

**Greater San Diego Science and Engineering Fair  
2015 PROJECT SUMMARY**

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**Project Title:** Forecasting the Impact of Climate Change on Agricultural Crop Yields in California

**Abstract**

**Objectives/Goals**

This project will be investigating the impact of climate change in Fresno, Kern, Tulare, Merced and San Joaquin, by measuring the daily high and low temperatures, dew point, humidity and rainfall recorded from June 1st 2014 to November 25th 2014. The project will then compare the observations to similar periods from 2004-2013. This study will help correlate the effect of temperature changes on the yield of agricultural crops in the Southern California region. These changes to the climate have been caused by a long term neglect by humans to fully understand the science and to take appropriate preventive action. Adaptation measures can help farmers delay and reduce some of the impacts on their crops due to climate change.

**Hypothesis**

It is hypothesized that:

1. A 1<sup>0</sup>F annual rise of nighttime temperature will decrease the yield of certain high-value agricultural crops by 0.3% annually during the next 2-5 years.
2. It is also predicted is that the average temperature from the previous summer (2013) will increase by at least 0.07<sup>0</sup>F annually in the southwest US for the next 2-5 years.

**Methods/Materials**

1. Computer with Windows, Excel 2013 with Internet Access
2. Five weather stations in CA for the selected counties: Fresno, Kern, Tulare, Merced and San Joaquin.
3. Access to daily weather temperature, humidity, dew point, rainfall data across these five selected regions from Weather Underground

**Results**

The following data trends were computed in support of hypothesis #1 and #2:

- a. Max Temperature vs 10yr Max Temperature Avg., Min Temperature vs. 10yr Min Temperature Avg.
- b. Mean Temperature difference over 10yr Mean Temperature Average
- c. Min Temperature difference over 10yr MIN Temperature Average
- a. Rate of increase in nighttime temperature vs. daytime temperature
- b. Cumulative GDD 50, 65, 85 over the observation period (June 1 – Nov 25)
- c. Daily GDD 85 vs. 10yr average GDD 85
- d. Daily CHUs for 2014 vs. 10yr Average
- e. Daily Min (Night time) temperature vs. Min Dew Point temperature

**Conclusions/Discussion**

A one degree increase in temperature has the potential to decrease yields by about 6%. Out of the top five agricultural counties in California, Fresno is predicted to suffer the most due to severe change in max/min temperature, GDD 85, and other temp related variables in 2014 from the averages.

**Summary Statement**

It is concluded that among all counties, FRESNO showed the most severe change in max/min temperature, GDD 85, and other temp related variables in 2014 from the averages, so it is likely that the agricultural yield of corn and soybean in FRESNO would suffer the most.

**Help Received**

Maximilian Auffhammer, Professor of Agricultural and Resource Economics at UC-Berkeley