SHuR FARMS®
Frost Protection
Division of Recovery P.T. Inc.

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Shur Farms' End of Year Sale Now in Progress!

Our end of year sale is now in progress! Get a 5% discount on all of our Cold Air Drain® models now thru Nov. 30, 2015!
Call now for your free site analysis. For projects already analyzed and quoted, give us a call and we can add the sale discount to your project purchase.

Analysis and Evaluation

How to determine if frost protection is needed or warranted.
Economic and Farming considerations
Putting your money where your frost is.

Benefit Analysis - Economic

Frost protection is a method of risk management. It should be viewed with the idea that no system can be put into place that will protect 100% every year, but overall there must be a satisfactory return on investment. Any decision on the acquisition of frost protection equipment should consider the economics, as well as the environment and esthetics.

Economic factors to be considered are the value of the crop and the risk of frost damage. Also to be considered is the possibility that the trees or vines will also be damaged and the accompanying replacement costs. A reasonable pay back on the investment in frost protection is 5 years, so if the anticipated average annual damage to yield and trees/vines is more than 1/5th the cost of the equipment, then purchase should be considered.

A reasonable return on investment would be (estimated or actual) yearly losses times 5 as the maximum for your investment in frost protection equipment. Total investment dollar amount includes operating costs, man hours, fuel and maintenance, and the original acquisition cost of the equipment used.

The effectiveness and return on investment of a frost protection system considers the frost losses over a period of years in the protected area compared to the same area for the same period of time without protection. It is not feasible to fully understand the impact of a frost protection system in the first year of operation.

I haven't started growing yet or have never been damaged significantly, so how do I determine if I need to frost protect?

Before planting a crop and to help determine the viability of growing a specific crop or variety in a given location, *Summary Frost Risk Analysis* of the area can be performed. The first part will consist of relevant information including frost history, orchard/vineyard specifics (acreage, age, skirt/cordon height, etc.) and the frost history and specifics of the surrounding area. If reliable information is available from nearby orchards/vineyards and then compared to the subject area, the analysis can give a feel for the risk and probable intensity of frost damage, even when there is little actual information from the subject area itself.

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This first part of the analysis can help determine if the regional climate is suitable to the crop or variety that is planned to grow there. If it is, then the next part of this analysis is completed.

The second part of the analysis consists of topographic and air flow models and will identify where cold air is entering, exiting and accumulating in the growing area. The designed frost protection system will optimize the growing area with passive measures that naturally enhance cold air drainage and block or retard cold air intrusion.

After the summary analysis and a determination of regional climate suitability, active frost protection measures can now be determined and designed to forcibly remove or mitigate the effects of any remaining cold air accumulation in the growing area.

To protect new plantings or plantings without a frost damage history a *Preventative Frost Protection* system can be designed. This design is based on either a *Summary Frost Risk Analysis* or a *Full Frost Risk Analysis*. There are downsides to a preventative system. Some methods of frost protection can cause damage to the crops if not used properly where none may have occurred without it, and the cost of running frost protection will add up as an expense that might not have been needed. Methods that can cause damage or have high acquisition or operating costs should be avoided.

A Preventative Frost Protection system designed on the basis of a Summary Frost Risk Analysis assumes a moderate to severe frost risk in the areas of cold air accumulation. In reality, there may or may not be a frost risk in these areas because cold air accumulation alone does not assure that the area will fall below the critical temperature for the crop that is planted there, only that it will be colder than other areas that adequately drain themselves. An accumulation area where peaches are grown may have substantial frost damage, but if lemons are planted in the same area, there may be no frost damage. A frost area is only a frost area if the crop that is planted there is susceptible to the minimum temperatures at the critical time.

A Preventative Frost Protection system based on a Full Frost Risk Analysis uses the data collected to create a 'virtual' frost damage history. A virtual damage history can be compiled for any area, even if it is newly graded or the outside factors contributing to the micro climate inside the protected area have recently changed. If the outside factors change after the data is collected, such as a tree line removed or a structure is built, the acquired data may no longer be relevant.

A Micro Climate Map and/or Full Frost Risk Analysis is made by installing data loggers in strategic spots within the growing area and an additional data logger in a control area. A local regional weather station (CIMIS, Adcon, PAWS, etc.) is used as the base for a Full Frost Risk Analysis. The control data and the base data must come from the same region as the growing area because micro climates within a regional climate will have consistent temperature differences, but there is no correlation of temperature differences between micro climates in different regional climates.

Data logger locations are determined by identifying the accumulation areas and cold air streams of the new growing area using the topographic and air flow analysis produced in the Summary Frost Risk Analysis. By placing the loggers in areas presumed to be colder (identified accumulation areas) and areas presumed to be warmer (hillsides and other well drained areas), a micro climate map can be produced showing the relative temperatures throughout the growing area. Relative temperature data will confirm the existence of cold air accumulation areas and drainage areas and identify the colder areas more at risk for frost to help determine where frost protection should be targeted.

