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Thursday, Mar. 11, 2010

Tropicana: Trying to Make a Greener Orange Juice

By Bryan Walsh

Correction Appended: March 12, 2010

How green is your orange juice? A couple of years ago, PepsiCo, which owns the orange-juice brand Tropicana, tried to size up the carbon footprint of the popular morning tonic. It found that each half-gallon carton of OJ is responsible for 3.75 lb. of CO₂.

What was particularly surprising was where much of that CO₂ was coming from. The single biggest contributor to Tropicana's carbon footprint wasn't the transport of the juice to stores or the energy required to operate a modern citrus farm. Rather, it was the fertilizer used to grow the orange trees. A great deal of natural gas is used to make nitrogen fertilizer, and a great deal of fertilizer is used on citrus trees — so much that fertilizer accounted for 35%, the largest share, of the carbon footprint of orange juice. "We thought it might be transport or packaging," says Tim Carey, director of sustainability and beverages for PepsiCo. "But the agricultural aspects of the operation are more important than we expected." ([See the top 10 green ideas of 2009.](#))

To make a greener orange juice, PepsiCo needed a greener fertilizer — and that's exactly what the company is experimenting with. Working with a pair of agricultural companies — Yara International and Colorado-based Outlook Resources — PepsiCo will test low-carbon fertilizers at one of its producer farms in Bradenton, Fla. If successful, the greener fertilizers could lower the carbon footprint of PepsiCo's citrus growers by as much as 50% and reduce the total carbon footprint of Tropicana orange juice by up to 20%. Given how much fertilizer is used throughout the U.S. farming system as a whole — more than 13 million tons of nitrogen in 2007 alone — a greener way to help plants grow could put a serious dent in U.S. carbon emissions.

Inorganic nitrogen fertilizer — the sort used by most farms in the U.S. — is made through the Haber-Bosch process, which fixes nitrogen to make ammonia, which is then used to make the nitrates and other chemicals that feed plant growth. It requires a lot of natural gas to help make the ammonia; agriculture eats

up as much as 5% of global natural-gas consumption. As a fossil fuel, natural gas has a high carbon content, which means nitrogen fertilizer has it too. (Conventional fertilizer also releases nitrous oxide, a greenhouse gas that has about 300 times the warming power of CO₂.) The need for natural gas also puts a strain on farmers; fertilizer prices are closely linked to natural-gas costs, leaving farmers vulnerable to huge price swings, especially if gas begins to be used more frequently for electricity. "It's something we always have to worry about," says Mac Carraway, who runs SMR Farms in Bradenton, which is hosting PepsiCo's fertilizer trial.

Yara and Outlook Resources are trying to cut carbon by reducing the need for natural gas in their fertilizer. Yara, the world's largest fertilizer company, is experimenting with calcium-based fertilizer that would almost completely eliminate nitrous oxide emissions, cutting its overall greenhouse-gas impact. The company is also working on improving the energy efficiency of its production plants, which further cuts the carbon attributed to its fertilizer. "The fact is, we now have the technology to reduce emissions," says Sandro Pippobello, director of premium offerings at Yara North America. "We think this can work for a variety of crops, especially high-value ones." ([See pictures of the world's most polluted places.](#))

Outlook Resources, by contrast, looks to make fertilizer through more renewable resources, eschewing imported natural gas in favor of organic, locally sourced feedstocks. The local sourcing helps cut the carbon emissions associated with transport, while the use of organic and renewable feedstocks like biofuels cuts carbon emissions further. Outlook also claims that its fertilizer is more efficient, so less of it has to be used — which helps prevent the water pollution associated with fertilizer runoff. "Eighty percent of the fertilizer in the U.S. is imported," says Scott Dyer, the chief of scientific solutions for EARTH Solutions, which is making the fertilizer for Outlook. "Local sourcing is a food-security issue."

PepsiCo will use the two alternative fertilizers for a multiyear pilot study at SMR Farms to see whether the switch could cut Tropicana's carbon footprint without losing crop yield, which would raise overall costs. If the study is successful, PepsiCo might be able to start using greener fertilizers throughout its agricultural supply chain, which could have a major impact on U.S. farming and the corporation itself. And if natural-gas costs rise in the future, which is a serious possibility if utilities come under pressure to switch from cheaper but more polluting coal, it could help cut costs. "There have to be commercial advantages as well," says Carey. "But sustainability is ultimately about being a better company."

The original version of this article misstated that more than 13 billion tons of nitrogen were used in fertilizer in the U.S. in 2007. In fact it was 13 million tons.

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