

### Best practices at wet processing pay financial benefits to farmers and processors



By Jan C. von Enden  
GTZ – PPP Project  
“Improvement of coffee quality and sustainability of coffee production in Vietnam”.

High quality coffee is demanded and well paid by international coffee traders and roasters. However, international clients are only willing to pay high prices for high quality.

Generally, Arabica coffee prepared via the wet method receive the best prices on the world market because it exhibits the most desirable taste characteristics. However, wet coffee processing requires a lot of care and knowledge as well as a lot of labour to produce a high quality product.

In order to achieve an optimum quality and price, coffee processors should know the potential of the coffee grown in the area and then decide the best way to process his coffee. From a natural point of view, the higher the altitude in which

Arabica coffee is grown, the better the inherent quality. Other influences on quality play of course climate and soil conditions and the variety planted.

However, the most crucial step to turn Arabica coffee cherries into a well paid product is wet processing. Coffee processors must be aware of best processing practices in order to make use of the whole quality potential and must not spoil quality by inadequate processing techniques.

#### “Washed” and “unwashed” coffees

Internationally, “washed” (Spanish: “lavado”) or “fully washed” are expressions suggesting a good quality Arabica coffee derived from wet processing. Fully washed is used for coffee which has undergone a fermentation step including a thorough cleaning after

fermentation. The expression “semi-washed” coffee often causes confusion as people mean different processing techniques. Firstly, the expression semi-washed is used for coffees which are pulped and then left for drying without prior fermentation. Secondly, semi-washed is used for coffee which has been undergone mechanical removal of mucilage as mostly applied in Vietnam.

Carefully processed washed and semi-washed



Picture 1:  
Clean, dry parchment: **washed**



Picture 2:  
Dried cherry: **unwashed**

coffees are higher valued than unwashed coffees as they exhibit a fine acidity, are generally lighter in body and cleaner in cup than unwashed coffees.

# Post Harvest Processing Arabica Coffee

## Quality starts in the field

The first step for producing quality, is good field maintenance suitable climate and soils, fertilisation and control of pests and diseases. Only a healthy coffee tree will carry good cherries.

During harvesting, it is important to pick cherries selective, only the red and ripe coffee cherries. The fully ripe cherries will run smoothly through all steps of wet processing and will develop a good aroma during roasting and will be appreciated by buyers.

Green and unripe cherries develop a peanut like, grassy or green taste in the cup, leading to quality discounts. More serious defects are black beans,

stemming from cherries which have been dried on the tree already or collected from the soil. Beans which are overripe, rotten or have been started to ferment in the cherry already due to long delays between picking and processing also need to be avoided by all means. Coffee must be delivered to the processing line as quick as possible to avoid set on of fermentation.

Selective picking for only ripe and red cherries requires more work but will produce higher quality. Stripping of coffee, i.e. just brushing off cherries from the tree must be avoided, because no differentiation between ripe, unripe and defected cherries can be done.

## Cherry reception

At cherry reception, the processor should make sure that the coffee delivered is of good quality by tipping out the bags and taking a sample of cherries for



Picture 3:  
High Percentage **defected cherries and foreign matter**

evaluation. If there are too many green and/or already fermented/rotten cherries (more than 10 to 15%), it is advisable not to process this coffee at all as it has the potential to spoil the whole coffee lot. Low quality cherries should be rejected at delivery or sorted out as early in the process as possible. Later removal of defects is time consuming, expensive and not all defects will be eliminated. Low quality cherries will be detected by clients when they are roasted and cupped!

It should also be borne in mind that every defected beans results in the same costs as a high quality bean for transport, storage and machine capacities. However, it creates only little revenue. It must be the goal of processors to avoid defects as early as possible

### ***Green Bean defects due to natural conditions and harvesting***



**Spotted beans**  
Fungus infection in field, lack of fertilisation



**Immature Bean, Quaker**  
Picking of unripe cherries



**Black bean**  
Cherries collected from the floor



**Withered Bean**  
Insufficient field husbandry

# Post Harvest Processing

## Arabica Coffee

during processing, that means at cherry reception!

### Pre-cleaning and floating

Weather conditions during the processing time in Vietnam are wet and therefore mud sticks to the cherries delivered to the processing line. Dirt and foreign matter like sticks, leaves and stones need to be separated before lead to the pulper to avoid damage of machines. This is ideally done with water on perforated metal screens.

