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Food Control





Detection of mislabeled commercial fishery by-products in the Philippines using DNA barcodes and its implications to food traceability and safety

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ABSTRACT

Global trade negotiations require a stringent line of certifications on accurate labeling and species traceability. National trade policies should therefore, comply with these requirements, not only to increase international competitiveness, but also to ensure food security, sustainability and safety. However, this is difficult to achieve without a strong basis for monitoring strategies and enforcement. In this study, issues on the identities of several species of sardines, cream dories, fish sold as fillets and choice cuts and shrimps were presented using DNA baxodes. Indications of mislabeling were found in frozen "ratwilis" samples and "bluefin" tuna fillets. Some products have been identified at the species level. Finally, fish labeled as gindara steaks have been found to be a fish species which can cause health problems. These results highlight the importance of increasing national concern and government effort in food trace-ability and that DNA barooding provides a robust method of assessment for species identification and authenticity testing of commercial fishery products.

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1. Introduction

Considering the importance of fish trade in the globalization era, technological developments in food production, hardling, processing and distribution by a global network of operators make it necessary to ensure the authenticity and the origin of fish and seafood products (Filonzi, Stefania, Marina, & Francesco, 2010; Marko et al., 2004). Because species substitution in fish occurs frequently, particularly in imported products which are not recognizable visually and are indistinguishable on the morphological basis after processing and freezing (Filonzi et al., 2010), precautionary measures are therefore necessary. Certain issues that may arise from this are health problems that occur primarily through consumption of cryptic species from contaminated are as (van Leeuwen et al., 2009). Because of this, Global Trade Operations require a stringent line of certifications with regards

to fish labels and other related aspects. For instance, the European Union law EC No. 2065/2001 requests appropriate species traceability and accurate labeling. In the Philippines, RA no. 7394, known as the Consumer Act of the Philippines, mandates that all products be properly labeled as to its accurate nature, quality and quantity. However, it is often difficult to comply and because of this, many monitoring agencies are looking for innovative and safe technologies to assess species identification and authenticity (Dawnay, Ogden, McEwing, Carvalho, & Thorpe, 2007; Maldini, Nonnis, Conzález Fortes, Papa, & Candolfi, 2006).

DNA harcoding is a rapidly emerging global initiative which involves characterizing species using a short arbitrary DNA sequence. This is based on the premise that species are generally well delineated by a particular sequence or by a tightcluster of very similar sequences that allow unambiguous identifications (Hebert, Cywinska, Ball, & DeWaard, 2003). The primary goals of DNA barcoding focus on the assembly of reference libraries of barcode sequences for known species in order to develop reliable, molecular tools for species identification in nature (Hubert, Hanner, Holm, Mandrak, & Taylor, 2008). The cytochrome c oxidase subunit 1 mitochondrial region (COI) is the most popular barcode region for animals and a lot of studies have established the usefulness of barcoding in several large groups of animals, such as birds (Hebert,

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