EFFECTS OF VITAMIN C ON GLUTAMATE DEFENSE SIGNALING OF THE *ARABIDOPSIS THALIANA*

Aliyah Okonkwo[*] and Shanna Demers[†]
Department of Biology, Division of Arts and Sciences, Rivier University

Aliyah Okonkwo, a senior Biology/Pre-Vet major, graduating in December 2024, was a presenter at the Transformative Learning Conference (TLC) in April 2024.

"… I'm a Biology/Pre-Vet major but since doing my research, I've developed an interest in botany and ecology. After graduating, I have plans to further my education by attending Cummings School of Veterinary Medicine at Tufts University and possibly finding a job that would allow me to work closer with animals and gain experience in the field.

What drew me to my major was my passion for animals and my interest in specializing in exotics like reptiles, birds, and other pets. This stems from the lack of exotic veterinarians throughout the nation. I hope to one day own a clinic and become someone of importance in the field of veterinary medicine, but for now, my focus will be on getting into veterinary school and applying for an entry-level position in the profession."

Abstract

Glutamate is the anion of the amino acid glutamic acid and acts as an excitatory neurotransmitter in the nervous system of vertebrates. It plays a role in maintaining homeostasis in the nervous tissue. Glutamate assists in key functions like learning, memory, and mood regulation. Glutamate is able to properly perform these functions by binding to a metabotropic G-coupled receptor, which then activates the postsynaptic membrane G-protein, triggering the secondary messaging system that allows for signal transmission. Plants are also able to use glutamate as it is used in metabolic processes. These processes include seed germination, pollen tube growth, and pollen germination. The mechanism of cell signaling in plants is very similar to signaling that occurs in human beings as glutamate receptors (GLRs) allow for the flow of cytosolic calcium ions through nonselective cation channels. We tested the effects of vitamin C on the glutamate defense signaling in Arabidopsis plants, as it has been known that vitamin C is linked to reductions in glutamate in humans. Wild-type Arabidopsis and GCaMP mutant Arabidopsis that fluorescently indicated cytosolic calcium ion passageways were grown in the lab and later used in a colorimetric assay. The colorimetric assay tested the absorbance of light through each sample using

ISSN 1559-9388 (online version), ISSN 1559-9396 (CD-ROM version).

a spectrophotometer. Preliminary results indicate vitamin C does not have a significant effect on the plant wounding response.

Research was supported by the Student Research Grant for Problem in Biology, the faculty start-up grant, independent funding to Professor Shanna Demers. ■

---

* **ALIYAH OKONKWO**, a senior Biology/Pre-Vet major at Rivier University, graduating in December 2024, was a presenter at the Transformative Learning Conference (TLC) in April 2024.

† **SHANNA DEMERS**, an Assistant Professor of Biology, obtained a Master of Science in plant pathology from North Dakota State University and a Master of Science in environmental studies from Antioch University. She is pursuing her doctorate at Antioch University. Demers is broadly trained as an ecologist. Her current research is focused on population dynamics of freshwater turtles in urban ponds and the role cryptogams (mosses/lichens) play in vascular plant succession following disturbance. Her passion is to encourage curiosity and wonder about the natural world and how it works.