In a second step, cherries should be fed into a siphon to eliminate floating cherries and other light material of red and ripe cherries. This technique makes use of the different density of coffee cherries: ripe cherries will sink to the bottom while rotten cherries will float and can be discarded easily.

### Pulping

Although many Vietnamese coffee processor use green cherry separators in front of the pulpers, the experience shows that still a high percentage of green cherries are processed. The concept of making more quantity appears to be unfortunately more prevailing than the concept of quality.

From a mechanical point of view, pulpers and green cherry separators must be maintained regularly and spare parts must be at hand. Operational results must be checked regularly by visual examination.

Due to overloading or sticks and stones in pulpers, pulper blades wear off and deform so that they possibly harm coffee beans and parchment. As soon as only the protective parchment husk is damaged, beans will



**Cut and broken parchment**  
Too much pressure on green cherry separator

### Cut beans

Problems with pulping blades be more exposed to the environment and therefore prone to deterioration during drying and storage. Parchment and beans must not be damaged during pulping.

### Demucilating

The technology of mechanical mucilage removal has been developed in Columbia and Mexico in order to reduce total water consumption for processing by skipping the fermentation and washing step. In addition, it has also been considered to bring economic benefits to processors because wet

coffee can be handled quicker when the time consuming fermentation step is left out.

In the process of demucilation, the friction of beans moving against each other is used to remove the mucilage. Beans are fed into the bottom of a cylindrical device in which beans are conveyed upwards. The pressure and movement of beans against one another is sufficient to remove most of the mucilage. At some parts, however, mucilage will remain, especially in the difficult accessible centre cut of the bean where it will slowly ferment off at later stages but will give the centre cut a slightly dirty appearance at roasting.

### Fermentation

Natural fermentation is a biological way to remove the slimy, hygroscopic mucilage layer from the parchment in order to



### Fermented or Stinker Bean

Too long time between picking and processing, insufficient cleaning of fermentation tanks and machinery

prepare it for later drying. During the preparation of fully washed coffee, the pulped coffee is led into the fermentation tank where it is left between 12 and 36

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hours. During this time, enzymes of pectin degrading bacteria will grow in the wet and warm conditions of bulked parchment and are liquefying the gel like mucilage layer.

In order to maintain good conditions for fermentation, most care and attention has to be paid. If conditions for fermentation are not right (too cool ambient air or water, too acid environment, too little available oxygen), fermentation will happen only slowly or not at all. It must be made sure that temperature of water is always around 20 C, oxygen should be available and the acidity of the water should not be lower than pH 6.5 for the bacteria and enzymes to work. In order to raise the temperature, increase the demucilating enzymes in the fermentation tank and keep the amount of oxygen dissolved in the water at high levels, it is suggested to recycle filtered pulping water and lead it through the freshly pulped coffee.

After fermentation has finished and the parchment fills rough and grippy, coffee must be washed in order to discharge the liquefied mucilage. If failed to do this, cup defects are very likely to occur, especially overfermentation and stinker beans.

In Kenya, a supplier of highest quality coffee, processors apply a “two step dry fermentation procedure” in which parchment is fermented under fully

drained conditions in fermentation tanks. After washing, parchment is soaked under water for an additional period. The soaking found to have positive effects on raw and roasted bean appearance. This effect has been attributed to the result of some otherwise deleterious water soluble chemical components diffusing out of the bean.

### *Demucilated vs. fully washed coffee*

A lot of research has been carried out to determine how and why the fine acidity and aroma carriers develop during wet processing better than in dry processed coffee. The latest research suggests that not the fermentation itself develops acidity and aroma but rather the time in which the pulped, wet parchment is left in fermentation or storage tanks before drying.

The time during fermentation with warm and moist conditions might stimulate pre-germination in the bean which causes a biochemical restructuring in the bean leading to the development of acidity and desired aroma carriers. In terms of cup defects, demucilated parchment is less prone to fruity flavour, sour and stinkers caused by overfermentation because mucilage and sugars are removed mechanically rather than by micro-organisms. However, when demucilated coffee is stored too long in wet condition or

airtight in plastic bags, moulds and yeasts will be growing resulting in cup defects and possibly OTA.

