# First experimental evidence for speedy adaptation to pesticides by worm species

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Scientists at the Instituto Gulbenkian de Ciencia (IGC) and the Faculty of Science of the University of Lisbon, in Portugal, have shown that populations of the worm *Caenhorabditis elegans* become resistance to pesticides in 20 generations, that is, in only 80 days.

These findings, published last month in the journal *PLoS ONE* open the way for future research into improved use of pesticides and antibiotics in pest and parasite control.

Patrícia Lopes and co-workers followed 20 generations of the worm *C. elegans* in the presence of Levamisole, a widely-used pesticide that acts on the nervous system, is lethal, but also affects fecundity and mobility, when present at lower doses. They found that Levamisole markedly reduced fecundity, survival and the frequency of males. Indeed, these almost disappeared in the population: from an initial frequency of 30%, they reached 0% by the 10th generation. The researchers showed that this drastic decrease in male frequency was not due to males being more susceptible to the pesticide than females. Rather, the pesticide affected the worms' mobility and, consequently, their ability to find a mate.

However, the populations of worms were able to adapt to the new Levamisole environment, so that by the 10th generation, survival and fecundity had recovered, and the frequency of males increased again by the 20th generation. The ability to lose males in a population and still reproduce is only possible because *C. elegans* is a hermaphrodite species, that is, within a population, some worms are both male and female and

can thus breed on their own, a process called 'selfing'.

The researchers then placed the adapted worms into the original, pesticide-free environment and found that the worms survived perfectly. Scientists say that there were no adaptation costs to the population. Says Elio Sucena, group leader at the IGC and co-author of this study, 'These findings have implications for managing the application of pesticides: if we had found that the survival of adapted worms in the original environment was impaired too, this would have meant that, by maintaining areas where the pesticide is not spread, resistance to the pesticide could be controlled, and the efficacy of the pesticide increased'.

Sara Magalhães, group leader at the University of Lisbon, points out that 'As a result of the widespread use of pesticides and antibiotics, resistance to these chemicals has developed in many species. Our ability to manage this resistance entails being able to dissect the genetic changes underlying the acquisition of resistance. Ourapproach, using experimental evolution, allows us to manipulate several factors, such as population size, environmental stability and genetic background in our efforts to tackle and understand pesticide resistance, not only of *C. elegans* but also other pests and parasites'.

Source: Instituto Gulbenkian de Ciencia