GRADUATE SCHOOL OF SCIENCE FACULTY OF KYOTO UNIVERSITY

植物生理学セミナー

接木、葉緑体プロテオミクス 乾燥ストレス経路の理解

"Effect of Drought Stress on Critical Signalling Pathways and Homeostatic Maintenance in Graft Junctions of Okra Cultivars Employing Physiological and Proteomic Approach"

SPEAKER

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日時：2024年10月9日（水）
16：00-17：30
場所：理学部2号館第1講義
（120号室）

ABSTRACT

Drought stress is becoming an issue for all important horticulture crops, including okra, as a result of climate change (Abelmoschus esculentus). We conducted a comparative physiological and a large-scale chloroplast proteomics on okra cultivars under drought stress. We tested four important okra cultivars, namely NS7774, NS7772, Green gold, and OH-3312, for their drought resistance. The cultivars NS7772, Green gold, and OH-3312 exhibited the most oxidative damage as a result of drought stress, as measured by H2O2 and O2- levels. The subsequent tissue-specific proteome study of chloroplasts and thylakoids by BN-PAGE (blue native polyacrylamide gel electrophoresis) revealed upregulation of certain proteins, including ATPase, PSI, PSII core dimer, PSII monomer, and ATP synthase for the cultivar NS7774 compared to three other cultivars. In addition, the proteomic data were validated using Immunoblot by selecting a particular protein, such as PsaA. Our physiological modulations and chloroplast proteomics in all cultivars led us to conclude that NS7774 is a resilient rootstock. Later on, we utilised proteomics, transcriptome, and molecular physiology to evaluate the response of sensitive okra cultivars; NS7772 (G1), Green gold (G2), and OH-3312 (G3) (scion) grafted to NS7774 (rootstock). In our investigations, we found that grafting sensitive okra cultivars onto tolerant cultivar alleviated the negative effects of drought stress by increasing physiochemical parameters and decreasing reactive oxygen species. A comparative proteomic investigation revealed the existence of stress-responsive proteins associated with Photosynthesis, energy and metabolism, defence response, protein and nucleic acid production. In addition, the transcriptome of RD2, PP2C, HAT22, WRKY, and DREB dramatically increased in the grafted NS7772 cultivar. Moreover, the parameters related to yield indicated that grafting alone increased plant morphological parameters which contributed directly to their high yield. The current study depicted a novel pathway in okra cultivars to withstand with drought conditions using a combination of grafting, molecular physiology, proteomics, and transcriptome.

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