

Harvest Systems

February 16, 2018

Burlington, VT

Julian Post



Mechanized Harvesting

Strip and Sort

New



Used



New

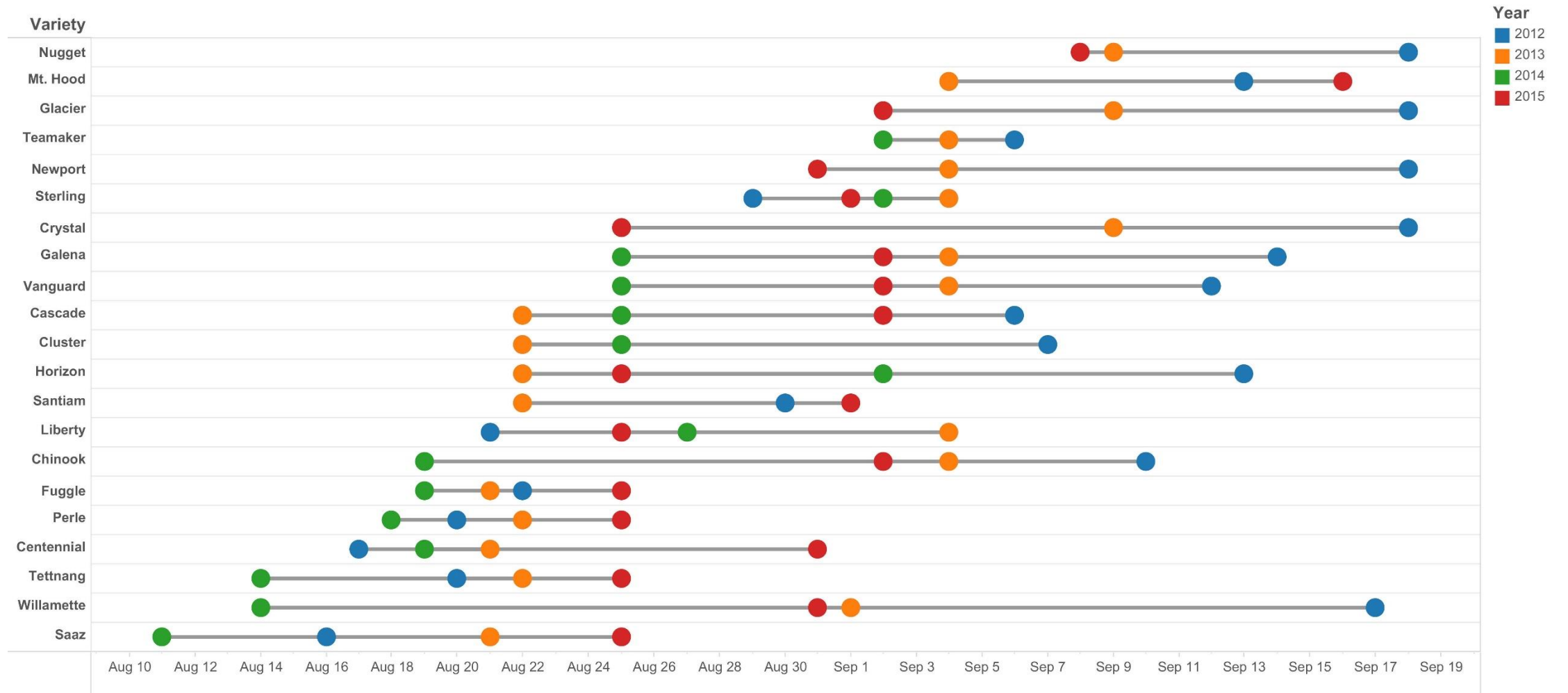
- ~120 bins per minute or 500+ bins per minute (nothing in between)
- Parts can be sourced locally
- Manufacturer is accessible for servicing
- Different power options (gas, PTO)

Used

- 140-280 bins per minute
- Parts come from Germany, must plan ahead
- 3-phase electric

What size do I need?

UVM Harvest Timing 2012-2015



What is your bottleneck?

