Energy For An Energy Dependent World

STUTTGART, ARK.

Some people look at animal manure and see a waste product to be avoided. Dr. Samy Sadaka looks at manure and sees a potential energy source for the future.

Sadaka is an assistant professor – extension engineer with the University of Arkansas Division of Agriculture. He has been conducting research for several years into new fuel sources for an energy hungry-world.

With a major commitment by the Division to his work and additional outside funding, Sadaka is working on six projects that focus on converting agricultural waste into gaseous and liquid fuels.

Since joining extension in February 2007, he has hit the ground running, establishing two biofuel and bioenergy research and extension laboratories at the U of A Rice Research and Extension Center at Stuttgart.

He is the lead scientist at the center in designing, manufacturing and testing equipment and processes to turn manures, vegetable oils and other agricultural products into a use fuel.

"The high moisture content of animal manure, about 90 percent, is a limiting factor in converting it to a fuel through thermo-chemical processes," he says. "Drying animal manures with traditional methods isn't economical because of the high energy needed to reduce moisture content."

To get around this, Sadaka mixes solid animal manure with any available agricultural residue and uses a bio-drying technique to reduce the moisture content in three to four weeks. This technique, he says, saves a significant amount of the energy needed for drying. The mixture can then be gasified to produce syngas.

Prices for glycerin, a useful biodiesel production byproduct, have dropped by more than two-thirds in the last five years and are expected to continue dropping because of the biodiesel boom.

A 10-million gallon capacity biodiesel plant produces about 10 million pounds of crude glycerin per year.

"We're developing a waste management plan for an environmentally friendly way of turning crude glycerin into high quality syngas," he says. "Syngas can then be used to produce high quality hydrogen that has the potential to power generators."

Syngas is the name given to a gas mixture that contains varying amounts of carbon monoxide and hydrogen.

Sadaka is also exploring the production of oil from cotton gin waste with a fast pyrolysis process. He wants illustrate this new technology to Arkansas cotton producers. Fast pyrolysis, he explains, is the rapid thermal decomposition of organic compounds in the absence of oxygen to produce liquids such as bio-oil, gases and chars.

"Cotton gin waste is the feedstock of choice," he says, "because of its abundance in Arkansas – 160 million pounds produced per year – and its favorable properties for this proposed process."

Cotton was a $461 million crop in Arkansas in 2007, and Arkansas ranked No. 2 in the nation in production. Δ