

The Effect of Pesticides From Unwashed Fruit on Zebrafish Embryonic Development

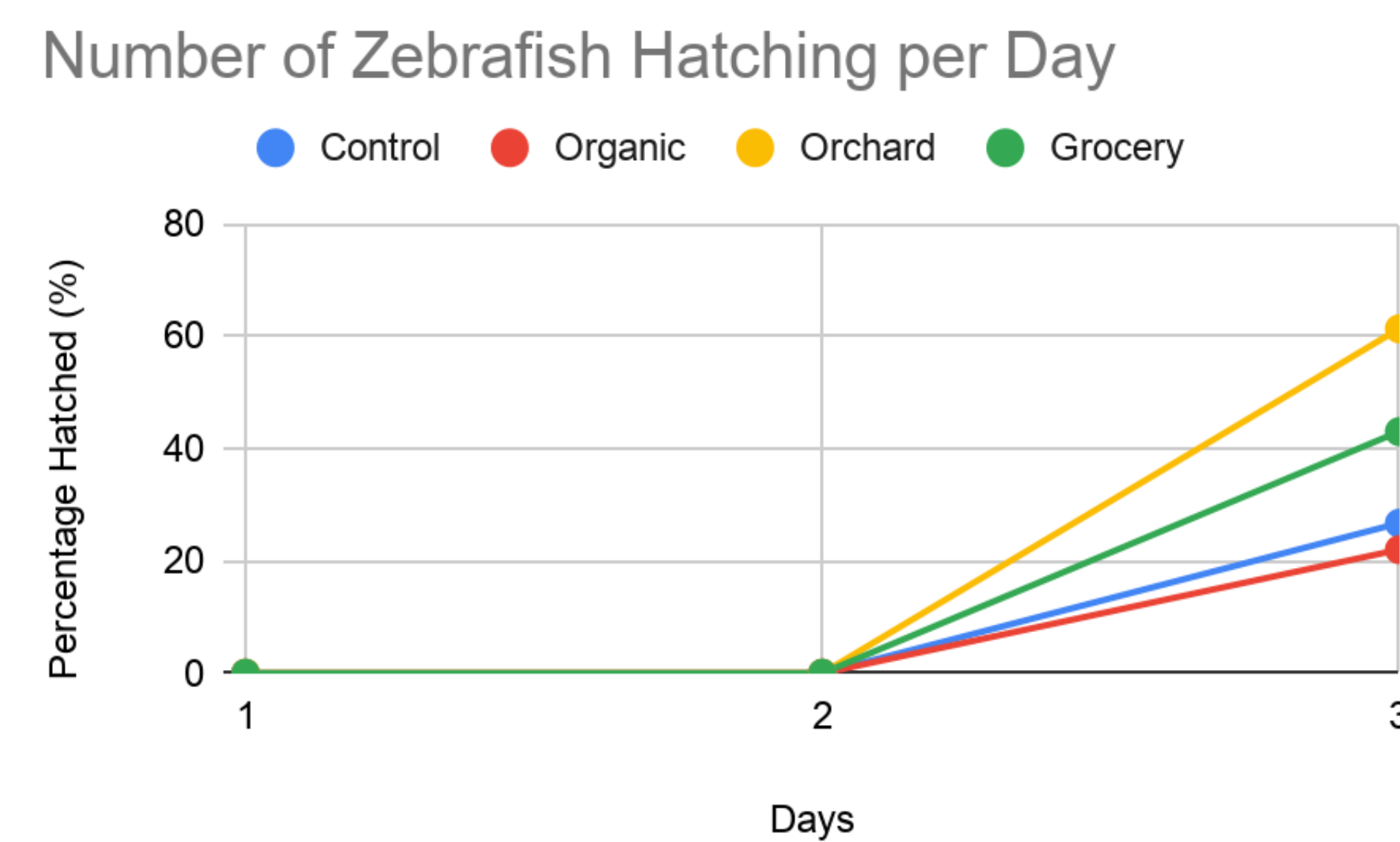
