The Solubility Of Manganese And Coincident Release Of Metals Based On The Reduction Of Alamosa River Basin Soils, Colorado

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Abstract

This research was conducted to determine the impact of reducing conditions on the solubility of manganese and the coincident release of Cu, Ni, and Zn. In the Alamosa River basin, Mn is of particular concern because it consistently exceeds water quality standards. An innovative approach was used for temporal redox potential measurements and sample solution collection. Platinum electrodes, inserted into repacked soil columns, were used to measure Eh (mV).

A critical Eh had to be reached before Mn oxide dissolution would occur. After the critical Eh was reached, Mn concentrations experienced a time lag effect. Metal concentration increased significantly in all of the soils under low pH and low Eh conditions as a result of increases in metal solubility. Manganese increases the most in concentration compared to Cu, Fe, Ni, and Zn under reducing conditions and is highest for the soils irrigated with Alamosa River water. Coincident increases in Cu, Ni, and Zn concentration occurred, however, there is not enough data to support coprecipitation as the responsible mechanism. Time may have been a limiting factor on the amount of Mn^{2+} in solution. Manganese reduction may not have occurred to the full extent due to the rapidity with which the soils became reduced.