

# New research provides early indications that recycled sewage water is safe for crop irrigation

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The first study under realistic field conditions has found reassuringly low levels of pharmaceuticals and personal care products (PPCPs) in crops irrigated with recycled sewage water, scientists reported here today at the 246th National Meeting & Exposition of the American Chemical Society (ACS).

The research, which eases some concerns over using treated wastewater for agriculture, was one of almost 7,000 reports on new advances in science at the ACS meeting. The sessions, held in the Indiana Convention Center and downtown hotels, continue through Thursday.

"The levels of pharmaceuticals and [personal care products](#) that we found in [food crops](#) growing under real-world conditions were quite low and most likely do not pose any health concern," said Jay Gan, Ph.D., who led the study. "I think this is good news. These substances do not tend to accumulate in vegetables, including tomatoes and lettuce that people often eat raw. We can use that information to promote the use of this treated wastewater for irrigation."

Gan and colleagues at the University of California-Riverside launched the study because drought and [water](#) shortages in the American southwest and in other arid parts of the world are using water recycled from municipal [sewage treatment](#) plants to irrigate food crops as the only option.

Water from toilets and sinks enters those facilities from homes and offices, and undergoes processing to kill disease-causing microbes and remove other material. Processing leaves that water, or "effluent," from most sewage treatment plants clean enough to drink. Traditionally, however, sewage treatment plants simply discharge the water into rivers or streams. The effluent still may contain traces of impurities, including the remains of ingredients in prescription drugs, anti-bacterial soaps, cosmetics, shampoos and other PPCPs that are flushed down toilets and drains.

Gan explained that concerns have arisen about the health and environmental effects of those residual PPCPs, especially over whether they might accumulate to dangerous levels in food crops. Previous studies on PPCPs in food crops were small in scale and conducted in laboratories or greenhouses. Gan said his team was the first to focus on 20 PPCPs in multiple crops under realistic field conditions.

They chose eight vegetables that people often eat raw—carrots, bell peppers, tomatoes, cucumbers, lettuce, spinach, celery and cabbage. Gan explained that cooking and other processing can destroy PPCPs, and he wanted to determine the maximum amounts of PPCPs that consumers might ingest.

Xiaoqin Wu, a postdoctoral student in Gan's lab who gave the ACS presentation, said all the crops absorbed PPCPs, including a medication for epilepsy; triclosan, a common anti-bacterial ingredient; a tranquilizer; and caffeine. Leafy vegetables took up the highest amounts of PPCPs.

Wu and Gan said the findings are a first step toward a full understanding of the potential human health effects of PPCPs in sewage treatment plant effluent recycled for irrigation. For instance, many other substances from PPCPs may occur in recycled water but were not included in the study. Likewise, they noted, young children, older

individuals and people with chronic diseases may be more susceptible to low levels of PPCPs.

They pointed out that irrigation of food [crops](#) with treated wastewater is a well-established practice in some desert countries. Israel, for instance, recycles about 80 percent of all municipal sewage treatment plant effluent and plans to ramp that up to 100 percent by 2020. Estimates suggest that the United States only recycles about 2 to 3 percent. Water scarcities predicted for the future could substantially increase the use of recycled wastewater here and globally. Water shortages already affect almost 1 billion people, they added.

### **More information: Abstract**

Accumulation of pharmaceutical and personal care products (PPCPs) in vegetables under field conditions

Treated-wastewater irrigation and biosolid amendment in agriculture are increasingly practiced worldwide, and contamination of plants by pharmaceutical and personal care products (PPCPs) from the treated wastewater and biosolids is an emerging concern. In this study, 8 common vegetable crops were grown in field plots and irrigated with tertiary-treated wastewater with or without PPCP spiking. The vegetables were analyzed for accumulation of PPCPs in the edible parts at harvest. The vegetables included carrots, bell pepper, tomato, cucumber, lettuce, spinach, celery, and cabbage, which were often consumed raw by humans. The results showed that a few PPCPs, especially carbamazepine, were taken up and accumulated in the edible parts. The study findings are valuable as they provide the first-of-its-kind information on the occurrence and potential risks of PPCPs in common vegetables under realistic conditions.

Provided by American Chemical Society

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