Safety of nanoparticles in food crops is still unclear

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With the curtain about to rise on a much-anticipated new era of "nanoagriculture" — using nanotechnology to boost the productivity of plants for food, fuel, and other uses —scientists are reporting a huge gap in knowledge about the effects of nanoparticles on corn, tomatoes, rice and other food crops. Their article appears in ACS' *Journal of Agricultural and Food Chemistry*.

Jorge Gardea-Torresdey and colleagues at The University of Texas at El Paso, a co- investigator for the NSF/EPA University of California Center for Environmental Implications of Nanotechnology, note that nanoparticles, which are 1/50,000th the width of a human hair, are used in products ranging from medicines to cosmetics. The particles also could end up in the environment, settling in the soil, especially as fertilizers, growth enhancers and other nanoagricultural products hit the market. Some plants can take-up and accumulate nanoparticles. But it is unclear whether this poses a problem for plants or for the animals (like humans) that eat them. So, the researchers sorted through the scientific literature looking for evidence to settle the safety question.

In the article, the scientists analyzed nearly 100 scientific articles on the effects of different types of nanoparticles on edible plants. They found that the uptake and build-up of nanoparticles varies, and these factors largely depend on the type of plant and the size and chemical composition of the nanoparticles. "This literature review has confirmed that knowledge on plant toxicity of [nanomaterials] is at the foundation stage," the article states, noting that the emerging field of

nanoecotoxicology is starting to tackle this topic.

More information: "Interaction of Nanoparticles with Edible Plants and Their Possible Implications in the Food Chain", *J. Agric. Food Chem.*, 2011, 59 (8), pp 3485–3498. DOI: 10.1021/jf104517j

Abstract

The uptake, bioaccumulation, biotransformation, and risks of nanomaterials (NMs) for food crops are still not well understood. Very few NMs and plant species have been studied, mainly at the very early growth stages of the plants. Most of the studies, except one with multiwalled carbon nanotubes performed on the model plant Arabidopsis thaliana and another with ZnO nanoparticles (NPs) on ryegrass, reported the effect of NMs on seed germination or 15-day-old seedlings. Very few references describe the biotransformation of NMs in food crops, and the possible transmission of the NMs to the next generation of plants exposed to NMs is unknown. The possible biomagnification of NPs in the food chain is also unknown.

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