

Detecting Defects

PART 2 OF A SERIES

Processing Defects Part ONE Overferment/Sour and Stinker Beans

BY ANDI C. TRINDLE
PHOTOS BY ENSEI NETO, SPECIALTY COFFEE BUREAU



■ Black, fermented and broken beans.

I HOPE EVERYONE has now experienced the wondrous peanut-buttery taste of quakers (flashback to the first article in our Detecting Defects series), and I invite you to move forward along the coffee production chain to experience the tastes of rotted fruit, vinegar and even rotten fish. I know, these are not the descriptors we like to find at the cupping table, but in the interest of education, we are going to look at some defects that produce these particularly unpleasant profiles. For those of you following along in our series, in the interest of logic, I'm moving us forward in a linear fashion along the coffee production chain. We started with plant-based and harvesting defects, and we're now going to examine defects generated in the next stage of coffee production: coffee processing.

Processing coffee is the phase in coffee production where the coffee seeds are removed from within the freshly harvested cherries, then dried and prepared for export as green coffee. Processing defects occur during this phase. With numerous steps and many different methods utilized (depending upon the origin country, region and/or buyer specifications), coffee processing is a critical and expansive phase in coffee production. As Robert Barker, vice president of quality assurance at Growers Direct Coffee in Berkeley, Calif., states, "Coffee processing can substantially remove defective beans or contribute to them." In some cases, mistakes made in processing can ruin coffee, rendering it totally undrinkable. In better scenarios, defects developed during the coffee growing and harvesting phases can be mitigated or eliminated. With the employment of proper processing practices, producers can ensure that well-grown coffee seeds leave the country as top-grade green coffee suitable for the discriminating specialty market.

continued on page 54

UNRIPE AND IMMATURE



■ The lighter beans are quakers or unripe; the darker are immatures. These beans have some particular features like the absence of sugar (it dries on the plant without passing through the cherry phase), which explains why it roasts faster than the cherry (without sugar it's faster, but the oils go to surface faster too) and is very bitter, rancid and smells like rubber.

FERMENTATION



■ Beans with high moisture + pilling + heat - oxygen = fermentation (acetic if cherry, phenolic if raisin).



■ Some origins pick the coffee after the cherry turns to raisin. If these beans gain humidity, the phenolic fermentation starts.



■ Before they go to the dry mill, these beans should pass through a cleaner.

FUNGUS



■ Bean showing mold. The black color means that the fungus is dead and probably consumed the sugars from the pulp through the skin. In this cherry phase, the external skin changes with the atmosphere.



■ The mold turned green, which means a new kind of fungus is working. This can lead to phenolic fermentation because the bean is partially dry.

CATEGORIES OF PROCESSING DEFECTS

The category of processing defects includes damage caused by incorrect or inadequate methods in pulping, washing, fermenting, drying, cleaning and hulling. Specific defects that can occur within these phases include bruised beans, stinker beans, soft beans, over-dried beans, overfermented beans, sour beans and many others.

To better understand defects created during processing, it's helpful to first review the methods and steps in coffee processing. We will do this very briefly.

The methods of coffee processing are washed (or wet process), dry (or natural process) and semi-washed (or pulped natural). Each of these methods produces unique flavor profiles and all must be skillfully managed. Farmers/millers generally employ one of the particular methods above based upon the climactic conditions of their region, the availability of water resources, and the traditions of their region. For example, in countries where clean water is more available, specialty coffee producers most often utilize the washed process, and in countries where water resources are limited, the dry process is most often utilized. However, in the modern world of specialty coffee, where coffee buyers choose coffee based upon the cup profile and its particular place in their coffee lineup, many producers are choosing non-traditional methods for their region in order to experiment with taste profiles and to satisfy the requests of buyers. This newer development of experimenting with processing methods is, in part, responsible for the growth in the usage of in-between methods, known as semi-washed and pulped natural.

The broad steps in coffee processing, which do vary depending upon the method used, include the following:

- 1) Pulping: removal of coffee seeds from within the coffee cherry (wet processing)
- 2) Fermentation and washing (wet processing)
- 3) Drying of fermented green beans still in parchment skin (in the dry method, coffee seeds are still within cherries and dried on patios before the cherry skins are removed)
- 4) Storage of coffee parchment
- 5) Cleaning/sorting of coffee parchment prior to hulling
- 6) Hulling (removal of green beans from within parchment)
- 7) Grading/sorting
- 8) Bagging for export

Clearly, an expansive range of activities during the processing phase makes the topic of processing defects a large one. To add to the challenge, many of these steps incorporate a variety of sub-steps and decisions in which a coffee mill has the opportunity to maintain and contribute to coffee quality or to destroy it.

