

Detecting Defects

a new series

Plants & Quakers

by Andi C. Trindle



A Guatemalan coffee cherry attacked by a coffee borer beetle. Photo courtesy of Jeff Taylor, PT's Coffee.

ROASTERS IN THE SPECIALTY COFFEE industry are fortunate to work with the very best coffees in the world—coffees layered with fruit, spice, floral, citrus, chocolate, and a multitude of other beautiful aromatic notes, which are divinely interspersed with refreshing acidity, silky body, and natural sweetness. You all know what I'm talking about; likely your mind has already wandered to that last beautiful cup you had. In the specialty coffee roaster's world, even the most average coffees on the cupping table tend to be of good quality, with at least one notable positive attribute.

Given this privileged position, many roasters newer to the specialty coffee industry have never experienced a truly bad sample, much less an actual defect. Coincidentally to working on this article, I had a recent conversation about defects with U.S. Barista Champion, Heather Perry, who cups coffees with her family's business, Coffee Klatch, in Southern California. Perry lamented that she had never tasted a defect, so she would not know how to identify one should it show up on someone else's cupping table or in an international cupping competition. You can hardly call this a sad state of affairs (who *really* wants defects showing up on their cupping table anyway?), but, nonetheless, as Perry believes, it's important that roasters understand and learn how to identify defects. Defects will inevitably occur and there is educational value for all of us in learning more about them—how to identify them visually and in the cup and how they are caused and prevented. Hence, this new series, Detecting Defects, which will look at various defects in detail and give you additional insight on how they occur, what they look and taste like, and how to make sure they're not showing up in your coffees.

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This first article in the series focuses on plant-based defects generally and then more specifically on quakers. Plant-based defects, also called field-damaged defects, are exactly as they sound: defects that occur in the coffee plant, while coffee cherries are growing *before* the coffee seeds are processed. Generally speaking, plant-based defects cannot be repaired in the processing, roasting or brewing once they have manifested themselves. If we're lucky, they can be detected before the coffee is processed, sold and shipped, but this is not always the case.

Within the general category of plant-based defects, it is possible to identify a few smaller categories based upon the core (not necessarily exclusive) cause of the defect. For example, field defects can be caused by genetics (something within the coffee tree itself), soil and climactic conditions, pests, and poor crop management. Each of these root problems/conditions can lead to specific defects, which may be visually noticeable and/or manifested as a mild or severe off-flavor in the cup. I'll briefly overview a few examples of the different types of field defects and then focus in-depth on one particular egregious defect: quakers.

Roasters are probably most familiar with insect-related plant defects. In these cases, an insect, like the coffee berry borer (*Hypothenemus hampei*), attacks the coffee cherries on the tree. As expected, the coffee seeds within the coffee cherries are damaged as the pests eat away at the bean tissue. With this particular pest, the defective beans are visually identifiable by small insect holes,

generally no bigger than 1.5 mm in diameter. They are also identified in the cup by mild to severe off-flavors and a general loss of aroma, acidity and flavor.

Elephant beans, triangular beans and peaberries (yes, the peaberry beans we all know and love) are examples of genetic plant defects. In each of these cases, the coffee seeds develop differently than usual due to genetic variance. Fortunately, these particular defects, although identifiable visually, are not known to cause significant deterioration in cup quality. In fact, in the case of peaberry beans, which form when only one seed develops within the coffee cherry, creating a single rounded bean, many contend that the flavor is improved due to an increased intensity. The unproven theory here is that the single seed receives all the nutrients that would usually go to two beans, so the single peaberry bean is richer in nutrients and, therefore, more intensely flavored. Whether or not this is true, peaberries are commonly selectively sorted and sold at a premium.

Soil and climactic condition defects, as expected, vary from country to country, region to region, and year to year. Climactic conditions, such as temperature, rainfall, humidity and sunlight are all critical components of producing good coffee. Generally speaking, coffee is only grown in areas where the appropriate environmental conditions exist, however, major climactic events, such as the infamous frosts of Brazil, hurricanes, and tsunamis, inevitably affect and sometimes seriously damage coffee crops.

