BIOdiesel TechNOTES

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UNIVERSITY OF IDAHO: PIONEERS IN BIODIESEL RESEARCH AND DEVELOPMENT

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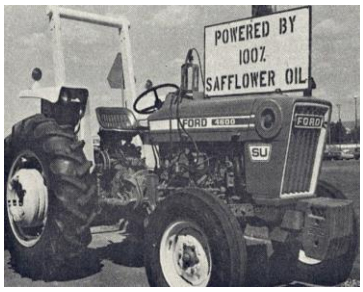
In 1979 Dr. Charles ("Chuck') Peterson was asked if vegetable oil can be used as a diesel fuel "extender". He purchased some cooking oil at the local grocery store and launched the research that eventually led to the commercialization of an environmental friendly alternative fuel that can run diesel engines.

Dr. Charles ("Chuck") Peterson

The research began with looking at using raw vegetable oil, specifically sunflower, safflower, and winter rape oil, as a diesel fuel substitutes for use in agricultural diesel engines. One of the test engines was a 52-hp Ford diesel tractor, which Dr. Peterson and Dr. Joe Thompson, Chuck's longtime Research Support Scientist, displayed and operated at county fairs and other agricultural events across the state of Idaho. While short term tests were almost always positive, longer term tests with raw vegetable oil led to severe engine deposits, ring sticking, injector coking and thickening of the lubricating oil.

Much of the research involved plant scientists, particularly studying rapeseed since it was grown on the Palouse in the area of Moscow, Idaho, but soon research partnerships grew to the Chemical Engineering Department. With this partnership, investigations began on transesterification, the chemical process to make biodiesel. This soon led to the development of "A Batch Type of Transesterification Process of Winter Rape Oil". The primary focus of the work, however, was on the effect of these potential fuels on diesel engines. The early decision to find a fuel that required no engine modifications was important to the University's ultimate success. Several types of engines were tested in the laboratory at the Department of Agricultural Engineering, from 1982 through 1992. After dismantled and inspected, the engines that ran on biodiesel always looked cleaner on the inside than the engines that ran 100% fossil diesel fuel.



Early research on a tractor powered by 100% safflower oil

Beginning in 1992, road tests of biodiesel began. On-board fuel mixing tanks were mounted on a 1992 Ford F250 and a 1992 Dodge Ram. The Ford had a pre-combustion chamber and was tested on a blend of 80% diesel and 20% raw rapeseed oil. The Dodge used the same blend but used biodiesel. The Dodge engine was sent to the manufacturer, Cummins in Columbus, Indiana for inspection, where its conditional was characterized as good or better than that which would have been expected with diesel fuel. In 1994, a new Dodge truck, which ran on 100-percent biodiesel, was driven to Los Angles, then to Ocean City, Maryland, and back to Idaho carrying the entire 320 gallons of B100 needed for the trip. While in Washington, DC, the drivers met with legislators to educate them about biodiesel. Again, the engine of this truck was inspected by a Cummins engineer after 100,000 miles, further convincing manufactures that biodiesel was a good fuel.

The first vehicle that went coast-to-coast running on 100% biodiesel occurred in 1994.

The University of Idaho introduced biodiesel into Yellowstone National Park in 1995, which was the first national park to use biodiesel. A 4-wheel drive Dodge running on B100 made at the University was used to kick-off the "Truck-in-the-Park" project. Within a few years, the park decided to use B20 in all its vehicles. Influenced by Yellowstone's success, all national parks now use biodiesel blends in their fleets.

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In the 1990's, much of Chuck's research was focused on emission testing but there was also a cooperative effort between the private industry and federal and state governments. The University conducted a 200,000-mile demonstration project running a semi-truck on a B50 blend of biodiesel made from used french fry oil. The used fry oil was reacted with ethanol produced from potato waste at the J.R. Simplot plant and the resulting fuel was called "HySEE". Kenworth donated the truck, Caterpillar donated the engine, and Simplot provided an area for the University to make the fuel in Caldwell, Idaho, then used the truck for the test on one of their normal operation routes.

The University of Idaho planned and conducted three "Commercialization of Biodiesel" conferences that were pivotal in the development of the biodiesel industry. These conferences were subtitled "Establishment of Engine Warranties" held in Moscow in November, 1994, "Environmental and Health Benefits", held at Mammoth Hot Springs, Yellowstone Park, in May 1996, and "Producing a Quality Fuel", held in Boise in July, 1997. The last conference also provided the kick-off event for the 200,000 mile HySEE project.

International interest in biodiesel was clearly growing and so was its research and education at the University. Albertson's, for instance, had the University conduct a study to determine if their used vegetable oil from frying chicken could be used to power their mobile refrigeration units or service trucks. In 2001, Dr. Brain He s recruited to the University's biodiesel program. Dr. Peterson then co-chaired the international conference "Bioenergy 2002" where 35 countries were represented. Leading up to the conference organizers received a call from Joosten Conneman in Germany stating he was coming to the conference so he could meet the person who did the research on which the design of his biodiesel plant was based. Clearly, BIODIESEL HAD BEEN COMMERICALIZED!

In 2003, USDA entrusted the University of Idaho with the National Biodiesel Education Program, which continues to this day. With this explosion of interest, Dr. Dev Shrestha was recruited to the biodiesel program in 2004. Then, later in that same year Dr. Jon Van Gerpen, a leader in biodiesel research, was also lured to the University's program. Although research continued on oil seed crops, biodiesel and biodiesel co-products, all of the University's biodiesel team were inundated with educating parties interested in biodiesel everywhere. Dr. Van Gerpen developed and taught internationally recognized 5-day biodiesel workshop program and travelled extensively helping to develop biodiesel plants around the world.

Dr. Jon H. Van Gerpen

Today, the biodiesel industry is established but the effort of research and education continues at the University of Idaho. The biodiesel lab continues to make biodiesel from oilseeds grown in the region to supply fuel for campus vehicles and the lab's service and demonstration vehicles. The lab also uses frying oil used in campus kitchens to make biodiesel that fuels delivery vehicles for the food supplier.

Logo of the Biodiesel Education Program