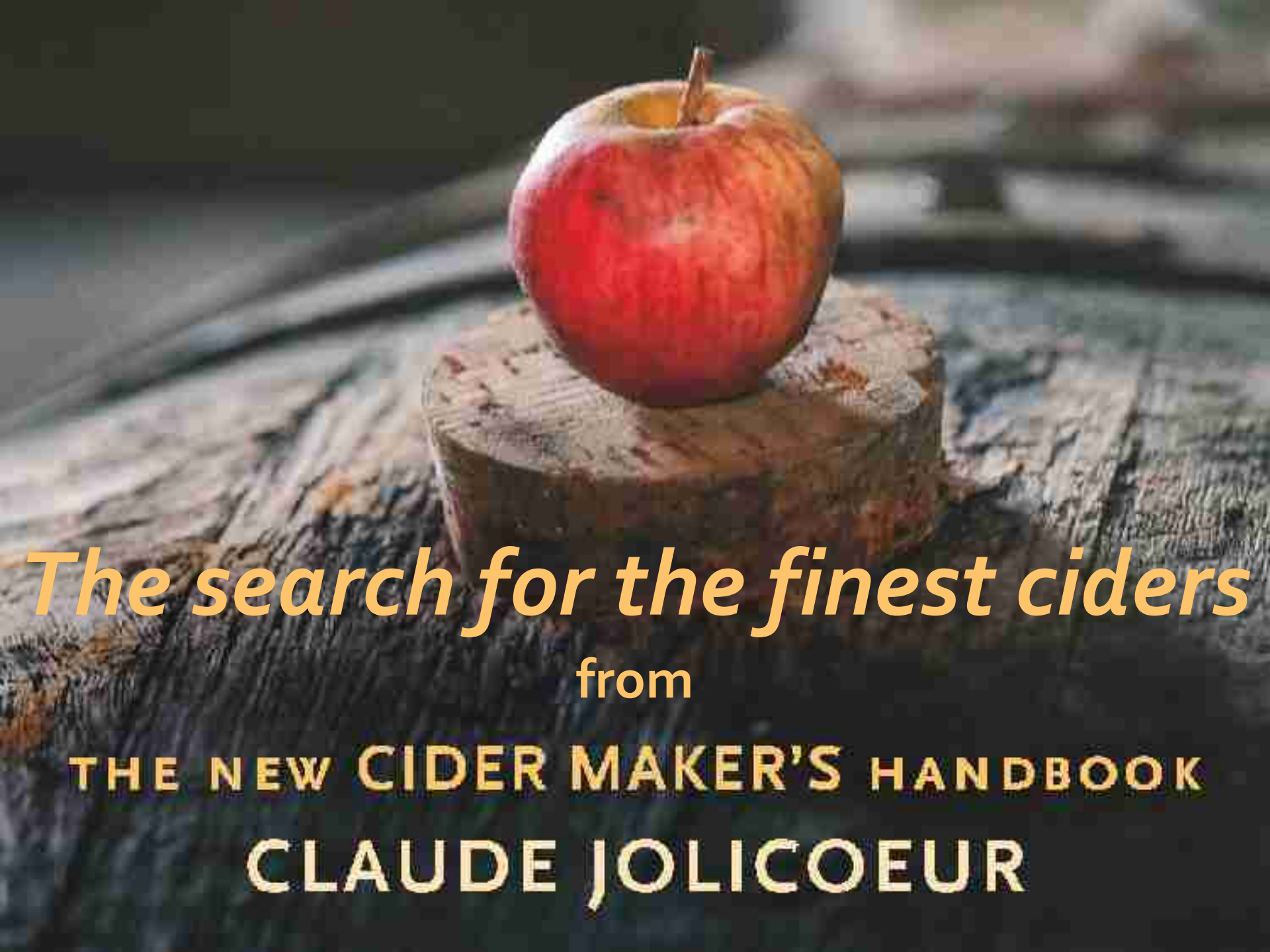

The search for the finest ciders
from
THE NEW CIDER MAKER'S HANDBOOK
CLAUDE JOLICOEUR

# INTRODUCTION

- The *Cider Maker's Mantras*.

- Why this search for quality in ciders?

- The 3 main themes of this talk:
  1- The quality of the fruit
  2- Blending for a well balanced cider
  3- Controlling the fermentation process

# The Cider Maker's Mantras

- *Seek Quality Cider.*
- *Good Cider Needs Great Apples.*
- *The Cider Makes Itself.*
- *Good Cider Needs Time;*
  *Cider Makers Need Patience.*
- *The KISS Principle.*
- *Clean Before Storing; Sanitize Before Using.*
- *Plan Ahead and Remember what you did.*

# Why bother making high quality ciders?

- The image problem of cider (compared to wine).
- Time and energy investment.
- Pleasure.
- Pride and satisfaction.

If you are to make cider, then make it good!

# 1
# GOOD CIDER NEEDS GREAT APPLES

Even the best cider maker can't make a great cider if he doesn't have the right apples to start with...

We could say that:

An apple tree is an apples tree, and it produces apples, whether for eating or for cider.
**BUT…...**

# Growing apples for cider is different

- Not the same varieties.
  - Need for special varieties in cider to obtain balanced blends.
- Visual appearance: the cider drinker will not see the fruit!
  - Blemishes / insect damage / scab are OK.
  - Flavor optimization.
- Harvest and storage.
  - Apples harvested at full maturity (when they have started falling).

# Apple quality

***Whoever thinks that "any apple is good enough for cider" had better not engage in the business.*** *He probably would not know a good article of cider if by any accident he should ever taste one. This book is designed to guide those who intend and desire to make the best, and are to be satisfied with nothing less.*

**J.M. Trowbridge**

*The Cider Maker's Handbook*, 1917

# What is a great apple for cider?

- High in sugar.
- High in flavor.
- Low in nitrogen.
- Perfectly ripe.
- Appropriate variety:
  - late variety (or some mid-season)
  - not too much acidity
  - some tannins.

# What's the problem with nitrogen?

- Nitrogen is a natural yeast nutrient:
  - promotes rapid fermentation
  - complete fermentation to dryness (to the point there are no more fermentable sugars)
- Comes from fertilization, either chemical or organic
  - compost is a good source of nitrogen...
- Some soils, even if not fertilized, are rich in nitrogen.
- Nitrogen is transported to the apple, juice.

# Cultural practices - Cortland apples, commercially and home grown

# Extensive orchard: old standard trees

# Cider-bush orchard: Steve Wood's Poverty Lane in NH

# The cultural practices

In summary, the cultural practices that will enhance the quality of the apples for cider are:

- old standard trees in nutrient-depleted natural orchard
- fully ripe or slightly overripe apples
- late maturing varieties
- may be scabby, wormy, blemished...

On the other hand, fertilization, dwarf trees, herbicide strip, and in general, intensive orcharding management practices (even organic) may be detrimental to quality.

# Varieties: cider-apple classification

Cider-apple varieties are classified according to their content in:

- sugar
- acids
- tannins

**TABLE 5.4:**
Classification according to the concentration of properties

| Concentration | Sugar Specific Gravity (SG) | Acidity (g/L as malic acid) | Tannins (g/L as tannic acid) |
|---|---|---|---|
| Low | less than 1.045 | less than 4.5 | less than 1.5 |
| Medium | 1.045 to 1.060 | 4.5 to 7.5 | 1.5 to 2.5 |
| High | 1.060 to 1.070 | 7.5 to 11 | over 2.5 |
| Very high | over 1.070 | over 11 | |

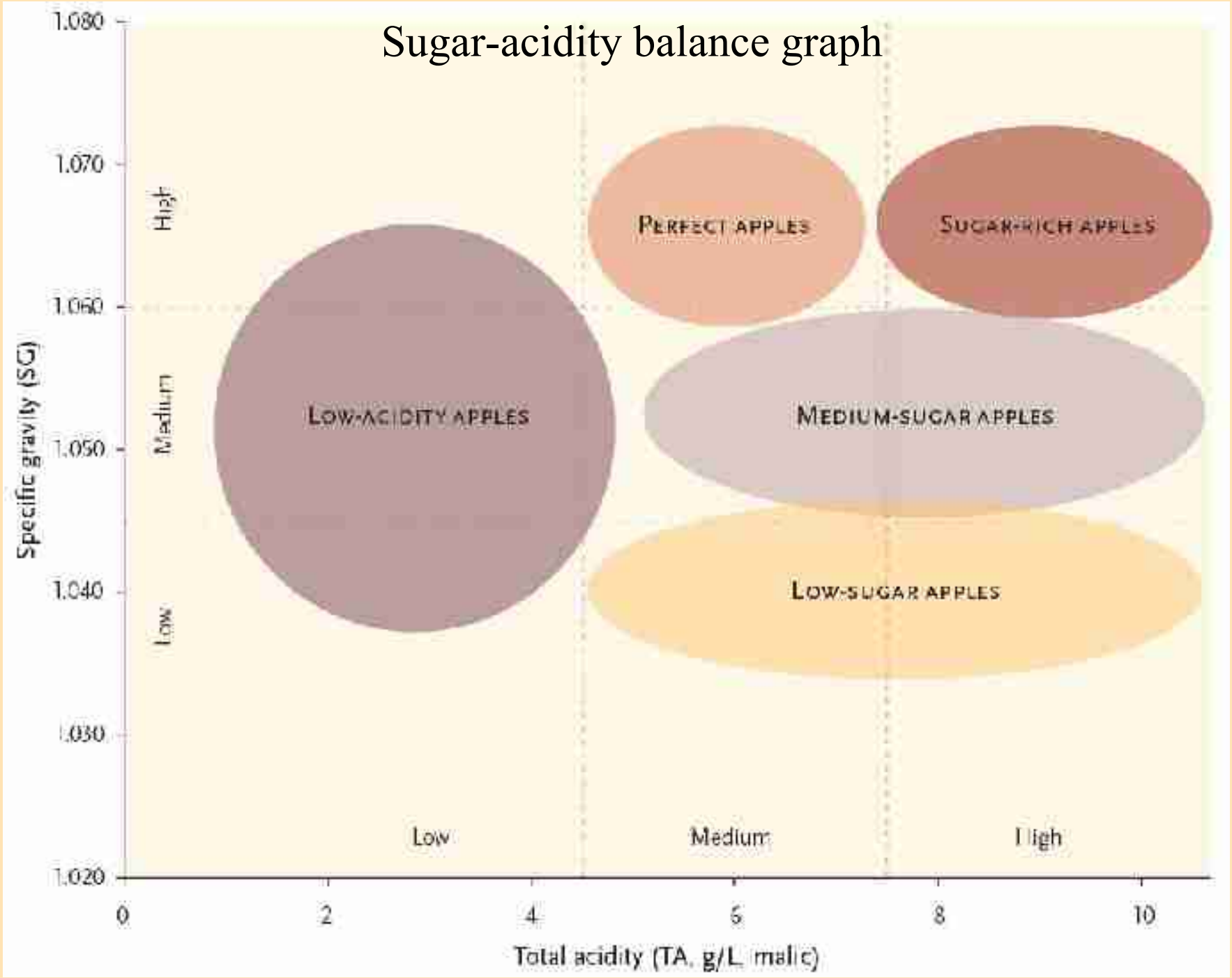
# English classification

The cider-apple classification in England doesn't take into account the sugar content;
only acids and tannins are considered.

**TABLE 5.1:**
Cider-apple classification used in England

| Class | Acidity (g/L as malic acid) | Tannins (g/L as tannic acid) | |
|---|---|---|---|
| Sharp | over 4.5 | less than 2 | High acid / low tannin |
| Bittersharp | over 4.5 | over 2 | High acid / high tannin |
| Bittersweet | less than 4.5 | over 2 | Low acid / high tannin |
| Sweet | less than 4.5 | less than 2 | Low acid / low tannin |

# Sugar-acidity balance graph



# The varietal selection

The ideal small farm orchard in terms of apple varieties …..

- Mixed orchard as to provide some table apples in addition to cider apples.
- Half of trees of high flavor, high sugar varieties, such as russets, heirlooms: Golden Russet, Esopus Spitzenburg, Ribston Pippin, Honeygold, Liberty, Cortland…
- Half of trees as low acidity cider apples (bittersweet): Yarlington Mill, Dabinett, Muscadet de Dieppe, Major, Chisel Jersey, Douce de Charlevoix...

# Wild seedlings

- Best cider-appropriate apples for our climate and soil still undiscovered.
- Huge number of seedling trees in the wild.
- Assume 1 out of 10 is good for cider, 1 out of 100 is great… this leaves an incredible number of cider-appropriate apples out there waiting to be discovered by adventurous cider makers.
- Build a genuine North American cider-apple pomona and tradition.

# Extracting the juice

*The New Cider Maker's Handbook* includes guidance for selecting or making your own grinder and press for extracting the juice

# 2
# BLENDING

*A well-done cider is a subtle blend of different varieties, adapted to their terroir, each bringing a touch of acidity or bitterness, its richness in sugar and its perfume.*

**François Moinet**

*Produire et vendre le cidre*, 2009

# The ideal blend

- **Sugar** - as high as possible.
  Min SG 1.045 (11 Brix).
  May be as high as SG 1.065 (16 Brix).
- **Acidity** - normal range of TA
  between 4.5 and 7.5 g/L as malic acid.
- **Tannins** - according to your personal taste and style of cider.

# The sugars

- Measurement and evaluation.
  - g/L of sugar, density (SG, volumic mass), Brix, potential alcohol
- Hydrometer to measure density.
- Relation between SG and true sugar content.

**TABLE 8.1:**
Classification of apples according to their richness in sugar

| SUGAR CONTENT | SPECIFIC GRAVITY | REMARKS |
|---|---|---|
| Low | 1.045 and less | Summer apples and cooking apples; not recommended for cider unless they have other desirable qualities |
| Medium | 1.045–1.060 | Good |
| High | 1.060–1.070 | Ideal for cider |
| Very high | over 1.070 | Exceptional; crabapples sometimes have such high sugar content |


SG measurement: 1.017

# The original Dujardin-Salleron sugar table (early 1900's)

DUJARDIN-SALLERON, PARIS

| Densités à 15° Poids en grammes d'un litre de moût | Grammes de sucre par litre de moût | Degré alcoolique probable du cidre fait Litres d'alcool par hectolitre | Densités à 15° Poids en grammes d'un litre de moût | Grammes de sucre par litre de moût | Degré alcoolique probable du cidre fait Litres d'alcool par hectolitre | Densités à 15° Poids en grammes d'un litre de moût | Grammes de sucre par litre de moût | Degré alcoolique probable du cidre fait Litres d'alcool par hectolitre |
|---|---|---|---|---|---|---|---|---|
| 1001 | 0.25 | 0.01 | 1035 | 72. | 4.33 | 1068 | 147.5 | 8.94 |
| 1002 | 2. | 0.12 | 1036 | 74. | 4.44 | 1069 | 149.5 | 9.05 |
| 1003 | 4. | 0.24 | 1037 | 76. | 4.60 | 1070 | 151.5 | 9.16 |
| 1004 | 7. | 0.42 | 1038 | 78. | 4.71 | 1071 | 153.5 | 9.27 |
| 1005 | 10. | 0.60 | 1039 | 80 | 4.82 | 1072 | 155.5 | 9.38 |
| 1006 | 12. | 0.73 | 1040 | 82. | 4.94 | 1073 | 157.5 | 9.54 |
| 1007 | 14.5 | 0.87 | 1041 | 84. | 5.10 | 1074 | 159.5 | 9.66 |
| 1008 | 16. | 0.97 | 1042 | 86.5 | 5.24 | 1075 | 161.5 | 9.77 |
| 1009 | 18. | 1.09 | 1043 | 89.5 | 5.43 | 1076 | 164. | 9.93 |
| 1010 | 20.5 | 1.26 | 1044 | 92. | 5.57 | 1077 | 166. | 10.04 |
| 1011 | 22. | 1.34 | 1045 | 94.5 | 5.71 | 1078 | 168. | 10.15 |
| 1012 | 24. | 1.46 | 1046 | 97.5 | 5.84 | 1079 | 170. | 10.26 |
| 1013 | 26. | 1.58 | 1047 | 100. | 6.05 | 1080 | 172. | 10.42 |
| 1014 | 28.5 | 1.70 | 1048 | 102. | 6.16 | 1081 | 174. | 10.53 |
| 1015 | 30.5 | 1.86 | 1049 | 104.5 | 6.30 | 1082 | 176. | 10.64 |
| 1016 | 32. | 1.95 | 1050 | 107 | 6.49 | 1083 | 178.5 | 10.80 |
| 1017 | 34 | 2.07 | 1051 | 109.5 | 6.60 | 1084 | 180.5 | 10.92 |
| 1018 | 36. | 2.19 | 1052 | 112. | 6.75 | 1085 | 182.5 | 11.03 |
| 1019 | 38. | 2.34 | 1053 | 115. | 6.83 | 1086 | 184.5 | 11.14 |
| 1020 | 41. | 2.47 | 1054 | 117.5 | 7.09 | 1087 | 186.5 | 11.30 |
| 1021 | 43.5 | 2.63 | 1055 | 119.5 | 7.24 | 1088 | 188.5 | 11.41 |
| 1022 | 44. | 2.68 | 1056 | 121.5 | 7.35 | 1089 | 191. | 11.57 |
| 1023 | 46. | 2.80 | 1057 | 124. | 7.51 | 1090 | 193. | 11.68 |
| 1024 | 48. | 2.92 | 1058 | 126. | 7.62 | 1091 | 195. | 11.79 |
| 1025 | 51.5 | 3.12 | 1059 | 128.5 | 7.76 | 1092 | 196. | 11.87 |
| 1026 | 53.5 | 3.23 | 1060 | 131. | 7.91 | 1093 | 198. | 11.98 |
| 1027 | 55.5 | 3.34 | 1061 | 133. | 8.06 | 1094 | 199.5 | 12.08 |
| 1028 | 57.5 | 3.45 | 1062 | 135.5 | 8.17 | 1095 | 201.5 | 12.21 |
| 1029 | 59.5 | 3.61 | 1063 | 137.5 | 8.33 | 1096 | 203.5 | 12.24 |
| 1030 | 61.5 | 3.73 | 1064 | 139.5 | 8.45 | 1097 | 204.5 | 12.35 |
| 1031 | 64. | 3.89 | 1065 | 141.5 | 8.56 | 1098 | 206. | 12.46 |
| 1032 | 66. | 4. | 1066 | 143.5 | 8.67 | 1099 | 207.5 | 12.57 |
| 1033 | 68. | 4.11 | 1067 | 145.5 | 8.78 | 1100 | 208.5 | 12.60 |
| 1034 | 70 | 4.22 | | | | | | |

