

GBG Ph.D. DEFENSE

Monday, September 24, 2018

Karanbir
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Johnson Cancer Research Center
Conference Room

36 Chalmers Hall, 1:00 p.m.

Refreshments available

Transcriptomic and lipidomic profiling in developing seeds of two *Brassicaceae* species to identify key regulators associated with storage oil synthesis

Triacylglycerols (TAG) are the major storage lipids found in the developing seeds, petals, pollen grains, and fruits of plants. In *Arabidopsis* seeds, acyl-CoA: diacylglycerol acyltransferase 1 (DGAT1) is the major enzyme contributing to TAG biosynthesis. In *Arabidopsis*, *dgat1-1* mutants retain 60-80% seed TAG content due to the involvement of phospholipid: diacylglycerol acyltransferase (PDAT1) in acyl-CoA independent TAG biosynthesis. Our study focuses on the elucidation and functional characterization of novel genes involved in the regulation of the TAG biosynthesis pathway in plants. We performed RNA-Seq of developing *Arabidopsis* seeds to detect differentially expressed genes in *dgat1-1* compared to WT. Significant changes in gene expression profile were detected in lipid-related genes such as lipases and desaturases. Mutations in a member of the α , β -hydrolase family, encoded by *ABH1* resulted in smaller seed and an altered seed oil phenotype. Combining the *dgat1-1* and *abh1-2* mutant alleles resulted in a lethal phenotype, demonstrating the important role of this enzyme in embryo development and TAG biosynthesis. Development of allopolyploid *Brassica* species from its diploid progenitors involves duplication, loss, and reshuffling of genes leading to massive genetic redundancy. It leads to selective expression or newly acquired role for duplicated homeologs. Differential expression analysis for homoeologous genes from the A and B subgenomes of allopolyploid *B. juncea* belonging to pathways including FA synthesis, acyl editing, and TAG biosynthesis and metabolism was performed. DE analysis identified the transcriptional dominance of A subgenome homoeologs. The selection of these homoeologs will facilitate their use in breeding programs directed towards improvement of lipid content and composition in seeds.

Major Professor: Dr. Timothy Durrett