

Some gall-inducers can use the fungi in gall as a sink of nutrients for their growth

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Insect galls are one of the best models to examine the extended phenotypes of gall-inducing insects due to the influence of insects on their growth and development. Galls normally grow on plant tissues, and gall-inducers use these leaf structures as a shelter for protection and source of nutrition. The use of stable isotopes in the examination of trophic interactions in other insect communities has been fruitful. Carbon becomes slightly enriched across trophic levels, and less reliably so than nitrogen; carbon isotope enrichment is primarily balanced by the ratio of respiration to growth. In the study, we investigated the effects of galling using gall-inducers on *Machilus thunbergii* and *Machilus kusanoi* by measuring stable carbon isotope of the gall and plant tissues. The results suggest that the $\delta^{13}\text{C}$ composition of larva was significantly enriched relative to gall tissues, while galls were slightly enriched relative to galled leaves. The primary plant carbon storage compounds (sucrose, starch) in sink tissues to be enriched in $\delta^{13}\text{C}$ composition over their counterparts in source tissues owing to post-transport metabolic conversions of primary compounds. Food chain of gall on *Machilus thunbergii* may be leaf→ gall→ fungi→ larva. Food chain of gall on *Machilus kusanoi* may be leaf→ gall→ larva. The results support the hypothesis assuming that galls are important sinks of nutritional resources for gall-inducers.

Keyword: Stable isotopes, *Machilus thunbergii*, *Machilus kusanoi*, Sinks, Gall