ARKANSAS STATE UNIVERSITY

OFFICE OF RESEARCH AND TECHNOLOGY TRANSFER

METHOD FOR SUBSTANTIALLY INCREASING YIELD OF PLANT-BASED PROTEIN PRODUCTION

THE CURRENT TECHNOLOGY INCREASES RECOMBINANT PROTEIN PRODUCTION IN PLANTS BY AS MUCH AS 500% COMPARED TO KNOWN PLANT PRODUCTION METHODS, HAVING A VARIETY OF APPLICATIONS INCLUDING THERAPEUTICS AND INDUSTRIAL ENZYMES

Key Features:

- Increases quality, accumulation and recovery of proteins in plant-based expression systems
- Low cost implementation
- Implemented stably or transiently
- Early stage data indicates significantly **higher** (up to **500%**), repeatable **yields of recombinant proteins**
- Adaptable **to existing plant production systems or for development of sustainable alternative** production systems for **pharmaceuticals** and other industrial products.

Key terms:

- *Recombinant proteins*
- *Industrial enzymes*
- *Vaccine manufacturing*
- *Nicotiana benthamiana*
- *Protein production in plants*

- **Advantages of plant-based system vs. mammalian and bacterial cell culture systems:**
  - Lower capital and operating costs
  - Enhanced safety profile of recombinant proteins
  - Greater simplicity
  - Faster production scale-up.
- **Major fields of use for the technology: production of vaccines, recombinant proteins, and industrial enzymes via**
  - **Plant-based transient expression systems** (such as utilizing ***Nicotiana benthamiana***) or
  - **Stable transgenics**.

Project Summary:

Arkansas State University (ASU) is seeking to commercialize a technology that enhances plant-based production of proteins, such as therapeutic compounds and industrial enzymes. **The technology is differentiated** in that it provides significantly higher yields for a variety of applications compared to current plant-based production processes.

Proof of principle of this innovation has been achieved in both transient (e.g. *Nicotiana benthamiana*) and stable [common tobacco (*Nicotiana tabacum*) and Arabidopsis (*Arabidopsis thaliana*)] processing models. Infiltration of a diverse class of antioxidants, including vitamin C, into the host plant significantly and consistently boosts protein yields. As much as a 500% yield increase is not

Arkansas State University – Jonesboro
Office of Research and Technology Transfer
P.O. Box 2760, State University, AR 72467
Phone: 870-972-2999
Fax: 870-972-2336
E-mail: brogers@astate.edu

ARKANSAS STATE UNIVERSITY

	uncommon. This innovation can be applied to existing or in the development of new production systems to enable, accelerate, and enhance commercialization and production of recombinant proteins.
Potential Markets Overview:	**1. Vaccines** The world vaccine market was valued at $25.2 billion in 2010 and is expected to reach $30.5 billion in 2012 and almost $40 billion in 2015, increasing at a compounded annual rate of 8.4% *(Kalorama Information)*. **2. Protein therapeutics** The global protein therapeutics market holds tremendous growth potential. It was valued at $92.5 billion in 2010 and is estimated to reach $143.4 billion by 2015 *(RNCOS E-Services)*. The U.S. continues to dominate the protein therapeutics market, followed by the European countries. **3. Biopharmaceuticals – recombinant protein** The worldwide market for biopharmaceuticals continues to expand and at a more rapid rate than for pharmaceuticals in general. The world market for biopharmaceuticals was approximately $140 billion in 2012, with approximately $100 billion involving recombinant proteins and antibodies (*Pharmaceutical Technology, Volume 36, Issue 2, pp. 54-56*).
Development Status:	Laboratory scale processing is proven and repeatable.
Patent Status:	Patents pending.
Commercialization Status:	Available to be licensed. Seeking funding/collaborations.

Arkansas State University – Jonesboro
Office of Research and Technology Transfer
P.O. Box 2760, State University, AR 72467
Phone: 870-972-2999
Fax: 870-972-2336
E-mail: brogers@astate.edu

ARKANSAS STATE UNIVERSITY