**Jatropha 2.0 – Breeding, Biotech and Molecular Agronomics**
***How an integrated platform is bringing the opportunities of Jatropha to reality***

SG Biofuels Vice President & Chief Technologist Eric Mathur will explain how SG Biofuels is unlocking the true promise of Jatropha through an integrated science platform including breeding, biotechnology and integrated agronomics.

*Jatropha curcas* is a non-edible shrub that is native to Central America. Its seeds contain high amounts of oil that can be processed to produce a high- quality energy feedstock for use in biodiesel, renewable jet fuel or specialty products. Because it is a non-edible feedstock and can be effectively harvested on abandoned land that is considered undesirable for food crops, it does not compete with global food supplies.

SG Biofuels has assembled the largest, most diverse library of Jatropha genetic material in the world including 12,000 unique genotypes, sourced largely from the center of origin in Central America. The germplasm collection is the foundation of an aggressive crop improvement program that has already produced an elite cultivar of Jatropha, optimized for Guatemala, with yields 100 percent greater than existing commercial varieties.

At SG Biofuels, intensive selection and breeding programs are identifying and developing the most productive, regionally adapted strains from its germplasm collection. Through outcrosses which combine important traits and inbreeding to improve uniformity of parental lines, high productivity hybrid seeds have been produced.

SG Biofuels plant biotechnology program is accelerating the improvement of Jatropha through the association of molecular markers with trait genes and the development of plant regeneration, transformation and dihaploid technologies. The biotechnology platform will pursue a broad range of traits through genetic improvements focusing on yield, profitability and growth characteristics that facilitate efficient fruit harvesting.

The company has formed an alliance with Life Technologies Corporation, a leading global provider of advanced biotechnology and synthetic biology tools. Those tools, combined with SG Biofuels' extensive germplasm library, provide an unprecedented platform from which to quickly identify and advance commercial traits impacting yield and profitability.

The partnership has successfully sequenced the *Jatropha curcas* genome, using the SOLiD™ 4.0 System by Life Technologies. Working with Life Technologies, SG Biofuels is using the sequence to generate a high quality Jatropha reference genome. The genome has been used to identify

molecular markers and trait genes; the company is applying more than 1.6 million genetic markers (SNPs) for *Jatropha curcas* toward the development of marker assisted selection (MAS) methods which will accelerate the production of elite, high-performing hybrid cultivars of the energy crop. This work will also advanced the introduction of transgenic plants with further improved traits.

Following more than three years of intensive research, scientists at SG Biofuels have developed proprietary JMax Hybrid Seed Production Technology™. Hybrid seed production requires 1/50th the land needed to produce clonal plants by vegetative propagation, with the added benefits of hybrid vigor, strong tap roots and overall improved plant health, all at a fraction of the cost of tissue culture or other methods. For example, using SG Biofuels' hybrid seed technology, a 10 hectare production plot can produce seeds sufficient to plant 22,000 hectares (43 million seeds) while vegetative propagation via traditional cuttings would require 500 hectares of land to achieve the same number.

Mathur will also speak to the company's advancements in the innovative field of molecular agronomics and progress in developing key characteristics including soil adaptation and pest resistance.

The integrated breeding and biotechnology approaches form the foundation for the SG Biofuels JMax Jatropha Optimization Platform™, which provides research agencies, growers and plantation developers with access to the company's germplasm library, the sequenced genome and advanced biotech and synthetic biology tools to develop superior cultivars specifically optimized for their unique growing conditions. The JMax™ platform is driving the commercialization of Jatropha through the development of elite cultivars of Jatropha with higher yields, reduced input costs and greater profitability.

**Eric Mathur**
**Vice President & Chief Technologist**
**SG Biofuels**

Eric Mathur serves as Vice President & Chief Technologist for SG Biofuels. In this capacity he is directing an expansion of SG Biofuels' research operations in San Diego and throughout the world, and is driving the company's continued commercialization of Jatropha as a renewable energy crop.

Mathur has more than 30 years of experience in environmental genomics and applied biotechnology. He previously served as Vice President, Agricultural Solutions at Synthetic Genomics, Inc. (SGI), where he was responsible for the creation of SGI's first laboratory in La Jolla, California. At SGI, he assembled and managed the plant biotechnology, environmental microbiology and bioinformatics research teams. In addition, he had fiscal and scientific oversight of SGI's

microbial enhanced hydrocarbon production collaboration with bp and its oil palm & Jatropha genomics collaboration with Genting Berhad.

Prior to SGI, he was a founding scientist and the first employee at Diversa Corporation (now Verenium; NASDAQ: VRNM). He most recently served as Vice President of Scientific Affairs, responsible for scientific management of Syngenta and DOW Chemical Corporation collaborations. He also had oversight of Diversa's Biodiversity Access Program involving relationships with more than 15 countries and 25 institutions. During his 12-year tenure at Diversa, he assembled the research organization, managed multiple large industrial collaborative research programs, served as technical lead for business development and was instrumental in the development of Diversa's intellectual property portfolio. Mathur directed many of the research programs at Diversa and at times had oversight for 150+ scientists in diverse disciplines including enzyme discovery, gene evolution, gene expression, cell engineering, DNA sequencing, bioinformatics and manufacturing.

Prior to Diversa, he was a founding scientist at Stratagene Cloning System; a La Jolla-based biotechnology company (now Agilent Corporation;A:NYSE) where he was responsible for the discovery of Pfu DNA polymerase, Stratagene's largest selling product. He also performed research at Scripps Research Foundation and at the University of California.

He is named inventor on 52 patents, has over 100 patent applications pending worldwide and has published extensively. Mathur sits on the Scientific Advisory Boards of the DOE Joint Genome Institute, UC Riverside College of Natural & Agricultural Sciences, the Monterrey Biotechnology Institute and the Thermal Biology Institute at Montana State University. He has served a member of the SETI Life in the Universe Working Group; the Space Studies Board of the National Academy of Sciences; the Sloan Foundation's Census for Marine Life and Deep Carbon Observatory Technology Working Groups. Additionally, he was awarded adjunct faculty appointments at the Center of Marine Biotechnology, University of Maryland and the University of Hawaii's Institute of Marine Biotechnology. Eric earned his Bachelor of Sciences degree from the University of California, Riverside in 1977.