

Effect of planting density on rice yield and quality in different varieties

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This experiment was carried out to determine the effects of planting density on rice yield and quality in different varieties. Planting density were adjusted by hill spacing and planting number of hill. Three rice varieties, Chucheongbyeo, Ilpumbyeo and Koshihikari, were treated with 3 different levels of planting distance (30×14, 30×16, and 30×18cm) and 4 different levels of planting number (1, 3, 5, 7 plants per hill). Resultant changes in each rice yield and quality factors such as Toyo taste value, protein content and head rice ratio were evaluated. The number of tiller and panicles per m² was increased by elevating the planting density and the number of plants per hill, however the yield was not significantly different by different levels of planting density in Ilpumbyeo. Heading date was delayed mainly due to the lowering plant number per hill. Whole grain ratio of brown rice was significantly decreased by lowering both of the number of hill per m² and plant number per hill. It seemed that rice quality was mainly deteriorated by narrowing hill space in Chucheongbyeo and by raising the number of plants per hill in Ilpumbyeo, whereas rice quality of Koshihikari was not significantly changed. In order to enhance rice quality level, it was needed to reduce planting density under maintaining rice yield. Optimum transplanting density of Chucheongbyeo, 30×14cm and 3 plants per hill, was inducted by statistical analysis. However the other two variety's optimum transplanting density levels were not distinctly clarified with statistically tenuous ground for quality enhancement.

Assessment of N top dressing rate with chlorophyll meter based diagnosis of rice

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This study was conducted to determine N topdressing rate at panicle initiation stage by using chlorophyll meter (SPAD-502) based N nutritional diagnosis of rice plant for high quality production of Chucheongbyeo variety. Field experiment had been carried for 3 years from 2003 to 2005 in Gyeonggi, Hwaseong. To confirm the method of measuring the leaf color with SPAD-502, leaf position of rice plant and measuring point in the leaf were studied. And the proper period to examine the leaf color and growth characteristics of rice plants was suggested at about Jul. 15th from the result of the correlation between SPAD value and both content of chlorophyll and nitrogen in rice leaves. The multiply value of plant height, tiller's number and SPAD could explain well the effect of nitrogen fertilization on the growth of rice plants, and it was used to make an equation for on-site determination of nitrogen fertilization rate for Chucheongbyeo variety at panicle initiation stage. Nitrogen fertilization increased tiller's number and rice yields, while affected the increase of protein content in rice grain resulted in quality loss, such as taste value, and decreased the percentages of both ripened grains and whole rice grains. By the response surface statistical methodology using SAS program, the relationship equation among protein content of brown rice (PROT), plant growth value (plant height×number of tillers×SPAD value, PTS), and nitrogen fertilization rate at panicle initiation stage (NF) was developed. That is, $PROT(\%) = 7.379403 - (5.27E-7)a - 0.013291b + (3.025355E-13)a^2 + (3.222997E-8)ab + (6.781E-05)b^2$, where a means PTS and b is NF(%), and the equation's coefficient of determination (R^2) was 0.9668. From this equation, a chart to find out easily the proper nitrogen fertilization rate at panicle initiation stage to produce high quality of Chucheongbyeo rice grain, which contains the protein content behind 7.5%, could be developed.