

JICA CUP2 Project

PROCESSING GUIDE

Coffee Washing Station
handbook





Contents

This guide introduces

Fully washed (In-fruit fermentation)

Glossary (English)

Traceability:

ability to track a coffee's journey from the farm to the final consumer, including all processing and handling steps

In-fruit fermentation:

a processing method where coffee cherries are fermented without removing the fruit skin or pulp, allowing natural microbes to act on the whole fruit.

Dry fermentation:

a method where coffee is fermented without adding water, allowing natural microbes to break down the mucilage in a dry or low-moisture environment.

Anaerobic:

without the presence of oxygen.

Aerobic:

in the presence of oxygen.

Encapsulation:

uneven drying due to direct sunlight causing the outer surface of the coffee beans to dry too quickly.

pH:

a scale that measures how acidic or basic a liquid is, ranging from 0 (acidic) to 14 (basic).

Nitrogen (N):

an essential nutrient in coffee production that supports healthy plant growth and improves yield

P (Phosphorus):

a vital nutrient in coffee production that promotes root development and flowering for better crop yield.

K (Potassium):

an important nutrient in coffee production that helps strengthen plants, improve drought resistance, and enhance bean quality.

Ventilation:

movement of air into and out of a space to ensure proper airflow, fresh air supply, and removal of heat, moisture, or contaminants.

List of tools and equipment

Cherry paddle:

a simple tool used to check the ripeness or density of coffee cherries, often by stirring cherries in water to observe their floatability during sorting.



Brix meter:

a measuring device used to determine the sugar content (°Brix) of coffee cherries, juice, or mucilage, often used to assess cherry ripeness and fermentation potential.



Moisture meter:

a measuring device used to determine the moisture content of coffee parchment or green beans, helping ensure proper drying and safe storage.



pH meter:

a handheld device used to measure the acidity or alkalinity (pH level) of coffee-related materials such as fermentation water, coffee pulp, or mucilage during processing.



Air-tight tank:

a sealed container designed to prevent air from entering, used in coffee processing to maintain anaerobic conditions and control fermentation.



GrainPro bag:

a hermetic bag used to ferment coffee cherries or parchment in an oxygen-limited environment, helping create controlled anaerobic conditions and enhance flavor development.



How and Why We Use Those Tools and Equipment

Using the right tools at each stage of coffee processing helps ensure consistent quality, better decision-making, and reduced risk of defects. The tools below are used to objectively assess cherry quality, control fermentation, and protect coffee during drying and storage.

Cherry paddle:

WHY: Used to check cherry quality during sorting.

STEP1: Randomly select 100 cherries from the bag and place them on the cherry paddle.

STEP2: Define the acceptable color range for ripe cherries.

STEP3: Count the number of ripe cherries based on this color range and calculate the percentage out of 100.

STEP4: The average percentage of ripe cherries collected from farmers must be above 70%.

STEP1



STEP2



STEP3&4



Brix meter:

WHY: Used to check cherry ripeness and fermentation potential by measuring sugar content.

STEP1: Randomly pick 3 collected coffee cherries.

STEP2: Place a few drops of the juice on the Brix meter sensor.

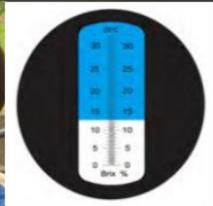
STEP3: Read and record the °Brix value.

STEP4: Use the average result to decide the processing method and fermentation time.

STEP1&2



STEP3&4



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Moisture meter:

WHY: Used to check moisture content to ensure proper drying and safe storage

STEP1: Set the mode according to what you check (parchment, dried cherry or green coffee)

STEP2: Take a small sample of parchment, dried cherry or green coffee.

STEP3: Measure the moisture content using the moisture meter.

STEP4: Read and record the moisture percentage.

STEP5: If moisture is too high, continue drying. If it is within the target range, move the coffee to storage.

STEP1



STEP2



STEP3&4&5



pH meter:

WHY: Used to monitor acidity during fermentation.

STEP1: Check if it is calibrated or not with water. It must show around pH 7.0.

STEP2: Collect a sample of fermentation water, mucilage, or juice.

