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Oral sessions | Farming System | O23: Crop Modeling: Recent Progress and Applications

## [O23] Crop Modeling: Recent Progress and Applications

Chair: Hiroshi Nakagawa (National Agriculture and Food Research Organization, Japan)

Chair: Xinyou Yin (Wageningen University and Research, Netherlands)

Thu. Sep 9, 2021 5:00 PM - 7:00 PM Room 2 (Oral) (Farming System)

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6:10 PM - 6:25 PM

### [O23-05] Characteristics of the Grain Weight Distribution Relating to the Ability of Resource Allocation in a Rice Panicle

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Rice is an important staple food. Disclosing the system controlling rice yield has been attracting our spirit of inquiry. In this study, we defined a novel criterion representing the resource allocation in a panicle based on grain weight distribution, which was represented as the mixture of two gamma distributions with five parameters. We evaluated the genotype-specific stability of the criterion using 91 rice cultivars in nine environments. Cultivars showed large variation in their stabilities. The cultivars, which decreased their average weight of high-weight grains under unfavorable environments and produced smaller amount of middle-weight grains, showed stable performance in allocation. To evaluate the possibility to control grain weight distribution genetically, the genomic prediction was conducted for the grain weight distribution parameters using the 123 cultivars. In a single environment, the proportion of high-weight grains, average weight and variance of high-weight grains were predicted with accuracies (correlation between observed and predicted values) of 0.30, 0.28, and 0.53, respectively. This result indicates the possibility of genetic control of the grain weight distribution. To overcome the challenging issue: prediction for wide environmental and genetic variations, it is required to harmonize the different levels of data, e.g., the environmental response of target traits and relating key traits and genome information. Constructing and binding of the small parts of models based on both the biological and mathematical knowledge will be helpful.