Juice and Byproduct Processing

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Made in the USA since 1931
Overview

• Juice processing overview
• Leafy greens and grasses
• Roots and firm vegetables
• Soft vegetables and fruit with a small peel influence
• Fruit with a significant pit or peel influence
• Byproducts
Juice processing overview
General Process

• Juicing turns a raw agricultural product into a liquid or liquid slurry (puree)
• Incoming material quality and characteristics are both HIGHLY VARIABLE
• Incoming material characteristics and desired end product attributes direct the selection of processing equipment and parameters
• Product pH and potential microbial types and loads dictate both pre-juicing handling and post-juicing liquid processing
• Think about your end product first
• Know your incoming material and it’s limitations
• What you don’t sell or give away, you pay to dispose of
General Process

Incoming

Wash

Grade

(Pit/Seed) / Shred / (Blanch) / Peel

Defect / Undesirables Removal

Decant / Cent / Filter / Clarify

Press / Finish / Puree

More Processing / Disposal

Cake
Processing Toolkit

- Shredders, macerators
- Puree-ers, pulpers, presses, finishers
  - Batch type squeeze press
  - Basket wine press
  - Screw type press
  - Screw type finishers
  - Paddle type finishers
- Decanters, centrifuges, filter machines, filters
- Specialized juicing equipment
Shredders and Macerators

Source: Corenco.biz
Squeeze Presses

Source: New Forest Cider
Basket Wine Presses

Source: commons.wikimedia.org; alibaba.com
Paddle Finishers

Source: genemco.com
Screw Finishers
Screw Presses

Source: Vincent
Filter Machines, Decanters, and Centrifuges

Sources: MECAT.com, GEA.com; foodindustrymag.com;
Leafy greens and grasses
Leafy Greens and Grasses

• Kale
• Spinach
• Wheat grass
• Barley grass
• Oat grass
• Alfalfa
Challenges and Strategies

• Sanitation challenges from soil contact and plant structure
• Incoming material sometimes degraded from storage
• Whole leafy greens and grasses have low bulk density, can result in decreased processing throughput
• Wash and sanitize
• Shred to increase bulk density (most of the time)
• Press, (finish, filter)
Roots and firm vegetables
Roots and Firm Vegetables

- Carrot
- Turmeric
- Red beet
- Ginger
- Yam
- Sweet potato
- Parsnip
- Turnip
- Onion
- Garlic
Challenges and Strategies

• Sanitation challenges from soil contact and internalized microbes

• Incoming material sometimes dehydrated from storage that results in decreased cell turgor pressure and decreased yield

• Whole roots and vegetables present low bulk density/low throughput and low juice yield

• Juice sometimes contains high insoluble solids
Challenges and Strategies

• Wash and sanitize
• Hydrate
• Shred
• Press
• Juice fiber removal if needed
Soft vegetables and fruit with a small peel influence
Soft Vegetables and Fruit with a Small Peel Influence

• Fresh blueberries
• Fresh raspberries
• Cranberries
• Fresh Elderberries
• Bell peppers
• Tomatoes
• Celery
• Apples
Challenges and Strategies

- Sanitation challenges from soil contact and internalized microbes
- Incoming material can degrade from storage
- Fruit characteristics can cause puree condition
- Over-ripeness can result in cell wall degradation and mushy texture which causes high insoluble solids in juice and low juice yields
Challenges and Strategies

- Wash and sanitize
- Shred if bulk density or fruit characteristics dictate
- *Sometimes* blanch and peel
- Press as necessary
  - Press aids?
- Finish or decant if necessary
- Centrifuge or filter if necessary
Fruit with a significant pit or peel influence
Fruit with a Significant Pit or Peel Influence

- Pomegranate
- Citrus
- Watermelon
- Mango
Challenges and Strategies

• Sanitation challenges from soil contact
• Incoming material can degrade from storage
• Compounds in peel or pit can cause juice off flavors
• Over-ripeness can result in cell wall degradation and mushy texture which causes high insoluble solids in juice and low juice yields
• Large pits give problems
Challenges and Strategies

• Wash and sanitize
• *Sometimes* blanch
• “Pop”, slice and scoop, or gently break the fruit
• Deal with the peel and pit – keep them separate or separate them quickly from juice
• Shred/pulp/macerate sometimes, press or finish
• Centrifuge, decant and/or filter if necessary to remove insoluble solids
Vegetables and Roots Examples
Watermelon Example
Byproduct processing
Byproduct processing

• Byproducts can be very, somewhat, or not valuable
• If you don’t use it, you pay to get rid of it
• Most leftovers from vegetable and fruit juicing now end up as animal feed
  • Feed mill
  • Ag bag/ensiled
  • Direct feed
• Byproducts (aka secondary products) can also include
  • Molasses
  • Nutraceuticals
  • Fiber and fiber products
  • Texturizing agents
Thank You

• Josh Burdine, Golden State Foods
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