Acres	5
Bines per acre	1776

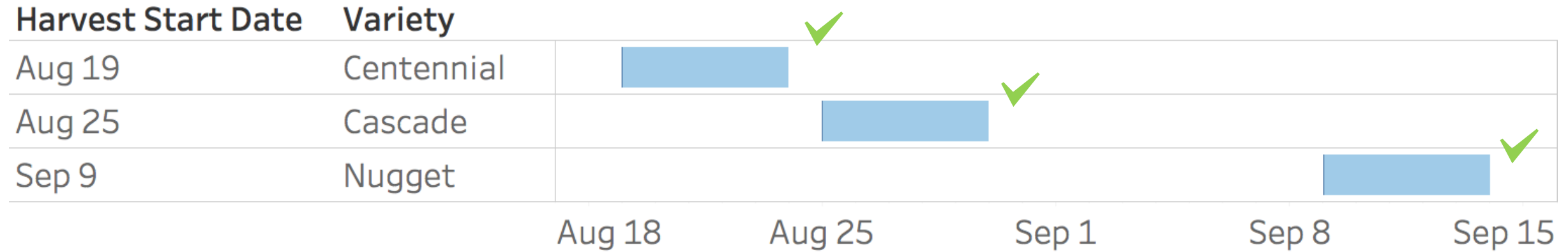
Model	Bines per hour	Hours per acre	Hours to harvest yard	Days (operating 24/7)	Days (operating 10hrs/day)
Bine 3060	30	59.2	296	12.3	29.6
Hopster 5P	120	14.8	74	3.1	7.4
Wolverine	120	14.8	74	3.1	7.4
WHE 140	140	12.7	63	2.6	6.3
WHE 170	170	10.4	52	2.2	5.2
WHE 220	220	8.1	40	1.7	4.0
WHE 280	280	6.3	32	1.3	3.2

This scenario - WHE 140 takes 6 ½ days to harvest 5 acres @ 10hrs/day

Balanced

- 5 acres Centennial August 19
- 5 acres Cascade August 25
- 5 acres Nugget September 9

15 total acres

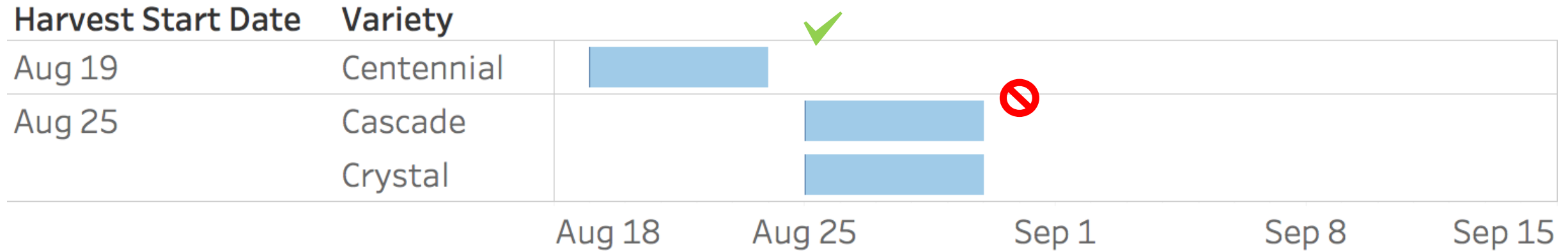


All good

Unbalanced

- 5 acres Centennial August 19
- 5 acres Cascade August 25
- 5 acres Crystal August 25

