



OFFICE OF RESEARCH AND TECHNOLOGY TRANSFER

PLANT ROOT PRODUCTION PLATFORM, CUSTOMIZABLE FOR CONTROLLED PRODUCTION OF A VARIETY OF COMPOUNDS HAVING SUBSTANTIAL HEALTH BENEFITS

The plant root production platform is a factory for producing high-value compounds that in exemplary cases exhibit higher bioavailability, improved health benefits, and have applications in pharmaceuticals, cosmeceuticals, nutraceuticals and drug discovery.

Synopsis:

Arkansas State University (ASU) owns a patented, plant root based production platform that can be customized for various applications to reproducibly generate valuable compounds impacting human health.

This technology is differentiated in that it is a plant based process capable of controlled, reproducible results, unlike production that occurs in nature, while it mimicks natural processes in that it produces high value combinations of compounds not producible by current industrial means.

Process summary:

Plant hairy root cultures (HRCs) are obtained by transforming plant tissues with the “natural genetic engineer” *Agrobacterium rhizogenes*.

HRC systems, including a patented system for production of high-performing antioxidants, have been developed for multiple applications in the laboratory of Dr. Fabricio Medina-Bolivar at ASU. Specific projects to date include bioproduction of HRCs from medicinally active plant species such as peanut, muscadine grape, skullcap, and annatto.

One HRC system developed at ASU is a patented system that reliably produces a unique combination of resveratrol analogues. These include Arachidin-1, Arachidin-3, and the compounds in the associated bulk extract. Data from standard, in vitro tests show that each of the foregoing exhibit significantly higher bioavailability and antioxidant properties, including improved health benefits, compared to other Resveratrol products currently on the market.

Advantages:

- Customizable platform with potential to reliably produce high value **novel compounds** from rare and/or unexplored plants.
- **Controlled process generating repeatable results.**
- **Production of novel compounds and combinations of compounds having higher biological activities.**
- **Genetically and biochemically stable** plant root production system.

Applications:

HRCs system possess the diverse range of uses:

- **Phytochemical production of bioactive compounds:** major new topic of interest and covers several classes of phytochemicals, including alkaloids, terpenoids and phenolics.

	<ul style="list-style-type: none"> ▪ Production of recombinant proteins: rapid, contained and low-cost means of producing human antibodies, cytokines, and other protein therapeutics ▪ Molecular breeding
Potential Markets Overview:	<ol style="list-style-type: none"> 1. Pharmaceuticals The global pharmaceutical market is expected to grow at a rate of 6% during 2012-2017, exceeding sales worth \$ 1.1 Trillion by 2017. The U.S. is still the world's biggest market. 2. Cosmeceuticals U.S. cosmeceutical market is expected to approach \$11.7 Billion in 2016. 3. Nutraceuticals U.S. nutraceutical market is expected to reach more than \$90 Billion by the end of 2015; herewith dietary supplements will contribute approximately \$33 Billion. 4. Drug discovery According to reports the global market for drug discovery technology and products is projected to reach \$41.4 Billion in 2012 and \$79 Billion in 2017.
Development Status:	Laboratory scale production and product quality are proven and repeatable.
Patent Status:	Patented.
Commercialization Status:	License pending. Seeking funding/collaborations for tailored compound discovery and development, process and yield characterization, process scale-up, and in vivo testing.