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Abstract

From Arabidopsis to crops: a molecular tool to increase protein content and broad disease resistance

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Abstract:

Crop plants must integrate signals from the environment and prioritize responses to stresses that may occur individually or simultaneously throughout the growing season. Stress responses can adversely affect plant growth and quality traits such as protein and starch. The ability to optimize protein productivity of plant-based foods has far-ranging impact on world health and sustainability. Plant diseases each year cause major losses to crop production. The Arabidopsis thaliana QQS (Qua Quine Starch) orphan gene modulates carbon allocation to protein and starch. Ectopic QQS expression increases protein content2 in leaf and seed in soybean, in corn and rice. QQS transcript levels are altered in plants under stresses and in mutants of genes involved in all sorts of stress responses, indicating that QQS may integrate primary metabolism with environmental perturbations, thus adjusting the plant's adaption to abiotic and biotic stresses. The QQS protein binds to a transcriptional regulator in Arabidopsis and its homologs in crops: Nuclear Factor Y subunit C4 (NF-YC4). NF-YC4 overexpression mimics QQS-overexpression phenotype.

Biography:

Ling Li has been an Assistant Professor in the Department of Biological Sciences at Mississippi State University from 2017. She has been developing an integrated experimental/biocomputational approach to identify the factors that regulate plant metabolism.

Recent Publications:

1. Li Li et. al. Identification of the novel protein QQS as a component of the starch metabolic network in Arabidopsis leaves. 2009;
2. Li Li et. al. Materials and methods for modifying a biochemical component in a plant. U.S. App.. 2012.
3. Li Li et. al. The QQS orphan gene of Arabidopsis modulates carbon and nitrogen allocation in soybean. Plant Biotechnology Journal. 2015; 13: 177-187.
4. Li Li et. al. The QQS orphan gene regulates carbon and nitrogen partitioning across species via NF-YC interactions. 2015;.
5. Li Li et. al. Coming of age: orphan genes in plants. 2014

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