CIDER PRODUCTION

THE APPLES

Type	Acid	Tannin
Sweets	<4.5 g/L malic	<2 g/L tannic acid
Bittersweets	<4.5 g/L malic	>2 g/L tannic acid
Bittersharps	>4.5 g/L malic	>2 g/L tannic acid
Sharps	>4.5 g/L malic	<2 g/L tannic acid

Condition

- Imperfect, some insect damage. Rot is unacceptable.
- Picked from trees, washing unnecessary.
- Pick mature but not overripe.

Sweating

- Let sit in cool, dry place from several days to several weeks post-harvest.
- Starch turns to sugar.
- Pectin degrades (softening).
- Concentration of characteristics.

MILLING

- Breaking down apples to coarse "apple sauce."
- Hammer mills, grinders, choppers, garbage disposals, garden shredders, etc.

PRESSING

- Extraction of juice from milled apples.
- Basket press, rack-and-cloth press, bladder press, etc.

ENZYMES

- Pectinases may be added before or after pressing.
  - Aid filtering, settling, clarification.
- Keeving (défécation)
  - Used primarily in French farmhouse ciders.
  - Juice treated with methyl-esterase enzyme to expose acid groups on pectin chain.
  - Calcium chloride added and causes pectin to gel.
  - CO_2 at start of fermentation causes gelled pectin to rise to surface.
  - Clean juice racked from underneath.

FERMENTATION

- Corrections: nutrients, tannin, acidity.
- Stylistic options: MLF, residual sugar, flavorings (hops, fruit, etc.).

EFFERVESCENCE

- Prepping the base.
  - Racking, clarification, SO_2 (depending on whether carbonation or second fermentation is used).
- Carbonation
  - Bright tanks, kegs, counter-pressure filler.
- Second fermentation
  - Bottle conditioning (no clarification after second fermentation).
    - Add sugar and yeast to base cider, bottle and cap.
    - The higher the sugar, the higher the pressure.
    - Up to 8.5 g/L sugar, may use beer bottles.
    - >8.5 g/L sugar, use champagne bottles.
  - Traditional champagne method
    - Bottle fermentation.
    - Clarification by riddling and disgorging.
  - Ancestral method
    - Cider bottled and capped prior to completion of fermentation.
    - "Liquid Russian roulette."

FINISHING

- Crown cap or cork.
- Dry or sweet.
- Sterile filter or not.
  - Contains malic acid?
  - Contains sugar?
- SO_2, sorbate, Velcorin.
- Rustic French farmhouse cider.

EXCELLENT RESOURCE:

- The New Cider Maker's Handbook by Claude Jolicoeur

BUILDING COMPLEXITY IN DESSERT APPLE FERMENTATIONS

INTRODUCTION

One of the biggest problems plaguing craft cider producers is the lack of true cider apples. Many of the best traditional farmhouse ciders are skillful blends of apples with different qualities: tannin for texture, body and mid-palate; acid for brightness and structure, not to mention microbial control; and flavor and aroma. Unfortunately, as cider lost popularity in the 19th C, the simple, perfumed dessert apples began to dominate the market and most cider apple trees, especially those producing the bitter tannic apples, were ripped out or abandoned.

As new producers enter the market and existing craft cider makers seek to expand, the need for more raw materials has forced craft producers to look to dessert apples to fill the void. In so doing, they need tools to build complexity and body in the ciders. The most obvious addition is sugar. It adds body and balances acid. The common denominator among most mass-produced ciders is sweetness. Below are further aids in the search for complexity.

TOOLS FOR BUILDING COMPLEXITY AND BODY

- Yeast
- Yeast nutrition
- Malolactic fermentation
- Tannin
- Enzymes
- Gum Arabic, yeast-derived mannoproteins
- Oak

YEAST

- Active dried yeast
  - Live yeast isolated for specific positive traits
    - Aromatics (ester production, glycosidase activity, etc.)
    - Polysaccharides (texture)
- SIY (Specific Inactivated Yeast)
  - Inactivated yeast to add to fermenting must
    - Autolyzed character (lees aging)
    - Polysaccharides
      - Mouthfeel
      - Reactive with phenolic compounds
- Autolysis in bottle-conditioned and pre-bottled cider
  - Breakdown of yeast post-fermentation adding flavor and texture

NUTRITION

- YAN (Yeast Available Nitrogen)
  - Organic (amino acids) vs Inorganic (ammonia)
- Amino Acids
  - Precursors to many positive aromas

MALOLACTIC FERMENTATION

- Bacterial conversion of malic acid to lactic acid
  - Softens and lowers acidity, raises pH
  - Helps microbial stability
- Sequential vs co-inoculation
- Flavor change
  - Loss of green apple malic character
  - Secondary apple aromatics

TANNIN

- Enological tannins
  - Fermentation and finishing tannins
    - Condensed tannins
    - Hydrolyzable tannins
  - Uses
    - Anti-oxidants
    - Increased mid-palate
    - Softening (sometimes)
    - Flavor (astringency, bitterness, dried spice, toasted oak, other)
    - Bind aldehydes (condensed tannins)
- Hops
  - Tannin and fruity character

ENZYMES

- Pectinase with side activity
  - Beta-glucosidase
    - Releases aromatic compounds bound to sugar
  - Increase filterability

GUM ARABIC, YEAST-DERIVED MANNOPROTEINS

- Protective colloids
- Add viscosity without sugar
- Softens, balances acidity
- Use at the end when the cider is bottle-ready (after bench trials)

OAK

- Barrels, chips, powder
- Different toast levels
  - Aromatic aldehydes (vanilla, caramel, mocha, etc.)
- Adds complexity but easily overwhelms apple character.