



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Nilay S. Sawant	Project Number J0122
Project Title A Comparison of Viscosities of Different Biofuels at Various Temperatures	
Objectives/Goals Though biodiesel is a renewable source of energy, it has a tendency to gel at lower temperatures. Viscosity is a measure of fluid's resistance to flow. The objective of my project is to make biodiesel from various vegetable oils and determine which vegetable oil based biodiesel is a better choice for colder temperatures.	
Abstract Methods/Materials Vegetable Oils, methanol and sodium hydroxide are needed to make biodiesel. Pour 250mL methanol in glass bottle. Add 31.5g of sodium hydroxide to the glass bottle. Stir the mixture until sodium hydroxide is completely dissolved. Add this solution to 1L of vegetable oil in a 2L soda bottle. Shake the solution for five minutes and let the mixture stand still for 2 hours. You will see the liquid start to separate out into layers. Top layer is biodiesel, bottom layer is glycerin. Carefully pour out biodiesel. To measure viscosity, fill the funnel separator with 100mL of biodiesel. Measure time taken to empty the biodiesel from the funnel. Record the time required to empty 100mL of biodiesel at various temperatures. The more time taken indicates higher viscosity.	
Results For all three biodiesel, viscosity increases when the temperature of biodiesel is decreased. Soybean biodiesel has higher viscosity at all measured temperatures compared to canola and corn biodiesel. Corn biodiesel is better choice of biodiesel with respect to viscosity for all kinds of weather because the drop in viscosity compared to the increase in temperature is minimal. Change in viscosity of canola biodiesel is very much comparable to that of corn biodiesel. Hence, canola biodiesel is also good for all kinds of weather. Soybean biodiesel is the worst biodiesel in comparison with the other two biodiesel tested, with respect to viscosity.	
Conclusions/Discussion Biodiesel is made from vegetable oils which is a renewable source unlike petrodiesel. Petrodiesel emits higher pollutants, some of which are linked to lung cancer. It also contributes to global warming. Biodiesel burns cleaner and emits fewer pollutants. It is simple to use, biodegradable, nontoxic and essentially free of sulfur, hence better for environment. A good choice of biodiesel is determined by two factors: cost and viscosity. The cost of oils from lowest to highest is soybean, corn, and canola. Soybean biodiesel has the highest viscosity. Canola and corn biodiesel viscosity is comparable. Canola biodiesel is the best choice among the three.	
Summary Statement Certain biodiesel exhibit a smaller increase in viscosity for the same decrease in temperature, making them more suitable for use in colder climates.	
Help Received My science teacher, Mr. Kai Brown, supervised me during making of biodiesel in the school laboratory.	