(1) D'après originales publiées par Lechartier pour la Bretagne et Tatin pour la Normandie.

# Sugar in g/L vs Density (SG)

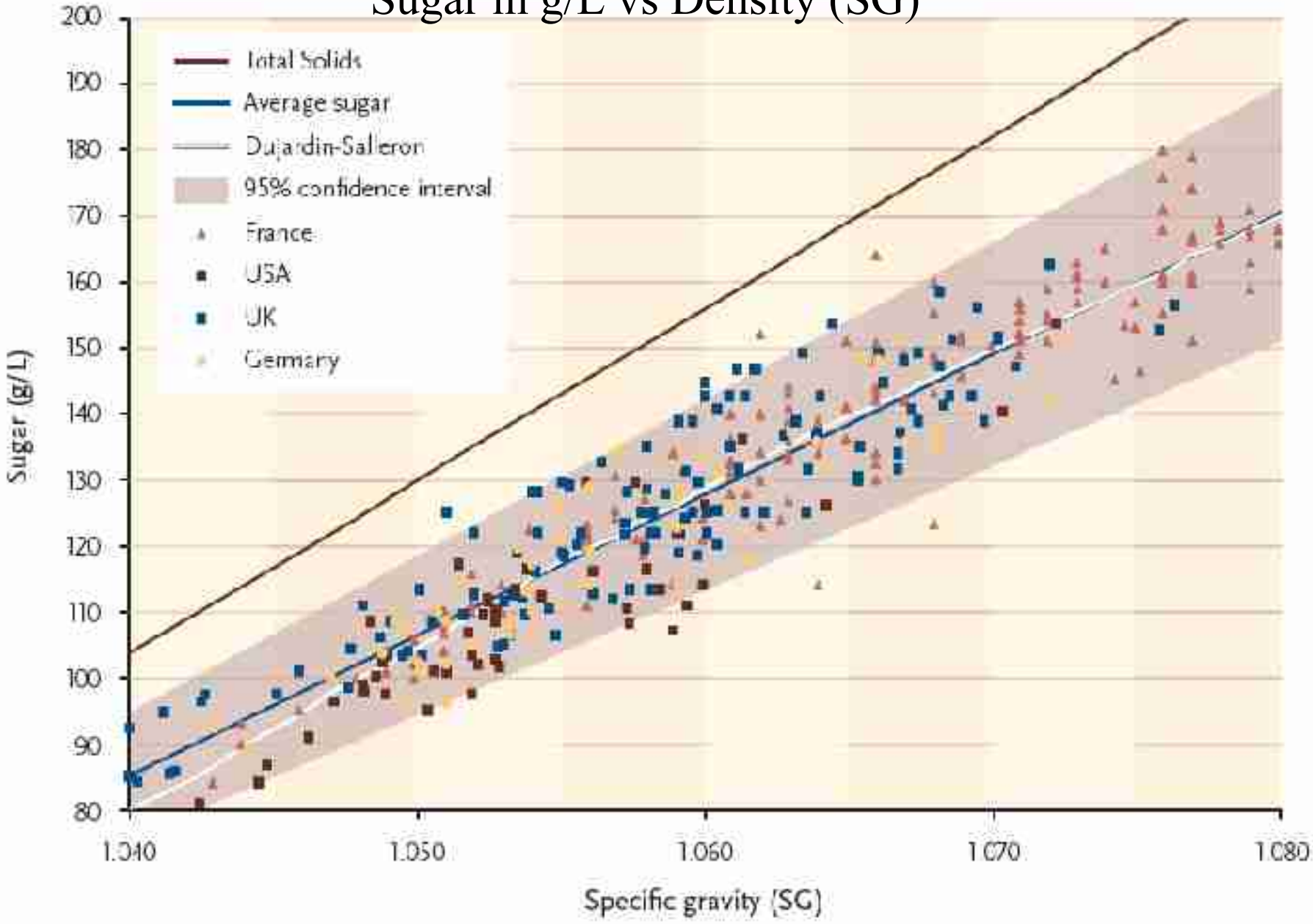



Figure 8.5. Graph of the sugar concentration as a function of the density for apple juice.