15 total acres



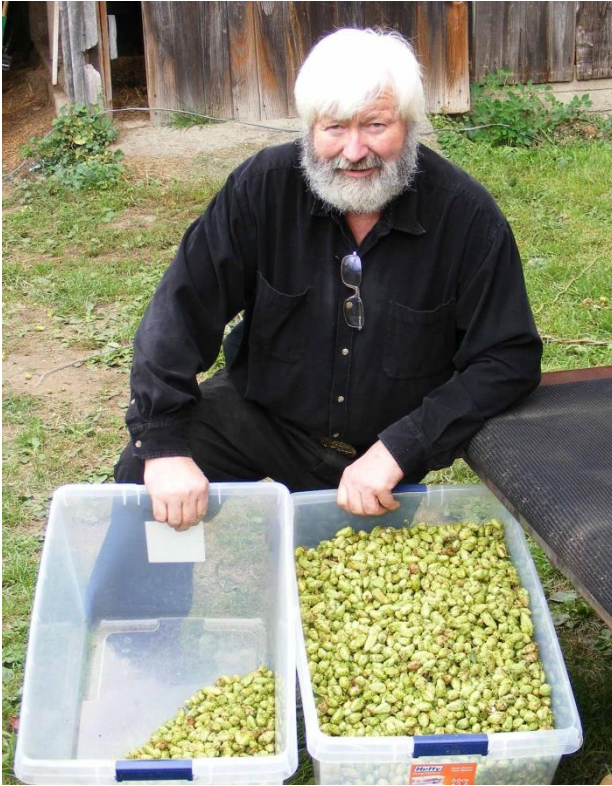
Need more harvester capacity



Contacts for Wolf Harvesters

Contact	Condition	Location	Company	Phone	Email	Website
Glen Fuller	Used	Peonia, CO	PPUH AGRO	(970) 209-8684	organichops@rof.net	wolfharvester.com, Facebook: "Wolf Pickers Only"
John Varisella	Used	St. Louis, MO	Euro Distributors LLC	(314) 276-2625	hopequipment@gmail.com	http://hoppicker.com/
Tom Frazer	Used	Ketchum, ID	Dauenhauer Mfg, Co.	(707) 546-0577	tfrazer@dmfg.com	www.dmfg.com
Tom Frazer	New	Ketchum, ID	WOLF Anlagen-Technik GmbH	(707) 479-1740	tfrazer@dmfg.com	www.dmfg.com
John Condzella	Used	New York	PPUH Agro	(631) 875-0786	condzellasfarm@gmail.com	http://hopharvesters.com/

Wolverine



Patrick Comerford
607-661-7473
puckster5@juno.com

HopsHarvester.com



John Bonzo
585-326-4677
info@hopsharvester.com





UVM Mobile Hop Harvester

Harvest Timing

Smell

- Not ready: “green” like hay or grass
- Over-ripe hops: onions, sulfur, and garlic

In general, you should be able to smell hops from a couple feet away from a plant when they are ready.

Sight

Split a cone in half

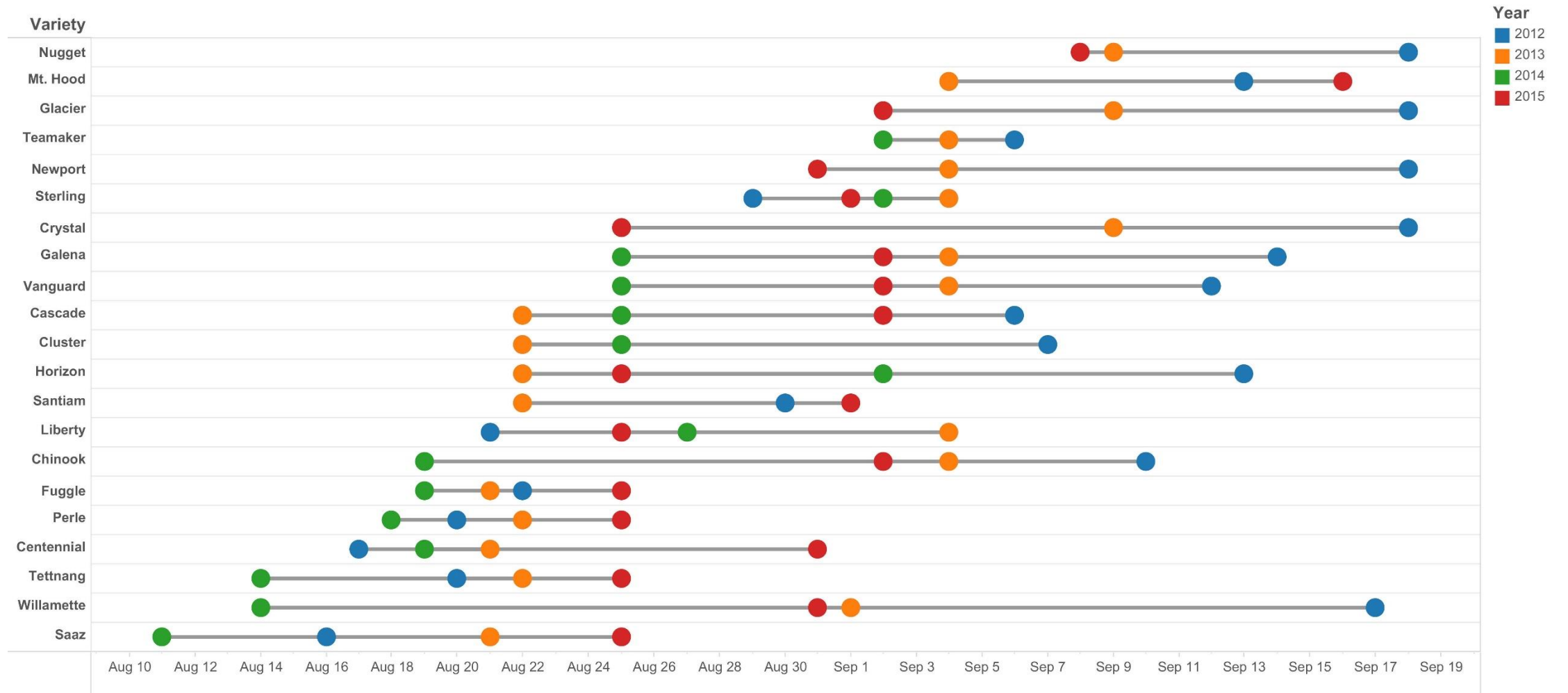
- Splits evenly, straight down the middle: not ready
- Splits unevenly: getting ready