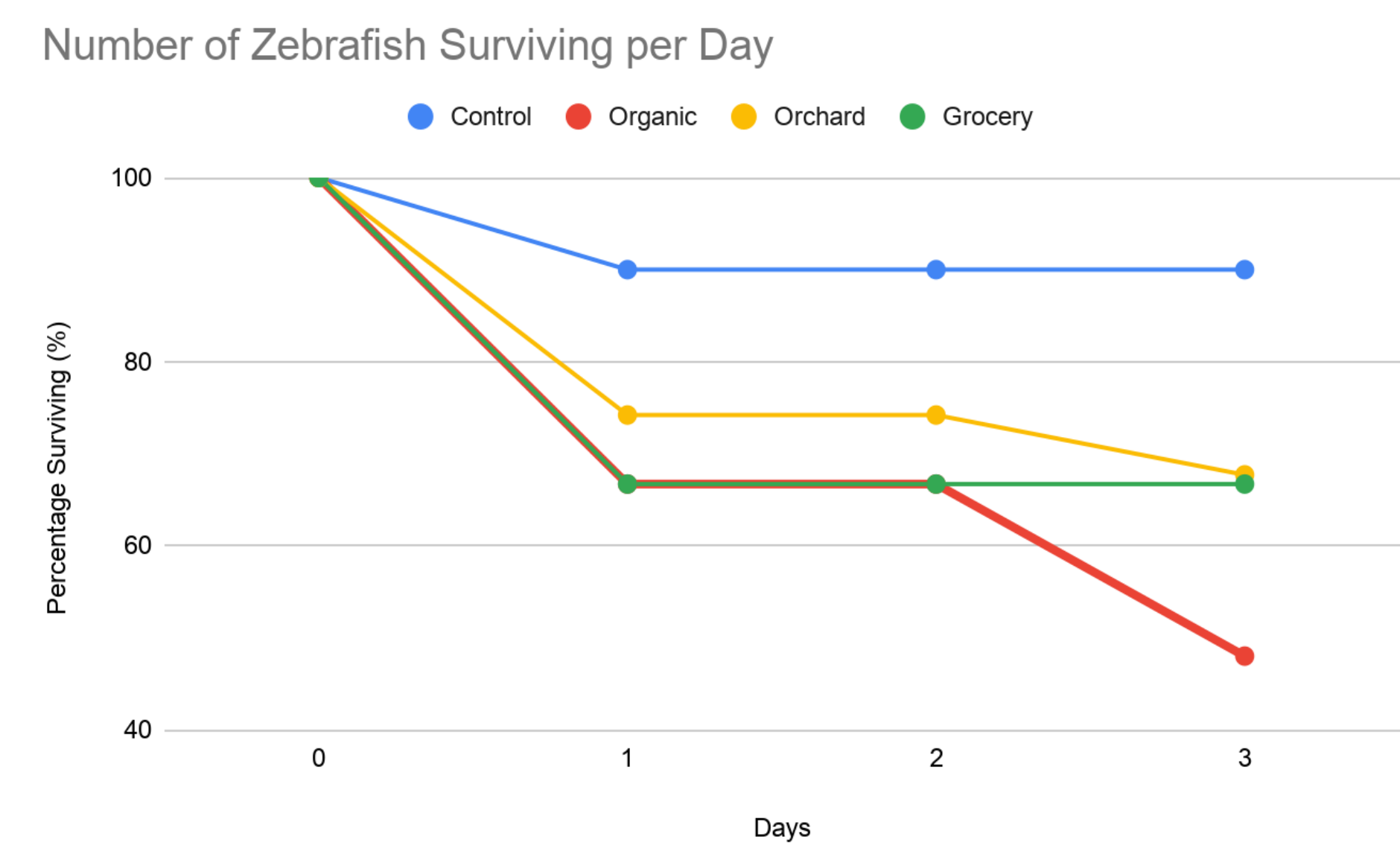
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Abstract

