CHARACTERISTICS OF RICE BRONZING IN NIGERIA AND ITS CONTROL BY POTASSIUM SULFATE APPLICATION

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Bronzing is one of the constraints on rice production in West Africa. However, few physiological studies on the bronzing had been carried out there, which prevented further development of breeding program and improvement of agronomical practices.

The rice plants with bronzing sampled from the Nigerian fields where the soils consisted of Tropaquent, Tropaquult and Tropaquept were deficient in potassium, phosphorus, and magnesium potassium deficiency occurring most frequently. The plants had a high iron concentration. However, the ferrous iron concentration in the soil was at most 50 ppm, which was not high enough to ensure the plants by itself. Thus, the nutrient deficiency seemed to trigger the bronzing occurence in Nigeria.

The application of chloride compounds to the soil was detrimental to the growth of rice plants and increased the bronzing severity. On the contrary, sulfate compounds were beneficial. These effects may be ascribed to the changes in the root metabolism and soil reactions of sulfur and chloride.

Application of potassium sulfate reduced the bronzing occurence of rice plants grown in the fields, presumably due to the combined beneficial effect of increased potassium nutrition and sulfate treatment. The decrease in the iron concentration in the shoots was associated with an increase in the shoot weight and was not due to the reduction in iron uptake from the soil.

The interrelationships between the factors associated with the bronzing occurence, which include the changes in soil chemical reactions and plant mineral metabolisms, in particular iron toxicity, were reviewed and discussed. The targets for varietal improvement included increased activity of roots, high dry matter production under nutrient stress, and tolerance of leaf tissues to high iron concentration. For the agronomical aspects, intensive potassium fertilization should be a prerequisite.