The Relationship between Grain Productivity and Nitrogen-fertilizer Rate of Currently Cultivated Rice Cultivars

I. The Effects of Different Nitrogen Rates on Grain Yield and Yield Components in Rice

Ming-Hsing Lai, Chen-Chang Chen, Yih-Chuan Kuo, Hsui-Ying Lu, Chyr-Guan Chern, Charng-Pei Li and Tung-Hai Tseng

Summary

A total of four currently cultivated rice cultivars, Tainung 67, Taikeng 2 and 6, and Taichung Sen 10(TCS 10), were used in this study. The experiment was conducted at the experimental farm of Taiwan Agricultural Research Institute under four nitrogen rates(60, 100, 140, 180kg N/ha for the 1st rice crop season; 60, 90, 120, 150 kg N/ha for the 2nd rice crop season) in 1993 and 1994. The objectives of this study were to elucidate the relationship between grain productivity and nitrogen-fertilizer rate for those rice cultivars, emphasizing on the performance of grain yield, yield components and the changes in some nutrients of soil and infestation of diseases. In the 1st rice crop season, the positive response of grain yield to increased nitrogen rate was found only in TCS 10. Grain yield of the three japonica rice cultivars peaked at the nitrogen rate of 140kg/ha. Under 180kg N/ha condition, as well as the infestation of blast and sheath blight were observed in Tainung 67. The grain yield under 180kg N/ha condition was lower among treatments for Tainung 67. On the another hand, the grain yield was not significantly increased as the nitrogen rate changed from 140 to 180kg N/ha for Taikeng 2 and 6. In the 2nd rice crop season, the positive response of grain yield to nitrogen rates was not found in all the cultivars used. Panicle number per hill increased in response to high nitrogen rate, however, both seed set and 1,000 grain weight decreased in the four cultivars. It is concluded that lodging and pest infestation were the two key factors in affecting grain yield with increasing rate of nitrogen. Soil analysis indicated no significant changes in organic matter content and pH value due to nitrogen treatment. Considering lodging and infestation of diseases, grain yield and quality, practice cost and straw, yield, it is suggested that the recommended nitrogen rate was 140kg N/ha for the 1st rice crop season and 90kg N/ha for the 2nd crop.

Key words: Rice, Grain yield, Nitrogen, Agronomic characteristics.

1. Contribution No. 1855 from Taiwan Agricultural Research Institute.
2. Assistant, Department of Agronomy, TARI. Wufeng, Taiwan, ROC.
3. Assistant Agronomist, Department of Agronomy, TARI. Wufeng, Taichung, Taiwan, ROC.
4. Respectively, Rice Breeder and Statistician, Department of Agronomy, TARI. Wufeng, Taichung, Taiwan, ROC.