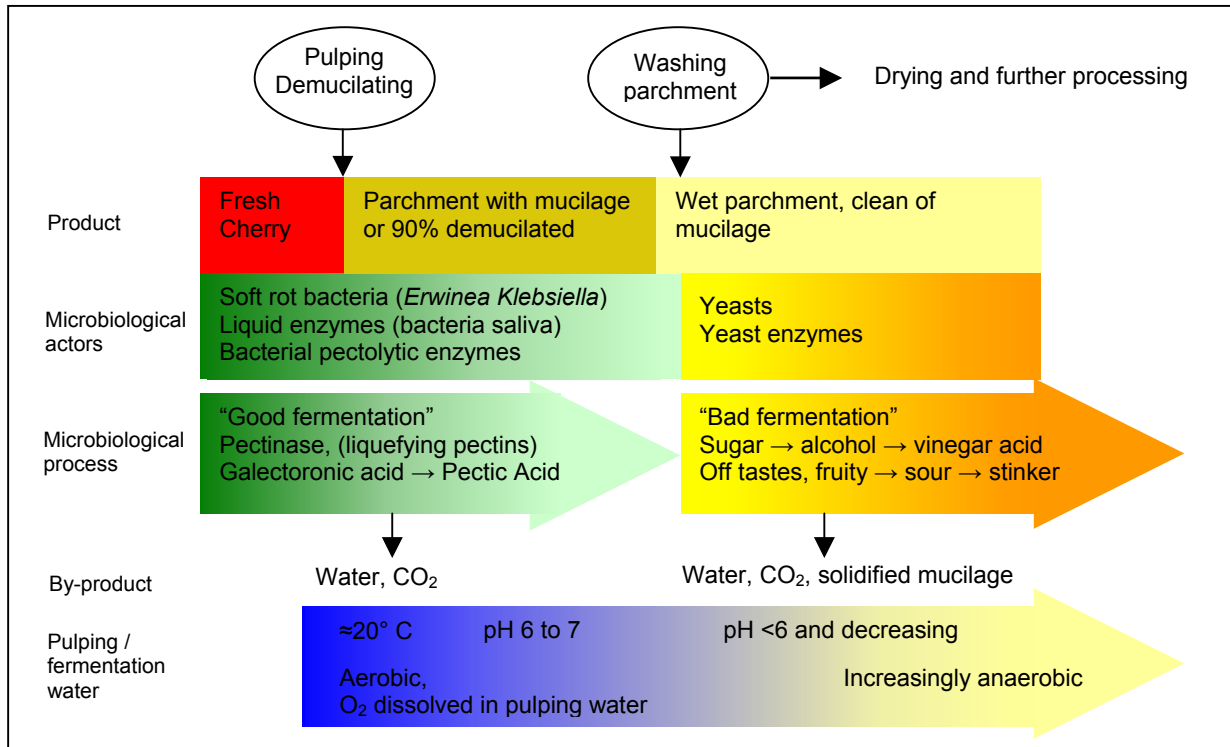
In terms of cup quality, research suggests that fully washed coffee will deliver better quality than demucilated coffee. However, this is not necessarily true. According to research carried out in Columbia, lower cup qualities have been only found when mechanically demucilated parchment is put from demucilators directly into driers. A flat, grassy taste and little acidity has been detected organoleptically by experts. However, the same coffee processed with a fermentation and washing step exhibited better taste characteristics as one would expect from this very coffee.

There is still ongoing research what the reasons behind this phenomena are. However, an important observation researchers have made already: when wet demucilated coffee is left in bulk for “finish” fermentation (e.g. in fermentation tanks, silos, etc.) before drying and thorough washing, quality characteristics like acidity will increase and the green/grassy taste will fade. Especially the warm conditions fuelled by microbial activity and the moist ambient conditions are considered to create conditions in which the beans pre-germinate. The biochemical changes in the bean induced by the

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pregermination is possibly inducing the fine acidity as well aroma precursors.



### Washing

After fermentation has fully removed the mucilage layer - either after full or finish fermentation - parchment needs to be washed to remove remaining fermentation products. Remaining mucilage will discolour parchment and provides a good growing ground for moulds. Therefore, parchment must be white and clean before further processing.



Picture 4:  
**Demucilated parchment** stored in silo for 6 hours (left) and parchment stored in 60kg plastic bags without washing (right)