ABSTRACTS (MASTER THESIS)

Functional analysis of flavonoid substrate prenyltransferase from *Macaranga tanarius*

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Prenylation reaction of polyphenolic compounds largely contributes to the chemical and biological diversities in secondary metabolism of plants. To date, ca. 1,000 prenylated aromatic compounds were identified from a variety of plant species, and many of those secondary metabolites exhibit useful biological activities like antimicrobial and anti-tumor activities. Prenyltransferase (PT) plays a critical role in the biosynthesis of those prenylated compounds, whereas only a few PTs have been isolated until now. Glandular trichomes of *Macaranga tanarius* (*Euphorbiaceae*) are known as the plant origin of Okinawan propolis, which contains a large amount of prenylated flavonoids [1,2] ; however no PTs from *Euphorbiaceae* have been reported so far. On those background we tried to isolate *M. tanarius* PTs (MtPTs), and analyze their biochemical functions in this study.

We isolated candidate clones, *MtPT1* and *MtPT3*, and thier full-length sequences were subcloned into a binary vector to make *MtPTs* expression constructs in a plant host. Then, *MtPTs* were transiently expressed in *Nicotiana benthamiana* leaves by using agroinfiltration method. Microsome fractions of the leaves were prepared as crude enzymes for prenyltransferase assay, and their enzymatic function was analyzed. As results, MtPT1 catalyzed prenylation of a flavanone substrate to give prenylated flavonoids. Besides, MtPT3 also showed prenylation activity to a flavanone. We then analyzed the subcellular localization of MtPT1 and MtPT3 by using N-terminal regions of each enzymes fused to GFP respectively. In addition, we investigated *M. tanarius* organ-specific expression of *MtPT1* by real time PCR. MtPT1 and MtPT3 are the first PTs isolated from the family *Euphorbiaceae*. We expect that these PTs being contributed to progression of molecular evolution of PT superfamily, and also metabolic engineering for industrial production of natural medicinal compounds.

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References

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