# 13C labelling reveals different contributions of photoassimilates from infructescences for fruiting in two temperate forest tree species

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The pathways of currently fixed carbon in fruit bearing branchlets were investigated in two temperate forest tree species (Carpinus betulus and Fagus sylvatica), which differ in texture of their vegetative infructescence tissues (leaf-like in Carpinus vs. woody in Fagus). During late spring, C-13 pulse-labelling was conducted on girdled, defoliated, girdled plus defoliated and untreated fruiting branchlets of mature trees in situ, to assess changes in C relations in response to the introduced C source-sink imbalances. At harvest in early August, 75-100% of the recovered C-13 label was bound to infructescences (either fruits or vegetative infructescence tissue), revealing them as the prime C sinks for current photoassimilates. Leaves on girdled branchlets were not stronger labelled than on ungirdled ones in both species, indicating no upregulation of the leaves' photosynthetic capacity in response to the prevention of phloemic transport, which was also supported by measurements of light saturated photosynthesis. In contrast, C-13 labels tended to be higher after complete defoliation in the vegetative infructescence tissues of Carpinus, suggesting enhanced net photosynthesis of green infructescence parts as compensation for the loss of regular leaves. The total la belling-derived C-13 content of whole infructescences was very similar between foliated and defoliated Carpinus branchlets. Cupulae of Fagus, on the other hand, remained almost unlabelled on defoliated branchlets, indicating the photosynthetic inactivity of this woody infructescence tissue. Consequently, Carpinus still produced relatively high fruit masses on girdled plus defoliated branchlets, while in Fagus fruit development ceased almost completely at this most severe treatment. Our results highlight that green vegetative infructescence tissue assimilates substantial amounts of C and can partly substitute regular leaves as C sources for successful fruit development.
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