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Development of Drought Tolerant Temperate Rice Varieties, ‘Sechanmi’ and ‘Solchanmi’ Utilizing *Pup1* and *DTY4.1* QTL

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[Introduction]

The impact of climate change on crops such as rice in recent years would cause serious problems for food security in temperate and tropical regions. A major issue with climate change in Korea is drought and high temperature in early spring. Improving root vigor and phosphorous uptake might be helpful to improve drought tolerance in that stage. Two QTLs conferring stress tolerance, *DTY4.1* and *Pup1* are effective for good establishment in early growth stage in less water condition.

[Materials and Methods]

We have developed BC₂F₁₀ QTL pyramiding breeding materials. ‘Sechanmi’ and ‘Solchanmi’ contain *Pup1* and *DTY4.1*, respectively, were introgressed into MS11, a *japonica* rice variety adaptable to tropical regions, using marker-assisted backcrossing. Background genotyping of the breeding lines of BC₂F₇ showed more than 88% of genomic similarity of them to MS11. The promising lines were tested in normal growth condition and rainfed, high temperature, and salinity conditions by collaborations. Candidate genes identification of two developed varieties would be performed by whole genome re-sequencing and Axiom Oryza 580K genotyping array.

[Results and Discussion]

MS11-drought tolerant lines showed mostly similar under normal growth condition to MS11 in the overall plant type and yield capacity. Under drought and abiotic stress conditions, the developed varieties showed better yielding and fertility. The pyramiding of *Pup1* and drought QTLs might provide the meaningful breeding materials for the climate-ready rice development.

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