STEP3: Place the pH meter probe into the sample.

STEP4: Read and record the pH value.

STEP5: If pH drops too fast or too low, stop or adjust fermentation.

STEP1



STEP2&3



STEP4&5



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Air-tight tank:

WHY: Used to control fermentation by limiting air exposure to create an anaerobic condition.

STEP1: Clean the tank to avoid any contamination.

STEP2: Put coffee cherries or parchment into the tank.

STEP3: Seal the tank tightly to prevent air from entering.

STEP4: Use an S-hook to check whether anaerobic fermentation is occurring.

STEP5: Allow the coffee to ferment for the planned time.

STEP6: Open the tank and check pH to see if fermentation is well done as planned.

STEP1



STEP2



STEP3&4&5



STEP6



GrainPro bag:

WHY: Used to control fermentation by limiting air and protecting coffee quality.

STEP1: Put coffee cherries or parchment into the GrainPro bag.

STEP2: Remove excess air and seal the bag tightly.

STEP3: Store the sealed bag in a clean, shaded place.

STEP4: Allow the coffee to ferment for the planned time.

STEP5: Open the bag and continue processing or check quality (smell, pH, condition).

STEP1



STEP2



STEP3&4



STEP5



Check points

Soil management

pH meter



Temperature & moisture meter



Water / hygiene



Traceability



Indicators

- **pH:** Good nutrient absorption rate (5.0-6.0)
- **N:** Essential for photosynthesis
- **P:** Healthy root systems and flowering
- **K:** Bean filling and overall cup quality

- **Colour:** clean and transparent
- **pH:** if clean, pH should be around 7.0
- **Frequency of cleaning:** Everyday machines must be cleaned before use

- Use a **check book** and **traceability tag**
 - Origin of coffee cherries
 - Processing method
 - Grade and weight
 - Collection date
 - Fermentation and drying period

Rationale



Good soil
↓
Good cherries
↓
Good flavors



Poor water
↓
Contamination
and off-flavors



No traceability
↓
Improper
processing and
marketing

Various coffee processing methods

| Name | 1 Fully washed (normal) | 2 Fully washed (with in-fruit fermentation) | 3 Honey | 4 Anaerobic Honey | 5 Natural | 6 Anaerobic Natural |
|---------|--|--|---|--|---|--|
| Image |  |  |  |  |  |  |
| Feature | <ul style="list-style-type: none"> •Most common •Easy to control •Clean cup | <ul style="list-style-type: none"> •Easy to control •Clean cup | <ul style="list-style-type: none"> •Moderately sweet •Fruity note | <ul style="list-style-type: none"> •Anaerobic •Fruity notes like white grape | <ul style="list-style-type: none"> •No pulping needed •Sweet, complex •Winey | <ul style="list-style-type: none"> •Anaerobic •Tropical fruits |
| Process | Harvesting | Harvesting | Harvesting | Harvesting | Harvesting | Harvesting |
| | Sorting | Sorting | Sorting | Sorting | Sorting | Sorting |
| | Pulping | In-fruit fermentation | In-fruit fermentation | Pulping | | |
| | Dry fermentation | Pulping | Pulping | Anaerobic fermentation | | Anaerobic fermentation |
| | Washing & Grading | Dry fermentation | | | | |
| | Pre-drying | Washing & Grading | | Pre-drying | Pre-drying | Pre-drying |
| | Drying | Pre-drying | Drying | Drying | Drying | Drying |
| | Storage | Drying | Storage | Storage | Storage | Storage |

2. Fully washed with In-fruit fermentation

Advantage of the process

- Increase more fruity flavors by in-fruit fermentation
- Shorter drying times
- Greater uniformity in cup profile

Recommended conditions

1. Sugar contents >18.0
2. Clean water and fermentation tank
3. Calibrated pulping machine

Steps

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|--|--|--|--|---|--|--|--|--|
| Harvesting | Sorting | In-fruit fermentation & floating | Pulping | Dry fermentation | Washing & grading | Pre-drying | Drying | Storage |
| DAY 1 | | DAY 1-2 | DAY 2 | DAY 2-3 | DAY 3 | DAY 3-4 | DAY 5- (for 14-18 days) | - |
|  |  |  |  |  |  |  |  |  |

Step 1: Harvesting

Purpose: Ripe cherries have good sugars and acidity to create flavors

Recommended equipment



Use a **container** of cherries during harvesting to easily collect cherries



Use a **plastic sheet** under the **tree** to collect any falling cherry.