# The acids

- Measurement and evaluation
  - TA: Titratable or Total acidity - taste, freshness.
  - pH: Potential hydrogen - biochemistry.
- Relation between TA and pH.

**TABLE 9.1:**
Apple classification according to their acidity

| Acidity | TA (g/L as malic acid) | Type |
|---|---|---|
| Low | less than 4.5 | Sweet apples |
| Medium | 4.5 to 7.5 | Balanced: ideal for cider |
| High | 7.5 to 11 | Many table apples |
| Very high | more than 11 | Cooking apples, crabs |

# Acidity testing kit (TA)

# Acidity: pH vs TA

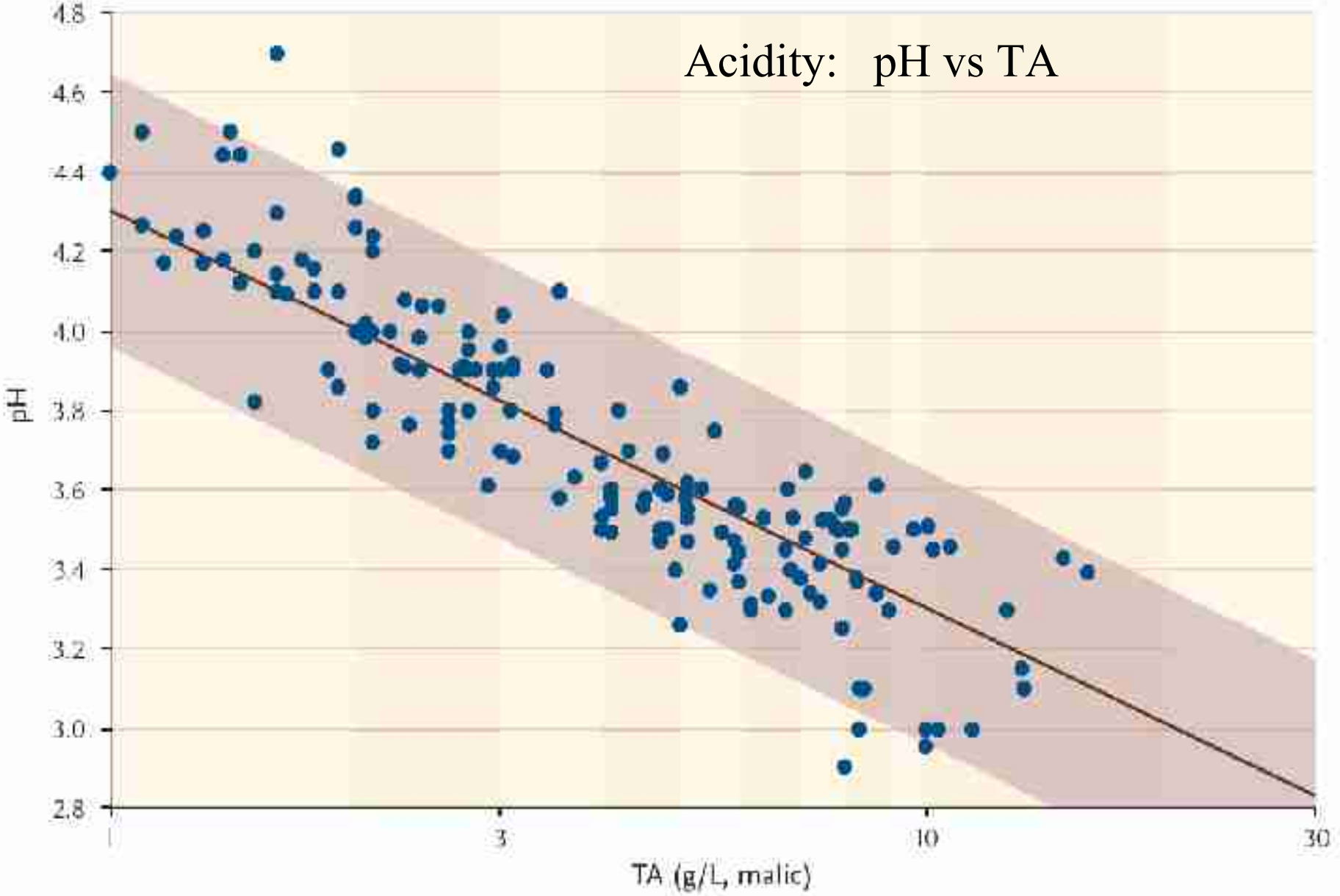
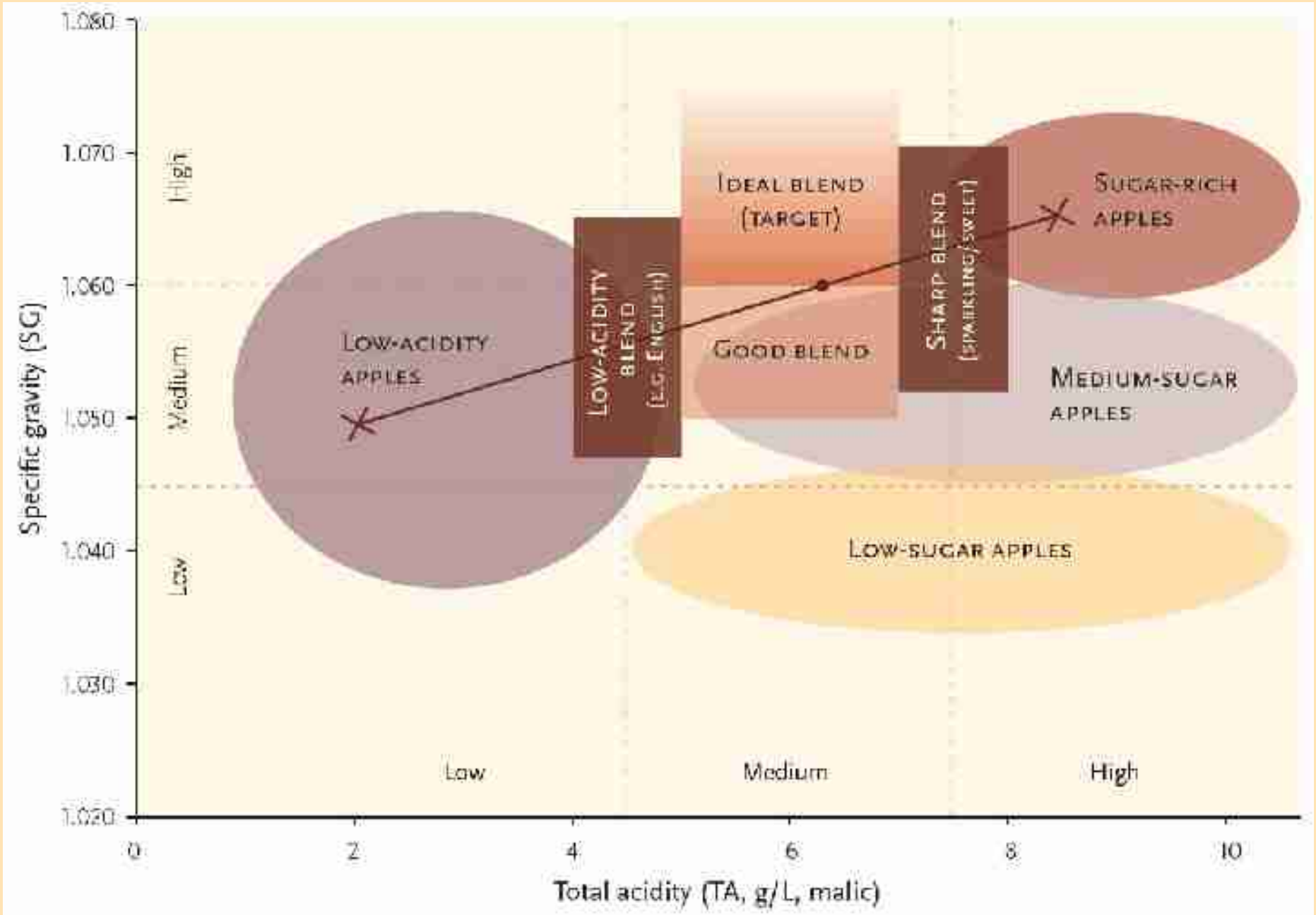



