



## EXTRACTION AND QUANTIFICATION OF TOTAL CHLOROGENIC ACIDS FROM COFFEE HUSKS

Isidro Adolfo-Cesareo, Leticia López-Zamora, Instituto Tecnológico de Orizaba (Departamento de Posgrado e Investigación), Orizaba, Veracruz, CP 94320; cisidroa@hotmail.com

*Key words: coffee husks, total chlorogenic acids (TCQA`s), extraction*

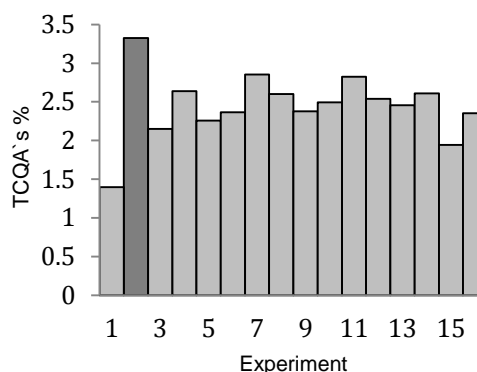
**Introduction.** Husk represents between 15 and 20 % of parchment coffee being seen as a loss (1). Coffee is a natural source of antioxidants, TCQA`s represent between 6 to 12% of coffee beans (2).

It's believed that the polyphenol intake is beneficial to human health, to favor the elimination of free radicals and modulation of enzymatic activity (3), Epidemiological studies have shown a relationships between the consumption of foods rich in polyphenols and the prevention of diseases such as cancer, cardiovascular diseases and osteoporosis, among others. Results of such studies have increased interest in the consumption of polyphenols (4). Coffee beans are an important source of chlorogenic acid. Coffee drinkers can consume up to 1 g of chlorogenic and caffeic acid (5).

The aim of this paper is to analyze the factors involved in the extraction of antioxidants from coffee husks, to increase the concentration of TCQA`s, favoring the use of parchment coffee.

**Methods.** From a  $2^{5-1}$  design of experiments, there was a solid-liquid extraction using as factors: 1) *Ethanol concentration* (50 and 70%); 2) *time extraction* (2 and 4 h); 3) *temperature* (50 and 70 ° C); 4) *relationship solvent/solute (husk)* (5:1 and 8:1) and 5) whether or not a prior extraction of oils. The extract is filtered; using a rotary evaporator the alcoholic fraction is eliminated. TCQA`s are quantified by HPLC.

**Results.** Statistical analysis reveals that the only significant factor is the extraction time. Figure 1 shows the results of experimental design  $2^{5-1}$ , TCQA`s extraction. Experiment 2, showed the highest concentration of chlorogenic acid total with 3.32 % of parchment coffee husks and followed by the experiments 7 and 11, with 2.85 and 2.82% of concentration. Table 1 show the values used in the experiment 2.



**Fig.1** Results of experiment design  $2^{5-1}$  for obtaining TCQA`s from parchment coffee husks

**Table 1.** Values of the factors used at experiment 2, where had the highest concentration of TCQA`s

Factor	Level
<i>Ethanol concentration</i>	<b>50%</b>
<i>Time extraction</i>	<b>4 h</b>
<i>Temperature</i>	<b>70 °C</b>
<i>Relationship solvent/solute</i>	<b>8:1</b>
<i>Extraction of oils</i>	<b>No</b>

**Conclusions.** Experimental design  $2^{5-1}$  was applied to obtain TCQA`s from parchment coffee husks. It was found that the only significant factor was extraction time, reaching 3.32 % of total chlorogenic acid concentration.

**Acknowledgements.** CAFIVER S.A DE C.V for the facilities for this work

### References.

1. Delgado Carlos. 2008. El libro del café. *Colección «Grandes obras de la gastronomía»*, 14. Barcelona: Ediciones Altaya,
2. Farah, A., DePaulis, T., Trugo, L., & martin, P. R. 2005. *Journal of agricultural and food chemistry*, 53, 1105-1113
3. Stocker R. (1999). *Curr. Opin. Lipidol.* 10. 589-597.
4. Yuki Sato, Shiro Itagaky, Toshimitsu Kurokawa. (2010). *I. J. Pharm* 403. 136-138
5. Rice -Evans, C.A., Miller, N.J., Paganga, G., 1996. *Free Radic. Biol. Med.* 20. 933-956