The petals of the hop cone fan out like a Christmas tree as the cone dries down. The extent varies dramatically by variety, so make sure to compare change in one variety over time as opposed to variety-wide comparisons.

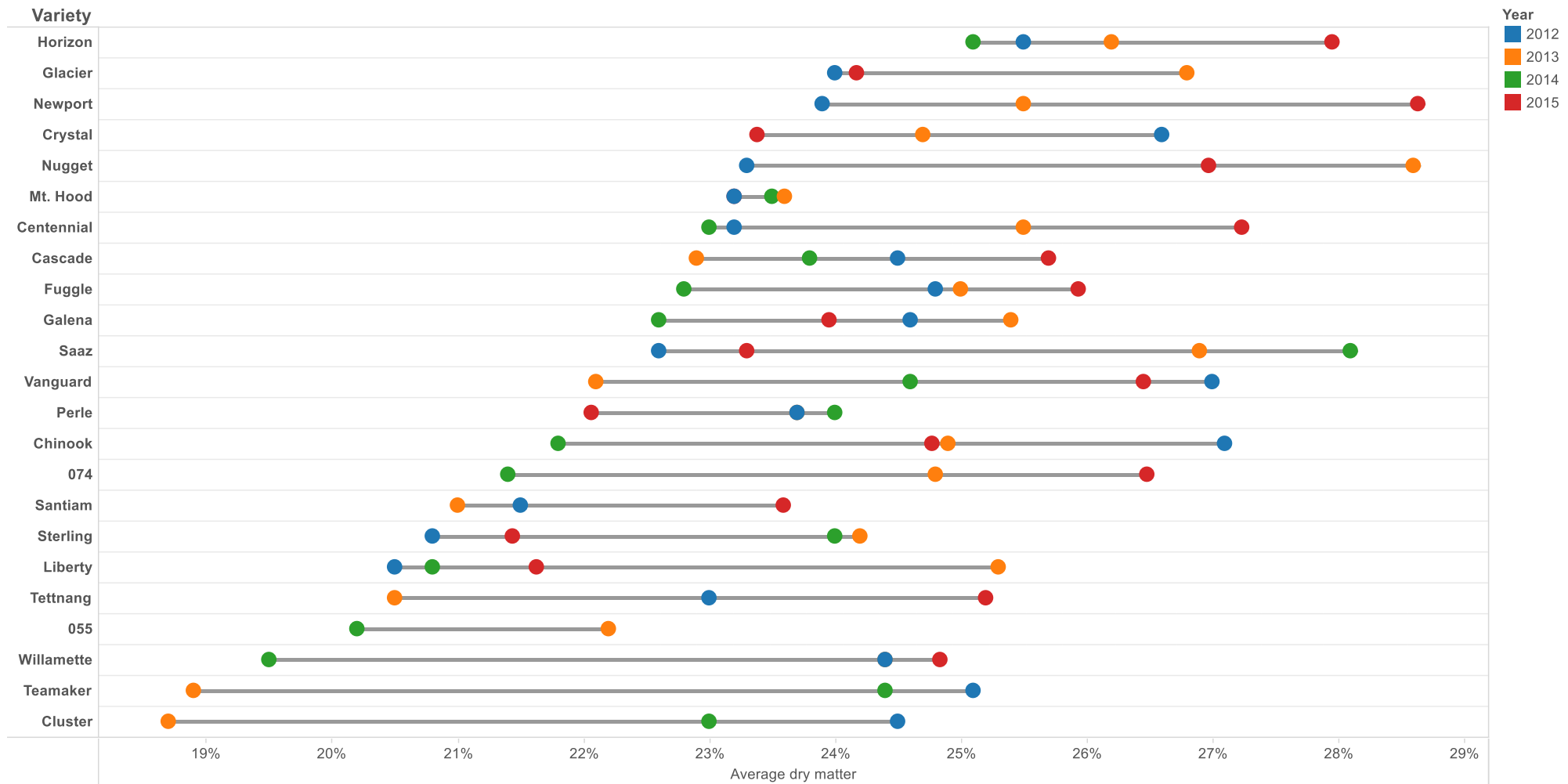
Dry matter

- Collect ~50 grams of hop cones from $\frac{3}{4}$ up the plant
(you will need an extra long-handled pruner or some other means of reaching 15 feet up)
- Weigh wet hops
- Dry hops in microwave or dehydrator
(when you think hops are completely dry, weigh them and dry them longer. If the weight doesn't change, they are 100% dry)
- Dry matter = dry weight / wet weight
- Hops are ready at 21-27% dry matter

UVM Harvest Timing 2012-2015



UVM Dry Matters 2012-2015



Use the UVM calculator

The screenshot shows a web browser window displaying the UVM Hop Harvest Moisture Calculator. The browser's address bar shows the URL: <https://www.uvm.edu/extension/agriculture/engineering/?Page=hopscale.html>. The page features a green header with the UVM logo and navigation links. The main content area is titled "Hop Harvest Moisture Calculator" and includes three steps for calculation. Step 1, "Weigh a Sample", shows a text input field for "Sample (A) Weight" with the value "120.25" and a unit of "grams". Step 2, "Dry the Sample to 0% Moisture & Re-weigh", shows a text input field for "Sample (A) Weight at 0% moisture" with the value "25.25" and a unit of "grams". Below these inputs, a green box displays the results: "Harvest Moisture is 79.2% moisture (by weight)" and "Harvest Dry Matter is 20.8% dry matter (by weight)". Step 3, "Weigh Another Sample", is partially visible at the bottom.

File Edit View History Bookmarks Tools Help

Agricultural Engineering: ...

