



MICROBIAL ECOLOGY OF TRADITIONAL MEXICAN VANILLA CURING

Perla Jiménez, Teresa Rosales, Adriana Tapia, Cristian Jiménez, Gloria Dávila, César Hernández;
Instituto Politécnico Nacional (Escuela Nacional de Ciencias Biológicas-Departamento de
Microbiología e Ingeniería Bioquímica), México, D.F. 11340; adriana3599@gmail.com

Key words: vanilla curing, microbial ecology

Introduction. In Mexico, curing of mature green vanilla pods (*Vanilla planifolia*; Orchidaceae) is carried out based on traditional processes (1). Curing is a complex, expensive, time-consuming and challenging high production process which takes approximately 20 to 25 sunning-sweating cycles. Although many aroma compounds of vanilla pods have been reported, little is known about the process by which are formed during traditional curing (2). Reports indicate that microorganism contribution, thermal processes, and enzyme plant reactions have an effect on vanilla flavor generation (3). The aim of this study was to investigate the microflora dynamics during the traditional curing process of vanilla pods in Mexico.

Methods. The microflora dynamics during the traditional curing process was to investigate by culture-dependent methods and the bacterial identification was performed by 16S gene analyses. The moisture content, water activity and vanillin content were also determined (4).

Results. Eight stages of vanilla pods during the traditional curing were analyzed: green mature vanilla pods, killing pods, pods subjected to 1, 5, 10, 15, 20 cycles of sunning/sweating and conditioned pods (Figure 1).

Fig.1 Vanilla pods during the curing process.



In pods subject to 15 cycles of sunning-sweating (15 SS) the highest concentration of vanillin and the lowest water loses were detected (Table 1).

Table 1. Moisture content, water activity and vanillin content in vanilla pods during the traditional curing process

Traditional curing stages	Moisture Content (%)	Water activity	Vanillin content (%)
GV	80.00 ± 0.56	0.986	0.27 ± 0.06
KV	73.00 ± 0.66	0.986	0.31 ± 0.16
1 SS	77.00 ± 0.17	0.986	0.28 ± 0.04
5 SS	72.00 ± 0.66	0.981	0.83 ± 0.02
10 SS	48.00 ± 0.89	0.963	1.39 ± 0.04
15 SS	34.00 ± 1.73	0.883	2.23 ± 0.19
20 SS	27.00 ± 1.54	0.848	2.10 ± 0.19
C	25.00 ± 1.00	0.834	1.98 ± 0.04

Results represent the average of three determinations ± S.D.

A total of 79 strains were discovered during the process. Sporulated and non-sporulated *Bacillus* sp. was the main specie throughout the complete traditional curing process of vanilla pods. Gram-positive were also frequently present and its population decreased rapidly during the killing stage (immersion of vanilla pods in hot water at 90°C). A high degree of phenotypic diversity occurred within the microbial species.

Conclusions. The differences in microbial abundance, communities and strains between the traditional curing stages indicate that the effect of enzymatic activities (proteases, hemicelluloses, celluloses, and β -glycosidase) on the development of vanilla flavor (vanillin content) could differ for each region and process of curing vanilla pods.

Acknowledgements. Authors thank the ICyTDF and CONACyT (Project 84910).

References. 1. Odoux, E. (2006). *Fruits*. 61: 171-184.
2. Odoux, E., Escoute, J., Verdeil, J. L. (2006). *Ann. Appl. Biol.* 149: 43-52.
3. Röling, W., Kerler, J., Braster, M., Apriyantono, A. (2001). *Appl. Environ. Microbiol.* 67 (5): 1995-2003.
4. Tapia, A., Camacho, B., Perea, M., Ordoñez, I., Gutiérrez, G., Dávila, G. (2011). *Rev. Mex. Ing. Quim.* 10 (1): 105-115.