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学术沙龙

学术沙龙第三十三期：磷脂酸代谢关键酶CDS调控拟南芥早期胚胎发育的机制研究

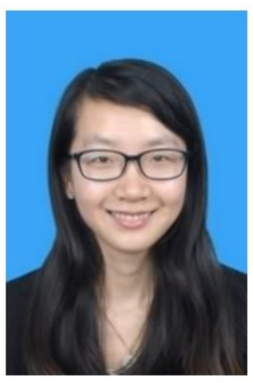
发布时间：2023-03-29 阅读次数：3245

报 告 人：杜心桥 农生学院植物科学系 助理研究员

时　间：2023年3月29日 (星期三) 12:40-14:00

地　点：农生学院创新楼（B楼）104会议室

主办单位：农生学院学科与科技办、农生学院青年教师联谊会



报告题目：磷脂酸代谢关键酶CDS调控拟南芥早期胚胎发育的机制研究

报告摘要：

胚胎是被子植物实现有性生殖和世代交替的重要载体，也是植物生长发育的重要环节。胚胎发育起始于受精后的合子胚，经过细胞分裂和分化，最终发育为成熟胚胎。尽管已鉴定了一些参与早期胚胎发育的调控因子，但由于植物胚胎发育过程和调控网络的复杂性，仍有很多影响胚胎发生的因素需要进一步解析。磷脂及其信号途径在植物生长发育、生物和非生物胁迫响应以及激素反应的信号传递过程中起着至关重要的作用。其中，磷脂酸（PA）作为重要信号分子，通过结合特异靶向蛋白调控细胞信号转导、细胞分裂、膜运输、细胞生长等过程，对植物生长发育调控起重要作用，但PA调控植物早期胚胎发育的功能和分子机制还知之甚少。研究表明，胞苷二磷酸二酰基甘油合酶CDS1/CDS2介导的PA代谢通过调节生长素运输和分布，进而调控植物早期胚胎发育，为植物胚胎发育调控研究提供了重要线索。

报告人简介：

【所在PI学科组研究方向】：

植物激素和磷脂信号调控植物生长发育的机制研究

【代表性著作】：

1. **Du X**, Yao H, Luo P, Tang X, Xue HW. (2022) Cytidinediphosphate diacylglycerol synthase—Mediated phosphatidic acid metabolism is crucial for early embryonic development of Arabidopsis. ***PLoS Genetics***, 18(7): e1010320.

2. Wang F#, Tan Y#, Wallrad L#, **Du X#**, Eickelkamp A#, Wang Z, He G, Rehms F, Li Z, Han J, Schmitz-Thom I, Wu WH, Kudla J, Wang Y. (2021) A potassium-sensing niche in Arabidopsis roots orchestrates signaling and adaptation responses to maintain nutrient homeostasis. ***Developmental Cell***, 56: 781-794.

3. **Du X#**, Wang F#, Li H, Jing S, Yu M, Li J, Wu WH, Kudla J, Wang Yi. (2019) The transcription factor MYB59 regulates K+/NO3- translocation in the Arabidopsis response to low K+ stress. ***Plant Cell***, 31: 699-714.

ACADEMIC SALON (XXXIII)

SPEAKER: Xinqiao Du

Research Associate

Department of Plant Science, SAB

TIME： 12:40-14:00 Mar 29, 2023 (Wed)

VENUE: Room 104, Building B, SAB

ORGANIZER: Office of Discipline and Science & Technology, SAB;

Young Teachers Association, SAB

TITLE: Cytidinediphosphate diacylglycerol synthase-Mediated phosphatidic acid metabolism is crucial for early embryonic development of Arabidopsis

ABSTRACT:

Embryonic development is a key developmental event in plant sexual reproduction; however, regulatory networks of plant early embryonic development, particularly the effects and functional mechanisms of phospholipid molecules are still unknown due to the limitation of sample collection and analysis. We innovatively applied the microspore-derived in vitro embryogenesis of Brassica napus and revealed the dynamics of phospholipid molecules, especially phosphatidic acid (PA, an important second messenger that plays an important role in plant growth, development, and stress responses), at different embryonic developmental stages by using a lipidomics approach. Further analysis of Arabidopsis mutants deficiency of CDS1 and CDS2 (cytidinediphosphate diacylglycerol synthase, key protein in PA metabolism) revealed the delayed embryonic development from the proembryo stage, indicating the crucial effect of CDS and PA metabolism in early embryonic development. Decreased auxin level and disturbed polar localization of auxin efflux carrier PIN1 implicate that CDS-mediated PA metabolism may regulate early embryogenesis through modulating auxin transport and distribution. These results demonstrate the dynamics and importance of phospholipid molecules during embryo development, and provide informative clues to elucidate the regulatory network of embryogenesis.