Smiglacide-C: A Novel Antibacterial Saponin from Annona muricata

Jayasankar, Dheiksha (School: Sir Winston Churchill Secondary School)

Antibiotic-resistant bacteria is a rising global health concern in both medical and agricultural industries, contributing to 700,000 deaths annually. By 2050, antibiotic-resistant bacteria, such as methicillin-resistant S. aureus (MRSA), can result in 10 million deaths worldwide. To preserve both human and plant health, there is a need to identify new antibiotic compounds. Annona muricata (soursop), a fruit native to the Caribbean region has demonstrated anti-parasitic, anti-diabetic and anti-cancer properties. Part one of this study discovered the presence of antibacterial compounds in soursop leaves active against skin pathogens. This research continued off of part one, investigating whether the leaves of A. muricata contained antibacterial compounds that demonstrated antibacterial properties towards both human and plant pathogens, as well as identifying the antibacterial compound discovered in part 1 of the study. Column chromatography fractionation procedures were used to extract the potential antibiotic compounds in soursop leaves. Using Kirby-Bauer and Colony Forming Unit assays, two bioactive compounds were discovered to be effective on both human (Staphylococcus epidermidis, Clostridium sporogenes, Listeria monocytogenes, MRSA, Clostridium difficile) and/or plant (Xanthomonas campestris and Erwinia amylovora) pathogens. Liquid Chromatography/ Mass Spectrometry data identified the potential antibacterial compounds to be Smiglacide-C and Artabotrine. The identification of the antibacterial compounds could lead to the development of new antibiotics for drug-resistant bacteria, saving thousands of human and plant lives annually. Future studies would include identifying the mechanism of action of the identified compounds and the development of a topical product.

Awards Won:
Third Award of $1,000