Prospects for Mechanical Harvesting in NY Cider Orchards

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Cider Apple Harvesting

Hand harvesting in NY

- All done by hand labor
- Average costs of $700-$2000 per acre
  - Frequently farms' largest operating expense
- Often requires a crew of multiple people
  - Picking rates of 0.17-0.45 ton/hour
- Apple fruits are stored for future pressing

Mechanized harvesting in the UK

- Long-term contracts for apples
  - Older, larger orchards
- Less discriminate of apple quality
- Apples are pressed within a week of harvesting
  - Stored as juice concentrate or fermented product
  - Less small-scale "artisanal" pressing

Steps involved with mechanical harvesting

1. "Shaker" makes first pass and drops fruit
2. "Windrowing" is done with rubber sweeper on front of the tractor

   Sometimes a fan follows collection conveyor to push missed apples into next row
3. Collection is done by a conveyor system, similar to a potato harvester
4. From there, apples are dumped directly into bins/trailers, or into a dumping bin by a conveyor system
5. Harvesters may include fans, "sifters", or opposing conveyors to minimize debris

Step 1 - Shaking

Step 2 - Windrowing

Step 3 - Collection

Step 4 - Relocation

Step 1-5 - Cleaning

Implementation in New York Orchards

- For non-cider specific varieties
  - First pick by hand for fresh-market sale
  - Second and final pick with machinery for cider/juice
- Small-scale orchards could collect fallen apples and press small batches every few days/weekly
    - Smaller, rolling harvesters cause very little damage to the fruit
- Investment in pressing and juice storage equipment on farm, co-ops, or conglomerates
- Find machinery that fits your orchard and its capacities
  - Options range from rolling pickers to self-propelled combines

5-acre NY Cider Operation

- **Pickers each pick 8 bu/hr, for $16.50**
- **Assuming 810 bu/acre production**
- **4' x 12' spacing provides 907 trees/acre**
- **Assuming 3% yearly repair costs of machinery**

- 101 hrs/acre, $1,665 to harvest an acre by hand
- Tree shaker costs $2,000 after delivery
  - Shakes 60 trees/hour, so 12.5 hours to shake costs $206.25 per acre
- Electric-assisted rolling picker costs $2,500 after delivery
  - 1 ton/hour at capacity means 17.2 hours per acre, or $283.80 per acre to harvest fallen apples
- 29.7 hrs/acre, $490.05 to mechanically shake and harvest an acre
  - **Pay for machine and shaker the first year!**
  - **With only one acre, pay for both in three years!**

https://www.organic-tools.com/gneiting?lang=en

- Medium-scale harvester - Pattenden Grouse
  - Costs about $40,000
  - Harvests 30-70 tons/day, conditions depending
- 2.75 hours harvesting an acre
  - **With 5 acres of land the machine is paid for in 8 years**
- Shaking takes 12.5 hours with current shaker
  - Upgrade to a SL81e for $15,000
  - Shaking only takes 2 hours
  - ~5% of the labor hours required when compared to hand-harvesting
- **At 5 acres, the machines pay for themselves in 9 years**

Medium 12-acre cider orchard

- **With a Pattenden Grouse and small shaker, machines are paid for by year 3**
- **Upgraded shaker saves 10 hours in labor per acre, and breaks even by year 4**
- Upgrade to a SFM SABRE Harvester
  - Costs ~$75,000 manufactured in the US
  - Harvesting capacity of ~80 ton/day
  - **Breakeven cost point is year 6**
- Very Large Harvester – Tuthill Centipede MK 2
  - Costs $175,000 and harvests 100 ton/day
  - Are there enough trees to keep this running?
  - **Breakeven point is around year 14**

https://agrimec-ledbury.co.uk/wp/index.php/product/sfm-mini-sabre-mk-ii/

Canadian "Salvage" Case Study

- 1,000 acre Canadian farm implements a dual-pick operation process
- Second round of pickers come through to collect grounders and remaining apples to be pressed
  - $0.07/lb or $2.98/bu loaded for transport
  - With roughly 430 tons to collect, costs $60,000
  - Crew of 20 people could pick the grounders in 8.6 days
  - Remaining fruit is valued at $90,000
- Equipment used to pick grounders after manually-harvested fresh market pick
  - One, or preferably two, operators required
  - Harvesting 100 ton/day means under a week to finish
- **Equipment will be paid for in just three years!!!**