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Abstract

Variation of Carbon- and Nitrogen-Stable Isotope Ratios in Conventionally and Organically Fertilized Cereals at Different Growth Stages †

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Over recent decades, the cereal grain market has experienced notable changes. Due to the demand for healthier and more sustainable food options, significant growth in the production of organically grown cereals has been observed in the EU and Latvia [1]. Climate change and its impact on agricultural productivity has created challenges to cereal grain production, leading to a focus on resilient crop varieties and sustainable farming practices. Research on stable carbon and nitrogen isotope ratio changes in barley and triticale at different growth stages provides valuable insights into the metabolic processes and nutrient uptake patterns of these crops. This research contributes to the improvement of sustainable agricultural practices by allowing the optimization of fertilization strategies and the development of more efficient crop management techniques. For this study, barley and triticale samples at the stages of tillering, jointing, booting and maturity stages from conventionally and organically fertilized sample plots were collected at the Institute of Agricultural Resources and Economics, Priekuli Research Centre. Roots, leaves and grains at maturity stage of the collected crop samples were analyzed using a stable isotope ratio mass spectrometer (Nu Horizon, Nu Instruments, Wrexham, UK). $\delta^{13}C$ and $\delta^{15}N$ values, and total carbon and nitrogen content were determined. The results showed a decrease in $\delta^{15}N$ values and total nitrogen content in both barley and triticale roots and leaves during the growth of the analyzed crop samples. No significant changes in $\delta^{13}C$ values and total carbon content were observed. Differences in total nitrogen content and nitrogen-stable isotope ratios between conventionally and organically fertilized crops were not definite both for barley and triticale samples. These findings highlight the dynamic nature of nitrogen uptake and utilization in barley and triticale crops during various growth stages and suggest that other factors beyond fertilizer type may influence nitrogen content and isotope ratios in these crops.

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