Asexual worm quickly adapts to soil contamination

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Soil contaminants lead to rapid genetic adaptations in the nematode Acrobeloides nanus. The worms from contaminated soil live longer and lay more eggs under polluted conditions than the worms from unpolluted soil. Dutch-sponsored researcher Agnieszka Doroszuk demonstrated this in her study into the long-term effects of environmental pollution on soil organisms.

Environmental pollution is an important cause of stress in natural populations. This not only has consequences for the size, dynamics and structure of the population but it can also lead to genetic changes and adaptations. Doroszuk investigated the long-term effects of pollution on the bacteria-eating nematode Acrobeloides nanus. This asexually reproducing nematode is easy to culture and study. The research is innovative due to a multidisciplinary approach, in which methods from various disciplines such as ecology, toxicology, molecular biology and evolutionary biology provide insights into the effect of soil pollution at different levels of biological organisation.

The nematode was exposed to a combination of different pH and copper values. As well as their individual effects, the pH and the copper levels in the soil can exert a synergistic effect on the nematode population. Unexpectedly fast adaptation was observed and considerable genetic changes took place. As a result of this the nematodes in the polluted soil became resistant to the contamination. In the contaminated culturing medium they laid more eggs and lived for longer than the nematodes from the clean soil.

The rapid adaptation to the environment in an asexual species is an interesting finding. It contradicts the general opinion that asexual species have low adaptive potential and that they adapt to stress less easily than sexual species. At present these asexual species are used as test organisms in ecotoxicological risk evaluations. The question now arises as to whether they are suitable for this purpose.

The results of this study are important for the development of protection strategies for natural populations. This can be realised by focusing environmental management more on functions such as biomass turnover rate and less on the structure and biomasss of populations per se. In her thesis Doroszuk shows that contributions from various research disciplines are crucial for insight into underlying mechanisms of the response to stress and for the consequences for the natural system.

Source: Netherlands Organization for Scientific Research