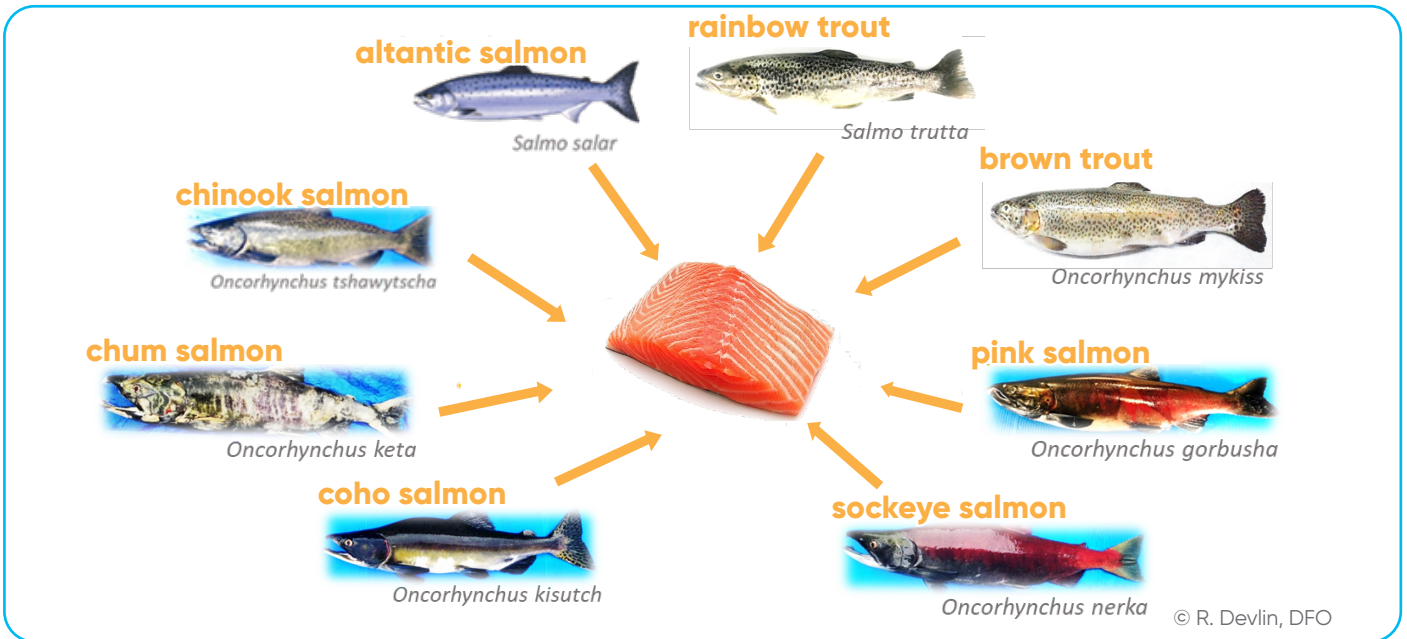


Seafood authentication: DNA-based tool for fast salmon authentication



SUMMARY

DNA-based methods increasingly play a role in food safety control and food corruption detection. One such method, High Resolution Melting (HRM) analysis, is a relatively new strategy used to identify variations in the DNA sequence. Its simplicity, flexibility, low cost, sensitivity and specificity make it the tool of choice for species authentication. This research adapted a procedure of HRM analysis as a fine-tuning technique to authenticate salmon species, verifying whether claims of species indication are correct. The technique enables the rapid identification and differentiation of eight salmonid species based on DNA sequence variants.



KNOWLEDGE NEED

The fraudulent substitution of seafood species and mislabelling of products puts consumers at risk of allergic reaction and other ailments, and has detrimental effects on the seafood industry. Common fraudulent practices include substituting highly valued wild Pacific salmon species with farmed Atlantic salmon, and Atlantic salmon being substituted with rainbow trout or brown trout. There is a need for fast, low-cost and easy-to-use DNA techniques that enable species identification, particularly in highly processed food products.



RESULTS

The adapted DNA technique is based on the use of HRMA of short, amplified fragments from the main barcode genes used for fish identification (Cytochrome oxidase c subunit 1, and Cytochrome b regions). The technique enables the discrimination of species according to their melting profile and subsequent identification when compared to profile standards. Two sets of primers are included in the tool's design, allowing for discrimination of eight species in the salmonid family: Atlantic salmon (*Salmo salar*), rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), chum salmon (*Oncorhynchus keta*), pink salmon (*Oncorhynchus gorbusha*), coho salmon (*Oncorhynchus kisutch*), sockeye salmon (*Oncorhynchus nerka*) and chinook salmon (*Oncorhynchus tshawytscha*). The analysis can be completed in under 70 minutes and has been validated by three labs in Portugal, Belgium and Poland.



IMPACTS

Industry-wide implementation of the DNA technique will ensure the availability of reliable and safe seafood products on the market. As the tool can discriminate eight species of the salmonid family, it is applicable to the European and North American market. The tool will support more efficient monitoring, at lower cost, enabling the delivery of higher quality and authentic products that help to increase consumer trust.

Contributes to the UN Sustainable Development Goal 12: Responsible consumption and production.

END-USERS & APPLICATIONS

➔ **Scientific community – researchers:** can use the new knowledge to support further Research and Development of genetic and molecular tools to support seafood authenticity.

➔ **Industry organisations – food producers/processors:** Quality control laboratories such as state monitoring agencies and producers/processors along the supply chain can use the tool to monitor correct labelling of seafood.

➔ **Environmental managers and monitoring agencies:** managers and monitoring agencies associated with the seafood industries can use the tool to support the implementation of conservation and environmental management schemes.



DISSEMINATION AND EXPLOITATION

Dissemination activities for society / all users:

- Project newsletter and website news articles
- Promotion on Twitter and LinkedIn
- Promotional materials and flyers will be developed by BIOREX Food Diagnostics upon commercialisation of a kit based on the knowledge

Exploitation activities for seafood industry:

- **SEAFOOD^{TOMORROW}** eLearning course – unit 4: opentea.eu/en/e-learning/courses-Creating-nutritious-safe-and-sustainable-seafood-for-consumers-of-tomorrow.29
- Horizon Results Platform: seafoodtomorrow.eu/horizon-results-platform

Scientific publications:

- Carolina Sousa Monteiro *et al.* Development, validation, and market application of a fast HRMA tool for salmon species authentication. *Manuscript in preparation.*

Exploitation activities for policy makers:

- Managers, regulators and policy makers will be reached through the final **SEAFOOD^{TOMORROW}** event, EC info session, and a dedicated EU policymakers' meeting (March – April 2021).



INNOVATION STATUS

DNA-based tool: Technology Readiness Level 6 – the tool has been demonstrated on retail samples

Patents and IPR: Discussions underway

Other: Commercialisation (by BIOREX Food Diagnostics) is foreseen within the framework of the project



FUTURE RESEARCH

The tool has been fully scientifically validated. An interlaboratory validation and market survey was carried out in Portugal, Poland and Belgium, and the tool was tested on retail samples. Further analysis of primer and standards shelf life and reagent supply must be carried out before final commercialisation.

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