The Efficiency and Health Implications of Bio- Flame Retardants

Wyatt, Emerson (School: duPont Manual High School)
Pancholi, Tanisha (School: duPont Manual High School)

The 2023 Maui wildfires were detrimental to Hawaii's community. However the Flame Retardants used to slow the flames, were just as detrimental to human and environmental health. The goal was to produce bio-flame retardants, and ensure that the char/residue wouldn't impact human health. The first phase measured the efficiency of the compounds Bamboo, Lavender, and Buckwheat on slowing the burning rate. Paper subjects were oil covered to ensure flammability, and half-coated in one of the ground compounds. A fire was lit from the compound-less end, and the time it took was noted at the halfway point, measuring the fire burning rate. The fire had this amount of time to burn through the half with compound. It was hoped the fire wouldn't reach the edge in time, proving the rate slowed. Bamboo and buckwheat tied in success, with burned areas under 30% of allotted space, completely putting out the fire occasionally. However their combination did not perform as well as the individuals. For the next phase, the compound's char/residue were made into: 1/2, 1/8, 1/12, dilutions, all with the same yeast amounts. This yeast/retardant solution was plated with method #1 allowing for more, smaller colonies, and method #2 allowing for less large ones. After 36 hours, yeast colonies thrived most with the compound combination. It affected cell growth least/could have the smallest impact on human cell development. It is believed that the strengths of the two diluted each other, making them safer for the cell growth. Despite the individuals performing better in fire trials, the health and regeneration of human cells takes precedence . Overall, The Buckwheat and Bamboo combination is the best Bio-Flame Retardant!

Awards Won: