Development and Optimization of Agricultural Runoff Treatment Systems to Mitigate Glyphosate Impact on Freshwater Zooplankton Daphnia magna

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Zooplankton are considered keystone species of freshwater ecosystems, but there is still far more research on marine zooplankton than those in fresh water. The lakes and rivers that are home to planktons such as Daphnia magna are under the constant threat of anthropogenic damage from practices such as fishing, manufacturing and agriculture. Namely, rainwater runoff from agricultural sites containing pesticides, including glyphosates that are deadly to their surrounding ecosystems, seep into natural freshwater environments and pose a substantial threat to their biodiversity and species populations. The purpose of this project was to reduce the negative impact of glyphosates on freshwater zooplankton populations. Different groups of D. magna were given treatments ranging from filtered spring water to contaminated water treated with UV-C light, to unfiltered contaminated water. A mortal stain was then used to distinguish the percentage of living and deceased invertebrates among each group. After using the Taguchi method to compare the survival percentage from each treatment type to isolate individual variables, it was found that a combination of UV-C treatment and filtration improved the rate of survival the most, at 64.1% as opposed to 6.5% survival of the group subjected to contaminated water only. These findings indicate that installing a similar system of treatments in at-risk freshwater environments may improve zooplankton populations, thus the health of the whole ecosystem.

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