Evaluation of Sedimentation Control as a Best Management Practice for Removing Copper-based Crop Protectants in Plasticulture Runoff

Karen Marie Stall

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Daniel Gallagher, Co-Chair
Andrea Dietrich, Co-Chair
Theo Dillaha

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(ABSTRACT)

The fate and distribution of copper-based crop protectants, applied to tomato fields to protect against disease, were investigated in a greenhouse-scale simulation of farming conditions in a coastal environment. Following rainfall, 99% of the applied copper was found to remain on the fields sorbed to the soil and plants; most of the soil-bound copper was found sorbed to the top 2.5 centimeters of soil. Of the copper leaving the agricultural fields, 82% was found in the runoff with the majority, 74%, sorbed to the suspended solids. The remaining copper, 18%, leached through the soil and entered the groundwater with 10% in the dissolved phase and 8% sorbed to suspended solids. Although only one-percent of the copper was found to leave the field, this was sufficient to cause high copper concentrations (average 2102 ± 433 μg/L total copper and 189 ± 139 μg/L dissolved copper) in the runoff. Copper concentrations in groundwater samples were also high (average 312 ± 198 μg/L total copper and 216 ± 99 μg/L dissolved copper). Sedimentation, a best management practice for reducing copper loadings, was found to reduce the total copper concentrations in runoff by 90% to a concentration of 245 ± 127 μg/L; however, dissolved copper concentrations remained stable, averaging 139 ± 55 μg/L. Total copper concentrations were significantly reduced by the effective removal of suspended solids with sorbed copper.

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