



**Argelia Lorence, PhD**  
Assistant Professor in Metabolic Engineering  
Arkansas Biosciences Institute  
Arkansas State University  
Phone: 870 680 4322  
Email: [alorence@astate.edu](mailto:alorence@astate.edu)

**Academic interests:** Plant biochemistry, Plant metabolic engineering, Plant-based protein production.

**Research Focus & Techniques of Expertise:** The central molecule of interest is the small but extremely powerful antioxidant and enzyme cofactor vitamin C (ascorbate). The Lorence group uses genetic, biochemical and physiological approaches to study the function of vitamin C in plant growth, senescence, and tolerance to abiotic and biotic stresses. We utilize as our main model the plant *Arabidopsis thaliana* (mouse ear cress). Other areas of focus include: The study and manipulation of the ascorbate – cell wall metabolic network in plants, with the current models of study including Arabidopsis, tomato, tobacco, rice, and cotton; metabolic engineering for the improvement of the nutritional and agronomical value of crops; Metabolic engineering of plant pathways leading to the formation of specialized metabolites with medicinal properties, with current models of study including tobacco, hazelnut, and *Galphimia glauca*.

#### **Current Research Projects:**

##### **Ongoing projects in the Lorence laboratory related to vitamin C are:**

- Metabolic engineering of vitamin C in plants
- Cloning and characterization of the genes involved in the *myo*-inositol pathway to AsA
- Study of the role of ascorbate in the control of aging and reproductive activity in plants - funded by NIH Arkansas INBRE
- Novel vitamin C metabolic engineering strategies to drive TCE/PAHs phytoremediation - funded by a subcontract with the Arkansas Children's Hospital Research Institute (ACHRI)
- Study of the role of ascorbate in mitigating ER and cellular stress associated with plant-based protein production (in collaboration with Dr. Maureen Dolan, ABI/ASU, and Vibha Srivastava, University of Arkansas at Fayetteville) – funded by NSF P3 EPSCoR
- Intersection of ascorbate regulation, jasmonate-signaling, and defense against herbivores in plants (in collaboration with Dr. Fiona Goggin, University of Arkansas- Fayetteville) – funded by NSF P3 EPSCoR
- Arabidopsis as a model to study toxicity and fate of selected nanomaterials (collaboration with Dr. Alex Biris, Center of Nanotechnology, University of Arkansas at Little Rock)
- Survey about fruits and vegetable consumption among children and adults in the Arkansas Delta (collaboration with Dr. Patrick Steward, University of Arkansas at Fayetteville)

##### **Current ongoing projects related to medicinal plants**

- Metabolic engineering of taxanes with anticancer properties produced by hazelnut cell cultures (collaboration with Dr. Mariangela Miele, University of Genova, Italy)

- Metabolic engineering of triterpenes with sedative properties produced by *Galphimia glauca* cell and hairy roots cultures (collaboration with Dr. María Luisa Villarreal, *CEIB-UAEM*, Cuernavaca, Mexico)
- Molecular speciation of selected Mexican medicinal plants with antidiabetic properties (collaboration with Dr. Rachel Mata, *Facultad de Química-UNAM*, Mexico City, Mexico)

### **Grants**

**Grant P3-105: Intersection of Ascorbate Regulation, Jasmonate –Signaling, and Defense against Herbivory in Plants.**

**Co-PI's:** Fiona Goggin, **Argelia Lorence**

**Grant P3-109: Role of Ascorbate in Mitigating ER and Cellular Stress Associated with Transient and Stable Plant-Based Protein Production.**

**PI:** **Argelia Lorence**; **Co-PI's:** Maureen Dolan, Vibha Srivastava