

Nanomaterials and crops: potential risks and food safety

Filip POŠČIĆ, Alessandro MATTIELLO, Francesco BERTOLINI, Rita MUSETTI, Luca MARCHIOL

Università degli Studi di Udine, Department of Agricultural and Environmental Sciences, Via delle Scienze 206, Udine, Italy, (e-mail:filip.poscic@uniud.it)

Abstract

It is expected that nanoagriculture significantly improves current agronomic practices, by enhancing the efficiency of managements of inputs to crops. Even though nanoagriculture is just beginning to explore the applications of nanotechnology, it has a great potential with new tools for the molecular treatment of diseases, weed control and enhancing the ability of plants to absorb nutrients. However, nanotechnologies are developing at a much faster rate than our knowledge of their impact on health and the environment.

Several questions were raised about the fate of nanomaterials in the agro-environment, both those used in agriculture as fertilizers or for plant protection, as well as those resulting from uncontrolled or accidental flows of nanomaterials.

Vascular plants and crops are of special concern as they could be exposed to risks of bioaccumulation of metal nanoparticles (MeNPs) and their subsequent entry into the food chain. So far, very few studies have been conducted on the plant's response to the exposure to MeNPs.

Several experiments are currently running at University of Udine to study the possible toxicity of CeO₂ and TiO₂ NPs on barley (*Hordeum vulgare* L.) with the aim (i) to clarify whether such materials influence the growth cycle of barley and the quality of caryopsis, and (ii) to evaluate the possible MeNPs bioaccumulation in organs.

The preliminary results suggest the potential of meNPs to modify crop physiology and to compromise the composition of barley caryopsis.

Key words: cerium oxide nanoparticles, titanium oxide nanoparticles, *Hordeum vulgare*, phenology, caryopses nutritional quality

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