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Influence of climate conditions on yield, chemical component, color difference and starch characteristics of colored rice cultivars

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Abstract

This study was conducted to know the influence of air temperature and sunshine duration on yield, chemical component, pigment color difference and starch characteristics of two colored rice cultivars in the plain area of Yeongnam province in Korea. The L^*, a^*, and b^* value of brown rice in Hongjinju and Josaengheugchal rice cultivars was significantly different at continuous cultivated years, 2015 and 2016. The L^*, b^* value of two colored rice was significantly increased in 2016 compared to 2015. The a^* value of Josengheugchal rice cultivar was also significantly higher at 2016 than at 2015. It can be noticed the a^*, b^*, L^* values in Josaengheugchal varied more than those in Hongjinju. Air temperature during ripening period in 2016 was higher than 2015, especially minimum temperature was too high to proper maturation for rice quality. In Josaengheugchal rice cultivar, sunshine duration after heading was longer in 2016 than in 2015. On the contrary, Hongjinju rice cultivar was ripened under condition of insufficient sunshine duration in 2016. The short growing duration by high temperature and long shiny duration made the lack of pigment for Josaengheugchal brown rice. In Hongjinju rice cultivar, shorten sunshine duration and higher night temperature were the source of the pigment deficiency. The grain size of rice which produced in 2016 was bigger than that of 2015 in both rice cultivars. The 1,000 grain weight of rice from 2016 was also bigger than that of 2015. Head rice ratio was high in the rice cultivars produced in 2015. Protein of milled rice in 2016 was more decreased than that of 2015 in Josaengheugchal rice cultivar, it showed reverse result in Hongjinju rice cultivar. Amylose contents of milled rice in 2016 were more decreased than that of 2015 in Hongjinju rice cultivar. Branch chain length distribution of amylopectin was shown a distinct difference between Josaengheugchal and Hongjinju rice flours by each produced year. Josaengheugchal rice cultivar produced in 2015 had a higher amount of short chains than that of 2016 rice starches. In Josaengheugchal rice cultivar, the pasting temperature and peak, trough, breakdown, final viscosity increased in rice flour which produced at 2016, whereas the setback viscosity and peak time showed lower value than those of rice from 2015. The most pasting properties (except of setback viscosity) of rice starch in Hongjinju rice cultivar grown in 2015 were higher than those of rice cultivar produced in 2016.

Keywords: pigmented rice, color difference, climate, starch, physicochemical properties

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