



## SELECTION AND OPTIMIZATION OF A PRODUCTION PROCESS OF CARMINIC ACID FROM *DACTYLOPIUS COCCUS*

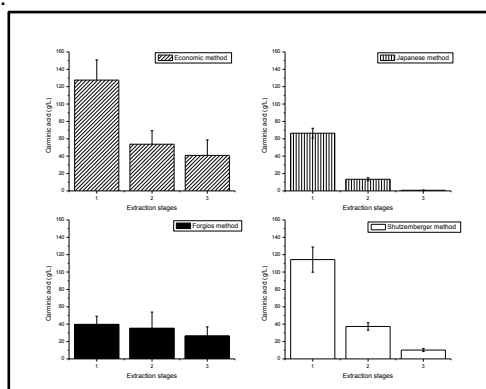
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**Key words:** carminic acid, extraction of natural dyes, *Dactylopius coccus*

**Introduction.** Carminic acid is a natural dye widely used in the food, pharmaceutical and cosmetic industry. Nowadays its demand has increasing due to the legislation of the Europe Union and the Food and Drug Administration of The United States who has restricted the use of synthetic dyes as food additives. Their preparation is effected from female insect *Dactylopius coccus* by alcoholic extraction which increase the cost of this process (1). The main goal of this work was to develop a carminic acid extraction method free of alcoholic dissolvents under conditions that doesn't affect the cost of production.

**Methods.** The cochineal was characterized based on its moisture and ash content under Peruvian Technical Standards. UV-Vis spectroscopy was used for quantification of carminic acid in extracts (490 nm). Three extraction methods were tested and compared: Shutzemberger, Forgios, Japanese and a fourth one developed by the group of investigation denominated Economic. Such methods were evaluated considering the yield of carminic acid having as response variable. The study was done in terms of extractions stages required and the extraction time per stage. One factor ANOVA, Dunnet and Tukey Statistical analysis was applied to experimental data.

**Results.** Results data of the number of extraction stages effect are showed in Figure 1.



**Fig.1** Carminic acid concentration obtained by extraction stage

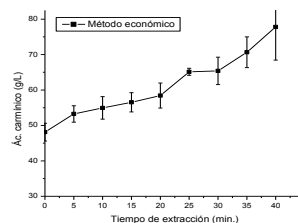
The Economic method presents the highest extraction yields followed by Shutzemberger method, suggesting that higher temperatures doesn't increase the extraction yield (2, 3).

The Forgios method yields shows that addition of HCl doesn't improved the extraction capacity.

Statistical analysis of extraction yields present significant differences proved all methods yields are different, being the Shutzemberger and Economic methods yield the most efficient.

The recommendable number of extraction stages for Economic and Shutzemberger methods are two stages (2).

Figure 2 shows the evaluation of extraction time effect on extraction yields. The carminic acid extraction yield per stage increase with the extraction stage process time, ANOVA analysis and Tukey test indicate there is a significant difference between the different extraction time evaluated.



**Fig.2** Extraction time evaluation in economic method

**Conclusions.** The economic method developed represents an efficient alternative for carminic acid extraction with optimum extraction conditions that gives the largest amount of carminic acid in the shortest time.

**Acknowledgements.** We thanks for CONACyT support. (Scholarship number 264556).

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