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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.

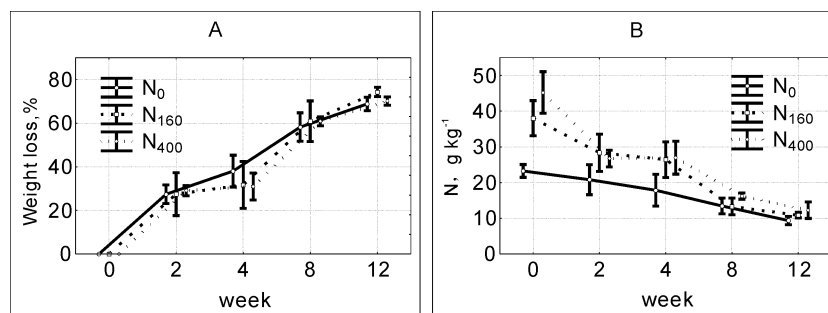


Figure 1 The weight loss of decomposing clippings (as percentage of the initial dry weight) (A) and N release from clippings depending on decomposition time and different N content in clippings (B) (mean ± SE $p < 0.05$).

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.

References

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