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Editorial

Special Issue on Interaction between Nanoparticles and Plants

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Nanotechnology is an extremely rapidly developing field that provides important elements to our daily life; however, it can also pose a threat to living organisms, including plants. Despite the enormous amount of scientific research on the impact of nanomaterials on plant growth and development, we still do not have a uniform picture of how nanomaterials affect these processes.

This Special Issue aimed to collect articles describing the current knowledge on the impact of nanoparticles (NPs) on plants. Topics for this Special Issue included: nanoparticles and plant growth, physiology and biochemistry on the cell, tissue and organ level, mechanisms and routes of entry of nanoparticles to the plants, movement of nanoparticles within the plant on the cell, tissue, and organ level, nanotoxicology, green synthesis and nanoparticles and plant–pathogen interaction.

In this Special Issue, a total of five papers (three research papers and two review papers) detailing current information on the influence of nanoparticles on crops, water plants and the influence of NPs on sexual reproduction, as well as a summary information on the impact of nanomaterials on medicinal and aromatic plants, and on the contribution of apoplast and symplast in the root response to nanoparticles, are present. Milewska-Hendel et al. [1] described the influence of negatively charged gold nanoparticles and proved that NP did not enter into the barley root. The authors also showed that morphological, histological, and ultrastructural changes in barley roots took place under the NP treatment. This indicate that NPs influenced the plant growth without entering the plant body. Zanelli et al. [2] presented results showing the impact of graphene-related materials on the sexual reproduction on the example of *Cucurbita pepo*. It was shown that both pollen adhesion and germination on the stigma decreased, fruits presented necrosis in the case of graphene oxide, but the graphene oxide purified from production residues was causing the fruit to become unripened, and ovules did not develop seeds after such a treatment. Such results suggest the negative effect of this type of nanoparticles on the plant reproduction. Parzymies [3] described the influence of AgNP on the regeneration processes of water plant *Aldrovanda vesiculosa* and detected the negative effects of this NP on plant regeneration, which can indicate that AgNP has a harmful effect of water plants. Kurczynska et al. [4] presented review article focuses on two aspects of NP interaction with plants. The current knowledge on NP movement through the roots into the plant body, in particular, the role of the cell wall in NPs entering was described. The second aspect summarized the current knowledge of the participation of the symplast, including the plasmodesmata (PD), in the movement of NP within the plant body. Special attention was paid to the need for future studies to explain the mechanisms that regulate the composition of the cell wall and the functioning of the PD under the influence of NP. Kralova and Jampilek [5] provided a comprehensive overview of the beneficial and adverse effects of metal-, metalloid-, and carbon-based nanoparticles on growth of medicinal and aromatic plants. The reader also learned about the effect of nanosized fertilizers on medicinal and aromatic plants.

As the editor of this Special Issue, I must admit that I expected more interest from scientists dealing with this subject. However, the presented research and review articles contribute considerably to our knowledge about the influence of nanoparticles on the growth and development of plants.

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