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## Analysis of indicator microorganism concentration in the rice cultural plot after reclaimed water irrigation

하수처리수 관개후 벼재배 시험구에서 지표미생물 거동 분석

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A study was performed to examine the effects of UV-disinfected reclaimed water on microorganism concentration during rice culture. Four treatments were used and each one was triplicated to evaluate the changes of microorganism concentrations: stream water irrigation (STR), biofilter effluent irrigation (BE), UV-disinfected water irrigation with dose of  $6 \text{ mW} \cdot \text{s/cm}^2$  (UV-6), and UV-disinfected water irrigation with dose of  $16 \text{ mW} \cdot \text{s/cm}^2$  (UV-16). The indicator microorganisms of interest were total coliform (TC), fecal coliform (FC), and *E. coli*. The biofilter effluent from 16-unit apartment sewage treatment plant was used as reclaimed water and flow-through type UV-disinfection system was used. Concentrations of indicator microorganisms in the treatment plots ranged from  $10^2$  to  $10^5$  MPN/100mL during 24 hours after irrigation in May and June, where initial irrigation water for transplanting preparation was biofilter-effluent without UV-disinfection. It implies that initial irrigation using only non-disinfected reclaimed water for puddling in paddy field can be health-concerned because of more chance of farmer's physical contact with elevated concentration of microorganisms. The concentrations of microorganisms varied widely with rainfall, and treatments using UV-disinfected water irrigation showed significantly lower concentrations than others and their levels were within the range of paddy rice field with normal surface water irrigation. The mean concentrations of STR and BE during growing season were in the range of  $4 \times 10^3$  MPN/100mL for TC, and  $2 \times 10^3$  MPN/100mL for FC and *E. Coli*. While mean concentrations of UV-6 and UV-16 were less than  $1 \times 10^3$  MPN/100mL for all the indicator microorganisms. Overall, UV-disinfection was thought to be feasible and practical alternative for agricultural reuse of secondary level effluent in Korea.

*KEY WORDS* : Indicator microorganisms, Paddy rice culture, Reclaimed water, Irrigation, UV-disinfection, Water reuse.