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Prevention of *E. coli* contamination of plant by restoring soil cohesion with substances of earthworm castings

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This experiment verified a phenomenon that plants grown in soil contaminated with Escherichia coli (*E. coli*) become contaminated by the *E. coli* in the soil because materials produced by them weaken soil cohesion and increase the water evaporation from the soil, which ultimately leads to contamination of the plants. However, as a result of the experiment, the number of *E. coli* bacteria was decreased in the soil containing earthworms. This is because the soil cohesion did not decrease due to the substances of earthworm castings, so there was no abnormal increase in water evaporation from the soil, which finally led to reduction in contamination of the plants growing in the soil. The calcium ions bound to the soil perform an important role in maintaining the soil cohesion, but the materials produced by *E. coli* separate the calcium ions from the soil to reduce the soil cohesion. According to the results of the experiment, the water-soluble substances of earthworm castings suppress the reduction of soil cohesion caused by the loss of calcium due to *E. coli*-producing materials. In addition, these water-soluble substances do not adversely affect anaerobic and aerobic soil bacteria responsible for material circulation in soil, but it can inhibit the growth of E. coli and the reduction of soil cohesion by *E. coli*. These results will provide a new perspective and solution for harmful bacterial contamination of organic crops.

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