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Effects of season and nitrogen supply on the partitioning of recently fixed carbon in understory vegetation using a $13CO_2$ pulse labeling technique

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Vegetation research in boreal forests has traditionally been focused on trees, with little attention given to understory vegetation. However, understory vegetation has been identified as a key driver for the functioning of boreal forests and may play an important role in the amount of carbon (C) that is entering and leaving these forested ecosystems. We conducted a large-scale 13C pulse labeling experiment to better understand how recently fixed C is allocated in the understory vegetation characteristic of boreal forests. We used transparent plastic chambers to pulse label the understory vegetation with enriched $13CO_2$ in the early (June) and late (August) growing seasons. This study was also replicated across a nitrogen (N) fertilization treatment to better understand the effects of N availability on C allocation patterns. We present data on the amount of 13C label found in different components of the understory vegetation (i.e. leaves, stems, lichens, mosses, rhizomes and fine roots) as well as CO_2 efflux. Additionally, we provide estimates of C residence time (MRT) among the different components and examine how MRT of C is affected by seasonality and N availability. Seasonality had a large effect on how recently fixed C is allocated in understory vegetation, whereas N fertilization influenced the MRT of C in the different components of ericaceous vegetation. Moreover, there was a general trend that N additions increased the amount of 13C in CO_2 efflux compared to the amount of 13C in biomass, suggesting that N fertilization may lead to an increase in the utilization of recently fixed C, whereas N-limitation promotes the storage of recently fixed C.