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Study of the lipid fraction of two hybrid varieties of coffee at different roasting temperature profiles

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Introduction

The lipids are flavor precursors of coffee drinks and these are exposed to physical-chemical changes like lipid oxidation and *Maillard* reaction that occur in the coffee bean during roasting. In 2015 the coffee hybrid varieties "Mundo Mex" (H15) and "Mundo Maya" (H16) were introduced in Mexico without having information on the effect of roasting of grains on their content of fatty acids and diterpenes. The present work was to evaluate the impact of 9 roasting heat treatments on the lipid profile of the hybrid varieties H15 and H16.

Materials/Methods

The methodology consisted of: 1) harvest and wet coffee cherry benefit to green coffee of the H15, H16 and Costa Rica (CR) varieties as a control; 2) Study of the lipid fraction, (content of total lipids, fatty acids and cafestol) in green coffee; 3) Application of heat treatments of roasting (P_1 to P_9), considering preheating (Tp: 220-240°C), flame change (Tc: 180-200°C) and final temperature (Tf: 200-215°C), in the rotary drum roasting process and 4) Study of the lipid fraction, (content of total lipids, fatty acids and cafestol) in roasted coffee.

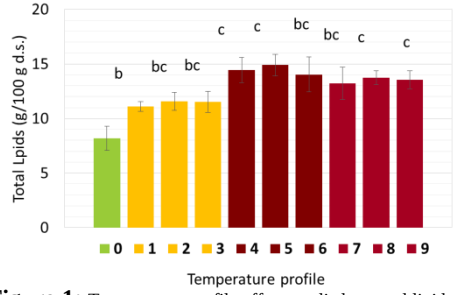
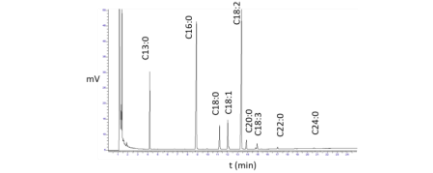


Figure 1: Temperature profile effect applied on total lipids



Varieties	C16:0	C18:0	C18:1	C18:2	C20:0	C18:3	C22:0	C24:0
H15	34.64±0.63	6.0±0.13	7.34±0.90	47.68±0.10	2.30±0.52	0.86±0.31	0.77±0.31	0.38±0.29
CR	33.40±0.36	5.96±0.33	5.89±0.10	49.25±0.25	2.87±0.10	1.60±0.25	0.74±0.13	0.268±0.24
H16	32.67±0.71	6.16±0.18	7.25±0.09	50.46±0.41	1.93±0.23	0.70±0.85	0.48±0.11	0.32±0.10
C.liberaboica	26.6-27.8	5.6-6.3	6.7-8.2	52.2-54.3	2.6-2.8	2.2-2.6	0.5-0.6	0.2-0.4

Figure 3: Esterified fatty acids in green coffee

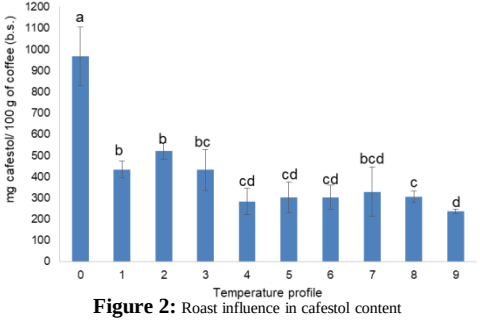


Figure 2: Roast influence in cafestol content

Results/Discussion

The total lipid content was: H15:7.34%; H16:7.8% and CR: 9.42%.The fatty acid profile was palmitic (C16:0) 33. 5%; stearic (C18:0) 6%); oleic (C18:1) 7%; arachidic (C20:0)2.3% linolenic (C18:3) 1%; behenic (C22:0) 0.7% and lignoceric (C24:0) 0.32%. The relative fraction of linoleic acid was 47% for H15; 49% for CR and 50% for H16. The content of cafestol in H1, H16 and CR was of 1066.64; 809.32 and 1023.2 mg / 100 g) respectively.

The total lipid content in roasted coffee with respect to the roasting profile was 11.52-11.9% (P1, P4, P7); 14.02- 14.89% (P2, P5, P8) and 13.21-13.73% (P_3, P_6, P_9). The temperature profiles with longer roasting times directly affected the fatty acid content. The cafestol content decreased from 966 mg/100 g in green coffee to 461 mg/100 g (P_1, P_4,P_7) and 292 mg/100 g (P_2, P_5, P_8, P_3, P_6, P_9) in roasted coffee compared to the applied temperature profile.

Conclusion/Perspectives

Varieties H15 and H16 showed lower lipid content (7.34 and 7.8%) compared to the CR variety (9.42%) in green coffee. Coffee roasted at a Tp of 240 °C and the use of a high Tc had a greater effect on fatty acid degradation. Results support the importance of the temperature profile in the content of fatty acids and cafestol lies in the times and rate of heat transfer applied at each stage of roasting.

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