Editorial

Nano carbon applications for plant

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New promising applications, like nano fertilizers, could handle cultivation in poor desert conditions. Nanofertilizers are nanomaterials which contain nanoparticles having unique physicochemical properties, i.e., large surface area, high reactivity, compatible pore size and particle morphology.[1] They provide one or more nutrients to plants for improving their growth and yields. They have high efficiency and consequently reduce the undesirable environmental effects that result from the massive usage of conventional fertilizers.[2] Nanofertilizers such as nano-phosphorus-fertilizer, nano-calcium carbonate, iron, magnesium, manganese, zinc, molybdenum oxides[3] were investigated on plants and many of them showed positive responses according to the concentration used. Otherwise, Carbon nanotubes (CNTs) could be used as a nutrient carrier for macro and micro elements that may reduce their higher concentrations which are usually used. Carbon nanotubes applications in agriculture showed very promising results.[4] It takes an important role due to its competitive mechanical, electrical, thermal and chemical properties.[3] Single and multi-walled CNTs special properties could be benefit for researches in the field of agriculture and food. Recently, some researches had shown that carbon nanotubes treatment encouraged growth, branching and other aspects of plant growth parameters. Multi-walled CNTs might act as regulators for seed germination and growth or could organize the marker genes to enhance cell culture growth by increasing cell divisions, cell wall formation and water transport. It was found that CNTs can penetrate coat of tomato seeds and induce germination and growth.[5,6] In addition, the engineered CNTs could induce germination of seed,[4] growth and development of plants.[7] However, in some researches, multi-walled CNTs did not found to show a positive effect on seed germination in many plants.[8,9] Some other studies faced the potential toxicity of multi-walled CNTs in plant cells.[10–13] This could be due to the higher concentrations used or the sensitivity of some plants or some of their growth stages in those investigations.[14]

Recently, the in vitro effect of CNTs on date palm cultures was studied.[14] It was indicated that CNTs increased callus fresh weight while decreased the number of embryos compared with the control. However, germinated embryos number increased and a significant enhancement of shoot length and leaf number in elongation stage was observed. Moreover, root number, root length, plantlet length and hairy roots were enhanced. It was found that CNTs could organize nutrients absorption in the plant. They increased nitrogen, phosphorus, potassium and calcium while decreased sodium percent. Consequently, it increased total chlorophyll, a and b. More knowledge about nanofertilizers in agriculture and the relationships between physicochemical characteristics of nano materials and biological interactions are necessity, but also more care about the risk with handling nano particles application in this important field is needed.[15] Scientific research is increasingly needed to study the effect of nanofertilizers on plant and their effect on human and animals' health.

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Conflict of interest

The author declares no conflict of interest.

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