https://www.manilatimes.net/2024/02/10/news/national/scientists-harness-worm-gut-bacteria-to-dissolve-plastics/1931877

A TEAM of scientists from Nanyang Technological University (NTU) in Singapore has isolated a worm gut bacteria that can break down plastics, a potential solution to the global plastic pollution problem.

Previous studies have shown that Zophobas atratus worms — the larvae of the darkling beetle commonly sold as pet food and known as "superworms" for their nutritional value — can survive on a diet of plastic because their gut contains bacteria capable of breaking down common types of plastics.

Their potential use to dissolve plastics, however, has been impractical due to their slow rate of feeding and tedious maintenance.

NTU scientists have demonstrated that this could be overcome by isolating the worm's gut bacteria and directly using them to breakdown plastics, eliminating the need for large-scale worm breeding.

"A single worm can only consume about a couple of milligrams of plastic in its lifetime, so imagine the number of worms that would be needed if we were to rely on them to process our plastic waste. Our method eliminates this need by removing the worm from the equation. We focus on boosting the useful microbes in the worm gut and building an artificial 'worm gut' that can efficiently break down plastics," NTU Associate Professor Cao Bin, principal investigator at Singapore Center for Environmental Life Sciences Engineering (Scelse), said in a statement released to the media.

NTU scientists fed three groups of superworms with different plastic diets: high-density polyethylene, polypropylene and polystyrene for over 30 days.

Their experiment revealed that gut microbiomes from plastic-fed worms showed a significant increase in capacity to degrade plastics compared to worms fed with oatmeal.

"Our study represents the first reported successful attempt to develop plastic-associated bacterial communities from gut microbiomes of plastic-fed worms. Through exposing the gut microbiomes to specific conditions, we were able to boost the abundance of plastic-degrading bacteria present in our artificial 'worm gut,' suggesting that our method is stable and replicable at scale," first author of the study Dr. Liu Yinan, a research fellow at the School of Civil and Environmental Engineering and Scelse, said.

The scientists said the next step is to understand how the superworms' gut bacteria break down plastics at the molecular level. They added that understanding the mechanism will help scientists engineer plastic-degrading bacterial communities in the future.