GET IT RIGHT THE FIRST TIME

HOW TO PREVENT ROASTING DEFECTS AND TAINTS

BY WILLEM J. BOOT

PHOTOS BY KENT HANSON

I USUALLY TEACH my students that roasting coffee revolves around the simple but important concept of "roasting right the first time." During the coffee roasting process, there are limited opportunities to correct mistakes. Once the beans have cooled, it is virtually impossible to re-roast them to a different degree or a different flavor profile. One of the keys to producing quality coffee is to roast right the first time and, in doing so, prevent roasting defects and taints.

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Picture A.
Panama bean (sliced):
inconsistent bean development with over-roasting and under-roasting in the same bean

Common Defects

Some major roasting defects occur as a result of external events, like earthquakes and power outages. Other defects are the result of operator errors, such as double charging the roasting drum, which occurs when the operator accidentally loads a second batch of green beans into the roaster while a first batch is already being roasted. Such a mistake can create hours of sorting and selection after the fact. Another common operator error is accidentally over-roasting and burning the beans, to the extent that even the stoutest operator cannot claim that it was a very special French Roast. Some of these errors, such as earthquakes are obviously not preventable, so you have to just throw away that batch and start over.

However, most of the aforementioned errors can be prevented relatively easily. For example, I would recommend installing a back-up generator that automatically turns on in the event of a power outage. In this case, the generator can provide emergency power to the drum drive motor and the roaster

impellor, which will allow the beans to cool slowly and securely in the drum, thus preventing major heat build-up and reducing the risk of roaster fires. Furthermore, developing clear roasting and operating procedures, as well as repeating monthly fire and emergency drills, can help roaster operators respond quickly and intelligently in case of unexpected events.

The second category of defects, called minor defects or roasting taints, occur when an operator does not calibrate the roasting machine adequately for the beans being roasted. Although these defects are not as detrimental to the completed cup of coffee, they do occur more often than operator errors and are more complicated to correct.

In the beginning of my coffee career in the United States, I met a client from Hawaii who brought me his newest crop of coffee beans, freshly picked from his Kona coffee trees. He asked me to design

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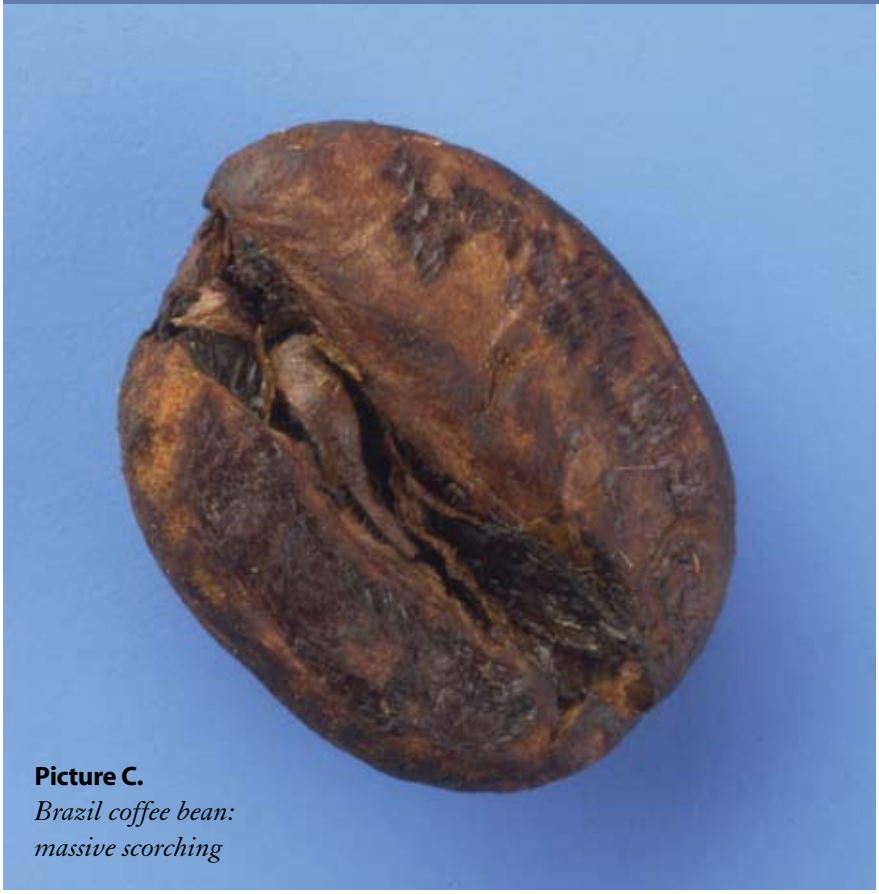
Picture B.
Brazil coffee bean: minor scorch and char marks



Picture C.
Brazil coffee bean: massive scorching

a roasting profile for his precious beans. In my first trials, I failed miserably and the beans were scorched on the outside and underdeveloped on the inside. The reason was simple: I did not take the proper amount of time to "read" the beans and complete a thorough analysis of them prior to roasting. Upon investigating the coffee, it appeared that these freshly produced Kona beans were relatively high in moisture and still lacked the "settled" cell structure that occurs when green beans are cured for six weeks in parchment after the completion of the drying process.