For the purposes of this series, we're going to divide the above steps into two major phases. Phase one incorporates just the first two steps, which are components of the washed-process method. The second phase, which we will discuss in the next article, incorporates steps three through eight, which are components of all processing methods.

Coffee Processing Phase One

After ripe cherries are harvested, the seeds (soon to be called green beans) must be removed from the cherries. In washed coffee processing, this is done by pulping, washing and fermenting the beans; this is our arbitrarily defined Phase One. There are a number of different steps within each of these main activities that require scrupulous attention to ensure quality in the final product. One of the most critical areas is fermentation.

Fermentation is a natural process that occurs to some extent in all methods (more on this later), but in the washed process, fermentation is a controlled process that requires, well, good control because, when fermentation is not well managed, we may end up with the aforementioned rotted fruit, vinegar and rotten fish flavors. (I'm all for education at the cupping table, but seriously, who wants rotten fruit and vinegar in their cup of Joe?)



OVERFERMENT

Although there are many potential defects developed during processing—many just within our designated Phase One—I've chosen to focus on overferment because it remains a common problem and it can contribute to a number of different specific defects, including stinker, sour and black beans—all of which produce notable visual and taste defects. (Note: Black beans are often the result of plant-based problems prior to fermentation, but they can stem from overfermentation as well, so they are included here as an example of overferment-produced defects.)

Causes

First off, it's good to know that fermentation is a naturally occurring chain reaction of chemical responses that transforms organic compounds. *The American Heritage Dictionary of the English Language, Fourth Edition* defines fermentation as “a group of chemical reactions induced by living or nonliving ferments that split complex organic compounds into relatively simple substances.” Although occurring naturally in many cases, fermentation is often deliberately induced and carefully controlled in the production of wine, beer, and, yes: coffee. Whether deliberately induced and tightly controlled, whether occurring naturally, or whether occurring by some combination of both, the fermentation process generates a number of incidental byproducts that affect the taste and aroma of the final green beans.

In washed coffee processing, fermentation is used to describe the managed process utilized to transform and ultimately remove the sticky mucilage surrounding the parchment skin (the parchment skin houses the green beans until hulling). Up to a point, fermentation creates positive flavor transformations, but the process must be tightly controlled in order to prevent overfermentation. “Overfermentation,” according to Ensej Uejo Neto, chemical engineer and food technologist, Specialty Coffee Bureau, Patrocinio, MG, Brazil, “causes defects by biochemical

transformations that end up punishing the cup strongly.”

There are many different stages in coffee processing where naturally occurring fermentation can spiral out of control, leading to the risk of overfermentation. High temperatures, high humidity, interactions with other organic compounds through shared and unclean equipment, and a number of other conditions can expedite the fermentation process of newly harvested cherries.

According to Mané Alves, president of Coffee Lab International, Waterbury, Vt., fermentation varies significantly depending on several factors, including the following: time from harvesting to processing; ambient temperature; time of fermentation mass of coffee in the tank; water being used; controlled environment in the tank; and cleanliness of equipment. In each of these stages, controls implemented by the producers and millers can mitigate factors that impact fermentation negatively. The principal challenge for producers/millers is to ensure that the fermentation process is stopped before the mucilage begins to overferment.

Commonly Found

Overfermented beans, which generally yield an overly fruity (rotten fruit) cup and sometimes specific defects like

black, sour and stinker beans are found everywhere. Certain conditions that increase the rate and minimize the manageability of fermentation, including temperature, rainfall and even infrastructure (ability of small coffee producers to transport coffee cherries to the nearest mill quickly enough after harvesting, for example), will impact the likelihood of overfermentation occurring. However, fermentation problems can and will occur in every producing country.

Identification

Overfermented beans, used as a general defect here, are primarily identified by the taste of rotted fruit in the cup, and they are not visually recognizable. Deciding when a coffee has positive fruity characteristics versus when it has crossed to a rotted, overfermented quality can be a very individual decision, however. I have served on a number of cupping juries where half of the panel finds a coffee overfermented and half finds the coffee “pleasantly and wildly fruity.” Identifying overfermented coffees that have manifested into specific defects is less controversial, though, because the negative flavors intensify and, as Alves states, “detection happens in the cup and also visually.”

