Frontenac, Lennox & Addington Science Fair

Expo-sciences de Frontenac, Lennox & Addington

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Prefair Report

3401 **Leila Smaili**

Div/Cat **Human Health / Intermediate**

Title: **Do herbicides kill people too?**

Summary: Glyphosate and the herbicide Roundup are the subjects of many recent studies regarding their genotoxicity. Some studies find glyphosate to be mutagenic. Others find that alone, glyphosate is not mutagenic but when in the presence of other ingredients of Roundup, it is mutagenic. These results have gained so much attention that glyphosate-based products are banned in several countries and Monsanto, the company that owns Roundup, paid 289 million dollars in a lawsuit to a man who held Monsanto responsible for his cancer. Roundup is the most widely used herbicide in the world. If it is mutagenic, it is possible that herbicides of similar nature share this property.
My experiment will test the genotoxic potential of glyphosate, Roundup herbicide and several other commonly used herbicides and insecticides containing mecoprop, dicamba, and malathion as active ingredients. I will use the SOS chromotest.
I hypothesize that glyphosate and mecoprop will have negative results. I hypothesize that Roundup herbicide, dicamba and malathion will have positive results.
The SOS chromotest is a biological assay used to determine the genotoxic potential of chemical compounds in E. coli. The test is a simple colorimetric assay comparable in sensitivity and accuracy to the Ames assay. It screens for compounds that cause mutations of DNA and require further studies to prove if the compound is a carcinogen.
In the experiment, E. coli is exposed to several compounds to determine if these compounds cause mutations to its DNA. The bacteria used have a genetic modification: the SOS promoter is linked to the β-galactosidase gene. If the tested compound damages the DNA of a cell, the SOS response genes will be activated. Because the SOS promoter is linked to the β-galactosidase gene, the cell will begin production of the enzyme β-galactosidase. Inside the cells, β-galactosidase will act on a lactose analog that yields a blue color upon degradation. β-galactosidase production is measured by how blue the test solution is. And indirectly, the activation and magnitude of the SOS response are measured.
It is possible that protein synthesis will be inhibited if the compound tested is used at a high concentration. Alkaline phosphatase, which yields a yellow colour, is measured alongside β-galactosidase production to scale cell viability.
The test is repeated with the addition of S9 microsomal rat liver extract because it is possible that the compounds will require metabolic activation before any mutagenic behaviours can be observed.
The negative control is 10% DMSO in saline. The positive control is a 10 μg/mL solution of 4-nitroquinoline-1-oxide (4-NQO) in 10% DMSO-saline.
The independent variable is the herbicide or insecticide tested as well as its concentration. The dependent variable is the β-galactosidase production (measured by blue colour production) and the alkaline phosphatase level detected, (measured by yellow colour production).
Experiments have not yet concluded. I will present my results at FLASF.

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Prefair Report

3402 **Marie Lamarche**

Div/Cat **Human Health / Intermediate**

Title: **Can nanosilver kill healthy bacteria?**

Summary: Nanosilver or silver particles are being found more and more commonly in everyday items; clothing, feminine hygiene products, hand sanitizers, water filtering systems, food, etc. With this particle becoming more and more common, it's getting easier to ingest this product and for it to appear in your digestive system.

My question is whether or not this new technology can be harmful to bacteria that contribute to your health.

My hypothesis is that the nanosilver will neutralize the bacteria, because past studies have shown that nanosilver can kill antibiotic resistant strains of bacteria. If the nanosilver particles can neutralize these bacteria, it isn't safe for the human body to be exposed to these particles.

In my experiment, I will be exposing three bacterias to the nanosilver particles: Bacillus subtilis, Bacillus megaterium and Escherichia coli. I shall be testing on three different bacterias to simulate the biodiversity of bacteria found in the human gut. This will produce more accurate results than if I tested on one single specimen. Results will be obtained through an experiment involving bacteria cultures of the B. subtilis, B. megaterium and E. coli. These bacterias shall be grown on inoculated nutrient-agar plates. then exposed to the nanosilver soaked sterile disks. I will monitor the effects caused by the nanosilver to the bacteria and verify my hypothesis.

This experiment hasn't been conducted at the time in which this abstract was written. Results will be presented at the fair.

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