

Green Biotechnology

R&D Project Title: Development of new plant breeding techniques by optimization of codon and translation machinery

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Summary :

Focusing on the regulation of gene expression at the translational step, we aim to develop new plant breeding techniques based on “codon optimization of useful genes” and “modification of the translation machinery ribosome” to improve the biomass productivity of plants under environmental stresses.

To identify the key codons for efficient translation under environmental stresses, we will examine the relationships between the codon composition and translational efficiency under various stress conditions including mineral nutrient deficiency. We will also try to identify ribosomal protein mutations that improve stress tolerance. In addition, we will develop techniques to increase the transformation efficiency of sorghum, a promising biomass plant.

By improving the tolerance to mineral nutrient deficiency in plants, the use of chemical fertilizers will be reduced, thereby contributing to reduction in CO₂ emissions. The increased stress tolerance of sorghum and other high-biomass plants is expected to further reduce CO₂ emissions through increased CO₂ fixation and the replacement of fossil fuels with biomass energy.

