CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

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Project Number

J2105

Project Title

Can Sodium Bicarbonate Be Used to Kill Mosquito Larvae?

Abstract

Objectives

The objective of this project was to determine if sodium bicarbonate can be used as an economical, efficient, and environmentally-safe method to control the mosquito larvae population by determining the sodium bicarbonate concentration required to achieve a 100% mortality rate of mosquito larvae at 12 hours. This project builds on my prior science project that determined that a 19 ppt road salt concentration killed 100% of mosquito larvae at 12 hours.

Methods

Before performing the experiment, two test trials were conducted to identify and correct potential errors in the proposed method and procedure.

After verifying the viability of the project, 20 mosquito larvae were placed in 500 mL samples of pond water with sodium bicarbonate concentrations of 0 g/L, 6 g/L, 8 g/L, 10 g/L, 12 g/L, 14 g/L, 16 g/L, and 18 g/L. All mosquito larvae were exposed to identical environmental factors (i.e. light, temperature, and homogeneous pond water to maintain identical nutrient content).

Three separate trials for each sodium bicarbonate concentration were conducted. The number of deceased mosquito larvae was recorded hourly for 12 hours. A 100% mortality rate occurred at a sodium bicarbonate concentration between 10 g/L and 12 g/L at 12 hours.

I then compared the environmental impact of using sodium bicarbonate versus road salt to kill mosquito larvae in stagnant water. Three groups of five 15 cm tomato plants were watered with one of the following: pond water, a 12 g/L sodium bicarbonate solution, or a 19 ppt saltwater solution.

Results

The mortality rate of mosquito larvae reaches 100% at 12 hours at a sodium bicarbonate concentration of 12 g/L.

The pond water tomato plants showed no signs of stress and reached an average height of 26 cm at day 21. The sodium bicarbonate tomato plants showed minimal signs of stress and reached an average height of 24 cm at day 21. The road salt tomato plants begin to exhibit signs of stress at day 6 (e.g. stunted growth, drooping and browning leaves) and were completely dead at day 21.

Summary Statement

I determined that sodium carbonate is an effective, economical and environmentally-safe method to kill mosquito larvae in stagnant water.

Help Received

None. I designed and conducted the experiment myself continuing my prior research.