

Peaberry Coffee Beans Roasting Uniformity Study Through Image Analysis

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Abstract

It was traditionally considered that coffee peaberries were a defect in the coffee production process. There are usually two plano-convex seeds inside the berry; however, a single ellipsoidal seed may form for biological reasons: The Peaberry. Due to this mutation, the peaberries were long considered a defect; further, their export was banned in many coffee-producing countries due to their significantly reduced shape and the worldwide demand for supreme beans. However, different sensory evaluations have revealed that the peaberry has a high cup quality. It is hypothesized that the bean shape accounts for these results. The roasting process occurs homogeneously throughout the bean's domain, and its shape makes it easy for it to roll inside the roaster enclosure. Nevertheless, the data shared in the literature regarding this topic are relatively scarce. Therefore, this study aimed to perform a set of image analyses on 3 samples of coffee beans: 120g of standard grain, 120g of peaberries and a mixture of 60g of standard and 60g of peaberries. The samples were then medium roasted at the same temperature and conditions to better observe the tonality and roast uniformity in 100 randomly selected beans from each sample, from which 50 were cut transversely and 50 longitudinally. Afterwards, a high-resolution picture was taken with a stereoscope, normally located on the flat face. The pictures were processed through image analysis to identify colour mapping, intensity, discontinuities and anomalies in all the grains. The tonality was less variable in both individual and mixed samples of peaberries. Standard berries displayed anomalies in their inner structure generated during the roasting process in both individual and mixed samples. During the roasting process, air chambers formed inside the bean, which resulted in heat accumulation and overroasting, resulting in undesirable flavours and reducing the cup profile and quality.