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Relationship Between Head Rice Yield and Yield-Related Traits for Rice Cultivars under different climate in the Mid-Plain Area of Korea

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[Introduction]

Head rice yield is one of the most important and complex traits in commercial rice production. It is important to understand the relationship between head rice yield and its components, which will improve development of rice cultivation methods. A field study was conducted to determine the relationship between head rice yield and yield-related traits for early, mid, and mid-late cultivars under different transplanting dates in Suwon from 2018 to 2020.

[Materials and Methods]

Three rice cultivars Odae, Cheongpum, and Samkwang were transplanted 6 times from 20 May to 10 July in 2018-2019, and four times in 2020 at 10-11 day intervals in Suwon. Thirty-day-old seedlings of the cultivars were transplanted in the same experimental plot for each transplanting date and were managed following the standard cultivation manual of the Rural Development Administration. Rice was harvested at 43 to 63 days after heading when the accumulated temperature reached 1100 to 1200℃, but late headed plots were harvested at the same time on 1 Nov in 2019, and 5 Nov in 2019. Apparent head brown rice yield (HBR) was measured and used instead of head rice yield in this study.

[Results and Discussion]

On average, the HBRs were 605, 631, and 547 kg/10a in 2018, 2019, and 2020, respectively. Overall the data, HBR showed positive correlations with grain yield (r=0.87**), spikelet number per m^2 (r=0.67**), spikelet number per panicle (r=0.69**), head rice ratio (r=0.41**), and panicle number (r=0.36*). Among those traits, grain yield was the most significant, and grain yield was correlated with sink size traits such as spikelet number in 2018 and 2019, and panicle number in 2020. In 2020, spikelet number was not correlated with HBR, and it is thought that panicle number is more important than spikelet number in low radiation condition. Highly significant correlation coefficients between HBR and head rice ratio were observed in 2018 and 2019, and the head rice ratio was correlated with ripening ratio. There was no significant relationship between HBR and panicle number for each of the three cultivars, whereas there were significant positive associations for spikelet number and spikelet number per m^2. We found that correlations between agronomic traits and HBR on three rice varieties across three years. HBR can be improved by increasing spikelet number and panicle number, however ripening ratio should be counted for unfavorable environmental conditions such as hot weather in 2018 or long cloudy weather in 2020.

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