Effect of Larval Crowding of the Zophobas morio Beetle on Consumption of Polystyrene Foam

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Every day, tons of expanded polystyrene (Styrofoam) end up in landfills and waterways all over the world, doing incalculable harm to the environment. Previous studies have found that the Zophobas morio beetle larvae (superworms) can survive exclusively on Styrofoam, with the depolymerized byproduct being much easier to recycle. High rearing density has been associated with slower development rates, supernumerary molts, and increased larval weight in this species. By sorting a sample of 1,250 larvae into three conditions, with 25, 75, and 150 larvae per container, observed over a period of two and a half weeks, different crowding rates were modeled and effects on polystyrene consumption and larval weight were observed. Almost every prior study into crowding effects on the species sets the conditions as only completely isolated or crowded. This project not only is the first to study the impact of this biotic factor on polystyrene consumption but also models more realistic crowding conditions for industrial and home settings. Superworms in the least crowded condition were shown to be the most efficient in Styrofoam consumption. The most crowded condition having the greatest mass per capita at the end of the experimental period aligns with the hypothesis and previous research. Studies indicate that superworms fed on a Styrofoam diet are safe and viable as human food and animal feed. The results of this project are an important first step in exploring how to design Z. morio home recycling plants and commercial farms to optimize polystyrene recycling and production of nutritionally-dense foodstuff.

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