<https://www.uvm.edu/extension/agriculture/engineering/?Page=hopscale.html>

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Hop Harvest Moisture Calculator

STEP 1: Weigh a Sample

Sample (A) Weight: 120.25 grams

Weigh a sample (A) of your harvested hops, making sure to 'tare' the scale before adding the hops, or subtract the weight of the container from the total weight.

STEP 2: Dry the Sample to 0% Moisture & Re-weigh

Sample (A) Weight at 0% moisture: 25.25 grams

Dry out the sample with a microwave, dehydrator, or oven. If using a microwave or oven, stir the sample every minute to prevent scorching! Weigh frequently: the sample is at 0% moisture when it no longer loses weight.

Harvest Moisture is **79.2%** moisture (by weight)

Harvest Dry Matter is **20.8%** dry matter (by weight)

STEP 3: Weigh Another Sample

Sample (B) Weight: grams

Weigh a second sample (B) from your harvested hops, making sure to

Calculator (Web and Excel):

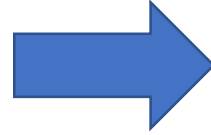
<https://www.uvm.edu/extension/agriculture/engineering/?Page=hopscale.html>

Instructional videos and wiki:

<http://www.uvm.edu/extension/cropsoil/hops>

Drying Oasts

77-80% moisture at harvest



8-10% for stable storage

Air can carry a fixed amount of water vapor

Two factors determine this:

- Temperature
- Humidity

More info: “Psychrometrics”

Max 140 F

More air = more capacity

Higher volume of fewer varieties



Higher volume,
some batch flexibility,
expandable



hopsharvester.com
modular parts

each unit (half of one level in
picture) is 48" x 48"

More varieties



More varieties



The oast includes two 4'x4'x8' cabinets with independent access doors and controls. Total capacity is 600 lbs wet hops which can be dried in 8 hours.



