Study uncovers mechanisms underlying biosynthesis and accumulation of Paris saponins in P. polyphyllavar yunnanensis

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Paris polyphylla var. yunnanensis. Credit: GAO Xiaoyang

Paris polyphylla var. yunnanensis can synthesize Paris saponins with multiple effective therapies, and its rhizome has become an indispensable ingredient in many patented drugs.

Although Paris saponins have important medicinal attributes, little is known about the biosynthesis and accumulation of the compounds in the different tissues of P. polyphylla var. yunnanensis at the functional genomic level. It is necessary to investigate changes in the active ingredients of tissues across development stages and the molecular mechanisms underlying these changes.

In a recent study published in *Phytochemistry*, researchers from the Xishuangbanna Tropical Botanical Garden (XTBG) tried to uncover the mechanisms underlying the biosynthesis and accumulation by integrating transcriptome sequencing and phytochemical investigation of the leaves and rhizomes at different growth stages.

The researchers sampled fresh leaves and rhizomes of P. polyphylla var. yunnanensis from the healthy 7-year-old plants at vegetative stage and fruiting stage and simultaneously subjected to high throughput transcriptome sequencing and phytochemical investigation.

They found that the change tendency of Paris saponins in the leaves across growth stages is opposite to that in the rhizomes. Paris saponins content in leaves was lower during the fruiting stage than the vegetative stage, whereas the content in rhizomes increased during the fruiting stage.

Moreover, most biosynthetic genes were abundantly expressed in the leaves and leaves can be used to extract the compounds. The expression patterns of the biosynthetic genes were positively correlated with accumulation patterns of Paris saponin.

"Our study provides insight into the underlying mechanisms responsible for the biosynthesis and accumulation of Paris saponins, and helps comprehensively utilize the medicinal plant," said Prof. Liu Changning, principal investigator of the study.

More information: Xiaoyang Gao et al. Transcriptome analysis of Paris polyphylla var. yunnanensis illuminates the biosynthesis and accumulation of steroidal saponins in rhizomes and leaves, *Phytochemistry* (2020). DOI: 10.1016/j.phytochem.2020.112460

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