Farms affected by frost damage, for example, will suffer particular defects, which can include the generically named frost-damaged beans, as well as brown and foxy beans. All of these defects are detectable in the appearance due to distinctive brown and black coloring. They also all have some impact on the taste, though the degree will vary based upon the specific defect and the severity of it. At the very least, aroma, flavor and acidity are diminished and, in severe cases, actual off-tastes may develop.

Defects caused by poor soil conditions, such as amber beans and immatures among others, develop when the soil lacks certain critical nutrients or has an abundance of particular nutrients. To remain healthy and productive, coffee trees require a careful balance of macro and micronutrients, which come from the soil. Macronutrients like nitrogen, potassium, phosphorus, calcium and magnesium contribute essential elements to aid in the development of healthy trees and fruit. Micronutrients like zinc, copper, iron and others, at particular levels, similarly provide important elements to maintain the health and productivity of coffee trees. Not surprisingly, when the soil has a lack or an abundance of certain nutrients, the coffee trees are affected and the coffee beans may develop improperly, ultimately lacking necessary sugars, starches and cell structure.

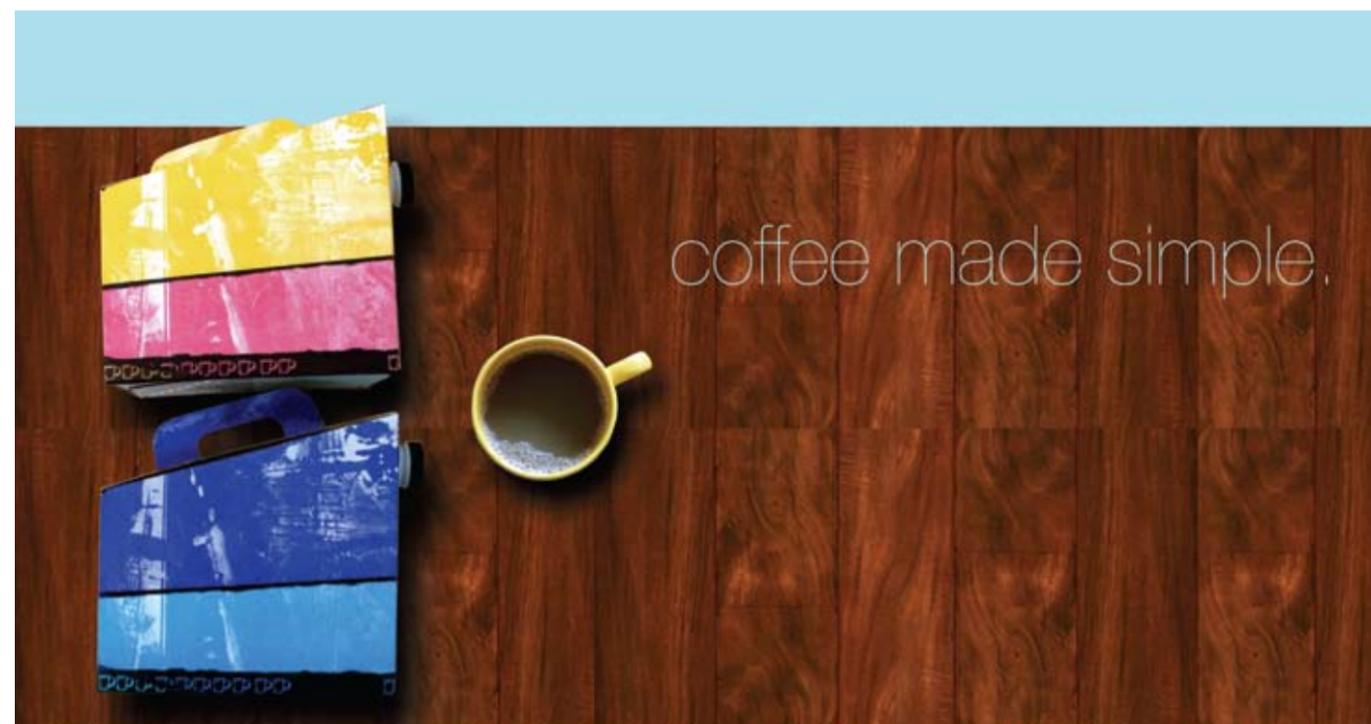
The final category of plant-based defects encompasses those defects caused by poor crop management. Poor farm management overlaps our discussion of poor soil conditions, since it is within the farmer's control to compensate for soil deficiencies through fertilization and other crop management techniques. When farmers do not fertilize their soil properly, manage water supply, control weeds, and implement other important practices in the field, coffee cherries and the coffee beans within them are at risk for developing defects—defects like quakers, for example. (Yes, we are finally here.)

