Environmental Impact: The Effects of Some Artificial Sweeteners in Nature

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Artificial sweeteners (acesulfame, aspartame, saccharin and sucralose) are used as sugar substitutes in foods and beverage. Can these sweeteners biodegrade in nature? Will they cause problems in ecosystems? With the aim of resolving these questions, a study using Daphnia magna as a testing model to evaluate the effects of sweeteners was conducted. Soil organisms were extracted and inoculated in a medium with a mixture of four sweeteners. The inoculated samples were cultured and tested every 7 days in total of 4 weeks. Results showed that aspartame completely biodegraded but acesulfame, saccharin and sucralose couldn't easily degrade in nature. Following the OECD Guidelines for the Testing of Chemicals, experiments involving a Daphnia magna living system with sweeteners were done. The results of the acute immobility of D. magna showed that animals couldn't survive above 0.2 mg/mL of sweeteners in 24 hr. For the reproduction test of D. magna in 3 weeks, though D. magna could produce the 2nd generation below 0.05 mg/mL of sweeteners after 19-22 days, the reproduction rate was reduced compared to 3 generations being reproduced in 3-4 weeks regularly. In conclusion, this study proves my hypothesis that artificial sweeteners can accumulate and cause some environmental problem in nature. The study showed that acesulfame, saccharin and sucralose could accumulate in nature. In a Daphnia magna living system with tested sweeteners, animals had the immobility and reproduction problems at certain level. Thus to protect nature, the use of artificial sweeteners must be limited.

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