

Effect of allophonic water treatment residual on paddy rice cultivation(Biological Interactions in Arable Land-Grassland-Forest Continuums and their Impact on the Ecosystem Functions, 7th International Symposium on Integrated Field Science)

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Effect of allophonic water treatment residual on paddy rice cultivation

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Water Treatment Residual (WTR) is a by-product of municipal drinking water treatment plants. WTR is generated in large quantities every year and most of WTR is disposed as an industrial waste. It is desirable to develop the effective way to use WTR from the viewpoint of the resources recycling.

In the present study, we applied WTR to the paddy field soil and examined the growth improvement of rice plants in 2006, 2007. In those experiments, we found promotive growth at the medium WTR rate and defective growth at the high WTR rate. In 2008, we examined the cause of defective growth when the WTR rate was high.

MATERIALS AND METHODS

The WTR sample was taken from Asaka filtration plant and soil was taken from the plow layer of the paddy rice field at Furukawa Agricultural Experiment Station.

The soil and WTR were mixed at various rates (0, 6, 12, 24, 100% in 2006, 0, 12, 24, 90, 95, 100% in 2007, 0, 90, 100% in 2008) and were packed in pots to become 3.3kg/pot in the total weight. During the growing season in 2006 and 2007, we measured plant height, number of leaves and tillers, leaf color index, and dry weight and the amount of nitrogen uptake after harvest. Further, in 2008, EC of the flooded water and soil solution were determined during the growing season, and concentrations of P and Mn in plant body, Mn concentration in soil were determined after harvest.

RESULT

Growth improvement was observed in plant height, number of tillers, and dry weight of rice plants up to the WTR rates of 24%. Dry weight of ear in the 24% WTR treatment increased twice that of control. However, when the WTR rate was more than 90%, rice growth became defective.

The amount of nitrogen uptake gradually increased to the WTR rate of 24%. Although an increase in nitrogen uptake was significant at the WTR rate was 90%, it decreased at the WTR rate was 100%.

The EC value of the flooded water and soil solution showed very high values compared with control in the 90 and 100% WTR treatments. The P concentrations of plant body were very low, and the Mn concentration in plant body and soil were very high in these treatments. These were considered to be the causes for the defective rice growth.