Use **clean bags** to hold cherry during harvesting

Key concept

① Harvest **only well-ripen cherries**



Because well-ripen cherries are heavier



| | | |
|----------------|-----------|-----------|
| Weight | 70kg | 100kg |
| Farmgate price | 700rwf | 700rwf |
| Total income | 49,000rwf | 70,000rwf |



② Start to harvest in **the morning**.



③ Deliver cherries to the station **within 8 hours** after harvest



④ Do **not** pick cherries **on the ground** to avoid **contamination**



⑤ Put coffee **under shade** after harvesting to avoid rapid fermentation

2. Fully washed with In-fruit fermentation

Step 2: Sorting – color sorting

Purpose: Classify cherries – Ripen / unripen / overripen

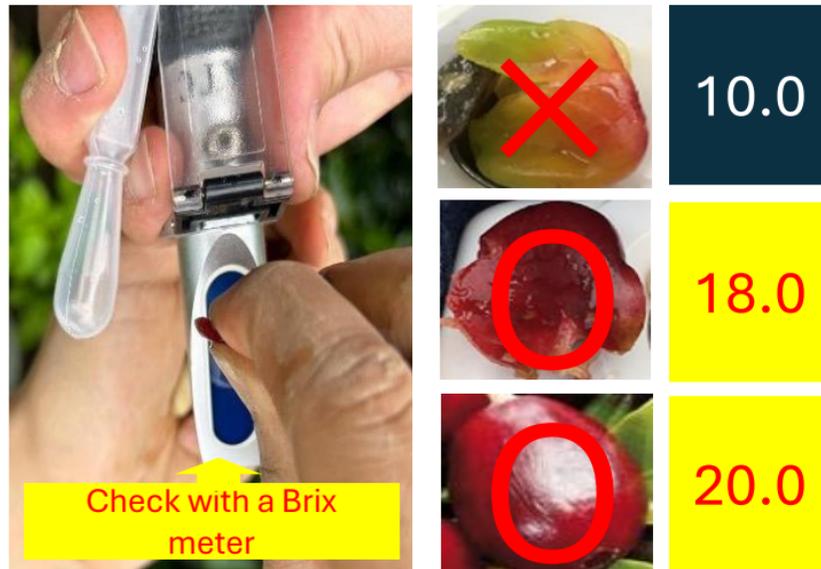
Checking point ①

95% of cherries are **well ripen**



Checking point ②

Sugar contents: above 18.0



2. Fully washed with In-fruit fermentation

Step 3: In-fruit fermentation (24-36 hours)

Purpose: enhance fermentation aroma through in-fruit fermentation

Equipment

Use a **bucket, a tank or a cherry bag** with air to ferment for 24-36 hours



Key concept

① Ferment cherries under an **open-air condition** (open the bag or tank) **for 24-36 hours.**



② After fermentation, make sure cherries are fermented by **smelling alcoholic and checking pH (about 5.0)**



2. Fully washed with In-fruit fermentation

Step 3: Floating

Purpose: float off defective cherries

Equipment

Use a **water tank or basket** to float cherries



Key concept

① Check **colors** by hand



② Check **density by water**

** very light cherries are to be removed*



Checking points

① **95%** of cherries show “**well ripen**”



② Floaters: should be **below 10%**



Step 4: Pulping

Purpose: remove the cherry skin while preserving the beans

Equipment



Use a **pulping machine**



Use a **clean fermentation tank** to collect parchments

Key concept

① Use **clean water** to pulp. Avoid contamination after in-fruit fermentation



② **Adjust a blade, amount of cherry and flow speed** to avoid damage on parchments.



