

Mobile Hop Dryer

SARE Project FNC17-1103



Dave Volkman
Ohio Valley Hops
Maineville, OH

BACKGROUND: Drying hops is time sensitive from start to finish. The sooner that harvested hops can begin and finish the process, the higher the quality, and more marketable. Hops (like any vegetative product) begin to break down as soon as they are picked, potentially resulting in off flavors that reduce their marketability. Conversely, immediate entry into the drying process and rapid completion prevents damage, and maximizes oil and acid retention that give hops the flavors and aromas desired, improved pelletability and storage, and thus sales potential and price point. Many growers rely on other farmer's drying facilities, increasing travel and time between harvest and drying. Farmers who have immediate access can produce a much higher quality hop than those who don't. Several growers in Ohio also process hops into pellets, the form required by brewers. These processors report most hops they receive are not dry enough, requiring them to be redried, further degrading their quality.

PROBLEM: Find a way to quickly dry hops to the ideal moisture content for processing, while reducing individual farmer investment by creating a shareable resource.



PROPOSED SOLUTION: Build a prototype mobile hop dryer that incorporates best drying practices from small-scale hop growers. It would facilitate immediate drying after picking. It will be shared among a group of growers who manage their harvest dates to maximize utilization, eliminate the cost and inefficiency of a fixed facility, while improving the quality and marketability of their crop. The design could be replicated and shared collaboratively by other groups of growers.

OBJECTIVES

To build a mobile hop dryer that will quickly dry hops to national quality standards for processing, storage and sale. Status: complete and successful.

To improve crop quality by decreasing time between harvesting and drying of hops, and testing the mobile hop dryer prototype for quality of product. Status: complete, but need testing data to compare two harvests .

To benefit farmers economically by allowing sharing of the mobile hop dryer among collaborating growers, reducing the need for all growers to build fixed facilities, saving them money, and improving crop quality and marketability. Status: Complete, and successful on a limited scale IAW year 1 objective.



PROJECT DESCRIPTION

The dryer was built in an enclosed trailer, with a three-step, 48 hour drying process involving high volume air movement for initial drying and then lower volume conditioned air for finishing, powered by a generator for complete mobility, with food safe materials and practices as required. Although using proven drying techniques, we tested to ensure this design was able to accomplish its' intended goal of drying the crop to accepted moisture content standards within approximately 48 hours.

We cooperatively shared the dryer with 4 Ohio based farmers the first year to test scheduling and sharing, and will schedule more the second year to determine the optimal number of farms that can be served by a mobile hop dryer.



Materials List

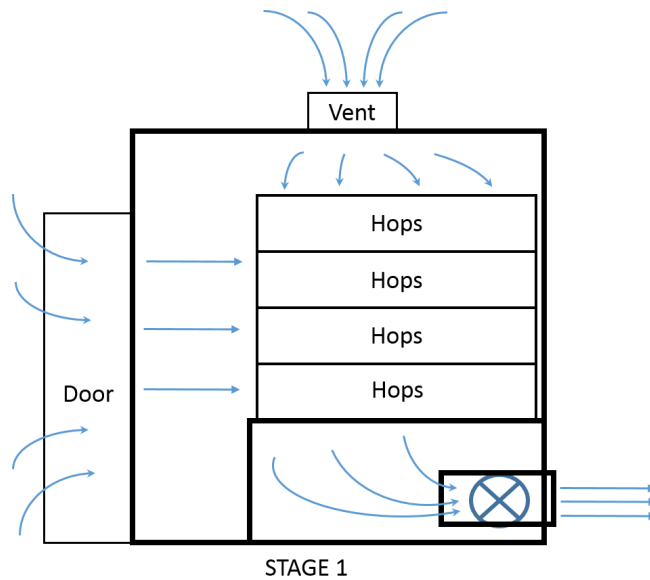
ITEM	COST
Trailer	3100
Generator, 9kw	800
Fan, 3750 CFM, 2 each	800
Louvers, 16", 2 each	160
Fan, 1100 CFM, 2 each	440
Louvers, 12" , 2 each	140
Harvest baskets, 90 each	1900
Dehumidifier	340
Heater	130
Screen door	130
Extension cords, 2 each	100
Outlet cover	30
Plywood, 4x8x 1/2", 3 each	60
Studs, 2x4x8', 20 each	60
Paint, latex, 4 gallons	160
Breaker box, 2 each	40
Breakers, switch duty, 6 each	60
Wire, 150'	100
Plumbing	20
Misc hardware, fasteners	120



Design

In order to effectively and efficiently dry hops from ~80% moisture to ~10% moisture, I use a three stage model, which relies on airflow, dehumidification and heat.

In Stage 1, we focus on airflow. Using two 3750 CFM grain fans vented out of the trailer, which provide a significant static pressure drop that ensures air will flow through several feet depth of hops. We draw ambient air through the hops to avoid bouncing and blowing holes through them. Depending on weather conditions, moisture content drops to 20% within 18-24 hours.



In Stage 2, we use conditioned air to continue drying to reach our target moisture content. We shut the trailer vent and door, turn on 1100 cfm fans that recirculate air inside the trailer while running a dehumidifier and thermostatically controlled heater. Moisture content drops to 8-10% within 12-18 hours.

In Stage 3, the trailer remains sealed with recirculating fans (no heat) for 12 hours to allow the moisture within the cones and within the batch to stabilize and equalize.

