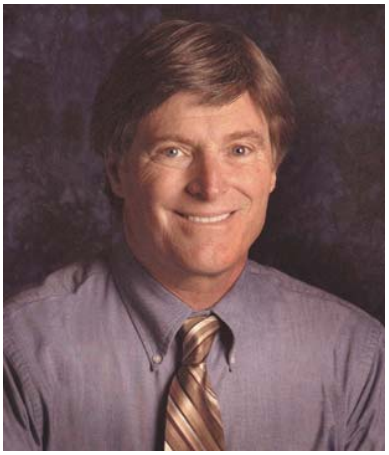
Green Energy

A Tree Fungus Produces Diesel Fuel Naturally



Jay Hardy, CLS, SM (ASCP)

Jay Hardy is the founder and CEO of Hardy Diagnostics. He began his career in microbiology as a Medical Technologist in Santa Barbara, California.

In 1980, he began manufacturing culture media for the local hospitals. Today, Hardy Diagnostics is the third largest media manufacturer in the U.S.

To ensure rapid and reliable turn around time, Hardy Diagnostics maintains six distribution centers, and produces over 2,700 products used in clinical and industrial microbiology laboratories throughout the world.

A tree dwelling fungus found in the Patagonian rainforest of South America has been discovered to produce diesel fuel.

This organism is *Gliocadium roseum*, a filamentous fungus which is widely distributed in soil and decaying vegetation. It is commonly considered a contaminant and has never been found to be a pathogen in animals or humans.

Researchers have found that when exposed to threatening substances, the fungus defends itself by emitting volatile gasses. This includes hydrocarbons remarkably similar to those used in diesel engines; they dubbed this "myco-diesel". They have suggested that this, combined with its ability to digest cellulose, make it a potentially exciting new source of biodiesel.

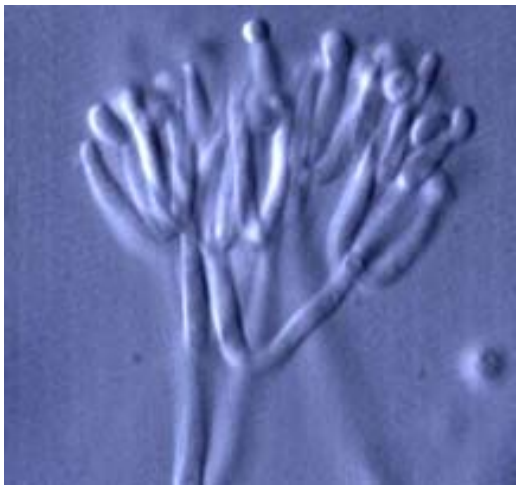
Experts believe the organism, *Gliocladium roseum*, could create, on an industrial scale, a new source of green energy. The fungus, which lives inside the Ulmo tree in the Patagonian rainforest, naturally produces hydrocarbon fuel similar to the diesel used in cars and trucks.

G. roseum is a harmless saprophytic fungus that may have great potential in creating alternative fuels.

Researchers were amazed to find that it was able to convert plant cellulose directly into the biofuel. Crops normally have to be converted to sugar and fermented before they can be turned into useful fuel. *G. roseum* could efficiently cut out this extra step in the production of biodiesel.

Professor Gary Strobel, from Montana State University in Bozeman said: "*G. roseum*

can make myco-diesel directly from cellulose, the main compound found in plants and paper. This means if the fungus was used to make fuel, a step in the production process could be skipped."



A penicillus bearing a single, large, slimy ball of one-celled conidia is typical of the genus Gliocladium.

Professor Strobel led an investigation into novel fungi in the rainforests of northern Patagonia, which cross the borders of Argentina and Chile. He found that when the diesel fuel fungus was exposed to potentially toxic antibiotics, it reacted defensively by generating volatile gases.

"Then, when we examined the gas composition of *G. roseum*, we were totally surprised to learn that it was making a plethora of hydrocarbons and hydrocarbon derivatives," said Dr. Strobel. "The results were totally unexpected and very exciting and almost every hair on my arms stood on end."

Nearly 430 million tons of plant waste are produced from farmland each year around the world. *G. roseum* provides new hope of turning this green waste into a useful fuel.

"When we looked at the gas analysis, I was flabbergasted," said Gary Strobel, a plant scientist at Montana State University, and the lead author of a paper in *Microbiology* describing the find. "We were looking at the essence of diesel fuel."

While genetic engineers have been trying a variety of techniques and genes to get microbes to create fuel out of sugars and starches, almost all commercial biofuel production uses the century-old dry mill grain process. Ethanol factories inefficiently ferment corn ears into alcohol, which is simple, but wastes the vast majority of the biomatter of the corn plant.

"…I was flabbergasted. We were looking at the essence of diesel fuel." – Gary Stobel

Using the cellulose from plants (the entire corn plant instead of just the ear, or simply wood) to make liquid fuel is a long-held dream. It would be more environmentally efficient and cheaper, but until now was considered to be impractical, if not impossible.

What's exciting about the *Gliocladium roseum* fungus, however, is that it can both break down cellulose and directly synthesize the liquid fuel.

A faster, more efficient way to produce biodiesel fuel, could be very good news at the gas pump.

"A major step in the production process could be skipped," Strobel said in a press release.

G. roseum has been previously studied as a method of controlling fungal plant diseases. This biocontrol agent has been found to be effective in preventing fungal infection in peas, beans, canola, wheat, barley beets,

broccoli, and other grains and vegetables.

By utilizing a natural process, the fungus, *Gliocadium roseum,* could hold great promise in helping to solve our nation's energy crisis.

Jay Hardy, CLS, SM (ASCP)
Santa Maria, CA

Oil Deposits; a product of fungal decay?

Beyond the biofuel implications, Strobel said that because the fungus can manufacture what we would normally think of as components of crude oil, it casts some doubt on the idea that crude oil is a fossil fuel.

Could it be that the earth's petroleum deposits came about from fungal decay of cellulose from primeval forests? Certainly more study is required to test this hypothesis.

"It may be the case that organisms like this produced some — maybe not all — of the world's crude oil", Strobel said.

Gary Strobel from Montana State University makes a remarkable discovery while studying fungi growing on a tree in the Patagonia region of Argentina.