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AN INVESTIGATION OF THE “CLEAN CUP” FLAVOR PARAMETER IN COFFEE BY COMPARISON OF DIFFERENT ROASTING PROFILES

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Background
The demand for high quality and specialty coffee is increasing worldwide. In order to meet these demands, a more uniform and standardized quality assessment of coffee is needed. Within this context, the aim of this study was to make a sensorial and chemical characterization of the term “clean cup” as a flavour descriptor for roasted coffee. “Clean cup” is an abstract term used in the coffee branch to define quality. Though associated with absence of defects and rated positively by coffee experts, the term is poorly defined and a better understanding of its sensory basis is needed.

Method
To investigate the potential of meaning of the “clean cup” concept, this study compared a reference coffee to a series of coffee with typical roasting defects. The green bean was a single-origin washed Kenyan Arabica from the wet mill Ndaroini from crop year 2012/2013. Six roasting profiles were considered: one normal roast and five defects labeled “dark”, “light”, “scorched”, “baked” and “underdeveloped” (Figure 1). The coffee samples obtained from these beans were evaluated by means of 1) aroma analysis by Gas Chromatography-Mass Spectrometry (GC-MS), 2) descriptive sensory analysis (DA) by trained assessors, and 3) hedonic and sensory evaluation by consumers using a Check-All-That-Apply (CATA) questionnaire.

Results and discussion
Multivariate analyses on, respectively, the aroma (not shown), DA (Figure 2), and consumer data (Figure 3), all produced similar sample spaces, showing a clear opposition of the light roast to the dark and scorched roasts along the first dimension (>70% variance in all models). The normal roast was mostly differentiated in the second dimension. The sensory data showed the normal roast to be highest in the DA attributes “complexity” and “acidity”, and the CATA attributes “Harmonic”, “Pleasant”, and “Balanced”. As expected, the normal roast received the highest mean liking ratings in the consumer test and was significantly preferred to all other samples but one (Figure 4). Taken overall, the results confirm the expectation that the “clean cup” parameter is related to absence of roasting defects.

Figure 1. Description of the six roasting profiles used in the study with respect to roasting time, starting temperature, time to first crack, development time and color.

Figure 2. PCA bi-plot of DA data, first versus second dimension (75.9% and 16.1% of variance explained respectively).

Figure 3. CA bi-plot of CATA data, first versus second dimension (79% and 12.9% expl. variance respectively).

Figure 4. Bar plots showing mean liking ratings and standard deviations for the six coffee samples. Different letters denote statistically significant differences with respect to liking (p<0.05).