Food vs. Fuel: Dating Your Feedstock, but Never Marrying, Part 2

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This is part two of a two-part piece. Part one can be found here *[1].* [1]

4.) Super Traits & Super Yields

As we pointed out in Seven Paths of the New Agriculture: [2] If new crops are unavailable and residues exhausted, why not try to get more productivity out of the overall plant? In the old agriculture, there was double-cross hybridization to put more vigor into a plant, and there have been additional inputs, such as added nitrogen, to assist with the growing cycle.

But in the new agriculture, there are traits that confer drought, heat, pest and/or pesticide tolerance.

Recently, the U.S. Department of Agriculture deregulated MON 87460, Monsanto's first-generation drought-tolerant trait for corn. Drought-tolerant corn is projected to be introduced as part of an overall system that would offer farmers improved genetics, agronomic practices and the drought trait. Monsanto plans to conduct on-farm trials in 2012 to give farmers experience with the product, while generating data to help inform the company's commercial decisions.
The drought-tolerant trait is part of Monsanto's yield and stress collaboration in plant biotechnology with Germany-based BASF.

In specific bioenergy crops, companies such as Ceres (switchgrass, energy cane in the Blade energy crop family) and Mendel Biotechnologies (miscanthus) have been garnering the most attention as they bring new traits forward for the new integrated biorefineries utilizing energy crops.

5.) Utilizing Waste Lands

If all the above strategies are already used or unavailable, why not bring lands, which have previously been unproductive, into production? This is closely related to the super traits pathway — in fact, many of the same companies, such as Ceres, are hard at work on traits such as salt tolerance that will open up lands with previously unsuitable soils or water sources. But there are also companies, such as SG Biofuels, working on developing non-food, extremophile crops like jatropha that can better handle poor soils and low rainfall, through its JMAX portfolio.

And there's microalgae from the likes of Sapphire Energy and solar fuels from the likes of Joule Unlimited. Yields in the 3,000 to 15,000 gallons-per-acre range —

compared to around 400 this year for U.S. corn ethanol yields (or closer to 500 in a normal rain season).

As we profiled in Natural Gas & Electrofuels: One-Stop Shopping for Energy Independence [3]:

Electrofuels use microoganisms — typically bacteria — to directly utilize energy from electricity, and do not need solar energy to grow or produce biofuels. ARPA-E's Electrofuels program is seeking to take advantage of those properties to create processes that are up to 10 times more energy efficient than current biofuel production methods. Back in 2010, the company funded 13 projects that will attempt to bring a feasible technology forward to achieve those productivity levels.

The gallons-per-acre range — the numbers could be truly astronomical given that these can be produced in three-dimensions to achieve efficiencies of acreage. Given that they utilize electricity rather than photosynthesis, production units can be stacked. The limiting factors are in the costs of engineering and constructing stacks, not in available light per acre.

6.) Improving Results from Photosynthesis

One of the more exciting entries in recent years is the recent class of technologies funded in the ARPA-E PETRO project. PETRO aims to create plants that capture more energy from sunlight and convert that energy directly into fuels. ARPA-E seeks to fund technologies that optimize the biochemical processes of energy capture and conversion to develop robust, farm-ready crops that deliver more energy per acre with less processing prior to the pump.

If successful, PETRO will create biofuels for half their current cost, finally making them cost-competitive with fuels from oil. Up to $30 million will be made available for this program area. More on the PETRO project here [4].

The Bottom Line

Food vs. fuel, for most, comes and goes with price cycles. We see it as a transitory debate, usually focused on a handful of feedstocks on which producers of food or fuel have become overly dependent. We see it in oil, too.
To us, energy diversity is the solution — and diversification the strategy — and scientists and entrepreneurs must ultimately solve the debate by ending the need for it.

To read part one of this two-part series, please click here. [1] What's your take? Please feel free to comment below! Copyright 2012; Biofuels Digest [5]

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