③ **Clean the machine everyday** to avoid contamination



Checking point

Take 100 parchments and check if it's below 10% of damage beans, below 10% of unpulped cherries



2. Fully washed with In-fruit fermentation

Step 5: Fermentation

Purpose: remove the remaining mucilage and develop desired flavors

Equipment



- Use a **clean fermentation tank** to ferment parchments
- Use **clean water** when washing out mucilage
- Use a **pH meter** to check if fermentation is completed.



Key concept

- ① **Length of fermentation:** Temperature affects fermentation speed. It can be shorter in dry season and be longer in rainy season. Normally, it takes between **12-18 hours**.
- ② **Open-air condition:** Tank is left uncovered to **expose the parchments to air**.

**If it is very cold, you may be advised to cover the tank to facilitate fermentation.*



Checking point

- ① **Smell:** Avoid sour or vinegary aroma.
- ② **Texture:** Check if mucilage is detached from parchments.
- ③ **pH:** Use a pH meter and check if it falls to **4.0-4.5*** by the end of fermentation.

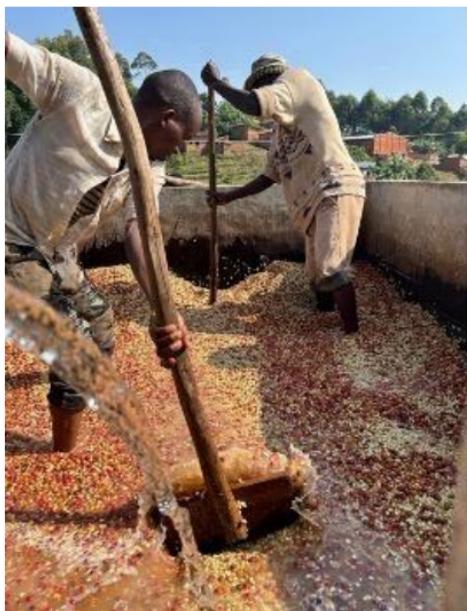


**Though you can adjust depending on buyers' demand*

Step 6: Washing and Grading

Purpose: wash off remaining mucilage and grade parchment by density

Equipment



Use a **wooden rake** for washing

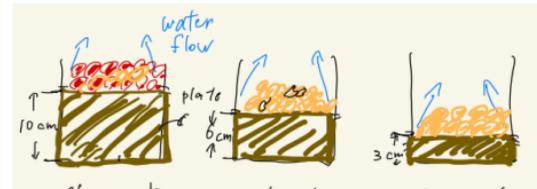
Key concept

- ① Check **by texture** that mucilage is all removed.
- ② **Maintain the grading canal clean** to avoid contamination.
- ③ Make **a clear segregation for the different grades** (A1 / A2 / floaters) by the height of wooden plates in the canal.

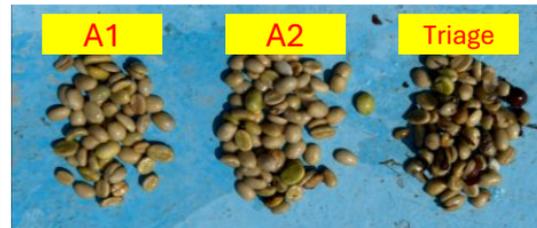


Checking point

- ① Control quality by **changing the height of the plate** for each grade (10cm: A1 / 6cm: A2 / 3cm: floaters & pulps)



- ② **Over 75%** should be **A1 grade**



2. Fully washed with In-fruit fermentation

Step 7: Pre-drying (36-48 hours)

