

Bar-HRM traceability of plants in food and medicine



Plant.ID
Molecular Identification of Plants

H2020 MSCA-ITN-ETN Plant.ID network

Keywords

aromatics

Aromatics and Medicinal plants

food safety

bar-hrm

wild harvested plants

metabarcoding

traceability

illegal trade

NWFP

Aromatic & Medicinal Plants

Scale

Continental



Context

Illegal collection and trade accelerate plant extinction and accounts for economic losses. Species of restricted distribution are affected disproportionately and require special conservation measures. The same applies to natural hybrids, due to their unique characteristics. Substitution of wild species, due to misidentification, can lead to severe adverse reactions. Poisonous plants can cause a variety of severe intoxications. Food adulteration harms the consumer in many ways. Based on the above, there is a need for efficient identification for edible, toxic, and endangered plant species.



Objective

Barcoding is an important tool towards the solution of traceability issues. Plant.ID is a collaborative network within Europe and addresses the challenges of plant identification in 15 different projects. We focus on common edible, poisonous, allergenic and pharmaceutical plants of the Greek flora. Through sequencing of barcoding regions and metabarcoding techniques, specific barcoding markers will be developed to be used either with PCR and/or with the High Resolution Melting Analysis for species-specific identification.



Results

In the first part within this project, seventy-one herbal medicinal products were randomly purchased throughout Greece and analyzed using metabarcoding to identify species. The aim was to investigate possible adulteration and assess the ability of metabarcoding for plant based product authentication. Of the detected species in our analyses we found species that were not listed on the product labels. This indicates a high level of adulteration and/or contamination during processing and distribution. We also identified the presence of toxic species, as major ingredients of two herbal mixtures for medicinal purposes. The detection of the latter two species was also confirmed through Bar-HRM analysis.



Recommendations

The study revealed a need for stricter quality control of herbal products, especially because of the presence of toxic species. Low fidelity was found to be an issue, also in short chains of commercialization. We state that standardization of protocols is necessary before DNA metabarcoding can be implemented as a routine analytical approach and approved by competent authorities for use in a regulatory framework. Also, the availability of a rich and reliable DNA reference database is a prerequisite for successful implementation.



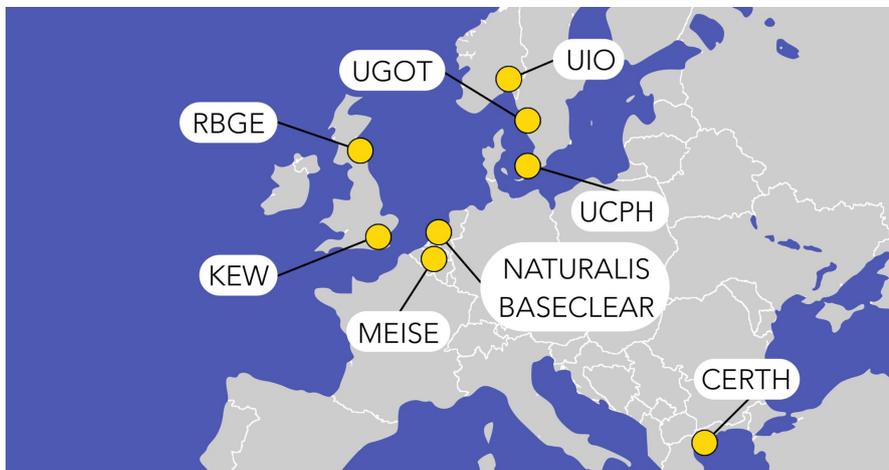
Impacts and weaknesses

The presence of toxic plant species in herbal products can pose serious health problems. Unexperienced pickers collecting edible plants in the field are particularly sensitive (Cornara et al., 2018). The harvest of saffron orchids in Greece are threatening the natural orchid populations of Northern Greece (Kreziou et al., 2015). Fast and efficient species-specific detection methods for Greek orchids is required for biodiversity conservation.



Future developments

The standardization of protocols is necessary before DNA metabarcoding can be implemented as a routine analytical approach and approved by competent authorities for use in a regulatory framework. Also, the availability of a rich and reliable DNA reference database is a prerequisite for successful implementation.



The Plant.ID project network

Further information

PLANTID PROJECT website, page of the specific project (ESR13): <https://www.plantid.uio.no/research/projects/esr13.html>

Cornara, L., Smeriglio, A., Frigerio, J., Labra, M., Di Gristina, E., Denaro, M., ... Trombetta, D. (2018). The problem of misidentification between edible and poisonous wild plants: Reports from the Mediterranean area. *Food and Chemical Toxicology*, 119(April), 112–121. <https://doi.org/10.1016/j.fct.2018.04.066>

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About INCREDIBLE Project

INCREDIBLE project aims to show how Non-Wood Forest Products (NWFP) can play an important role in supporting sustainable forest management and rural development, by creating networks to share and exchange knowledge and expertise. 'Innovation Networks of Cork, Resins and Edibles in the Mediterranean basin' (INCREDIBLE) promotes cross-sectoral collaboration and innovation to highlight the value and potential of NWFPs in the region.



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