Tomato bioresource development and adaptation of genome editing -PIRC Kenji Miura (Tsukuba-Plant Innovation Research Center, Univ. Tsukuba)

Useful genes can be identified from mutants. And the mutation can be introduced into other cultivars by using genome editing technique.

Development of cultivar by genome editing



Genome editing technique





High sugar content



By using artificial restriction enzymes, mutation can be introduced into the gene of interest without leaving foreign genes*.



XThe scheme for regulation is not clear in Japan

Tomatoes 60 days after harvesting Upper: wild type Lower: mutant

Parthenocarpy



Wild type (parthenocarpy) High sugar content (Brix 10%)





High GABA content

3For public acceptance of genome editing

Natural scientific



Mutation by genome editing Protocol for null-segregant







Social implementation Marketing protocol Science communication

- Collecting scientific information for regulatory authority
- **Explanation about** genome editing to citizens

This work is partly supported by SIP.

4 Establishment of a transient protein expression system in plants

Transient expression in several plants





Level of protein expression in plants is similar to that in *E.coli* (~4mg/gFW)





Three days after agro-infiltration

NT Improved before

 Establish genome editing technique by expression of Cas9 in plants Preparation of protein products

> Yamamoto et al, Sci Rep 8, 4755 (PCT/JP2018/008512)

Tomato bioresource development and adaptation of genome editing -PIRC Kenji Miura (Tsukuba-Plant Innovation Research Center, Univ. Tsukuba) **Importance of tomato research Characteristics of Micro-Tom** Tomato cultivars cv. Micro-Tom Functional ingredients Unique characteristics (Vitamin A&C, lycopene, GABA) (fruit development) Model plants for Solanaceae



THE TOMATO GENOME WRITE OF SPRENG Iner Rat NIC area advantage grantine THE GREAT ESCAPE

Tomato bioresource development is required, because of increase in basic and applied research activity of tomato

Micro-Tom, as a model tomato for research

- Dwarfism (10-20 cm)
- Normal growth under fluorescent lamp
- Short lifecycle (~3 months)
- High efficient transformation (~10%)
- Cross with other varieties

Suitable for cultivation in closed environment

1 Development of mutant population



TOMATO National BioResource Project

Micro-Tom mutant population

Database for mutant population

~20,000 population

10-12 plants/family



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Now 2,300 mutant lines can be provided **TOMATOMA** (http://tomatoma.nbrp.jp/)

DB Contents About Strain (Browse & Home Search) Phenotype Plant Ontology How to Request Download Table of Fees Others Reference Feedback Related Sites Last updated: Nov. 16, 2011 (Ver 1.4.20) NBRP



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NBRP core papers

(1)Micro-Tom mutant collections (full text, pdf) (2)Micro-Tom full length cDNA (full text, pdf) (3)About NBRP activity (Abstract and pdf)

Resource information

What's New





gamma irradiation-induced mutant lines show all (164) a search



Large scale of mutant population (One of largest population)

Information of fruit metabolism



Useful genes can be identified form mutants



Dictionary for breeding

Average and SD values of wild-type Micro-Tom were represented by solid and dotted lines in cyan, respectively.