



**University of Tsukuba**

**Plant Transgenic Design Initiative**

**70<sup>th</sup> PTraD Research Seminar**

**T-PIRC Research Seminar**

Date and Time: 2022/9/27 (Thu) 14:15 –15:00

Place: Gene Research Center, Seminar Room (211)

## **How can genomics studies improve vegetable pre-breeding programs?**

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Genomics studies have improved genebank management, initiated germplasm utilization, and accelerated the development of molecular markers for breeding programs. The World Vegetable Center is the largest public vegetable genebank in the world, and it has been dedicated to tropical vegetable breeding for half a century. The vegetable accessions and breeding lines are perfect genetic resources for vegetable improvement. However, WorldVeg collects more than 300 vegetable species, and most of these vegetables are orphan crops, leading the breeding programs could rely heavily only on phenotypic evaluations. Recently, accompanied by cost-down sequencing technologies, it is achievable to integrate the germplasm into the WorldVeg genebank for breeding programs with different purposes. Starting from genebank management, WorldVeg hosts more than ten *Amaranthus* species, and *Amaranthus* taxonomy was clarified through DNA markers developed by genotyping-by-sequencing. As for the activation of germplasm, WorldVeg maintained more than 10,000 mungbean accessions; a minicore collection (300 accessions) was developed through genotyping-by-sequencing and distributed to 15 countries for multiple location yield trials. Further to developing DNA markers for breeding programs, a Multiparent Advanced Generation InterCross (MAGIC) population was created by the WorldVeg. This population was designed to generate heat-tolerant tomatoes and to study the genetic mechanism of reproductive traits under heat stress. Candidate loci were identified and will be validated in the future.

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