The defect identification chart provides information on the

continued on page 56

DEFECT IDENTIFICATION CHART

Defect Name	Causes	Visual Identification	Taste Identification	SCAA Classification
Sour	Overfermentation due to picking of overripe cherries, processing cherries that have fallen from the trees, water contamination, humid conditions whereby fermentation begins while the cherries are on the tree	Full or partial yellow or yellow-brown to red-brown coloring	Sour, vinegar-like flavor Note: according to the SCAA Arabica Green Coffee Defect Handbook, “one single full sour bean can contaminate an entire pot of coffee”	Full sour= primary defect; 1 sour bean= 1 full defect Partial sour= secondary defect; 3 sour beans= 1 full defect
Black	Overfermentation due to picking of overripe cherries and/or improper management of conditions during processing	Full or partial black opaque coloring	Fermented/rotted fruit, dirty, moldy, sour	Full black= primary defect; 1 black bean= 1 full defect Partial black= secondary defect; 3 black beans= 1 full defect
Stinker	Overfermentation due to extended/repeated fermentation, polluted water, delay in pulping after picking	Light-brown, brownish, or grayish coloring and dull appearance	Fermented/rotted fruit, foul, rotten fish flavor	Unknown

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DETECTING DEFECTS (CONTINUED)

causes and identification methods for the three distinct defects mentioned earlier that can be caused by issues of overferment; potential causes included here are only those stemming from fermentation issues. Note that these defects, unlike the more general term "overfermented," are identifiable visually, as well as on the palate.

Prevention

Overfermentation and the defects it produces can only be prevented by a firm command of the fermentation process as stated earlier. Natural fermentation often begins as soon as the coffee cherries are picked from the coffee trees (and in very humid conditions, sometimes while the cherries are still on the tree), so prevention strategies to avoid overfermentation must occur as soon as the coffee cherries are harvested.

There are many places in which fermentation varies (read: places in which fermentation can spiral out of control), so it makes sense that there are many strategies that farmers and millers must employ to avoid problems created by uncontrolled fermentation. Prevention strategies include processing coffees promptly after harvesting, adapting for temperature and other climactic conditions, carefully monitoring fermentation time, utilizing clean equipment and fresh water, and closely watching the process. One particular strategy to avoid the challenges of controlled fermentation used in washed processing is the use of mechanical demucilaging, an in-between processing method that is becoming more common.

Whether or not a miller goes so far as to modify their processing method to better control fermentation, conscientious and knowledgeable farmers and millers can often successfully control the conditions that can lead to overfermentation. Nonetheless, it is not always possible and certainly not always done, so it is important to find opportunities to eliminate visual and taste defects produced by overfermentation before export.

Fixes

To be crystal clear: overfermentation cannot be reversed. However, careful sorting and grading can eliminate some of the resulting defects of overfermentation before green coffee is exported. According to Rob Stephen, president, Coffee Solutions, Hopedale, Mass., "More attention to incoming coffee at the mill level, including cupping and solid grading, will discover defects like immature beans, sour and ferment." Responsible millers should be able to visually identify and catch blacks, sours and stinker beans before samples reach specialty roasters, specialty importers and roasters should reject samples that do not follow the clearly defined visual standards for specialty coffee. However, general overferment, which is not identifiable by sight alone, is frequently not caught before export. Although more producers and millers are gaining skills in cupping analysis, there is still a steep learning curve in many countries.

What does this all mean for the specialty coffee roaster? You can probably guess what I'm going to say: cup carefully! And remember that the best way to learn how to identify taste defects is to taste them, so I send everyone off with the task of tasting some rotted fruit, vinegar and rotted fish.

ANDI C. TRINDLE began working as a barista in 1989, and, to her surprise, remains in the specialty coffee industry 18 years later. She currently works exactly where she belongs as a green coffee trader with VOLCAFE Specialty Coffee. Andi also consults, lectures and volunteers extensively within the coffee industry both nationally and internationally. She is currently serving as President of the International Women's Coffee Alliance and as co-chair of the Cupping Subcommittee for the Specialty Coffee Association of America Training Committee. She can be reached at andit@volcafespecialty.com.

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