Mediating the Degradation of Nitrobenzene Into Nematicidal Chemicals Using Streptomyces antibioticus

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Nitrobenzene is a potential carcinogen, highly flammable, and toxic environmental pollutant in air, water, and soil that is commonly synthesized in pesticide, dye, and explosives manufacturing. Bacterial agents of the Streptomyces genus, particularly Streptomyces antibioticus, have been known to degrade nitrobenzene and subsist on it as a source of nutrients. S. antibioticus is also a producer of actinomycin D-- a chemical commonly used as an antibiotic, which has nematicidal properties. This study focuses on the use of S. antibioticus as a mediator in the degradation of nitrobenzene into a pesticide, which was analyzed through the mortality rate of Caenorhabditis elegans. According to the hypothesis, the mortality rate of C. elegans individuals treated with the degraded nitrobenzene solution was predicted to be higher than C. elegans not treated with degraded nitrobenzene. In order to determine the possibility of pesticide synthesis using S. antibioticus, bacterial cultures were established, nitrobenzene was added in quantities of either 17 or 34 ppb, and allowed to rest for 72 hours. Then, this was applied to C. elegans nematodes and compared to the controls (S. antibioticus bacteria and GYM broth). Data for this experiment had positive results and were statistically significant ($p < 0.001$), considering the low-probability mortality rates seen in experimental trials.

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