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Effect of Transplanting Time on the Physicochemical Properties of Starch According to Mature Type of Rice Varieties

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[Introduction]

Starch determines the eating and cooking properties of rice grains, at least contributes to them through interactions with other components in the rice endosperm (proteins, lipids, water) or through interactions with other ingredients used to process the rice. This report is the result of studying the changes in starch characteristics when transplanting is delayed for each mature type of rice variety.

[Materials and Methods]

The varieties used in the experiments includes Jopyeong (early-maturing variety), Haiami (mid-maturing variety), and Ilpum (mid-late maturing variety). In 2017~2019, these three varieties were transplanted in May 30th, Jun 30th, and July 30th at a paddy field of Gyeongsangbuk-do agricultural Research & Extension Services. Milled rice quality, the granule size distribution of flour, gelatinization properties (starch pasting properties and differential scanning calorimetry), damaged starch contents, amylopectin branch-chain-length distribution and X-ray diffraction (XRD) were measured.

[Results and Discussion]

The limit transplanting period considering the yield of rice in Dague region, the inland plains of Gyeongsangbuk-do, was estimated to be July 15th for early and mid-maturing rice and July 5th for mid-late maturing rice. However, as the transplanting time was delayed, it was observed that the characteristics of rice starch changed significantly. In the case of early and mid-maturing rice varieties, the starch granule size increased as the transplanting time was delayed, and the opposite tendency was observed for mid-late maturing varieties. In all mature types of rice, the late transplanting resulted in a longer pasting time and a higher pasting temperature. In addition, the peak viscosity, breakdown (BD), gelatinization temperature were significantly lowered, and the relative crystallinity degree was decreased, and the setback (SB) was significantly increased,. In the case of Ilpum, a mid-late maturing rice variety, the distribution of amylopectin short chains tended to increase markedly when rice was transplanted on June 30th.

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