As a result of my analysis, the next trials were very successful, and I designed a roasting profile for my client that addressed the higher moisture content and the spongy consistency of the beans. The fresh crop roasting profile in question allowed my client to maintain a low roasting temperature during the first three to five minutes (the drying phase) followed by a moderate-heat roasting cycle, resulting in evenly expanded beans with consistent color development inside and outside and no signs of scorching. In the end, I learned my lesson, and the client was happy.

Let's review some basic parameters that, if properly analyzed and addressed, can help you roast right the first time, without defects.

Bean Moisture

It helps to use an effective moisture analyzer, which can be purchased for less than $900. To prevent roasting imperfections, the green bean moisture content should be between 10 and 12.5 percent. Green coffee beans usually become too dry (8–10 percent moisture) or too humid (12.5–14 percent) as a result of improper storage conditions and environmental factors. Think of warehouses in regions with sub-tropical, humid conditions or regions with bone-dry, hot climates. High-moisture beans should be roasted very gently in the first stage and low-moisture beans must be watched closely because of the risk of an uncontrollable acceleration throughout the process. I also recommend recording the moisture content of all green beans frequently.

Picture A. (page 34) shows a Panama bean

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Picture D.
Coffee bean:
first signs of tipping

with a low moisture content (8.7 percent), and a roasting process that was not adequately controlled. Only one minute and 50 seconds passed between the beginning of the first crack and the end of the roast (Agtron 55–beans). The picture shows the uneven coloration inside the bean where it was over-roasted in some spots and under-roasted in others.

Green Bean Consistency

There can be a huge difference between a fully washed beans and natural- or dry-processed beans. The difference is usually found in the cell structure of the green bean, and in the resulting variance in heat resistance during roasting. Picture B. (page 35) shows a roasted, dry-processed Brazil bean with minor scorch and char marks on outside layers. Picture C. (page 36) shows the massive scorching that occurs when the same bean type is exposed to excessive heat in the first stage of roasting. This type of defect leads to burnt and acrid flavor profiles.

The best prevention in this case is to always verify the green bean production process and, if possible, use your sample roaster to check the heat resistance of the coffee beans prior to roasting a full-size batch. If you suspect that the beans might be more prone to scorching, keep the charging temperature of the roaster as low as possible, without stalling the roasting process unnecessarily.

Regular cupping protocols with the goal of preventing roasting defects are effective tools in maximizing customer satisfaction and roasting right the first time.

Roasting Machine Settings

For best roasting results, maintain a monthly service schedule of your roasting machine. Depending on your roaster type, check atmospheric burner nozzles, power burners or infrared heating systems to ensure that the heating system is producing consistent BTU. It's a good idea to install a gas pressure gauge that displays the pressure coming from the gas supply line, or rather, install a gauge that shows the exact pressure between the gas control valve and the heating system itself.

Additionally, you should inspect the color of the flames to make sure that the heating system is burning fuel efficiently. Flames with long yellow tips can reach up far enough to touch the walls of the roasting drum, which can cause unnecessary contact heat and tipping and scorching of the beans. Picture D. (page 37) shows a coffee bean with the first signs of tipping, which is

recognized by the development of burnt spots on the ends of the beans.

Last but not least, check the airflow through your system. In this case, I recommend installing a gauge that displays the air pressure inside your drum. Reduced air pressure will cause baked flavors that often go hand-in-hand with reduced brightness, reduced acidity and a flat, dull flavor profile. An air pressure gauge will help you monitor and diagnose the root causes for reduced air pressures, such as clogged venting pipes, malfunctioning blowers or impellers, and changing weather patterns.

Cupping Protocols

There is no doubt that a stringent cupping routine will help you to improve the consistency of your roasted coffee. Besides measuring the quality profile using effective laboratory analysis methods, I recommend documenting the target flavor profile for each coffee type, which should be compared against the production results by using effective cupping protocols. For example, after each shift of roasting, the roaster operator should taste at least two cups per roasted batch and compare intensity of the key parameters of the coffee's flavor profile (acidity, body, sweetness) against the targeted intensity level. Some companies actually involve all roaster operators in daily tasting sessions, which enables the roasting staff to make effective assessments of their own performance, which will improve consistency in roast output and, in the end, strengthen customer satisfaction.

Did you know that only one out of 10 customers usually complains? The other nine simply will not make the effort to tell you about their dissatisfaction and, as a result, you could lose their loyalty. Regular cupping protocols with the goal of preventing roasting defects are effective tools in maximizing customer satisfaction and roasting right the first time.

Coming Next Issue

The challenges and benefits of developing roasting profiles.

Willem Boot, president of Boot Coffee Consulting & Training, specializes in consulting and training programs for coffee companies. He can be reached at 415.380.1999 or by sending an e-mail to wboot@bootcoffee.com.