Figure 9.2. Graph of pH as a function of titratable acidity for 187 data points.

# Blending for sugar and acidity



# The tannins

- Phenolic substances:
  - Astringency: sensation of dryness in the mouth.
  - Bitterness: like what hops do to beer...
- Tannins give mouthfeel, structure to cider.
- Evaluated by our taste buds…
  - low: less than 1.5 g/L tannic acid
  - medium: 1.5 to 2.5 g/L
  - high: over 2.5 g/L
- Important for the style of cider.
  - Most North American apples and ciders are (too) low in tannins.

# 3
# FERMENTATION PROCESS

- Fermentation setup
- Primary (rapid, turbulent) fermentation phase
- First racking
- Secondary (slow) fermentation phase
- Stabilization racking as required
- Final racking and bottling
- In-bottle maturation
- And finally… enjoy a great cider

# Fermentation setup

- Cleaning and sanitation of the material.
- Record SG and TA of must.
- Sulfite/SO2.
- Pectinase for degradation of pectin (for more reliable clearing of the cider).
- Yeast strategies / culture.

# Sulfite

- Sulfite useful to protect the cider from spoiling yeasts and bacteria.
- Dosage of sulfite according to pH of must.
  - typical dosage 50 - 75 ppm $SO_2$,
    i.e.: 1/2 - 3/4 tsp metabisulfite per 5 gal.
- Too much sulfite detrimental to quality.
- Many cider makers (and in particular organic) choose not to add sulfite to the must. If taking that route, be aware there are more risks of a spoiled batch.