Different hop varieties can be kept separate in the oast by placing them in different trays. A total of 8 trays can be accommodated in each cabinet. Wire mesh is used as the bottom for the trays which allows air flow through the hops.

Oven-style heater

Fact sheet online at [UVM Wiki](#)



The fan and heater are installed on the ceiling of the cabinet. A PID controller (inset) rests on top of the cabinet and ensures temperature control.



Hop Pelletizing

Small scale options do not yet meet quality standards





Pellets = much
smaller

NY Commercial Processing Services Page 1 of 2

Name	County	Machine	Services Offered	Phone Number	E-Mail
Dietrich Gehring	Albany	Wolf 170	Harvesting (at Facility)	518-577-1484	dcgehring@gmail.com
Willet Hop and Grain LLC (Chuck Rhoades)	Cortland	Wolf 170 20 x 8 Dryer RB60 Baler	Harvesting (at Facility) Drying, Baling	607-761-6244	chuck@willethop.com
Hudson Valley Hops (Justin Riccobono)	Dutchess		Harvesting Pelletizing Packaging Hop Broker	845-202-2398	jr@hvhops.com
The Bineyard (Chad Meigs)	Madison	Wolf 170 Oast Pelletizer	Harvesting Drying Pelletizing	617-515-1011	hops@thebineyard.com
Foothill Hops (Larry Fisher)	Madison		Drying, Baling Pelletizing	315-495-2451	
Mosher Farms (Terry & Corey Mosher)	Madison	Wolf 140 (converted to 170)	Harvesting Drying, Baling Trucking	315-893-7173 315-723-9763	tmosher@frontiernet.com
Northeast Hop Alliance	Madison	Wolf	Harvesting (at Facility)	Larry Fisher 315-495-2451	
Appleton Farms (Charles Stodolka)	Niagara	Wolf 170	Harvesting (at Facility)	716-778-8155	ctruskey@verizon.net
Pedersen Farm (Rick Pedersen)	Ontario	Wolf	Harvesting Drying, Baling	315-781-0482	pedersenfarms@gmail.com
Schmidt Farm (Stephan Schmidt)	Ontario	Wolverine Buskirk Pellet Mill	Harvesting (Portable) Pelletizing	585-869-9641	sschmidt@schmidthops.com

NY Commercial Processing Services Page 2 of 2

Name	County	Machine	Services Offered	Phone Number	E-Mail
Whipple Brothers (Justin Whipple)	Orleans		Pelletizing Packaging	585-350-9707	justin.whipple@gmail.com
Northern Eagle Hop Processing (Ian Porto)	Otsego		Harvesting Drying Pelletizing Packaging Hop Broker	607-434-9306 607-432-4000	logistics@coopbrew.com
Pat Comeford	Steuben	Wolverine	Harvesting (Portable)	607-661-7473	puckster5@juno.com
Crooked Creek Farms (Christopher Holden)	Steuben	Buskirk Engineering Pellet Mill	Pelletizing Packaging	607-377-0393	cpholden2@yahoo.com
Lynn Tucker	Steuben	Wolverine	Harvesting (Portable)		Ltucker1703@hotmail.com
John Condzella	Suffolk	Wolf 170	Harvesting (at Facility)	631-461-3841	condzellasfarm@gmail.com
Josh Grazul	Tompkins	Hop Harvester 1000	Harvesting (Portable)		
Keuka Hopper Hut (Mike Mullins)	Yates	Wolf 140	Harvesting (at Facility) Drying Pelletizing Packaging	315-521-7201	mike@keukahopperhut.com

VT Commercial Processing Services

Name	Town	Machine	Services Offered	Phone Number	Email
Whitefield Hop Yard	East Hardwick	Buskirk	Pelletizing	(802) 472-6231	whitefieldhopyard@yahoo.com
Wicked Bines Farm	Berlin	Hopster 5P	Picking	(802) 223-7931	wickedbinesfarm@gmail.com

Sample Budget for 2 Acre Hop Enterprise

This is a sample, not a rule book. Your numbers WILL be different!

