

# Improving Iron and Copper Uptake by Changing the Ratios in Root of Vetiver Grass

## Abstract

Phytoremediation using Vetiver grass (VG) has been used in the past few decades all over the world, but the effectiveness of its uptake mechanism in water has less been discussed especially in mixed metal conditions. Hence, the focus of this research was to determine and evaluate the heavy metal removal effectiveness of two heavy metals, copper (Cu) and iron (Fe), based on vetiver grass uptake and toxicity. Three treatments of Fe and Cu mixture were chosen, and individual concentrations act as a control. The vetiver grass at a height of 10 cm and a root length of 25 cm for each treatment was used and harvested on days 0,1, 3, 6 and 7. The roots were randomly cut, oven-dried and used the digestion method to extract the Fe and Cu in the root. From the result, vetiver grass has better Fe and Cu uptake ability in the mixture treatment compared to the individual treatment. Fe uptake is increasing up to 25.3 % in the presence of Cu (mixture 1). Meanwhile, for Cu, mixture 3 is an ideal ratio to increase the Cu uptake by 14.5%. It shows that both Fe and Cu facilitated each other's uptake in real wastewater conditions. There were also observed minimal toxicity signs such as necrosis throughout the experiment. The appearance of vetiver grass has changed in this experiment starting day 3 and remains yellowish. In conclusion, wastewater that contains a high concentration of Fe than Cu can promise the improvement of both Fe and Cu uptake by vetiver grass. This study benefits researchers that apply phytoremediation to remove heavy metals in wastewater by providing a guideline for Fe and Cu removal by vetiver grass. In future, the study will focus on the mechanism and interaction of Fe and Cu uptake by root