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E-BABE- A comprehensive framework of gene prioritization for flooding tolerance in soybean

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Abstract

Soybean [Glycine max (L.) Merr] is rich in protein and oil, which is one of the most important crops around the world. Drastic and extreme changes in global climate has led to decreasing production of crops, deterioration of quality, increasing plant diseases and insect pests, which resulted in economic losses. Facing such a harsh circumstance, a seed which is less susceptible to stresses, both abiotic and biotic, is urgently needed. The present study proposes a comprehensive framework, including phenotype-genotype data mining, integration analysis, gene prioritization and systems biology, to construct prioritized genes of flooding tolerance (FTgenes) in soybean to develop a fast-precision breeding platform for variety selection of important traits in soybean. We applied big data analytic strategies to mine flooding tolerance related data in soybean, both phenomic and genomic, from cloud-based text mining across different data sources in the NCBI. We conducted meta-analysis and gene mapping to integrate huge information collected from multiple dimensional data sources. We developed a prioritization algorithm to precisely prioritize a collection of candidate-genes of flooding tolerance. As a result, 219 FTgenes were selected, based on the optimal cutoff-point of combined score, from 35,970 prioritized genes of soybean. We found the FTgenes were significantly enriched with response to wounding, chitin, water deprivation, abscisic acid, ethylene and jasmonic acid biosynthetic process pathways, which play important role in biosynthesis of plant hormone in soybean. Our results provide valuable information for further studies in breeding commercial varietie.

Biography:

Chung-Feng Kao has completed his PhD at the age of 36 years from Lancaster University (UK) and postdoctoral studies from National Taiwan University (Taiwan). He is the assistant professor of National Chung Hsing University. He has published more than 30 papers in reputed journals and has been serving as an editorial board member of Frontiers.

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