

**P3 NSF-EPSCOR P3-105 Seed Project**

**“Intersection of Ascorbate Regulation, Jasmonate-Signaling, and Defenses against Herbivory in Plants”**

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**Abstract**

Ascorbic acid (AsA) is a critical antioxidant in plants, and also an important dietary requirement for human health. Recent evidence suggests that the plant hormone jasmonic acid (JA) plays a role in regulating AsA levels in plants, and that AsA content of crops may be enhanced by artificial induction of JA. Conversely, AsA may also modulate JA signaling. This relationship between AsA and JA could have important implications for plant interactions with herbivores, many of which induce JA-dependent defenses as well as generate oxidative stress in their host plant. The proposed project would use tomato and Arabidopsis as model systems to investigate the role of JA in regulating AsA levels, and to assess any feedback that AsA levels may have on JA-signaling. In addition, this study would assess the effect of a diverse range of herbivores on AsA levels in plants, as well as the impact of AsA on herbivore performance and plant fitness in the presence of herbivory. This work would help elucidate the mechanisms through which specific branches of the AsA biosynthetic network are regulated in plants and predict how metabolic engineering of AsA in crops might influence their susceptibility to pests. Furthermore, this project will shed light on the role of AsA in balancing trade-offs among plant adaptations to divergent stresses.