



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

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Project Title Heat of Condensation: A Natural Source of Protective Heat: A Second Year Study	
Abstract Objectives/Goals Current farming methods used to protect agricultural crops from frost are energy consumptive and expensive. This investigation is an attempt to practically apply the theory of heat of condensation into agricultural fields to prevent frost destruction in crops. This investigation will use previously acquired knowledge about the tendencies and properties of heat of condensation and attempt to create an ideal structural matrix that can promote water nucleation. Methods/Materials Using a self-designed computer program and a thermister interface, air temperature differences were monitored beneath structural net matrixes and the adjacent experimental control of ambient air temperature. Structural matrixes used during the investigation included: three 5#x5# plastic nets, two containing hole diameters of .5# and a third net containing hole diameters of .1#. One .5# net and the .1# net were suspended 9# above ground; the third net was suspended 3# above the ground. Comparative temperature readings were simultaneously recorded at hourly intervals from the hours of 6:00 p.m. to 7:00 a.m., during the winter months. Results Data from the investigation showed a significant difference between ambient air temperatures and temperatures beneath the net matrixes on cold nights. As temperatures decrease, marginal differences between the ambient air temperatures and temperatures beneath the net matrixes would increase. Ideal conditions for heat of condensation were overcast nights without any wind. As readings were taken in later months and temperatures rose, marginal differences between the ambient air temperature and temperatures beneath the nets decreased. Conclusions/Discussion Data and statistical analysis showed that a structural matrix might increase the rate of nucleation of water vapor, which does increase the relative air temperature through heat of condensation. Data analysis showed an increased temperature difference between the matrixes and the experimentally controlled ambient air temperature on cold nights; therefore significantly reducing the possibility that this phenomenon is caused by heat being re-released from the surface. Results suggest that a matrix, such as netting, could be practically applied in agriculture to protect crops, thus serving as a natural source of protective heat with an associated advantage of energy conservation.	
Summary Statement Creating an ideal situation to promote and harness the effects of heat of condensation, so that they may be practically applied in agriculture, in the form of a structural matrix, to prevent frost destruction.	
Help Received Mother took pictures of me to put on board;statistics teacher helped teach me how to mathamatically calculate statistical data.	