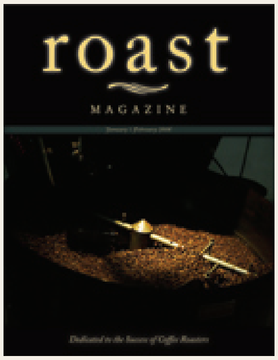

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Blending for Italian Espresso Part 1

Background and A Rationale for Blending

by Dr. Joseph John
Photos by James Hoffmann

EACH COFFEE-PRODUCING country cultivates a product that is somewhat different from that of another origin. Some display high acidity, some have high body, others are very aromatic, and still others taste of fruits, spices, chocolate and even tobacco. In each case, the coffee exhibits a flavor profile in the cup that is characteristic of its origin—the place where the coffee is grown.

Blending coffee is both an art and a science. In its noblest form, blending attempts to create a cup that does not exist in nature, by mixing two or more coffees in various proportions. When expertly done, the resulting blend displays a flavor profile that is distinctly different from those of any of the component coffees—often superior, sometimes more complete and, at other times, better balanced.

Blending for brewed coffee is relatively simple and straightforward, because brewed coffee can accommodate a wide array of physical and flavor properties. Although every such combination of two or more coffees in a wide range of relative proportions can constitute a technically acceptable blend for brewed coffee, not every one of those blends can become a commercial success, because of taste preferences. However, espresso in general, and Italian espresso in particular, is defined much more narrowly in terms of what physical and flavor characteristics it can exhibit. As a result, blending for espresso is quite different from blending for brewed coffee, because the two beverages are vastly different.

Espresso blends are not created by taking brewed coffee blends and roasting them darker and more oily; such dark roasting does not magically make it an espresso blend. However, before discussing blending for espresso, the important distinctions between ordinary brewed coffee and real espresso must be appreciated. Although this article covers the subject of blending for espresso, it is not intended to provide specific recipes for espresso blends; rather it is to elaborate on one blending philosophy and to develop a practical approach to blending for an Italian espresso.

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Due to its length and the complexity of its content, this article is split into two parts. The first part, contained in this issue, develops the background information leading to the specific requirements of an espresso blend. The second part, to appear in the next issue, will elaborate on an approach to blending for Italian espresso.

Ordinary Coffee and How It Is Made

Ordinary brewed coffee is prepared by bringing hot water into physical contact with ground coffee at room pressure. In this process, some portion of the ground coffee, roughly twenty percent by weight, dissolves in the hot water. This is primarily a physical process. Most of the chemical reactions occur after the coffee is brewed and allowed to linger, often resulting in deterioration of its fresh brewed flavors.

There are many different ways of making coffee, but they all follow the same basic principle of bringing hot water and ground coffee into physical contact with each other. Some use steam and others use a hand piston to push water through the ground coffee, while most common techniques simply call for pouring the hot water on top of the ground coffee or dumping the ground coffee into a vessel containing the hot water. It takes about seven grams of ground coffee to make a six-ounce cup of coffee. Different methods of making coffee take varying amounts of time; and the contact time, during which ground coffee is in physical contact with hot water, determines the fineness to which coffee is ground. Longer contact times call for coarser grind, in order to control extraction.

Because the preparation is carried out at ordinary pressures, the water-soluble components of ground coffee are primarily extracted and account for the taste and color of the brew. The process extracts some of the water-insoluble compounds that account for the body. Much of the aroma molecules released by the ground coffee during the extraction process simply escape into the room and are lost. Only a minute fraction of this aroma stays dissolved in the liquid coffee.

Cooling in the tray.

The sweet, flavorful and desirable components of ground coffee are extremely soluble in water and most of them are easily extracted in a short time or by little water flowing through the ground coffee. Longer contact time, or more water flowing through the ground coffee, results in dissolving more of the undesirable components such as acids, bitters and caffeine.

What Exactly Is Espresso?

Espresso can only be made using a machine that not only heats the water and pre-measures the water volume, but also delivers the hot water under high pressure, ranging from 100 to 140 lbs. per square inch. This high water pressure causes the oils in ground coffee to be extracted, formed into microscopic droplets and suspended in liquid coffee concentrate. It is this emulsification of oils that distinguishes espresso from strong coffee.

As in the case of brewed coffee, it takes about seven grams of ground coffee to make a one-ounce, single shot of espresso. In this process, the water-soluble components of ground coffee, roughly the same 20 percent by weight, goes into solution, just as in the case of brewed coffee. But this is dissolved in only one ounce of water, making the espresso six times as strong as brewed coffee. The process described so far will result in producing only strong coffee, even if an espresso machine is used, unless steps are taken to insure that oils in the ground coffee are also emulsified.

