The Effects of Philippine Cypermethrin on Earthworm Cardiovascular Health: Continued Evaluation of Environmental Damage and Proposed Solutions for Sustainable Pest Management Systems

Ullman, Aaron (School: West Career and Technical Academy)
Wu, Jessica (School: West Career and Technical Academy)

The overdependence of pesticides poses a major risk to the environment, one recent example being the use of cypermethrin to combat Spodoptera frugiperda in the Philippines. In this mesocosm study, we grew rice with simulated environmental conditions of the Philippines (soil pH, temperature) and with different dosages of cypermethrin (0%, 1%, and 2%). We tested the effect of different dosages and means of exposure (direct dermal exposure, residual rice exposure, and residual soil exposure) on California Blackworms. The heart rates of the Blackworms were taken after one hour of exposure to the test samples. The control group had the highest average heart rate of 10.583 beats per minute across all samples, which was significantly higher than the 1% group (2.25 bpm) and the 2% group (0.58333 bpm). Furthermore, soil exposure had the highest mortality rate for cypermethrin samples. This may be due to the lower rate of hydrolysis in low pH environments, shown in Takashi et al. (1985). With the Philippines having a soil pH of 4.6, cypermethrin would decompose at a slower rate, meaning that soil exposure would have a higher concentration of cypermethrin as compared to temperate climates. Thus, we developed a GIS data system to prescribe appropriate biological pest uses and risk of pesticide contamination based on land use, elevation, and distance to water. We also developed a new pest management system using three forms of biological controls for countering Spodoptera frugiperda, as well as the appropriate cost analyses for each.

Awards Won: