



CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s) Nitya Mani	Project Number J0610
Project Title Can Jatropha Oil Be Converted into a Usable and Cost-Efficient Green Alternative Fuel?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Fossil fuels are running out, and we are looking for sustainable replacements. Jatropha oil, an inexpensive oil, has potential for being an effective replacement. My experiment focuses on trying to correct three main obstacles that are currently preventing this oil from fulfilling its potential which are that the oil oxidizes too quickly, has a high cloud point, and is currently being extracted with hexane which is both non-sustainable and expensive. I hypothesized that we could use antioxidants to significantly lower oxidation level, add chemicals that completely dissolve in the oil to lower cloud point, and use other common solvents in place of hexane to extract the oil.</p> <p>Methods/Materials 1.I added TBHQ and ascorbic acid, two antioxidants, to the oil to see how it would affect its oxidation level. 2.To the lower the cloud point of the oil, I tried adding isopropyl alcohol, ethanol, cyclohexane, and ethyl acetate. This experiment had two controls: a positive control (Jatropha oil) and a negative control (Jatropha oil and salt). 3.I performed extractions with hexane, ethanol, and ethyl acetate.</p> <p>Results 1.The solution of Jatropha oil and TBHQ was the most effective at lowering the oxidation level of the oil. Ascorbic acid was effective at lowering oxidation levels but only when used in relatively high concentrations. 2.Cyclohexane and ethyl acetate both lowered the cloud point of the oil by over 20°C, whereas ethanol and isopropyl alcohol actually raised the cloud point of the oil. 3.My experiments indicated that ethyl acetate could be a viable alternative to hexane in the extraction of Jatropha oil. Both of them extracted a little over 30% oil from the seed. The ethanol performed significantly worse than the other two.</p> <p>Conclusions/Discussion 1.The TBHQ was the better antioxidant of the two although both TBHQ and ascorbic acid were fairly good at lowering the oxidation level of the oil. 2.Both cyclohexane and ethyl acetate were both effective at lowering the cloud point. Given that ethyl acetate is cheaper and greener than the cyclohexane, it might be the better alternative. 3.In the case of extraction, ethyl acetate proved to be as effective as hexane. Here also, it might be the better alternative as ethyl acetate is inexpensive and sustainable.</p>	
Summary Statement Changing the oxidation levels, cloud point levels, and increasing the sustainability of the oil extracted from Jatropha Curcas seeds, so that it will be commercially viable and sustainable, yet still retain its low price.	
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