If the coffee is not ground fine enough, the pressurized water will rush through the ground coffee in less than 15 seconds extracting only the solubles and making strong, ordinary coffee. But when the coffee is ground very fine and packed very tight in the porta-filter so as to impede the flow of water, water molecules will be forced into the interior of the ground coffee particles and made to drive out the oils, with the water losing most of its energy in the process. The resulting espresso will simply ooze out of the porta-filter like warm honey without having enough energy to gush out.

These oils completely change all the physical and flavor characteristics of this coffee beverage. Its mouth feel, density, viscosity, wetting power and foam-forming ability are all different from those of strong coffee.

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Significance of Crema

The emulsified oils also change the flavor properties of the beverage. For example, these oils coat the taste buds and inhibit their ability to detect bitterness. This reduced bitterness will be interpreted as enhanced sweetness. Thus, if brewed coffee and espresso are made from exactly the same blend, the resulting espresso will actually taste sweeter.

Much of the enjoyment of consuming coffee comes from its flavor, consisting of taste and aroma, with a majority of the flavor sensation actually being derived from the aroma, as detected by the nose. While much of the aroma molecules escape into the room when brewed coffee is prepared, espresso preparation has a built-in mechanism to capture the aroma and keep it in the cup—the all important crema.

The emulsified oils responsible for the crema, which is a collection of tiny bubbles with a film of oil on the outside and the coffee's aroma inside, provide this mechanism to hold the aroma of fresh ground coffee in the cup. These aroma molecules, later released when the bubbles burst in the back of one's mouth, find their way to the nose through the pharynx that connects the mouth to the nasal cavity. These tiny bubbles also attach themselves to the taste buds and burst, from time to time, to release the volatile compounds long after the espresso is gone, accounting for the long after-taste, a distinguishing feature of espresso quality. Crema, therefore, is the single most important indicator of a well-made espresso.

An example of excellent crema.

Real Espresso should ooze out of the porta filter like thick, warm, honey.

A Few Words About Acidity

Because espresso is six times stronger than brewed coffee, all characteristics of the coffees are exaggerated in an espresso. This is particularly true of its acidity. As the concentration of the beverage increases linearly, the acidity perceived by the tongue seems to increase much faster. As a result, high acidity, considered by many to be a virtue in brewed coffee, is not a desirable feature in a quality espresso.

This acidity has a major impact on the selection of component coffees for an espresso blend. Much of the coffees available in the United States and Canada are grown in Central and South America, many of which exhibit high acidity in the cup. Many brewed coffee blends offered in North America showcase these Central and South American coffees both for their flavors and their acidity. Because espresso does not tolerate

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anywhere near the acidity desired in brewed coffees, the role of these high-acid coffees in espresso blends has to be curtailed.

Single-Origin Espresso

There are some, particularly in North America, who consider espresso as just another way of making coffee. In that context, using a single-origin coffee to make espresso may be a rewarding experience. The espresso process magnifies all the good (and the bad) characteristics of that coffee, and when their good features far outweigh the negatives, this may be a way to enjoy one's favorite coffee. The single-origin espresso is favored by the home connoisseur as a way to add variety to their everyday espresso routine.

However, in a commercial environment, the single-origin espresso is best used as a "guest espresso," in addition to the house espresso staple. An additional grinder for the guest espresso is a must. This situation may change as the general quality of espresso in North America improves and the consuming public gets more conversant with espresso to the point that more than five percent of espresso beverages are consumed as "straight".

In a café or espresso bar, customers are looking for the espressos and espresso-based milk drinks to taste exactly the way they tasted the last time. In such commercial environments, the café is in the business of fulfilling peoples' expectations. In that situation, espresso blend stability as well as shot-to-shot consistency is of paramount importance. In that context, it is inconceivable that one single-origin espresso can fulfill that consistency objective if that is the only espresso offered in a café.

Everything coming out of the portafilter should be crema.

Initial pour must have the correct reddish-brown tinge.

Roast Before Blending vs. Blend Before Roasting

As to whether it is better to roast the individual coffees separately before blending or to blend the coffees in the green and roast them all together depends on the properties of the coffees used in the blend. Both procedures are completely acceptable.

Post-roast blending, where the individual coffees are roasted separately and blended afterwards, affords the luxury of being able to roast each coffee to a different degree to bring out the best flavors in that particular bean. It also offers coffee retailers who do not roast their own coffees the ability to create proprietary espresso blends out of the individual roasted coffees they get from one or more wholesale roasters.

However, this post-roast blending procedure has disadvantages, the most obvious being the need to do several batches of roasting in order to produce a blend. Also, most roasting machines have practical minima for the quantity of coffee that can

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be roasted in them, and it is inevitable that one has to roast more coffee than is required for a particular blending session. If one's commitment to freshness prohibits holding coffee from today's roasts for tomorrow's blending, it can lead to considerable waste of the leftover component coffees.

