#19: Presence of three antibiotics in wheat plants and groundwater at The Living Filter: a wastewater reuse site

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With rising demands on water supplies, wastewater treatment plant (WWTP) effluent is often reused to irrigate agricultural lands. Emerging contaminants, like antibiotics, are frequently found in effluent due to limited removal during WWTP processes. With incidences of antibiotic resistant bacteria in human and animal medicine increasing, concern has arisen about the environmental fate of antibiotic compounds when WWTP effluent is released into the environment. This study's aim was to analyze the presence of three antibiotics, sulfamethoxazole (SMX), trimethoprim (TMP), and ofloxacin (OFL), in wheat plants (*Triticum aestivum*) and groundwater at The Living Filter, an agricultural site where WWTP effluent is spray irrigated year round. Water samples were collected three times throughout the year (Spring, Summer, and Fall). Wheat plants were collected during the summer prior to and during harvest and, then, separated into grain and straw for subsequent analysis. Plant and water samples were analyzed by solid phase extraction cleanup and liquid chromatography tandem mass spectrometry. Plant tissues required an additional liquid-solid extraction step. Sulfamethoxazole and OFL were quantifiable in groundwater samples with concentration ranges of 1.9-660 ng/L and 0.14-67 ng/L, respectively. Trimethoprim was typically only detectable in groundwater, but had a high concentration of 22 ng/L in the summer. For wheat plants, residues of each compound were present on most plant surfaces. Ofloxacin was found throughout the plant in straw (10.2 Â± 7.05 ng/g) and grain (2.28 Â± 0.89 ng/g). Trimethoprim was found only on grain or straw surfaces, while SMZ were concentrated within the grain (0.64 Â± 0.37 ng/g). Overall, these findings demonstrate that when WWTP effluent is spray irrigated antibiotic compounds can be found in groundwater and plant tissues as well as adhere to plant surfaces. While overt toxicity is typically not a concern, these low levels of antibiotics found in groundwater and associated with plants used as food sources raise questions about potential long-term risks for human, animal, and ecological health.