In our experiment we tested the effect of pesticides found on apples on embryonic development in Zebrafish. Pesticides are commonly used on various types of produce to help block hazardous, disease carrying species and plants from infecting crops. We questioned if the harsh pesticides used on plants were actually causing issues among humans upon ingesting them. Specifically, we wondered how pesticides affect the embryonic development in pregnant women. In our experiment we divided 118 Zebrafish embryos into four different groups. The first group was the control group, the second group was exposed to the pesticides found on organic apples, the third group was exposed to the pesticides found on orchard picked apples, and the fourth group was exposed to the pesticides found on grocery store apples. The percent survived from the control group was 90% while the percent survived from the groups exposed to different pesticides were between 48%-67%. This significant difference gives us enough evidence to conclude that pesticides found on produce may have adverse effects on human embryonic development that can result in the termination of the embryo.

Introduction

Toxicology studies and measures the nature, effects, and detection of poisons present in the human body. Zebrafish embryos will be used as the test subject, as the embryos develop rapidly and show defined stages of development, permitting clear observations of embryonic development from fertilization to adolescence. In this experiment, the effect of pesticides and waxes of unwashed grocery produce on embryo development will be tested. A pesticide is any substance intended for preventing pests which can be defined as any organism that causes plant diseases (Hicks). Nearly 75% of American households use pesticides along with those used in agriculture and public health, making young children particularly vulnerable to toxicants in the environment (Liu). Pesticides can enter the human body through inhalation, ingestion, or penetration of the skin (Hicks). Many pesticides interfere with the body's biological signals, harming the reproductive system, potentially killing or damaging cells, resulting in infertility (Pesticide). Children exposed to pesticides in utero face higher health incidences: defects, disorders, disruptions, and developmental impairments. One example is Diphenylamine, an organic compound deriving of aniline, dissolves well in many common organic solvents and is partially soluble in water. Diphenylamine is widely used as an industrial antioxidant and is employed in agriculture as a fungicide (Diphenylamine). In this experiment the Zebrafish will serve as an embryo to that of a human child in utero. Based on the research provided, it was hypothesized that the pesticides washed from produce would have adverse effects on the development of Zebrafish embryos.



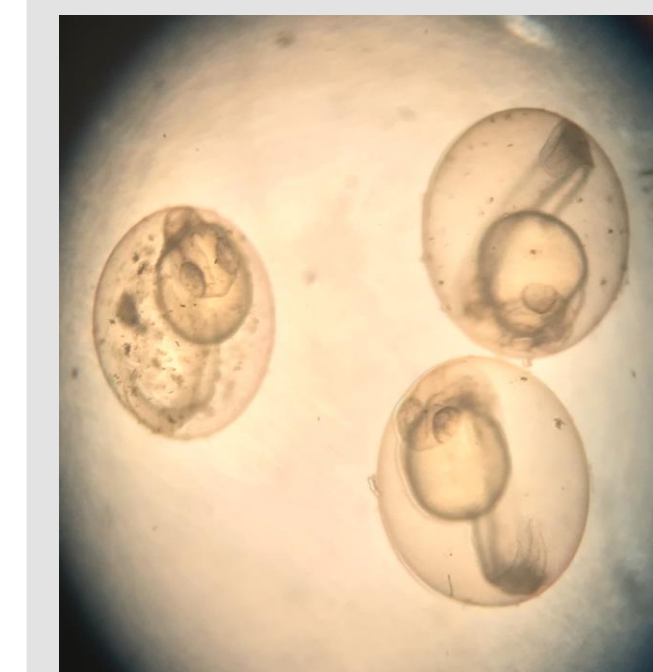
Data Analysis

Figure One

In this graph, it shows the results of the number of surviving embryos over a course of 72 hours. The independent variable shown is the type of pesticides exposed to different groups of apples. While the dependent was the number of embryos that survived. The chi squared analysis showed that there is a significant difference between the observed and expected. This tells us that the different pesticides likely determined how many embryos survived

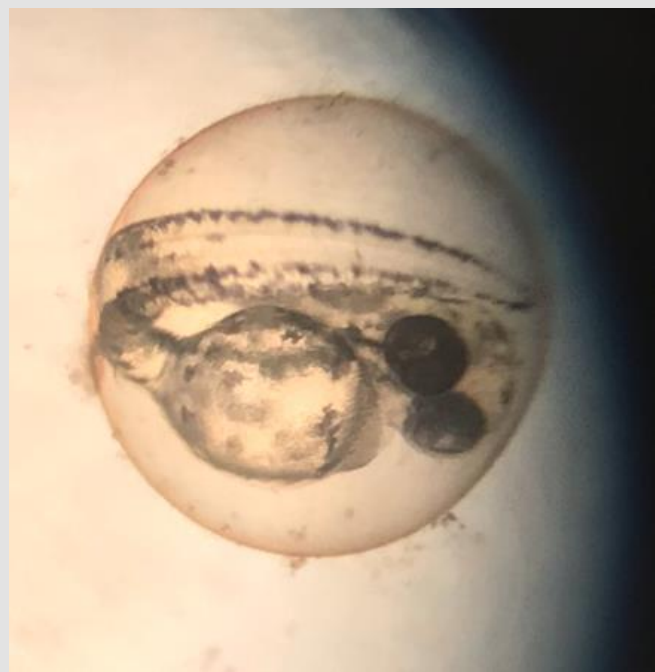
Figure Two

This graph shows the results of the number of zebrafish hatching over the course of 72 hours. The independent variable shown is the type of pesticides exposed to different groups of apples. While the dependent variable was the number of embryos that hatched. The chi squared analysis showed that there is a significant difference between the observed and expected. This tells us that the different pesticides likely determined how many embryos hatched

