

## Working Toward Sustainable Agricultural Systems and a Bio-based Economy through the Development of a New Crop Species

Our current agricultural systems are based on unsustainable models of linear resource utilization. Both the energy that fuels most of our food production and the nutrients that make our crops grow are part of linear systems. Natural resources are harvested, used once and then discarded into the environment to cause global degradation. Eventually, within the next century, these systems will exhaust fossil fuels, phosphorus and potassium reserves and will no longer function. We have no choice but to alter these systems. The more immediate danger is climate change and destruction of our aquatic ecosystems so the faster we make changes, the better. We must shift the paradigm away from unsustainable linear systems and toward circular systems of resource utilization. Agriculture will play a key role for a circular carbon economy with phyto-based carbon capture and utilization. Future production will also function on closed-loop nutrient cycling where N, P and K are reclaimed from wastewaters and re-used to grow crops over and over. The Sartor Lab is working to breed a new species of crop plant, *Lemna gibba*, that is uniquely suited to address these issues.