Regulatory mechanism of product specificity of FPP synthase providing GPP as the specific product in *Lithospermum erythrorhizon*

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Terpenoids occur in all organisms characterized so far. In particular, plants produce a large variety of terpenoid compounds, which are classified into hemi-, mono-, sesqui-, di-, tri- and tetraterpenoids according to the number of carbons in the molecules that correspond C5, C10, C15, C20, C30 and C40 (carotenoid) compounds. Among them, monoterpenoids consist of major flavor components in plants. These C10 compounds are biosynthesized in plastids from geranyl diphosphate (GPP) provided in vivo by GPP synthase (GPPS), whereas there is only one exception of cytosol-localized GPPS that is reported in Lithospermum erythrorhizon, a boraginaceous plant. In order to clarify what kind of polypeptide is responsible for the production of GPP in cytosol and what is the regulatory mechanism of the chain elongation, we systematically cloned putative prenyl diphosphate synthases from the EST library of *L. erythrorhizon*.

Figure shows the subcellular localization of known prenyl diphosphate synthases, either in plastid or in cytosol. There are two types of GPP synthases, one is that functioning as a homodimer and the other is active as a heterodimer (shown in pink), while FPP synthase is cytosol-localized and functioning as a homodimer. The cytosol GPPS of *L. erythrorhizon* is presumed to be either a mutated FPPS having product specificity for GPP or a hetoromer FPPS with an unknown regulatory subunit. Both possibilities have been examined with cell-free extract of cultured *L. erythrorhizon* cells.

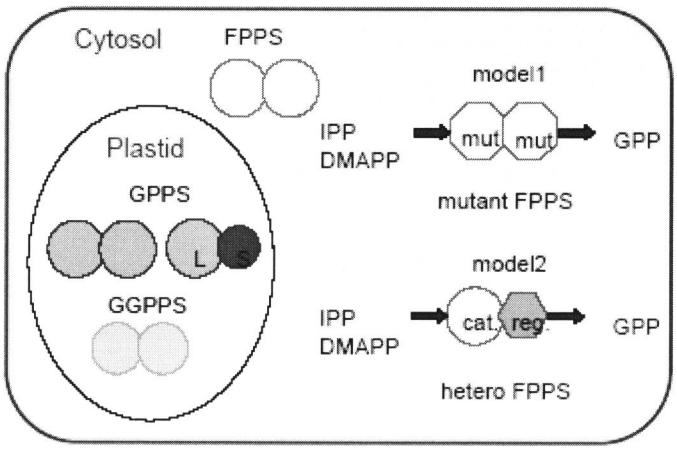

Figure. Two hypothesis of cytosol-localized GPPS