【生命科学セミナー Biostudies Seminar】

日時：12 月 4 日（月）16:00 - 18:00
場所：京都大学北部構内　農生棟　1階セミナー室
下記 Map 中の 12 番の建物
https://www.kyoto-u.ac.jp/ja/access/campus/yoshida/map6r-n
（開催形式は対面のみになります）

16:00 – 17:00

今井亮三博士
エグゼクティブリサーチャー／農研機構・生物機能利用研究部門
教授／筑波大・生命環境系

植物個体を酵素で直接ゲノム編集する技術 - iPB 法 –

作物でゲノム編集を行う場合、通常培養を介した形質転換が必要である。しかし多くの作物の商業品種においては、脱分化と再分化を経る培養法による形質転換は困難であり、ゲノム編集技術の作物育種への展開を阻害する要因となっている。そこで我々は in planta Particle Bombardment (iPB）法という培養を使わずに植物体を直接ゲノム編集する技術を開発した。iPB 法では、CRISPR/Cas9 リボヌクレオタンパク質を直接導入することにより、DNA を使わずにゲノム編集を行うことができる。本講演では iPB 法の技術の紹介とその作物育種への利用例を紹介したい。

1. Hamada, H., Linghu, Q., Nagira, Y., Miki, R., Taoka, N., Imai, R.* (2017) An *in planta* biolistic method for stable wheat transformation. ***Scientific Reports***. 7, 11443.
2. Hamada, H., Liu, Y., Nagira, Y., Miki, R., Taoka, N., Imai, R.* (2018) Biolistic-delivery-based transient CRISPR/Cas9 expression enables *in planta* genome editing in wheat. ***Scientific Reports*** 8, 14422.
3. Kumagai, Y., Liu, Y., Hamada, H., Luo, W., Zhu, J.,Kuroki, M., Nagira, Y., Taoka, N., Katoh, E., Imai, R.* (2022) Introduction of a second 'Green Revolution' mutation into wheat via in planta CRISPR/Cas9 delivery. ***Plant Physiology***, 188, 1838–1842.
4. Luo, W., Suzuki, R., Imai, R.* (2022) Precise *in planta* genome editing via homology-directed repair in wheat. ***Plant Biotechnology Journal*** 21, 668-670.

17:00 – 18:00

Dr. Gabor O. Galiba
Professor／Department of Agronomy, Hungarian University of Agricultural and Life Sciences, Hungary

Hormonal and Lipidomics Background more over the possible regulatory role of *Rht* (DELLA) genes in the Light-Regulated Cold Acclimation of wheat and barley

Many studies reported that apart from the cold the modulated spectra of the incident white light is also influence the expression of *CBF* genes and frost tolerance in Arabidopsis and winter cereals. In the case of cereals, the increased ratio of far red (FR) light activates the main genes of calcium signaling pathway which in turn induces the expression of CBF-regulon, responsible for the enhanced frost tolerance. More recently the involvement of blue light in cold acclimation was also highlighted in Arabidopsis and also in cereals. To illuminate the inherent changes, some metabolites (not published yet), plant hormone content and lipid composition were determined from leaf samples by advanced MS spectroscopy. In order to discriminate among the light and cold induced changes, the barley plants were raised at both 5 and 15°C under control white light and under supplemental FR and blue illumination. In addition to the metabolite changes, the expression of some key hormone and lipid biosynthesis related genes was measured and will be also presented. To be effective *CBF* genes interact with both the gibberellin (GA) biosynthesis and Della (*Rht*) genes. Consequently, our interest is to work with different wheat *Rht* mutants and with wheat denso and barley slender mutants with altered GA biosynthesis. Some very recent (unpublished) results will be presented how these mutations alter the light spectrum induced freezing tolerance and GA content.

1. ***Journal of Experimental Botany*** (2016) *Vol. 67, No. 5 pp. 1285–1295,*
2. ***Plant Mol Biol Rep*** (2017) 35:399–408 DOI 10.1007/s11105-017-1035-1
3. ***Int. J. Mol. Sci.*** (2017) 18, 1828; doi:10.3390/ijms18081828
4. ***Int. J. Mol. Sci.*** (2020) 21, 7557; doi:10.3390/ijms21207557
5. ***Plants*** (2020) 9, 83; doi:10.3390/plants9010083
6. ***Biomolecules*** (2021) 11, 450.https://doi.org/10.3390/biom11030450
7. ***Plants*** (2022) https://www.mdpi.com/2223-7747/12/1/40

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