Purpose: remove lower-quality beans

Equipment

Covered drying beds



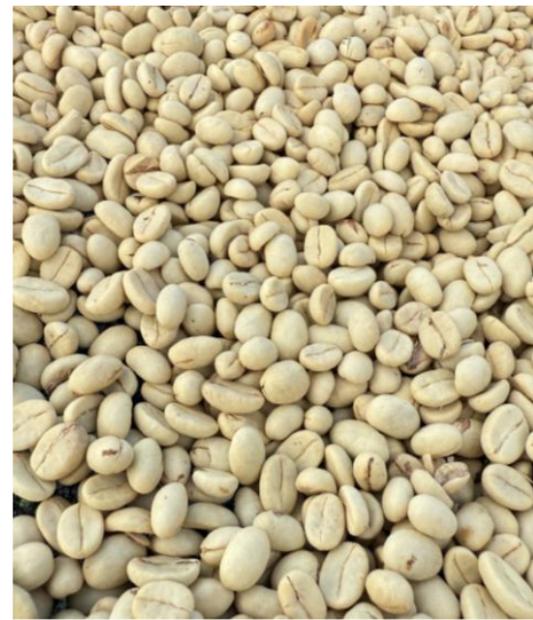
Key concept

- ① Place parchments **under shade** to sort bad parchments before getting them dry.
- ② Sort and rest parchments **for 36-48 hours** after washing. Parchments must rest well before sun-dry.
- ③ Set the **target colors of the defects** to sort:
 - Green (Immature)
 - White (floaters)
 - Black/insect damaged beans
 - Broken/Chips/Cut (pulping machine)



Checking point

Defects are **100% removed**



2. Fully washed with In-fruit fermentation

Step 8: Drying

Purpose: reduce moisture content and prepare for proper storage

Equipment



A shade net to avoid strong heat.



A plastic sheet to avoid rain and dew.



A moisture meter to check moisture.

Key concept

① **Control temperature:** Use a **shade net** to cover from **11:00-15:00** to avoid strong heat.

② **Control humidity:** Cover parchments with a **plastic sheet** to avoid rain and dew.

③ **Resting:** 1 day in a week, **cover parchment completely for resting.**

④ **Uniformity:**

- **Stirring 4 times a day** by hand to keep equal sunshine.
- **Thickness** of the layer: **3cm (first week) -> 5-7cm**

Checking point

① **Moisture contents:** Aim for **11.5-12.0%** for best condition. Check with moisture testers twice a day.

② **Duration: 14-18 days.** The drying process must be carefully controlled to avoid rapid or uneven drying.

③ **Parchment temperature:** The temperature should be always **kept below 35°C** to prevent embryo damage.



2. Fully washed with In-fruit fermentation

Step 9: Storage

Purpose: stabilize beans post-drying for export or milling

Equipment

Use pallets to avoid damage



Key concept

① **Moisture control (MC):** Maintain the bean moisture content at **10-12%**

**Adjust the MC if storage is either very hot or very humid*



② **Ventilation:** Control consistent **air flow** to avoid dew and high humidity



Checking point

① **Temperature:** Keep temperature **at 15-23°C** to avoid damage



② **Humidity:** Keep humidity **at 50-70%** to avoid mold



③ **Resting:** Beans should rest for **around 2 months** to stabilize MC



Appendix A: Lot management sheet (example)

| Lot management sheet | |
|--|------------------|
| CWS: _____ | Name: _____ |
| -Receiving date: dd/mm/yyyy | Weight kg |
| -Process method: FW / HN / NR / Other (____) | |
| -Certificate: _____ | |
| -Lot name: _____ | |
| -Main area: _____ | |
| -Fermentation: _____ hours (From ____:____ to ____:____) | |
| -Soaking: _____ hours (From ____:____ to ____:____) | |
| -Grade: A1 / A2 / A3 / Triage | |
| -Drying start date: dd/mm/yyyy | |
| -Drying end date: dd/mm/yyyy | |
| -Moisture content: _____% | |
| -Final weight: _____kg | |

CWS: *the name of the coffee washing station where the coffee lot is received and processed.*

Receiving date: *the exact date when coffee cherries are delivered to the washing station.*

Process method: *the processing method applied to the lot (e.g. Fully Washed, Honey, Natural, or other specified methods).*

Certificate: *the certification status associated with the lot, if any (e.g. Organic, Fairtrade, Rainforest Alliance).*

Lot name: *the unique identification name or code assigned to the lot for traceability.*

Main area: *the main origin of the coffee cherries, such as the sector, cell, or village where they were harvested.*

Fermentation: *the total fermentation duration in hours, including the exact start and end time.*

Soaking: *the soaking duration in clean water after fermentation, including the start and end time.*

Drying start/end date: *the dates when drying begins and ends, indicating the total drying period.*

Moisture content: *the final moisture level (%) of the coffee after drying, measured before storage or milling.*