

Optimizing Soybean (*Glycine max*) Regeneration Utilizing 3D Bioprinting

Soybean (*Glycine max*) is the second most produced crop in the United States, however the regeneration recalcitrance in many cultivars limits effective methods of creating genetically modified organisms. To identify the factors limiting regeneration in soybeans I have worked on developing a bioprinting pipeline for two separate cultivars, the recalcitrant Williams82 and the callus-forming Thorne cultivar. I have worked on a protoplast to plant callus pipeline and optimized factors including tissue selection, enzyme wash composition, centrifugation settings, and debris removal methods. A significant portion of my contribution has been the introduction of a sucrose cushion centrifugation protocol to isolate viable protoplasts from other debris and dead protoplasts that limit callus formation. I plan on running parallel bioprinting trials of Thorne and Williams82 soybeans and performing transcriptomic analysis to study the differences in expression between the two cultivars over time as Thorne regenerates, determining the molecular sources of regeneration recalcitrance. This work is crucial to the establishment of a rapid, scalable pipeline for plant regeneration that enables novel genetic constructs to be engineered and deployed at the rate necessary to support modern agriculture.