Nitrogen Release from Turfgrass Clippings with Different Fertilization Rates

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Introduction By leaving the turfgrass clippings onsite after mowing , which is primary function of turf management , a source of nitrogen is provided to the turfgrass/soil system . The aim of this study was to investigate the dynamics of nitrogen mineralization after clipping addition to growing place .

Materials and methods The experimental site had been seeded in 2003 with a turfgrass mixture of *Festuca rubra* 50% and *Poa pratensis* 50% . In year 2006 the fertilization rates were 0 as control , 160 and 400 kg N ha^{-1} . The following year from 15 May (the first cut of the year) to 8 Aug the litterbags method was used to study decomposition rate of clippings returned to the growing place . The clippings were put into litterbags (20 g fresh plant material per bag) and placed into the thatch layer of each fertilized plot . The bags were retrieved from the field after weeks 2 , 4 , 8 and 12 to measure changes weight and nitrogen (N) content by Kjeldahl of clippings . Plant residue loss at each sampling was expressed as a percentage of the initial biomass . Nitrogen content is based on weight of material remaining in the litterbag .

Results and discussion The weight loss of decomposing clippings after two week was 27 .9% and by the end of week twelve increased up to 71 .1% . The different initial N content in plants did not affect the decomposition rates of clippings (Figure 1A) . The initial N content in clippings was 23 .3 g kg^{-1} in control variant and 38 .0 g kg^{-1} in variant N160 and 45 .7 g kg^{-1} in N400 (Figure 1B) . In the first phase of degradation (2 weeks) N release accounted for 10 .7% of initial N content in control variant , 25 .5% in variant N160 and 41 .6% in N400 . By the end of the study period the N content was decreased to 9 .4 g kg^{-1} in control variant and to 10 .9 g kg^{-1} in variant N160 and to 12 .3 g kg^{-1} in N400 .

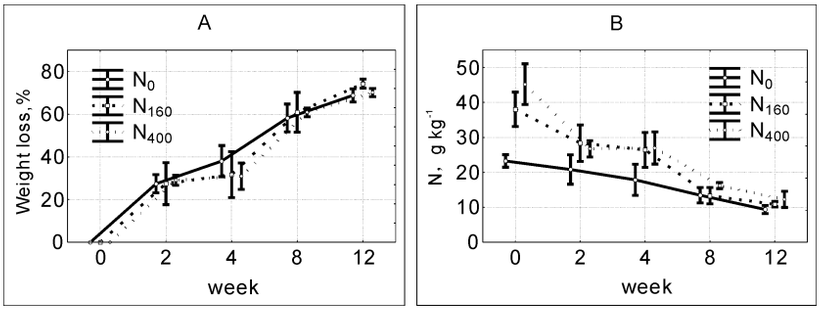

Figure 1 *The weight loss of decomposing clippings (as percentage of the initial dry weight) (A) and N release from clippings depending on decomposition time and different N content in clippings (B) (mean± SE p< 0 .05) .*

In the beginning of decomposition process more N was released from the clippings with higher initial N content caused by higher concentration of readily available N components in plant material . In later phases of decomposition the release of N is influenced by the N content in the cell-wall constituents (cellulose , hemicellulose and lignin) which is resistant to decay (Magill and Aber , 1998) .

Conclusions Different N content in clippings did not affect the decomposition rate of clippings returned to growing place but N release from clippings during decomposition was faster from clippings with higher N content . Based on literature , it is known that plants take up around 5-50% of the N from decaying clippings during the growing season (Ladd and Amato , 1986) . Therefore , N fertilization rates should be reduced when clippings are returned to turfgrass managed as a residential lawn .

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