Runoff of Chemical Herbicide Paraquat and Its Concentration in the Environment

Reddy, Pranav (School: St. Andrew's Episcopal School)

This work presents the first study that examines the runoff of the herbicide, paraquat, and how it flows through the environment. Paraquat is a highly toxic herbicide that is widely used and can cause severe damage to humans and aquatic systems. Herbicide runoff can lead to widespread and long-lasting residues in soil (up to 20 years) and aquatic systems that hurt the food chain. The hypothesis tested is as follows: there is a significant concentration of paraquat in water and soil samples collected downstream from paraquat using farms. Soil samples from the 4 cardinal directions(North, South, East, and West) were collected from a farm with no known history of using herbicides. Water samples from a pond upstream and a creek downstream from the farm were collected as well. This study used the All-Step-in-One Test Kit for Paraquat Detection in Water and Vegetable Samples(Mahidol University) to test the absorption of the blue radical ion of paraquat to measure the paraquat in mg L^-1. The North, South, and East soil samples did not show a substantial amount of paraquat; however, the West soil sample showed 0.02947mg L^-1paraquat per gram of soil. The upstream sample showed a higher concentration than the downstream sample at 0.8640mg L^-1paraquat and 0.3748mg L^-1paraquat respectively. These results show that the farm measured from does not have a history of using paraquat; however, we hypothesize that a farm upstream may have been using paraquat due to the upstream pond’s higher concentration along with the western soil sample, which paraquat flows through. The closest farm upstream from the sampled farm is 0.5 miles away, leading to the conclusion that is the farm from which paraquat is running off.