The readings from the data loggers will give temperature differences within the orchard/vineyard as well as the differences with the control logger and/or weather station. For a full
Frost Risk Study, the weather station control must have several years of history. By comparing temperature differences between the weather station and accumulation areas conclusions as to the actual temperature within the growing area during past radiation frost events can be made.

For instance, if a data logger shows a difference of -3 deg. F in relation to the weather station during a radiation event, then whatever temperature that is recorded on the weather station during the growing season is presumed to be 3 deg. higher than that spot during a frost event. When this information from prior years is recorded on a spread sheet, a virtual frost history can be compiled even on newly planted orchards. This history can include actual low temperatures, dates and frequency of frost events. With this information the grower can match the specific requirements of each variety of crops with the most acceptable area within the orchard and determine the amount of frost protection that will be needed.

Executive Frost Risk Study

An *Executive Frost Risk Analysis* is an effective frost risk analysis when performed correctly. It expands on the *Summary Analysis* and *Micro-climate mapping* and is made by installing data loggers in accumulation and other areas within the planned growing area.

To produce an *Executive Analysis*, there must be another orchard/vineyard close by in the same regional climate that has been growing the same crop as planned in the new orchard for several years, at least some of it growing successfully without frost protection. A control data logger is placed in an area that is growing the same variety of crops as what is to be planted outside of the frost damage zone, but as close as possible to the damage zone. This is the control area, and instead of comparing temperatures to a weather station's recorded history and creating a virtual frost damage history, by choosing a control area that has an acceptable frost damage history, temperature comparisons can be made and the grower can assess the viability of the new planting. If the temperatures are the same in the proposed area as in the known area, then the frost risk is the same. If the temperatures are less, the risk is higher.

Data logger data must be compiled during radiation events. The most beneficial data is from the long uninterrupted nights. Several months of data may need to be considered in order to get a relevant and useable sample. This is time consuming and tedious work and has a high engineering cost. Due to the high cost of a full Frost Risk Analysis, it is often more economical to perform the Executive Risk Analysis or to simply assume moderate to severe frost risk in the accumulation areas and design and install a preventative frost protection system accordingly.

How do you know if you need frost protection?

1. Is there is enough financial risk to pay for the system in 5 years or less?
2. Is the regional climate suitable for what you plan to grow?
3. Do you have accumulation areas and micro-climates within the growing area (commonly called 'Frost Pockets')

Shur Farms Scholarships Awards!

Shur Farms is proud to participate in helping students achieve a higher education. Shur Farms Frost Protection awards a scholarship to two hardworking, deserving students to assist in furthering their education. This year we want to congratulate Skye Bruce and Nicholas Fantozzi.

Skye Bruce is a student at California Polytechnic University of San Luis Obispo majoring in Wine and Viticulture. She grew up on an avocado ranch. In high school she was the president of the Agriculture, Animal Science and Natural Resources majors clubs. She is a hardworking student earning a GPA of over 3.0.

Nicholas Fantozzi is a civil engineer major from California Polytechnic University of San Luis Obispo. He grew up on his family's vineyards always fascinated with the complex machinery of the vineyard. Nicholas comes from a generation of engineers and dreams of carrying on the tradition. He is a high achieving student earning a GPA of higher than 3.0.

Shur Farms Frost Protection Scholarships and Grant 2016

Shur Farms 2016 scholarship applications are now being accepted. Deadline is August 1, 2016, requirements are; 3.0 or higher GPA, Agriculture related major preferred, and a deposition of why we should select you.

Contact Amber Andrade for an application at: amber@shurfarms.com or call us at (909) 825-2035.

Upcoming Events

Nov. 5, 2015: San Diego Farm & Nursery Expo, Del Mar Fairgrounds, CA
Nov. 12, 2015: Rootstock, Napa, CA
Nov. 16 – 17, 2015: Sustainable Ag Expo, San Luis Obispo, CA
Nov. 17 – 19, 2015: Willamette Ag Expo, Albany, OR
Dec. 3, 2015: North Coast Wine Industry Expo, Santa Rosa, CA
Dec. 7 – 9, 2015: Northwest Horticultural Expo, Yakima, WA
Dec. 8 – 10, 2015: Great Lakes Expo, Grand Rapids, MI
Dec. 8 – 10, 2015: The Almond Conference, Sacramento, CA
Jan. 15, 2016: Cherry Institute, Yakima, WA
Jan. 27 – 28, 2016: Unified Symposium, Sacramento, CA
Feb. 9 – 11, 2016: World Ag Expo, Tulare, CA
Feb. 17-18, 2016: Ontario Fruit and Vegetable Convention, Niagara Falls, Ontario, Canada
Feb. 18 – 20, 2016: Texas Wine & Grape Growers Association, Dallas, TX
Mar. 4, 2016: Calaveras Winegrape Alliance Grower Meeting,, Murphys, CA
Mar. 9 – 10, 2016: Eastern Winery Expo, Lancaster, PA
Mar. 15-16, 2016: WIVI, Paso Robles, CA

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Customer Survey

SOCIAL NETWORKING

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