Blending the green beans before roasting is conceptually ideal in overcoming some of the disadvantages of the post-roast blending. Pre-roast blending is possible when the coffee beans are compatible with respect to their roast characteristics. When the beans are dissimilar in bean size, density, moisture content, heat conductivity and roast development profile, blending before roasting is difficult, and in many cases, impossible.

Such is the case with the blend I have the most experience with: viz., Malabar Gold, Josuma's premium European espresso. The coffees used in this blend cannot be more dis-similar. The Monsooned Malabar-AA Super Grade is extra large, having grown to twice the original size during the monsooning process. It is also extremely low in density. The premium washed robusta Kaapi Royale, on the other hand, is small and dense. Those beans just did not want to roast together and initial attempts at roasting them together produced disastrous results. It took me three years to perfect the blending procedures to enable the blend to be roasted properly. In that process, I learned a lot about the properties of those coffees and got a real education about the mechanics of roasting.

Thus Far

We have established the difference between brewed coffee and real espresso and laid the foundation to discuss how blending for espresso differs from blending for brewed coffee. In the second part we will cover a particular approach to blending for Italian espresso.

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Some Statistical Considerations ☞

Some Statistical Considerations

WHEN AN ESPRESSO BLEND consists of two or more coffees, the exact proportion of each bean in a dose will vary from shot to shot. The extent to which these proportions vary, from dose to dose, depends on the dose size and the relative proportion of a particular bean in that blend.

It takes about 56 beans to make up seven grams of coffee, often used to make a single shot of espresso. Thus, in making espresso, one is conducting a random sampling experiment, selecting 56 beans at random when making a single shot, or randomly selecting 112 beans to make a double. The question then becomes, if one selects 56 beans at random out of a hopper containing this blend, what is the chance that you get the correct number of each bean in that sample? Intuitively, one can see that the odds improve as the sample size expands (e.g. it takes 112 beans to make a double shot and it gets even better if the sample size is the 168 beans required for a triple.).

The same is true if the blend contains a large proportion of a particular bean, certainly when compared to the behavior of a coffee that is present in a much smaller proportion in the blend.

The table below illustrates this effect for three different doses, nominally a single shot, a double and a triple. The five rows represent the proportion of a coffee in the blend (10 percent, 20 percent, etc.). For example, if the blend has 20 percent of a particular coffee, refer to the second row of this table. If it happens to be 25 percent, one has to interpolate between the results in the second and third rows. These calculations are made and rounded to the nearest whole bean.

The columns show a measure of the "error rate" in the relative proportions of the beans when a single, double or triple shot is made. They are calculated as a set of probabilities that a particular coffee is within +/- x percent of the nominal proportion, where "x" is the heading on top of each column. For example, reading down the +/- 20 percent column, the numbers indicate the probability that the particular sample chosen has a specific coffee within +/- 20 percent of its nominal proportion.

Suppose a blend uses 40 percent of a Sumatran coffee. For a double shot, using 14 grams of coffee, the probability of that Sumatran coffee being present within +/- 10 percent of its nominal composition (between 36 and 44 percent in this case) is contained in the fourth row. Focus on the middle portion of this table, devoted to 14 grams, and look down the first column covering +/- 10 percent and read off the fourth row pertaining to 40 percent blend component, resulting in the reading of 66 percent. In other words, in selecting 112 beans at random, the Sumatran bean will be present between 36 and 44 percent concentration about 66 percent of the time. In the remaining 34 percent of the time, the concentration will be outside these limits.

If the same blend had another coffee, say a Costa Rican, at a nominal proportion of 10 percent, and we require that bean to be present within +/- 10 percent of its nominal composition (between 9 and 11 percent, in that case), in making the same double shot, we find that probability to be 39 percent. It means that in the 112-bean sample, that Costa Rican coffee will be present at concentrations between 9 and 11 percent only 39 percent of the time. In the remaining 61 percent of the time, its concentration will be outside those bounds. ■

TABLE 1. Shot to Shot Variation of Coffees in a Blend for Different Doses

	Dose = 7 grams Spread			Dose = 14 grams Spread			Dose = 21 grams Spread		
Blend Component %	+/- 10%	+/- 20%	+/- 40%	+/- 10%	+/- 20%	+/- 40%	+/- 10%	+/- 20%	+/- 40%
10	36	52	77	39	61	88	42	68	94
20	41	64	90	48	76	97	54	84	99
30	47	74	96	57	86	100	65	92	100
40	54	82	99	66	93	100	74	97	100
50	62	89	100	75	97	100	83	99	100

Tables courtesy of Jim Schulman of the University of Chicago.

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