Mobile Hop Picker

A project of University of Vermont Extension, Vermont Agency of Agriculture and Massachusetts Department of Agricultural Resources through the USDA Specialty Crops Block Grants Program.

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Project Team

• Dr. Heather Darby (UVM Extension)
• Rosalie Madden (UVM Extension)
• Roger Rainville (Borderview Farm – Alburgh, VT)
• Gene L’Etoile (Four Star Farm – Northfield, MA)
• Paul Hendler (Shaftsbury, VT)
• Mark Magiera (Bobcat Cafe - Bristol, VT)
• Chris Callahan (Callahan Engineering, PLLC – Cambridge, NY)
• Dave Bister (Triangle Metal Fab – Milton, VT)
• With technical support & donations from several key vendors including
  – Dauenhauer Manufacturing (Hop Harvester Parts - Fresno, CA)
  – Kauffman Trailer, White Drive Products (Hydraulic Motors)
  – Prince Hydraulics (PTO Pump)
  – Charlebois Truck Parts (Burlington, VT) and
  – Sparks Belting Co. (MI).
Project Goals

– Provide mechanical picking and cleaning capability to Northeast hops growers
– Serve multiple growers with one or two machines
– Provide outreach and education about hops and hops harvesting
Picker Design Requirements

Capacity
- 2 bine/min
- 8 hr/acre
- 10,000 lbs/day wet {2,000 lbs/day dry}

Portability
- over road with standard tow hitch

Safety
- similar to farm equipment
- training req’d

Power
- 110 VAC or PTO / direct hydraulic

Cone Damage
- <5% by volume

Operation
- team of two trained operators
Full bines enter here

Stripping Section

Dribble Belts

Hops and leaves

Stripped bines exit here (far side)

And new ones are hooked on here (near side).
Frame – 2”x2”x0.25” Steel – Intentionally Overdesigned
Subframing - Unistrut Channel for adjustability
Sprockets, Shafts, and Bearings
Feed and Drive Chain
Bine Hook (Unmodified, from Dauenhauer Mfg Co.)
Stripping Fingers
From Dauenhauer Mfg Co
Stripping Fingers
From Dauenhauer Mfg Co
PTO Pump (Prince)

Hydraulic Motor (White)

Flow Control Valve
Cost Summary

- Trailer $3,500
- Frame & Subframe $1,800
- Stripping Section $4,100
- Motors, Pump & Hydraulics $5,800
- Conveyor Belts & Rollers $4,200
- Bine Feed $1,200
- Total Material $20,600
- Fabrication Labor $32,000
- Total $52,600
So Did it Work?

Yes, with some “adjustments.”
• Gene L’Etoile – Four Star Farms explains his hops operation and the machine
  – http://how2heroes.com/videos/field-trips/growing-harvesting-hops
• Chris’ explanation on the UVM Extension Crop and Soil Team YouTube channel
  – http://www.youtube.com/watch?v=2iZIkdozeXo
Lessons Learned

• **COSTS** - 1st time fabrication of a prototype is expensive.

• **WALKING BELTS** - Conveyor tracking is challenging on short, wide belts. V-grooves are nice.

• **BINE FEED** – Extension on back is not completely necessary. Current design tends to pull bine toward right side of machine. (No directional panels had yet been installed for 2011 harvest).

• **DRIBBLE BELTS** – Gravity only separation is fine. Rough top belts. Quantity of 5. Need quicker adjustment mechanism.

• **ADJUSTABILITY** – Very helpful when doing different varieties, serving different farms, or when you have different maturities.
Next Steps

- Correct belt walking – steel shafts and v-grooves
- Add directional panels / chutes
- Add a hydraulic radiator
- Improve dribble belt adjustment
- Improve all belt tensioning adjustments
- Reconfigure bine feed
Thank You’s

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