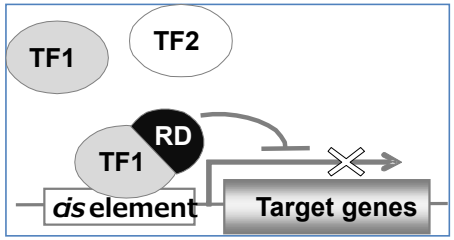
Project Name: International Project of Innovative Artificial Apomixis Induction Technology (2020–2023)

Entrusted parties: Saitama University, National Institute of Advanced Industrial Science and Technology (AIST), Yokohama City University, Tokyo Metropolitan University

Outline of the project

Regarding the apomixis phenomenon in plants, which forms unfertilized and mother-derived cloned seeds, we will develop an artificial apomixis inducing system using the chimeric repressor gene silencing technology that we have developed. The developed artificial apomixis inducing system will be reproduced using genome editing technology.
By applying this technology to grains that have not been adapted to the F1 hybrid, their productivity will improve by more than 20%, and by converting this increase to biofuels, CO_2 emissions will be reduced on a global scale.

CHIMERIC REPRESSOR (TF-RD)

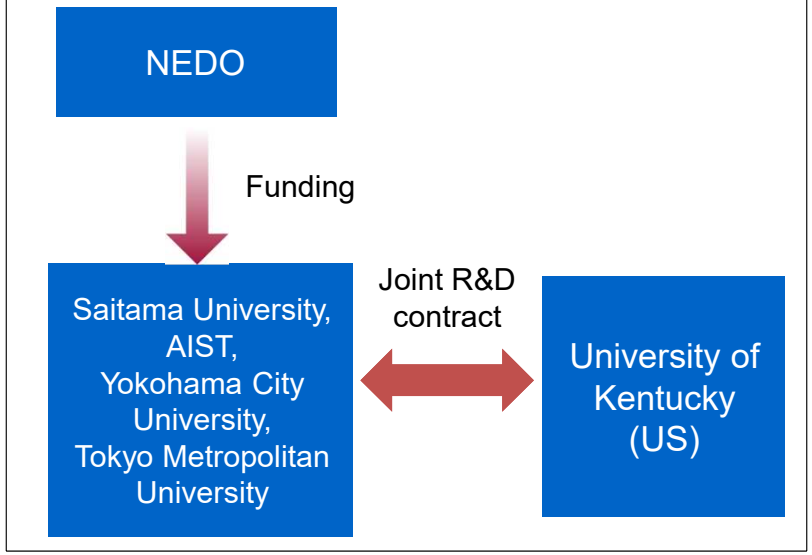


Transforms function by fusion of Transcription Factors (TF) and Repression Domains (RD).

Significance of international R&D

The University of Kentucky is conducting research on endosperm development and has found that improving the stability of actin in the endosperm increases seed size by 20%. This project aims to increase crop production by applying this system to enlarge seed size and the apomixis inducing technology and to further reduce CO_2 emissions.
In addition, this project enables the evaluation of the characteristics of field cultivation of recombinant plants produced in this research and development.

Project scheme



Expected outcomes

- By applying the artificial apomixis-inducing technology to crop plants, such as rice, soybean, and wheat, to which the F1 hybrid is not adapted, the crop production of those crop plants will be increased by 20%. By converting these extra crop yields into biofuel, a dramatic reduction of CO_2 will be achieved.
- For estimated production (rice/soybean/wheat)
  Bioethanol: 130 billion L/year
  Biodiesel: 12 million tons/year
- Estimated reduction amount of CO_2 emissions:
  200 million tons/year