

ABSTRACT:

Many bacteria strains are now successfully used for plant-growth promotion (PGPR) and as biocontrol agents (BCA) against plant diseases. Mechanisms behind their action involve production of enzymes and antibiotics, which in high concentrations could also affect non-target organisms hence the biodiversity and processes in the soil. Despite these potential negative side effects, there is little research done on the subject to confirm whether they are significant. In three laboratory experiments, we tested the effect of the bacterial BCA *Bacillus amyloliquefaciens* UCMB5113 (BA) on two earthworm species, common in agricultural soils in temperate regions of the world and representing different ecological groups; one anecic (*Aporrectodea longa*) and one endogeic species (*Aporrectodea caliginosa*). The earthworms were kept in replicated pots containing soil from local agricultural fields. They were fed on cow manure, and exposed to BA by (1) dipping into a BA solution (short-term external exposure in high concentration), (2) mixing BA solution into the soil (long term external and internal exposure) and (3) feeding earthworms with BA infested plant litter (internal exposure of the gut). After 162 months, survival, growth and reproduction of the earthworms were recorded. We found no effect of the treatments as compared to control without BA amendments. We conclude that the use of high doses of BA with concentrations at the same magnitude as maximally expected when the bacteria are used as PGPR and BCA, is not harmful to the soil dwelling earthworms tested in this project. Further studies of the ecological effects of PGPR and BCA bacteria on other non-target soil organisms are encouraged. The development of sustainable agricultural systems, where ecosystem services are optimized, has to be aided by a deeper knowledge of the combined effect of bacteria and earthworms on the promotion of plant health.