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EXPOSURE TO PHARMACEUTICALS AFFECTS NUTRIENT AND METAL UPTAKE BY WHEAT, *Triticum aestivum* L.

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Abstract

Interest in water recycling has provided opportunities to evaluate the potential impact of pharmaceuticals and personal care products (PPCPs) on plants where recycled wastewater is used for watering and irrigation. Most researches have focused on the impact of pharmaceuticals on seed germination and plant physiology or the uptake of pharmaceuticals into plants. We sought to find out whether nutrient and metal uptake into wheat plants were affected by the presence of PPCPs (acetaminophen, caffeine, β-estradiol, and gemfibrozil) in soil. As acetaminophen, caffeine, β-estradiol, and gemfibrozil concentrations in soil increased, plant physiological parameters such as electrolyte leakage and lipid peroxidation also increased significantly over levels in control plants grown in parallel. Furthermore, increasing PPCP soil concentrations led to decreasing element concentrations in wheat plants, suggesting a reduction in uptake of nutrients and metals in the presence of pharmaceuticals. Our short-term observations suggest plants irrigated with recycled wastewater containing PPCPs experience stress which is ultimately reflected in a reduction of nutrient and metal uptake by wheat plants.

Key words: acetominophen, metal, personal care products, pharmaceuticals, wheat

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