# Yeast

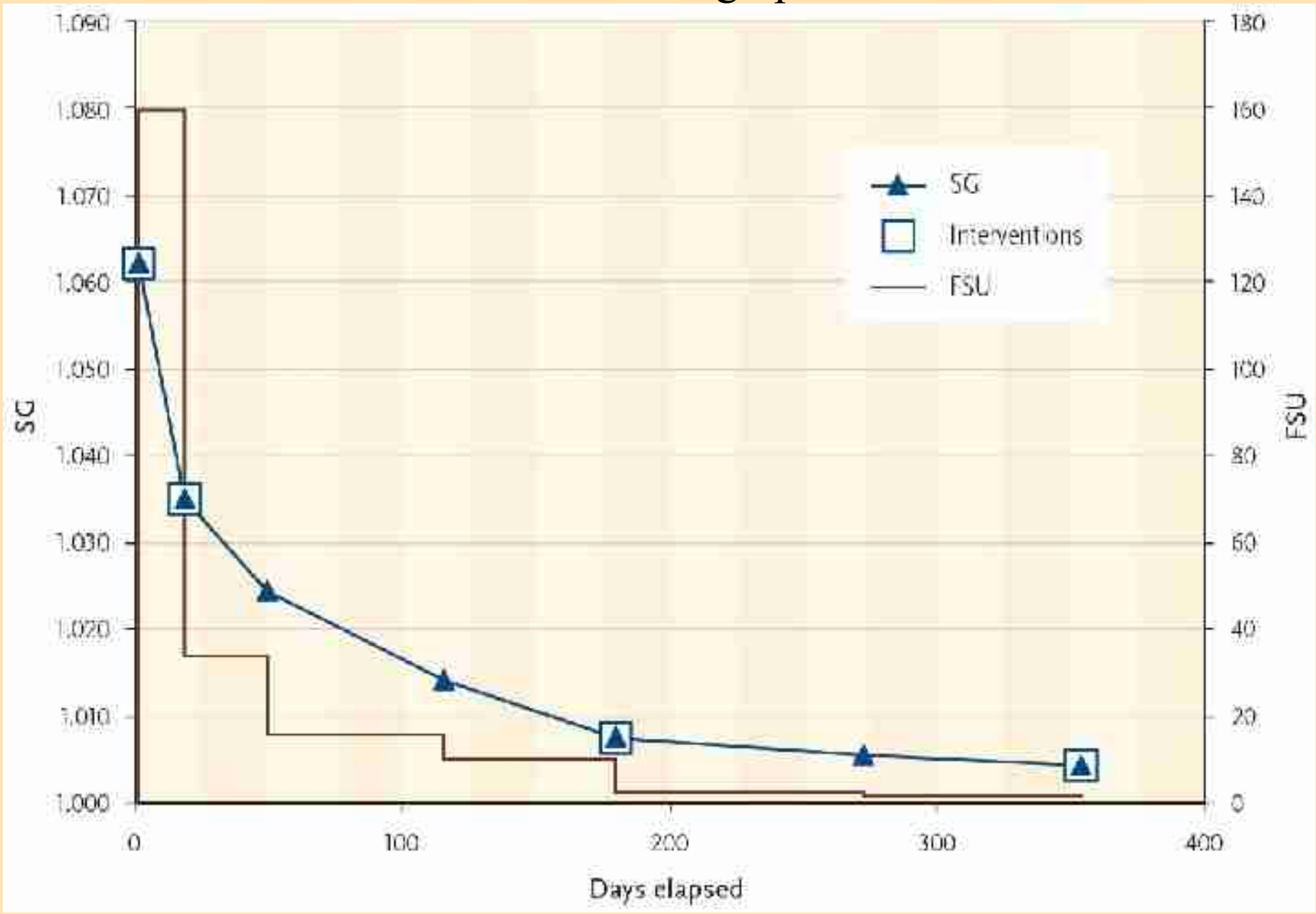
- Yeast strategies
  - Wild yeast fermentation
  - Wild yeast in partially sterilized must
  - Cultured yeast fermentation
  - Cultures yeast in an unsterilized must
- Comparative yeast testing.
- Yeast nutrients - effect of nitrogen.


Yeast culture

# Monitoring and control of the fermentation

- Fermentation speed
  - FSU : Fermentation Speed Unit
  - 1 FSU = speed that corresponds to a drop in SG of 0.001 in 100 days.
- Temperature control
  - Low temperature reduce speed (8-10ºC ideal)
- Racking as a way to reduce speed.
- Plotting the evolution of fermentation.

