Department of Biochemistry and Molecular Biophysics Seminar

Wednesday, November 18 at 4:00 p.m. in Ackert 120

Coffee and cookies at 3:45 p.m. in Chalmers 168



Dr. Jacob Weber

Vice President of Product Development, InVitria, Inc.

Plant-Based Biomanufacturing: Rice as a Scalable Platform for Recombinant Protein Production

Growing demand for recombinant proteins requires manufacturing platforms that can support molecular complexity, product quality, scalable production, and economically sustainable supply. Plant-based expression provides a cost-effective alternative to microbial fermentation and mammalian cell culture by leveraging eukaryotic cellular machinery while enabling agricultural-scale production. This presentation will focus on two main topics.

The first topic will introduce a recombinant protein production platform, ExpressTec, based on genetically engineered rice (*Oryza sativa*). Using this expression technology, target proteins accumulate within the seed endosperm. Rice cells provide eukaryotic protein folding, disulfide-bond formation, and secretory processing without the bacterial endotoxin burden associated with microbial systems or the adventitious-agent risks associated with mammalian systems. Expression levels can reach grams of recombinant protein per kilogram of harvested rice, while seed-based accumulation enables multi-year storage under ambient conditions prior to downstream processing. Development from gene design to commercial production can be completed in approximately 3 years, progressing from event selection within 10–12 months to field scale-up and commercial production at scales of ≥1,000 kg of recombinant protein annually. The platform has demonstrated expression of >20 recombinant protein targets across diverse protein classes, including albumin, transferrin, lactoferrin, lysozyme, cytokines, growth factors, and antibody formats.

The second topic will focus on a commercialized product from the ExpressTec platform, recombinant human serum albumin (rHSA). Biochemical and biophysical characterization of rHSA demonstrates that the plant-based platform can produce not only high-purity protein but also proteins with well-defined structural and functional attributes. These properties support diverse applications in biologic formulation, drug delivery, cell culture, in vitro fertilization (IVF), and cell and gene therapy manufacturing, where albumin can contribute through ligand binding, antioxidant activity, stabilization of labile biomolecules, and passivation of process surfaces.