Investigation of a Potential Role of Phospholipase D Zeta in *Arabidopsis thaliana* Seed Oil Accumulation

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Seed oils are important commodities used primarily for human consumption, but also for a wide range of industrial applications. With the decline of crude oil supplies, seed oils are also generating a lot of interest as a “green energy source” for biofuel production. Given the overall demand for oil, understanding the factors that limit seed storage oil accumulation is an essential first step in an effort to increase oil content by genetic engineering. We are investigating a potential role of phospholipase D Zeta (PLDZ) in oil deposition in developing Arabidopsis seed. Two PLDZ genes, *PLD Zeta1* and *PLD Zeta2*, have been annotated in Arabidopsis and they are homologous with the mammalian *PLD1* and *PLD2* which encode enzymes that specifically hydrolyze phosphatidylcholine to produce phosphatidic acid (PA). Expression analysis of *PLD Zeta1* and *Zeta2* in the developing embryo revealed that both genes are highly expressed during storage oil biosynthesis (7-10 days after fertilization). Oil content in single *pldz1* or *pldz2* mutants was decreased by about 4%, while *pldz1pldz2* double mutant exhibited a10% reduction in oil content. Transgenic lines overexpressing *PLDZ* are currently being generated and will be analyzed for oil content. Furthermore, GL2 transcription factor has been reported to negatively regulate *PLDZ* in leaf tissues. To assess a possible role of the GL2 transcription factor in *PLDZ1* and *PLDZ2* expression during oil production, we have constructed the *gl2pldz1pldz2* triple mutant. Functional analysis of the triple mutant will be discussed.

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