Effect of carbon, nitrogen, and phosphorus resource on the reproduction of Fagaceae: allocation strategies and seasonal expression profiles of their transporter genes

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（ブナ科樹木の生殖に対する炭素、窒素およびリン資源の影響：生殖器官における配分戦略およびそれらのトランスポーター遺伝子の季節的発現プロファイル）

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論 文 内 容 の 要 旨

Allocation strategies of carbon [C], nitrogen [N], and phosphorus [P] are key to the reproductive processes of plants, and Fagaceae family species exhibit high trait diversity on reproductive traits. Although there have been some studies on the diversity of reproductive characteristics of Fagaceae species, the effect of carbon, nitrogen, and phosphorus resource on the reproduction of Fagaceae species has not been fully studied among different species. To further better understand the influence of carbon, nitrogen and phosphorus resources on their reproduction of Fagaceae species and the differences among their effects in the evolution of a wide variety of Fagaceae, we analysis and compared resource allocation strategies in the reproductive organs of several Fagaceae species and different seasonal expression patterns of carbohydrate, nitrogen, and phosphorus transporter genes in two evergreen Fagaceae species using transcriptome data, and also would like try to explore the relationships between related three resource transporter genes with flowering phenology. In first part, we found that an important parameter in the Resource Budget model determining masting pattern, varied largely among three resource types (C, N, and P) and among species. We also found that there was a negative correlation between pericarp thickness and total phenolics concentrations among seven Fagaceae species, as which suggested by a possible trade-off between C-based physical and chemical defenses. In second part, our results showed transport of nitrate, amino acids and ammonium between leaves and buds was very frequent in spring and summer, while in winter related monosaccharide, nitrate, amino acid, and phosphorus transport were all more frequent and abundant than in other seasons. And we also found that the upregulation of FT genes in leaves was more likely related to nitrogen status in the two Fagaceae species. The research combined physiological, mathematical, and molecular methods will help us better understand the effect of internal resource on the reproduction of Fagaceae family and their evolutionary mechanism.