

Engineered tobacco plants have more potential as a biofuel

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Researchers from the Biotechnology Foundation Laboratories at Thomas Jefferson University have identified a way to increase the oil in tobacco plant leaves, which may be the next step in using the plants for biofuel. Their paper was published online in *Plant Biotechnology Journal*.

According to Vyacheslav Andrianov, Ph.D., assistant professor of Cancer Biology at Jefferson Medical College of Thomas Jefferson University, tobacco can generate biofuel more efficiently than other [agricultural crops](#). However, most of the oil is typically found in the seeds - tobacco seeds are composed of about 40 percent oil per dry weight.

Although the seed oil has been tested for use as fuel for [diesel engines](#), tobacco [plants](#) yield a modest amount of seeds, at only about 600 kg of seeds per acre. Dr. Andrianov and his colleagues sought to find ways to engineer tobacco plants, so that their leaves expressed the oil.

"Tobacco is very attractive as a biofuel because the idea is to use plants that aren't used in food production," Dr. Andrianov said. "We have found ways to genetically engineer the plants so that their leaves express more oil. In some instances, the modified plants produced 20-fold more oil in the leaves."

Typical [tobacco plant](#) leaves contain 1.7 percent to 4 percent of oil per dry weight. The plants were engineered to overexpress one of two genes: the diacylglycerol acyltransferase (DGAT) gene or the LEAFY

COTYLEDON 2 (LEC2) gene. The DGAT gene modification led to about 5.8 percent of oil per dry weight in the leaves, which about two-fold the amount of oil produced normally. The LEC2 gene modification led to 6.8 percent of oil per dry weight.

"Based on these data, tobacco represents an attractive and promising 'energy plant' platform, and could also serve as a model for the utilization of other high-biomass plants for biofuel production," Dr. Andrianov said.

Provided by Thomas Jefferson University

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