Technology from Kyoto University

Novel Genome Editing Technology to Significantly Increase Plant Yield

We are looking to out-license the technology for its commercialization.

Genome Editing of Specific Plant-Common Sequences to Enhance Plant Yield

◆Background

Global agriculture is under pressure from labor shortages and climate change, resulting in unstable yields and higher food prices, as seen in Japan's 2024 rice shortage. While conventional breeding is slow and GMO adoption remains limited, genome editing, which precisely targets specific DNA sequences, offers a faster and socially acceptable alternative. With Nobel Prize-winning technology and several genome-edited crops already commercialized, genome editing is emerging as a practical and promising solution for crop improvement.

◆Description

Researchers at Kyoto University applied genome editing to introduce targeted edits into a promoter sequence that regulates the expression of a gene known to enhance plant biomass and is conserved among many plant species. These edits increased the gene's transcriptional activity, resulting in a significant improvement in rice yield (Fig. 1). Because this approach targets a regulatory mechanism common to many plants, it is expected to be broadly applicable to diverse plant species and contribute to increased production of various food crops.

- **Increased yield and seed number per plant**
  The yield per rice plant increased by approximately 45%, with the number of grains per panicle rising by about 50% (Fig. 1). Grain weight and panicle number per plant were also higher than in the wild type.

- **Broad applicability to other plant species**
  As the target DNA sequence is widely conserved among plant species, this approach is expected to be applicable to various plant species.

◆Development Status

- In targeted genome editing of rice, the following outcomes have been confirmed:
  - Increased yield per plant
  - Increased number of grains per panicle (Fig. 1)
  - Increased panicle number
  - Increased total plant weight

Technology Readiness Level: 3

◆Applications

- Crop variety improvement
- Plant breeding

◆Offer

- Patent License
- Option for Patent License
- Collaborative Research

◆Contact

TLO-KYOTO Co., Ltd.

Mail: licensing_ku@tlo-kyoto.co.jp
Phone: +81-75-753-9150

Level 3, International Science Innovation Bldg., Kyoto University, Yoshidahonmachi, Sakyo-ku, Kyoto 606-8501, Japan

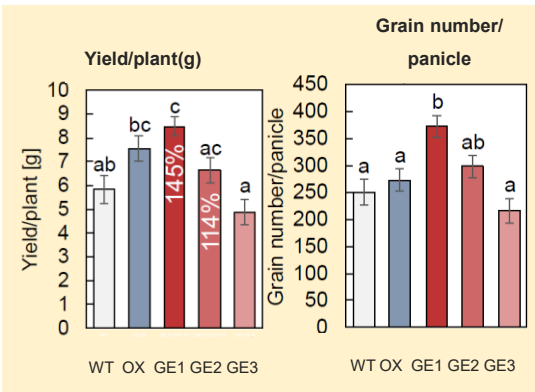

Fig.1 . Comparison of yield and grain number among wild-type (WT), transgenic (OX) plants, and genome-edited rice lines (third generation; GE1–GE3).

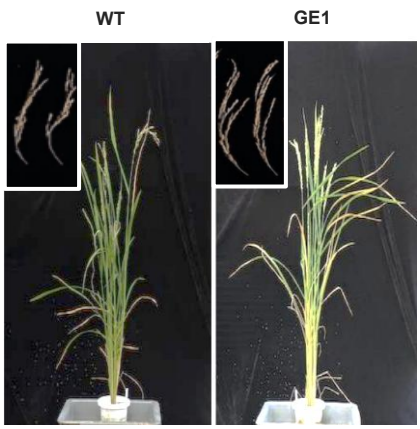

Fig.2 Photographic comparison of wild-type rice (WT) and genome-edited rice (GE1).
White frame: Enlarged image of harvested rice panicles.

Institutional Advancement and Communications

TLO-KYOTO