Identifying Novel Modes of Inhibition of C. pusillum and B. subtilis Bacteria, Against Deadly Bat Fungus, Pseudogymnoascus destructans (Year 8)

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Bats, like bees, are a keystone species benefiting the environment and saving farmers billions of dollars in chemicals. However, since 2006, millions of bats in North America have died of a disease called White-Nose Syndrome (WNS) caused by a deadly fungus, Pseudogymnoascus destructans (Pd). This cold-loving fungus wakes bats in wintertime. With little food available, the bats become weak, starve, and die. In 2017 caves in King County and Cottle County, in the Texas Panhandle, tested positive for the fungus, and in the winter of 2021, WNS was confirmed. The purpose of this project tests two naturally occurring soil bacteria from King County: Curtobacterium pusillum and Bacillus subtilis, for antifungal properties against (Pd). Inhibition assays using cross-streak and dual culture streak methods found Curtobacterium pusillum did not inhibit (Pd), but Bacillus subtilis inhibition was significant at $p<0.001$. Extracellular protein inhibition assays were significant at $p<0.001$. Intracellular proteins did not inhibit (Pd). Bacillus subtilis is reported to produce Volatile Organic Compounds (VOCs) with antifungal properties. A Dual-Dish Sandwich (DDS) assay was performed to test VOCs against (Pd). Inhibition was significant at $p<0.01$. Also reported, in the presence of Iron(III) chloride ($FeCl_3$), Bacillus subtilis produces VOCs effective against fungus, but has never been tested against (Pd). A Dual-Dish Sandwich (DDS) assay was performed to test VOCs produced from Bacillus subtilis with the addition of ($FeCl_3$) against (Pd). Inhibition was significant at $p<0.001$. These results show promise to develop natural ways to mitigate the fungus.

Awards Won:

Second Award of $2,000

University of Texas at Dallas: Scholarship of $5,000 per year, renewable for up to four years