



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

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<b>Project Title</b> <b>Seeing Through the Haze: What Light Penetrates Wildfire Smoke?</b>	
<b>Abstract</b>	
<b>Objectives/Goals</b> My objective was to find out how light of different wavelengths penetrates smoke. The hypotheses that I tested were that light penetration through smoke is independent of the a) type and b) amount of smoke it passes through.	
<b>Methods/Materials</b> Two different types of smoke were obtained by burning canola oil and juniper needles. A beam of white light was passed through the sample of smoke, and the amount of light at different wavelengths transmitted through the smoke was measured with a homemade spectrometer. An attempt was made to control the amount of smoke (high, medium or low density) per sample.	
<b>Results</b> The two different types of smoke did not have the same pattern of light transmission. At high densities (Approx. 20% light transmitted) canola oil smoke allowed more light of blue wavelengths to pass through. However at lower densities transmission of reds was equal to blue and yellow and green were less favorable. At high densities, juniper needle smoke had the same pattern as the canola oil sample. At the lowest density of juniper needle smoke red wavelengths were transmitted more than blue reversing the high density trend.	
<b>Conclusions/Discussion</b> I found that light penetration through smoke is dependent on the type and amount of smoke. The density dependence is surprising to me, maybe smoke particles interact when they are at high densities producing a different pattern. I will collect more data on smoke from different materials found in forest fires. This information can be used to help develop climate studies that model absorption of carbon dioxide by plants. Forest fires are predicted to increase as global climate change progresses. Plants that are starved of certain wavelengths due to the smoke created from forest fires could display stunted growth and lower uptake of carbon dioxide, a greenhouse gas.	
<b>Summary Statement</b> Measuring light penetration through smoke to understand the relationship between plant growth and climate change.	
<b>Help Received</b> Dad made home made spectrometer, faculty at Humboldt State University gave me idea about project.	