

New Strategies of Traceability for Determining the Geographical Origin of Foodstuffs: Creation of a biological Bar-Code by PCR-DGGE

A. F. EL SHEIKHA^{1,2} & D. MONTET²

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

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

Contact: elsheikha_aly@yahoo.com & didier.montet@cirad.fr

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 (Montet *et al.*, 2004).

The molecular technique employing 16S and 26S rDNA profiles generated by PCR-DGGE was used to detect the variation in the bacteria and yeast communities structures of fish and fruits (Montet *et al.*, 2008). We applied this new technique on Pangasius fish from Viet Nam harvested in different aquaculture farms and during different seasons. When the 16S rDNA profiles were analysed by multivariate analysis, distinct microbial communities were detected. The band profiles of the fish bacteria from five different farms are different and are specific for each location and could be used as a bar code to certify the origin of the fish. When band profiles within the same location at different seasons were compared, we also observed the difference banding pattern for each season. Some common bands were noted which are stable throughout the seasons. These bands can be used as specific markers for this specific location (Le Nguyen *et al.*, 2008).

We applied also this new technique on two fruits Physalis from Egypt and Clementine from Spain and Morocco. 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 (El Sheikha *et al.*, 2009a). *Physalis* fruits and its juice are nutritious, containing particularly high levels of carotenoids, minerals, essential amino acids and vitamin C (El Sheikha *et al.*, 2009b). When the 26S rDNA profiles were analyzed by multivariate analysis, distinct microbial communities were detected. The band profiles of *Physalis* yeasts from four different governments were specific for each location and could be used as a bar code to discriminate the origin of *Physalis* fruits (El Sheikha *et al.*, 2009c).

A method of bacterial ecology, the PCR-DGGE, was used to characterize the bacterial flora of Clementines imported to France from Spain and Morocco in order to show that there is a relation between the bacterial communities of the fruits and their geographical origins. The principle rests on the determination of specific biological markers for a given region. DGGE profiles analyzed by multivariate analysis permitted to distinguish microbial communities from different origins (Le Nguyen *et al.*, 2008).

This method is a new traceability tool which provides food with a unique biological bar code and makes it possible to trace back the food to their original location.

Key words: Traceability, PCR-DGGE, *Pangasius* fish, *Physalis*, mandarins, microbial communities, origin

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