Stimulating innovation in cocoa post-harvest methods for quality chocolate

Exploring genetic diversity and post-harvest processing management towards genetic branding

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Why innovate at post-harvest?

Need to access new markets and product development

Limited bean quantities available

Need for increased efficiency of processes and better quality

Research

Information dissemination

Optimisation of fermentation and drying processes

Increased earnings $

Ultra niche marketing

Mechanisation
Why optimise cacao fermentation protocols?

• Fermentation is a critical step in flavour development.

• Many variables impact fermentation.

• A temperature peak ≥44°C is imperative in fermentation and is usually possible in larger masses or well insulated smaller fermentations.
Types of Innovation in Cacao Fermentation

- **Use of inoculums and starter cultures**
- **Modification of aromatic profiles via fruit pulp and juice addition to fermentations**
- **De-pulping pre fermentation**

- **50-200 Kg**
  - Small scale, insulated, variable capacity fermentation protocols

- **≤30 Kg**
  - Single pod fermentations

- **5 Kg**
  - Use of inoculums and starter cultures

- **3-5 Kg**
  - Modification of aromatic profiles via fruit pulp and juice addition to fermentations
Investigating fermentation dynamics in various cacao genetic groups towards genetic branding

Genetic groups being profiled

- Contamana
- Nacional
- Nanay
- Amelonado
- Iquitos
- Marañón
- Trinitario
- Refractario

Parameters assessed

**During fermentation**
- Temperature
- pH (mass)
- pH (testa and cotyledon)
- Cut tests (fermenting beans)
- Pulp colour
- Pulp °Brix

**Dried beans**
- Moisture content
- Individual bean weight
- Bean count
- Bean length
- Bean width
- Bean thickness

**Chemical analyses (NIRS)**
- Organic acids
- Sugars
- Proteins
- Purines
- Polyphenols
- Fat

**Sensory assessment**
Investigating fermentation dynamics in various cacao genetic groups towards genetic branding - some preliminary results

Temperature progression comparison of 8 genetic groups

- Iquitos
- Nanay
- Refractario
- Marañón
- Amelonado
- Trinitario
- Nacional
- Contamana

Average temperature (°C)

Time (days)

Temperature progression comparison of 8 genetic groups

- Zone 1
- Zone 2
- Zone 3
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Flavour analyses

• Comparison of 2 groups- *Cocoa flavour on Days 4, 6 and 8*
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Chemical analyses
Comparison of 2 groups - Purines and polyphenols on Days 0 and 8

Trinitario

- Epicatechin (%)
- Catechin (%)
- Caffeine (%)
- Theobromine (%)

Amelonado

- Epicatechin (%)
- Catechin (%)
- Caffeine (%)
- Theobromine (%)

Genetic group and time fermented

% polyphenols and purines
Conclusion

Advantages of genetics based branding:

• Niche marketing potential – towards increasing farmer income.

• Celebrating genetic diversity.

• Accessing a spectrum of flavour attribute experiences.

• Accessing an array of nutraceuticals.
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