Julian Post, BVME Extension

Income						
	Unit	Number	Price per		Total	Yield per acre
Dry Pelleted Hops	dry lb	2,000	\$15.00		\$30,000.00	1000
Total Income					\$30,000.00	
Expenses						
Variable	Unit	Number	Price per	Cost per acre	Total	Notes
Coin	bale	2	\$500.00	\$500.00	\$1,000.00	2500 strings per bale
W-clips	acre	4	\$50.00	\$100.00	\$200.00	1000 ctt box
Fertilizer	ton	1.25	\$621.00	\$388.13	\$776.25	1,250 lbs/acre (cheap) (cheap (4-3-3) for 2000 N/planted acre (500 N/actual acre)
Fungicide/DG	20 lb bag	1	\$160.00	\$80.00	\$160.00	6 lbs/acre
Herbicide/DG	5 gallon barrel	2	\$260.00	\$260.00	\$520.00	2 applications @ 2.5 gallons/acre
Training Labor	hours	80	\$15.00	\$600.00	\$1,200.00	40 hrs/acre
Stringing Labor	hours	24	\$15.00	\$180.00	\$360.00	12 hrs/acre
Weed Control Labor	hours	160	\$15.00	\$1,200.00	\$2,400.00	hand weeding, trimming, and herbicide
Spraying Labor	hours	90	\$15.00	\$675.00	\$1,350.00	4 hrs/week @ 3.5 weeks
Tractor fuel for field work	acre	2	\$420.00	\$420.00	\$840.00	
Oast fuel	season	1	\$176.00	\$88.00	\$176.00	
Harvester fuel	season	1	\$200.00	\$100.00	\$200.00	
Harvest Labor	hours	80	\$15.00	\$600.00	\$1,200.00	
Post-harvest processing Labor	hours	32	\$15.00	\$240.00	\$480.00	200 cutting, 200 picking, 100 drying, 160 baling
Pelletizing contracted	lb	2,000	\$1.50	\$1,500.00	\$3,000.00	
Packaging contracted	lb	2,000	\$0.65	\$650.00	\$1,300.00	
Total Labor				\$3,495.00	\$6,990.00	
Total Variable (including labor)				\$7,581.13	\$15,162.25	
Fixed	Unit	Number	Price per	Cost per acre	Total	Notes
Rent	acre	2	\$150.00	\$150.00	\$300.00	
Insurance	year	1	\$1,200.00	\$600.00	\$1,200.00	
Taxes	year	1	\$200.00	\$100.00	\$200.00	
Total Fixed				\$850.00	\$1,700.00	
Total Fixed Variable				\$8,431.13	\$16,862.25	
Loans (annual payment total)				Cost per acre	Total	Notes
Start-up Capital/Equipment (detailed below)				\$2,766.67	\$5,533.33	\$69870 @ 15% for 20 years
Net Income						
	Unit	Number	Price per	Cost per acre	Total	Notes
Net After Capital Expense Yr 1					-\$16,039.58	no trop
Yr 2					\$715.75	half trop
Yrs 3+					\$7,604.42	
5 Yr Average					\$1,497.88	
10 Yr Average					\$4,551.15	

Input costs for conventional growing practices:

Pesticides: \$300/acre

Fertilizer: \$350/acre

2 Acre Detail

Start Up						
Capital/Equipment	Unit	Number	Price per		Total	Notes
Plants	plant	2000	\$4.00		\$8,000.00	
Field poles	pole	216	\$20.00		\$4,320.00	
Drainage Stone	ton	3	\$1,000.00		\$3,000.00	
Wire	feet	17000	\$0.15		\$2,550.00	
Hardware	acre	2	\$2,500.00		\$5,000.00	
Irrigation drip system	acre	2	\$1,500.00		\$3,000.00	
Small tractor	tractor	1	\$10,000.00		\$10,000.00	
Sprayer	sprayer	1	\$3,000.00		\$3,000.00	
Harvester	machine	1	\$25,000.00		\$25,000.00	
Oast	machine	1	\$3,000.00		\$3,000.00	
Baler	machine	1	\$2,000.00		\$2,000.00	
Refrigeration unit	cooler	1	\$1,000.00		\$1,000.00	
Total startup cost					\$69,870.00	
Labor						
	Hours per week per acre	Number of weeks	Total Hours			
Training		40	1	80		
Stringing		12	1	24		
Weed Control		10	8	160		
Spraying		3	15	90		
Harvest		10	4	80		
Post-harvest processing		4	4	32		

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