# Fermentation graph

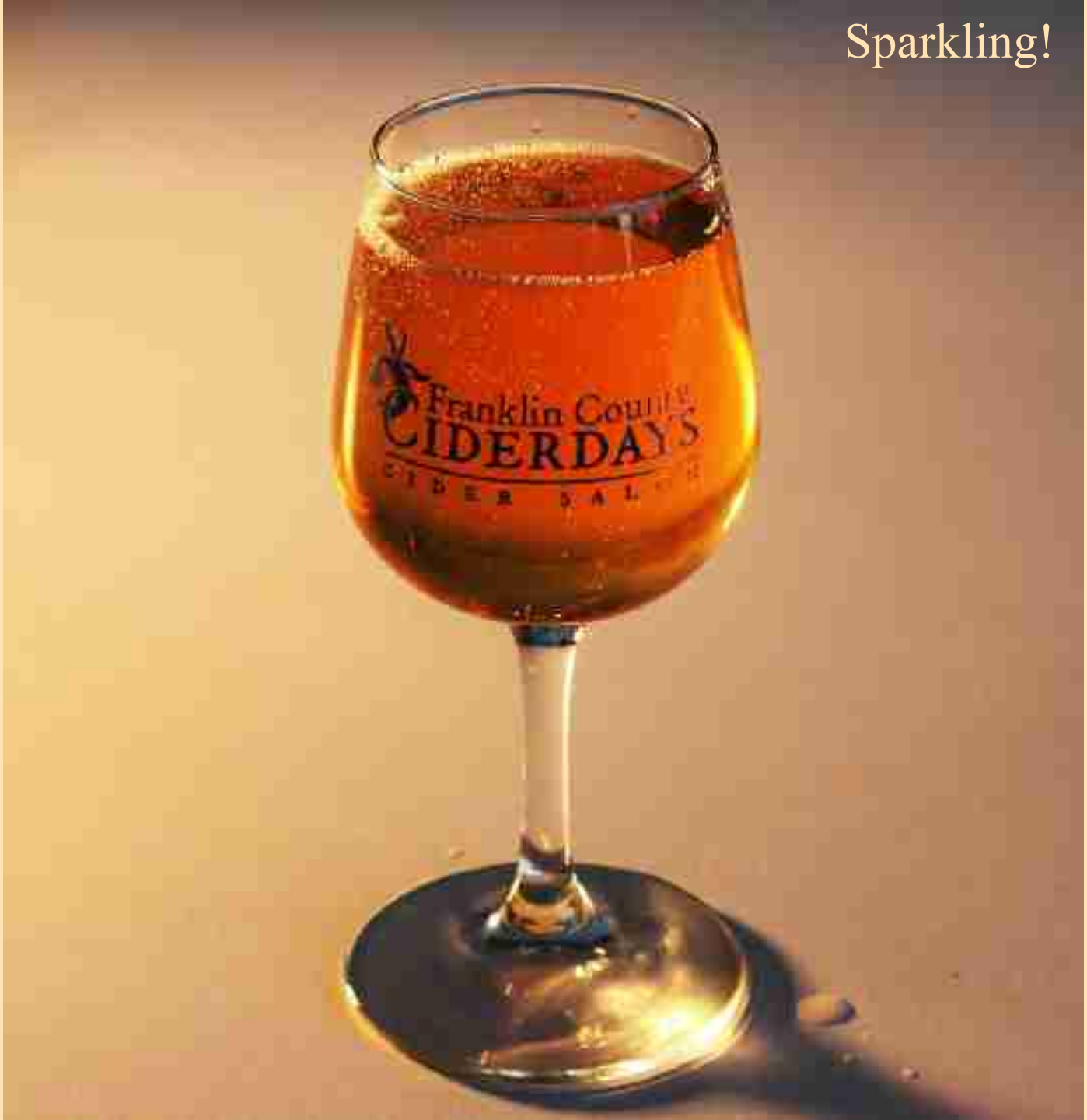


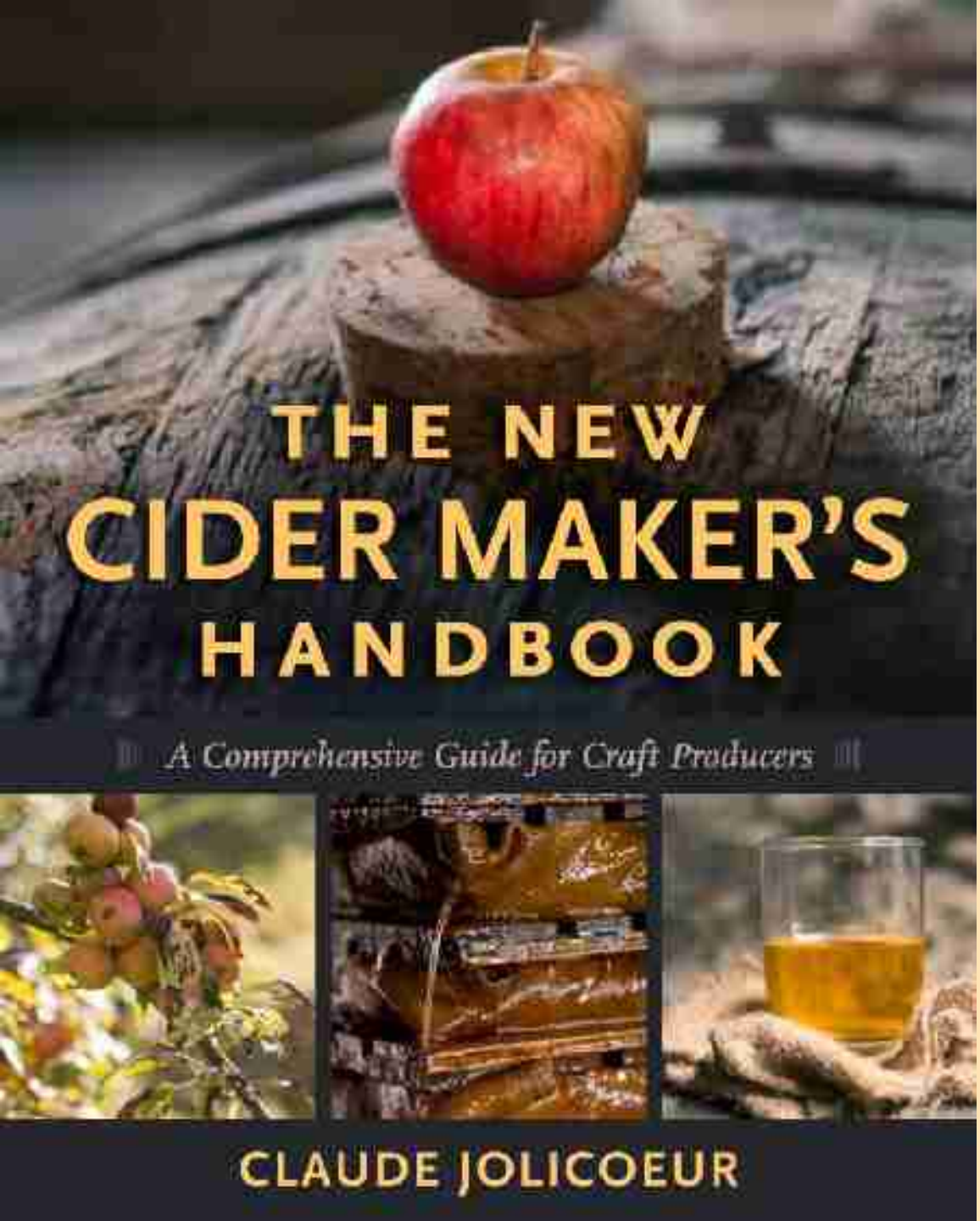
# Cider diversity

- Sweetness: dry / medium / sweet.
  - Keeving and other methods to retain residual sweetness.
- Bubbles: still / perlant / petillant / sparkling.
  - Prise de mousse / bottle conditioning / sugar dosage / CO2 tank and forced carbonation.
  - Bottling procedures.
- Ice cider.
  - Methods for obtaining the concentrated juice.
  - Fermentation and stabilization.

# Keeving for a naturally sweet cider

Sparkling!



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