QUAKERS

I've chosen to focus on quakers as the primary defect for this first article because, in asking some casual questions to prepare for writing this series, I discovered that many people don't have a clear understanding of this particular defect, even though it poses a serious problem for many roasters. According to Peter Giuliano, director of coffee and co-owner of Counter Culture Coffee in Durham, N.C., "The number-one culprit for



■ Yirgacheffe region sun-dried naturals on elevated drying patios. Example of under- and over-ripe selections. Photo by Darrin Daniel, Allegro Coffee.



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rejections has always been quakeriness... The impact of quakers on coffee quality is profound.”

There is a good side to quakers however: they can be prevented. Here’s some further information about this pervasive, but preventable, defect.

Defect Name: Quaker

Quakers are more generically called immature beans, but the term quaker is used to identify immature beans that reveal themselves very specifically after roasting. According to David Roche, chief technical director of the Coffee Quality Institute in White Salmon, Wash., the term quakers is only used in the cupping room, since they are not identifiable until after roasting.

Causes

Quakers are a specific manifestation of immature beans. Most commonly, immature beans are caused by underripe picking (the picking of green, not yet fully developed, coffee cherries). And, according to Ensei Uejo Neto, chemical engineer and food technologist at the Specialty Coffee Bureau in Patrocínio, MG, Brazil, “the main cause of quakers is the picking of unripe beans.” All sources agree that underripe picking is the principal cause, however, climactic and/or soil conditions and poor field care may also result in quakers.

In Nicaragua, according to Lexania Marín Grádiz, Star Cupper and consultant working throughout Nicaragua, immature beans—which may or may not result in quakers—are a frequent problem of poor fertilization. When soil is not properly nourished, necessary nutrients are not available for the growing coffee seeds. Roche agrees with this theory and states, “when coffee trees are stressed [lacking adequate nutrition], it is difficult for the nutrients, carbohydrates, and essential components to fully ripen the bean... This is true of any fruit in the world. If you don’t provide enough nutrients, water, or anything essential, then plants go into survival mode and will not have enough to ripen the fruit.” In the case of coffee, when this happens, the cell structure of the green beans within the coffee fruit is not well defined and the seeds will lack the starches and sugars necessary for good flavor.

It is interesting to note that, although quakers can certainly be caused by soil nutritional problems and not exclusively by picking underripe cherries, Giuliano has never experienced Quaker problems in countries like El Salvador, where his experience shows that cherries

are consistently allowed to ripen fully before picking. Note to producers: pick ripe cherries to avoid quakers and, ultimately, rejections.

Although quakers are created in the field, processing customs within a country may influence the likelihood that quakers show up in the final roasted product. According to Roche, the prevalence of quakers can be influenced by the processing method that is most common to a country. This is not to suggest that quakers are caused by processing (they aren’t), but that Roche has found that quakers are more commonly allowed to pass through the processing cycle to the final product in countries where natural processing is more common. This may be true because countries producing more naturals or semi-washed coffees do not generally utilize gravity separation methods that assist in eliminating underripe beans. In the washed coffee processing method, coffee cherries go through a gravity separation process, where floaters (cherries that float, rather than sink in water) are removed. Although removing floaters does not guarantee the removal of potential quakers, it reduces the number of overall immature beans, which logically will reduce the likelihood of quakers. Important note: floaters and quakers are not synonymous. Floaters are caused by a number of different problems, including overripe beans in some cases.



■ Yirgacheffe cherries, partially dried using a sun-dried process. Example of primarily overripe picking. Photo by Darrin Daniel, Allegro Coffee.

