LISEF Project Listing for North Shore Hebrew Academy High School

Students	Project Title	Project Code	Certified	
Rachel Hanan Jennifer Katz	Genetic and Phenotypic Comparison of Four Arabidopsis thaliana Strains when Exposed to Heavy Metals, for Future Applications in Agriculture	PLNT2642	Certified	Details
Jeremy Noah Bernstein Aaron Michael Baruch Joseph Abraham Masri	Addressing SIDS: Analyzing the Respiratory Rate of Infants Using Image Processing Algorithm	ENBM3780	Certified	Details
Justin Blake Ganjian	The Effect of Microplastics on Tissue Regeneration and the Homeostasis of Dugesia tigrina	ANIM1582	Certified	Details
Jeremy Adam Sofiev	Tackling Food Poisoning: Monitoring Methane Concentration Produced by Spoiled Food Using Arduino Sensors	CHEM1598	Certified	Details
Daniella Azar Ashley Hakakian Leah Samantha Mayeri	A Meta-Analysis to Elucidate the Link Between Tocopherol Acetate and Lung Illnesses of Vape Users	BMED3630	Certified	Details
Ethan Basaleli	A Novel System for Detecting and Mitigating Gas Hazards within the Home	COMP1762	Certified	Details
Ikey Croog	Using RGB Pixel Data to Generate a Stream of True Random Numbers for Encryption	COMP1123	Certified	Details

Genetic and Phenotypic Comparison of Four Arabidopsis thaliana Strains when Exposed to Heavy Metals, for Future Applications in Agriculture

(Project ID# 390)

Project Certified

School

North Shore Hebrew Academy High School

Adult Sponsor

Lisa Runco

Category - Subcategory

Plant Sciences(PLNT) - Growth and Development(PGD)

Project Files

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Project Abstract

This study reports the resistance to chromium sulfate (Cr2(SO4)3), nickel sulfate (NiSO4) and copper sulfate (CuSO4) in the Col-0, Lov-1, Ws-2 and Santa Clara strains of Arabidopsis thaliana. Previous reports have shown illness-associated with consuming food grown in environments contaminated with such heavy metals (Shams, et al., 2018). Plant growth and biomass are also affected by considerable amounts of heavy metals in soil. To investigate the effects of heavy metals on Arabidopsis thaliana, plants were exposed to the heavy metals every two days, after 14 days of growth under normal conditions. Plant height was tallied daily and spectrophotometry was performed. BLAST was conducted to locate characteric similarities and differences between the genome sequences of the strains. Based on phenotypic observations, copper, nickel and chromium sulfate were found to have no significant effect on the plants, in comparison with the control. Interestingly, WS-2 exhibited excessive growth when exposed to nickel sulfate, reaching 125mm on Day 25. Only after exposing the plants to the heavy metals for the fourth time, plants exhibited wilting and leaf browning. However, statistical analysis [p result = 0.048 (<0.05)] indicated that only Col-0 was resistant to nickel sulfate. Significant differences in nucleotide strings of Col-0 include inner membrane localized protein, HD Zip, FRO gene family, beta-1,3-n-acetylglucosaminyltransferase radical fringe and SAT gene. The elucidation of a heavy metal-resistant gene in Arabidopsis thaliana could potentially lead to genetic engineering of genes to cultivate heavy metal resistant plants that are safe for human and animal ingestion.

ISEF Form Wizard Used

Yes

Other Competitions

none

Will Submit

Form 1
Form 1A
Form 1B
Form 3

Involves

Hazardous Chemicals, Activities or Devices

Qualified Scientist

No

Designated Supervisor

Yes

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