

**Division-3-02**

**Identification of a Potential Gene for Elevating  $\omega$ -3 Concentration and its Efficiency for Improving  $\omega$ -6/ $\omega$ -3 Ratio in Soybean**

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**[Abstract]**

This present study was to identify a novel candidate gene that contribute to the elevated  $\alpha$ -linolenic acid (ALA,  $\omega$ -3) concentration in PE2166 from mutagenesis of Pungsannamul. Major loci *qALA5\_1* and *qALA5\_2* were detected on chromosome 5 of soybean through quantitative trait loci mapping analyses of recombinant inbred lines. With next generation sequencing of parental lines and Pungsannamul, and recombinant analyses, a potential gene, *Glyma.05g221500 (HD)* controlling elevated ALA concentration was identified. *HD* is a homeodomain-like transcriptional regulator that may regulate the expression level of microsomal  $\omega$ -3 fatty acid desaturase (*FAD3*) genes responsible for the conversion of linoleic acid into ALA in the fatty acid biosynthetic pathway. In addition, we hypothesized that combination of mutant alleles, *HD* and either of microsomal delta-12 fatty acid desaturase 2-1 (*FAD2-1*), could reduce the  $\omega$ -6/ $\omega$ -3 ratio. In populations where *HD*, and *FAD2-1A* and *FAD2-1B* genes were segregated, combination of a *hd* allele from PE2166 and either of the variant *FAD2-1* alleles were sufficient to reduce the  $\omega$ -6/ $\omega$ -3 ratio in seeds.

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