Commonly Found

Quakers can occur anywhere, but some roasters and importers find this particular defect more common in deliveries from certain countries. Counter Culture has historically experienced the most problems with quakers in deliveries from Mexico, Costa Rica and Brazil. Ian Kluse, quality control manager at Volcafé Specialty Coffee in Petaluma, Calif., agrees that Brazil and much of Central America have regular problems with quakers; he also finds significant problems with quakers in Sumatra. In spite of these patterns, there is no clear indication that quakers are consistently more common from one producing country to another, and they can certainly be found in coffee lots from every origin at times.

How to Identify Quakers

Quakers can be identified visually after roasting and in the cup. Visually, quaker beans are distinctly lighter/pale in color after roasting; regardless of the degree of roast, quakers will stand out obviously among roasted coffee beans. Unfortunately, though, quakers cannot be detected by examining green coffee and they may manifest sporadically in a coffee lot, which can create serious problems for roasters even when they are scrupulously cupping

their arrival and spot samples. Grádiz agrees that quakers cannot be identified when examining green coffee, but, she states that she can sometimes predict the likelihood that quakers will exist when she notices a problem with immature beans in general. Immature beans can be visually identified by a smaller size, by a wrinkled surface, and when the silver skin adheres very strongly. It’s important to be clear, however, that the term “quakers” is reserved for immature coffee beans that show up as distinctly pale colored beans *after* roasting. And, because it is not possible to determine how many quakers there may be in a bag of green coffee until roasting, they are a particularly insidious defect.

In the cup, quakers have a distinctly peanutty/peanut butter taste, with the possible addition of woody, grassy and papery notes—not exactly the profile of specialty coffee. Quakers will also lack full flavor and sweetness—no surprise, since the sugars and carbohydrates are not there. According to Steven Diaz, quality director at Expocafé S.A in Colombia, “just one quaker bean among the beans that go into one cup can affect the flavor dramatically.” Diaz, co-author of the *Specialty Coffee Association of America Arabica Green Coffee Defect Handbook*, emphasizes “that is why in specialty coffees the standard is so strict concerning quakers.” For the record, according to the green coffee handbook, in evaluating a roasted sample (100-gram sample size) for specialty grade classification, no quakers (that’s right: zero) are allowed. However, when evaluating a green coffee sample (350 grams), immature beans, which may result in quakers when roasted, are a secondary defect and five are allowed before they are considered a full defect equivalent.

The best way to learn how to identify the taste of quakers in the cup is to find them in a roasted sample (you really can’t miss them), hand sort them out, and taste them on their own. It won’t be fun, but it will be educational.

Prevention /Fixes

Quakers cannot be fixed once they have occurred (besides being painstakingly removed by hand from the roasted product), but they can be prevented at the farm level. Giuliano said it best in his interview by stating emphatically, “producers can prevent quakers by picking ripe and caring for their soil. I will repeat: pick ripe, care for your soil. Pick ripe, care for your soil. Repeat until you win the Cup of Excellence.” Even if a producer is not out to win Cup of Excellence competitions, surely avoiding rejections and eliminating the potential for a serious taste defect is worth a renewed effort to pick ripe cherries and focus on soil nutrition.

Why roasters should care: As I started this article off stating, there is educational opportunity and value for roasters in understanding defects because they inevitably occur. Quakers are particularly worth understanding as a roaster because they are a preventable and prevalent defect. If you experience a high level of quakers from a particular origin, region or farm, it is possible to communicate with the producer about the problem and encourage the farmers to, once again: “pick ripe, care for your soil.”

ANDI C. TRINDLE began working as a barista in 1989, and, much 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 Volcafé Specialty Coffee. Trindle also consults, lectures and volunteers extensively within the coffee industry both nationally and internationally. She currently serves as president of the International Women’s Coffee Alliance and as co-chair of the Cupping Subcommittee for the SCAA Training Committee. She can be reached at andiw@volcafespecialty.com.



■ Yirgacheffe cherries at washing station, an example of underripe picking. Photo by Darrin Daniel, Allegro Coffee.

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