

## SUMMER 2022 – SC EPSCOR / INBRE RET PROJECT DESCRIPTION FORM

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Research Subject Area	biochemistry of communication in and among plants

**A. Briefly describe overall research program at your laboratory.**

We are interested in how plants respond to their environment with an emphasis on herbivores. In collaboration with Dr. Wang in the Department of Chemistry and Biochemistry, we are working on volatile organic compounds (VOCs) that plants emit when they are stressed by herbivores or pathogens. These VOCs induce defense responses in parts of the plant that are not under attack (intraplant communication) and in neighboring plants (interplant communication). Our goal is to understand at the molecular level how plants perceive VOCs and how that translates into responses that render plants more resistant to herbivores. This has implications for sustainable agriculture by improving crop plants to make them more stress resistant. In addition, the biochemical aspects of our project could lead to novel ideas for how to study small bioactive organic chemicals in human cells.

**B. Briefly describe specific project(s) for your teacher:**

The teacher will work with tomato cells and plants and test their responses to VOCs. The responses to be tested include a rapid change in the pH of the medium in which the cells are cultured, an increase in the activity of signal transducing proteins (MAP kinases). The tomato cell system is ideal to test plant responses to VOCs and to learn basics on experimental design, data analysis, and data presentations. The other part of the project is testing VOC-treated tomato plants for their response to the tobacco hornworm caterpillar. Preliminary data from a previous RET project indicate that VOC-treated plants are more resistant to caterpillars than untreated plants. These experiments are typically carried out by skilled undergraduate students and should not require special know-how by the mentored teachers. The tomato-caterpillar experiments require only basic laboratory equipment and could be transferred to high schools for student research projects or integration into curricula. Students can work with live plants and animals (caterpillars available through Carolina Biological Supply Company) and learn basic scientific skills such as experimental design, data logging and analysis, and interpreting results.

**C. Will any other people (post docs, grad students, undergraduate students, colleagues, etc.) be involved directly with your teacher?**

There will most likely be one graduate and two experienced undergraduate students in the summer of 2022 working on this project. The mentoring will be carried out mainly by myself. In the beginning, some of the

bench work can also be supervised by the students. Depending on the teacher's interest, we could also include chemical aspects of the work in collaboration with Dr. Wang.

**D. Will you require any advanced reading/preparation for the teacher? If yes, please briefly describe.**

No advanced reading is required at this time. It will be provided at the time the teacher will start on the project.