

Poster

Universal Biological Bar-Code for Determining the Geographical Origin of Fruits by Using PCR-DGGE

A. F. EL SHEIKHA^{1, 2,*} & D. MONTET¹

* Corresponding author & Member of SFE

Tel.: 33 4 67 61 57 28

Fax: 33 4 67 61 44 44

E-mail: elsheikha_aly@yahoo.com

¹Minufiya University, Faculty of Agriculture, Department of Food Science and Technology, 32511
Shibin El Kom, Minufiya Government, Egypt

²Centre de Coopération Internationale en Recherche Agronomique pour le Développement, CIRAD,
UMR Qualisud, TA 95B/16, 34398 Montpellier Cedex 5, France

Abstract

Introduction: The determination of geographical origin is a demand of the traceability system of import-export foodstuff. One hypothesis of tracing the source of a product is by analyzing in a global way the microbial communities of the food and links statistically this analysis to the geographical origin of the food (El Sheikha et al., 2009a). Physalis is included in the priority list of many governments' horticulture and fruit export plan. It is exported from several countries including Colombia, Egypt, Zimbabwe and South Africa, but Colombia stands out as one of the largest producers, consumers and exporters. Colombia exports of Physalis in 2004 were worth 14 millions USD (El Sheikha et al., 2008). In Egypt, economical importance of Physalis is rising, due to, achieving a great success in local, Arabic and European markets (El Sheikha, 2004). Physalis as the whole plant has many medicinal properties, including antipyretic, depurative, diuretic, pectoral, and vermifuge. A decoction is used in the treatment of abscesses, cough, fevers or sore throat (Duke and Ayensu 1985). The pulp is nutritious, containing particularly

high levels of carotenoids, minerals, essential amino acids and vitamin C (El Sheikha et al., 2009b).

Regarding Shea tree fruits, only seven countries have statistics. Nigeria accounts for more than 60% of the production of Shea butter in 2005. It is followed by Mali, Ghana and Burkina Faso, which together account for just under a third of world production in 2005. In Europe, Shea butter is used mainly (95%) by the chocolate industry (FAOSTAT, 2007). The quantities exported to Japan, the United States or Switzerland would be mainly used for cosmetic or pharmacological (UNCTAD, 2001).

Purpose: We applied a molecular technique employing 28S rDNA profiles generated by PCR-DGGE as a new traceability technique to detect the variation in fungal community structures of Physalis fruits from four countries (Colombia, Uganda, Egypt, Madagascar) and Shea tree from four countries (Cameroon, Mali, Senegal, Ghana).

Results: The DGGE gels showed some significant differences in the migration patterns. However, the duplicates for each sampling location gave statistically similar DGGE patterns throughout the study. We demonstrated that there was a link between the fungi populations and the geographical area. When the 28S rDNA profiles were analyzed by multivariate analysis, distinct microbial communities were detected. The band profiles from different countries were different and were specific for each country and could be used as a bar code to discriminate the origin of the fruits.

Significance of study: This method is a new traceability tool which provides fruit with a unique bar code and makes it possible to trace back the fruits to their original country.

Key words: biological bar-code, fruits, PCR-DGGE

References

Duke, J.A., and Ayensu, E.S.1985. Medicinal Plants of China Reference Publications, Inc., Algonac, Michigan, USA, 705 pp.

El Sheikha, A.F. 2004. Technological, chemical and microbiological studies on some packed foods. MSc Thesis, Faculty of Agriculture, Minufiya University, Egypt, 174 pp.

El Sheikha, A.F., Zaki, M., Bakr, A., El Habashy, M., and Montet, D. 2008. Physico-chemical properties and biochemical composition of *Physalis (Physalis pubescens L.)* fruits. Global Science Books Ltd., UK, FOOD 2 (2) 124-130.

El Sheikha, A.F., Condur, A., Métayer, I., Le Nguyen, D.D, Loiseau, G., and Montet, D. 2009a. Determination of fruit origin by using 26S rDNA fingerprinting of yeast communities by PCR-DGGE: Preliminary application to *Physalis* fruits from Egypt. Yeast 26 (10): 567-573.

El Sheikha, A.F., Zaki, M., Bakr, A., El Habashy, M., and Montet, D. 2009b. Biochemical and sensory quality of *Physalis (Physalis pubescens L.)* juice. Wiley-Blackwell Publishing, Journal of Food Processing and Preservation (Early View). DOI: 10.1111/j.1745-4549.2009.00382.x. Available at: <http://www3.interscience.wiley.com/cgi-bin/fulltext/123203771/PDFSTART>

Food and Agriculture Organization of the United Nations Statistics "FAOSTAT". 2007. Shea Tree Fruits Production and Distribution in all of the World.

UNCTAD. 2001. United Nations Conference on Trade and Development. Organ of the UN. UNCTAD secretariat based on the statistics of the United Nations Food and Agriculture. Market information in the field of commodities "Shea Tree Fruits", N° 2885. Available at: <http://unctad.org/infocomm/francais/karite/plan.htm>. Accessed February 2001.