OPTIMIZATION OF EXTRACTION CONDITIONS OF BOUND PHENOLIC COMPOUNDS FROM CHILEAN NATIVE CORN (Zea mays L.) BY RESPONSE SURFACE METHODOLOGY

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Chilean food diversity includes a wide array of native grains such as corn (Zea mays L.) and several pigmented races have been identified. However, information regarding their health-relevant phenolic composition and conditions for their analysis are still scarce. The objective of this study was to optimize the alkaline hydrolysis conditions for extracting the bound phenolic fraction in Chilean native corn by using the response surface method. The pigmented corn accession Cristalino Chileno INIA CHZM 13005 was used and a central composite 2² + star experimental design with one replicate and 4 center points was applied. Evaluated factors were the extraction time (60-90 min) and concentration of sodium hydroxide (2-4 N) whereas the response variables corresponded to the total phenolic content determined according to the Folin-Ciocalteu method and the antioxidant capacity assessed by the 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical inhibition method. All data were analyzed using the Statgraphics Centurion XVI software. Total phenolics varied from 143.62 to 174.21 mg Gallic acid equivalents/100g whereas the antioxidant capacity ranged from 588.76 to 698.57 µM Trolox equivalents/100g. The effect of the extraction time was significant (p<0.05) for both response variables and no interaction between the two factors was observed. The R-squared (adjusted for degree of freedom) was 49.93% (standard error of estimate=2.38) for total phenolics meanwhile the R-squared (adjusted for degree of freedom) was 47.34% (standard error of estimate=8.95) for the antioxidant capacity. Finally, the multiple optimization revealed that best hydrolysis conditions for both response variables were 88 min and a concentration of 3 N.

Acknowledgement: CONICYT, grant No. 11100007 (2010); INIA (La Platina, Santiago).