</sup> d. m. of compost,
- treatment IV: 500 (460-536) g H<sub>2</sub>O + 5 g N (in form of urea) kg<sup>-1</sup> d. m. of compost.

Due to aeration, composts were mixed after each 15 days; during composting periodic sampling was performed. The samples were collected from 20 sites for preparing a "mean sample", which used for the determination of N-total, and its water-soluble forms including N-NH<sub>4</sub> and N-NO<sub>3</sub>, as well as N-organic. The change of examined forms of nitrogen as a function of time could be considered as first-order reaction even through it was interpreted according the first-order kinetics. The correlation co-

efficients, which cross their origins, were high and ranged from -0.992 to -0.848. It suggests properly fitting of experimental dates to the kinetics model. According to the first-order reaction, the first-order velocity constant, and half decay time ( $t_{1/2}$ ) as well as shelf-life time ( $t_{1/10}$ ) were calculated.

The increase of the moisture up to  $100\text{g kg}^{-1}$  influenced on the decrease of  $t_{0.5}$  for N-total from 1248 to 1141h, water soluble nitrogen from 1185 to 646h,  $\text{N-NH}_4$  from 411 to 376h, and  $\text{N-NO}_3$  from 2158 to 1280h. Simultaneously, the increase of the  $t_{0.5}$  for water-soluble organic forms of nitrogen was observed. As result of supply of urea, the conversions of nitrogen were significantly accelerated. Higher application of nitrogen resulted in short-term conversions of  $\text{N-NH}_4$  and  $\text{N-NO}_3$ , which were clearly observed in the treatment IV. In conclusion, addition of N to the composts from municipal solid wastes characterized by the C/N ratio 30:1 is inappropriate.