Abstract

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Utilization of High Throughput Microcrystalline Cellulose Decorated Silver Nanoparticles as an Eco-Nematicide on Root-knot Nematodes

The present study aimed to evaluate the influence of high throughput microcrystalline cellulose embedded silver nanoparticles (Ag-NPs), as an alternative eco-nematicide on Root-knot nematode (Meloidogyne incognita), which deem the main reason toward the loss of more than 20% in crops worldwide. In this work, Ag-NPs was prepared in very high concentration. Ag-NPs prepared using such technique has many advantages such as: absence of organic solvents, scaling up thru using high concentration of silver precursor and utilization of environmentally benign polymer Microcrystalline Cellulose (MCC). At the beginning, the bulk Ag-NPs colloidal solution is diluted to 5, 10, 15, 20, 25, 30, 40, 50, 60, 75, 80 and 100 ppm. Then, heavily galled roots of annual seed-propagated weed, Solanum nigrum L. family Solanaceae were selected to identify the Meloidogyne species and followed by treatment with the previously Ag-NPs concentrations. Results obtained after 24 h incubation, showed the highest mortality (M%) (40.36 ± 1.15%) which was achieved by means of 20 ppm of Ag-NPs compared with the highest concentration of Ag-NPs 100 ppm (42.85 ± 3.51%). It was obviously noticed that, by increasing the concentration of Ag-NPs, M % decreased. On the other hand, after 48 h, 30 ppm Ag-NPs showed the highest M% (52.82 ± 0.57%), while, after 72 h of treatments, the M% reached 95.53 ± 0.57% using 40 ppm Ag-NPs, then decreased to 66.67 ± 2.00% using 100 ppm Ag-NPs. All previous finding affirms the effectiveness of lower concentrations of Ag-NPs compared with the highest one, after 72 h. In conclusion, Ag-NPs could be successfully used as eco-nematicide for Root-knot nematodes Meloidogyne incognita with a recommended dose of 20?40 ppm that is acquired higher M% and caused many aberrations during the different growth stages.