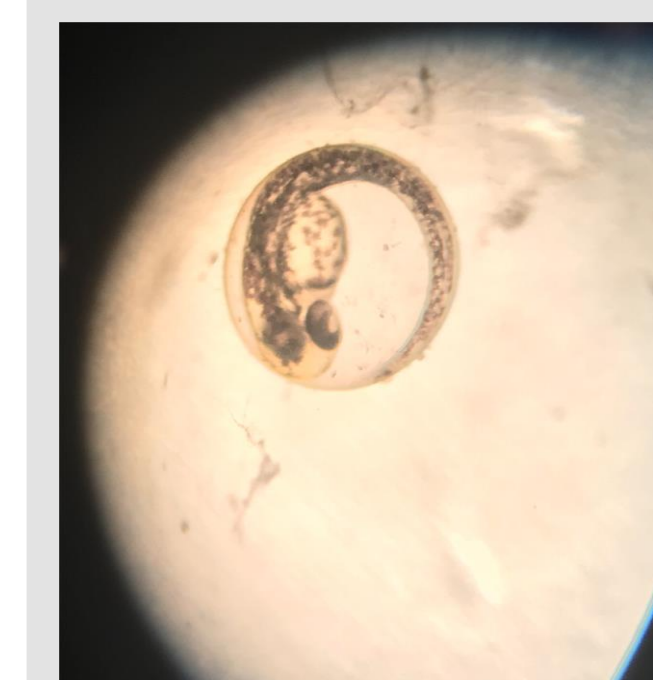


Control Group

Day 1: Control group embryos appear to have a clearer embryonic shield than the orchard picked apples

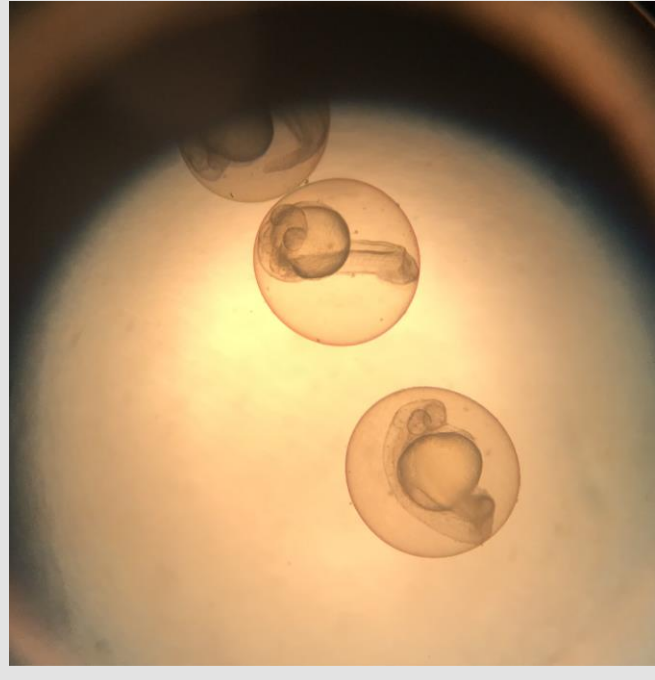


Orchard Picked



Orchard Picked

Day 2: A difference in the tails of the zebrafish embryos was noted. The grocery store group showed that the curvature of the tail was closer to the head compared to the orchard picked group.



Grocery Store



Orchard Picked

Day 3: It was observed that there was a difference in the color of the embryos. The orchard picked group appeared to have a darker color than the grocery store group.



Grocery Store

Methods

To set up the experiment, each row of Falcon dishes were labeled to show each group of apples (organic, grocery store, orchard) and the control group (water). An apple-pesticide solution was set up by placing each apple in their own separate bowl. Each apple was scrubbed using brushes. Three mL of each solution was transferred into the properly labeled Falcon dishes. Then, five embryos were played into each section of the falcon dishes. Each day, the number of embryos that died and hatched was recorded. Then, the old solution was replaced with a three mL of new solution. These steps were repeated for three days and recorded in a data table. Chi squared analysis was used to determine the statistical significance between the groups of pesticides.

Discussion

It was hypothesized that the pesticides washed from produce would have adverse effects on the development of zebrafish embryos. After looking at the chi squared analysis for zebrafish that survived and hatched, we found a significant difference between control and the other solutions of the pesticides. Although fewer survived in orchard, they had the greatest hatching success. The same was true of our results for expected and observed number of hatched fish. Our main limitation throughout our experiment was not knowing the exact concentration of each of our pesticides solutions. Another limitation we had, was not knowing the specific types of pesticides on the different types of apples. After looking at figure one and two, the pesticides did have effects on zebrafish embryos. Based off of our results we can conclude that there may be effects on embryonic development in pregnant women and is more likely that the pesticide were toxic to cells in some way as was predicted in previous public research. These pesticides could harm the reproductive system which in turn could cause cells to be damaged or killed.

Works Cited

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