



Solar Dehydrator

California State University, Chico College of Agriculture

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PROJECT OVERVIEW

The purpose of this project was to prevent the continued waste of produce from the inability to sell at market during peak ripeness.

The objectives of the project included:

- Reducing waste
- Extending shelf life of produce
- Creating the opportunity for expansion of the farm
- Creating a sustainable practice

Project Specifications:

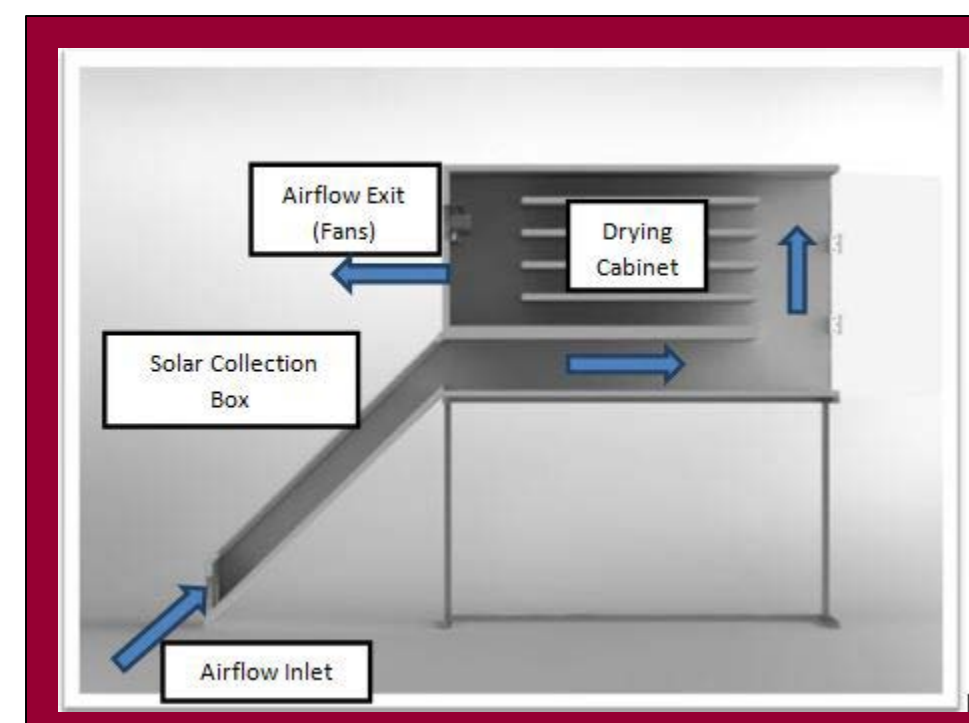
- Dehydration time of less than 12 hours
- Drying chamber temperature difference of $\pm 5^{\circ}\text{F}$ spatially
- Volumetric flow rate of 530 CFM
- Ability to dry 50 lbs wet weight of tomatoes a day
- Washable and removable drawers
- Use solar convection heating
- Conforms to California Food Safety Standards
- Withstand year round elements
- Year round operation
- Universally controlled interface
- Ability to dry both fruits and vegetables

HOW IT WORKS

This cabinet style dehydrator combines both horizontal airflow and vertical airflow into its design. The dehydrator can be turned into vertical airflow by removing the dividing plate.

For the horizontal airflow, an electric heater and fans will help assist the flow and temperature of air through the drying chamber.

During ideal conditions, the vertical airflow option will be used to minimize power usage by eliminating the need for the backup heater and fans.



Test Results

- Drying time:** The drying test yielded a time of less than 12 hours for a batch of tomatoes.
- Temperature:** The spatial temperature difference inside the drying chamber was within $\pm 5^{\circ}\text{F}$.
- Volumetric Flow Rate:** The volumetric flow rate of the air was about 400 CFM.
- Batch Weight:** The drawers are capable of holding 50 lbs of wet weight sliced tomatoes

Components

Each removable drawers are capable of holding approximately 10 lbs of wet weight sliced tomatoes. The drawers are made from Angled Stainless Steel and $\frac{1}{4}$ " Expanded Stainless Steel Sheeting.

A FT1A-C14SA-B Smart Axis PLC+HMI Combo from IDEC was chosen as the controller for the user interface. Different produce can be chosen on the home screen to run various drying time. A variable dial is used to control the fan speeds.



PROJECT OUTLOOK

The Solar Dehydrator will help reduce the amount of waste generated by the College of Agriculture while using a more sustainable process during the summer. This solution will also allow the College of Agriculture to expand the usage of their farm by being able to plant, harvest, and sell more produce.

