PHYLOGENETIC TREE CONSTRUCTION AND EVOLUTIONARY ANALYSIS USING DNA BARCODING

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Abstract

We are doing a tool for DNA barcoding of indian medicinal plants. Our tool also gives out the phylogenetic tree and conservation status of the given plant.

Previous Works

- Computation for DNA barcoding
- Computation for constructing Phylogenetic Tree
- Creation of Biology Dataset (50%)

Recent Updates

- Improvised DNA Barcoding tool
- Completed the dataset

Computation results

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Enter DNA barcode sequence:  AAAGATTACAAATTGAATTATTATACTCCGGAATATGCACCCAAAGATACTGATACCTTGGCGGCATTCCGAGTAACTCCTCAACCTGGAGTTCCACCCGAAGAAGCAGGGGCTGCTGGAGCTG
CCGAATCTTCTACGGGTACATGGACAACTGTGTGGACCGATGGACTTACCAACCTTGATCGTTACAAGGGACAATCCTACCCCTTGGAGCCCGTGGCTGAAAAAGAAAATCAATATATTTGTTATGTAGCATATCCTTTAGACCTTTTTGAAG
AGGGTTCTGTTACTAACATGTTTACTTCCATTGGGGGTAATGTATTTGGGTTCAAAGCGCTACGCGCTCTACGCCTGGAGGATCTGCGAATTCCTGTTGCTTATGTTAAAACTTTCCAAGGCCCACCTCACGGCATCCAAGTTGAAAGAAATA
ATTTGAACAAGTATGGCCGCCCACTTTTGGGATGTACTATTAA

Species Name: Aconitum balfourii
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Enter DNA barcode sequence:  GUACCUAAAGATTACAAATTGAATTATTATACTCCGGAATATGCACCCAAAGATACTGATACCTTGGCGGCATTCCGAGTAACTCCTCAACCTGGAGTTCCACCCGAAGAAGCAGGGGCTGCTG
GAGCTGCCGAATCTTCTACGGGTACATGGACAACTGTGTGGACCGATGGACTTACCAACCTTGATCGTTACAAGGGACAATCCTACCCCTTGGAGCCCGTGGCTGAAAAAGAAAATCAATATATTTGTTATGTAGCATATCCTTTAGACCTTT
TTGAAGAGGGTTCTGTTACTAACATGTTTACTTCCATTGGGGGTAATGTATTTGGGTTCAAAGCGCTACGCGCTCTACGCCTGGAGGATCTGCGAATTCCTGTTGCTTATGTTAAAACTTTCCAAGGCCCACCTCACGGCATCCAAGTTGAAA
GAAATAATTTGAACAAGTATGGCCGCCCACTTTTGGGATGT

Best Match: Aconitum balfourii (Edit Distance: 14)
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Future Works

- Interfacing th DNA barcoding and Phylogenetic Tree into a single tool
- Creating a user interface for easy accessibility

Assessment of adulteration in raw herbal trade of important medicinal plants of India using DNA barcoding

J. U. Santhosh Kumar[1,2,3] · V. Krishna[1] · G. S. Seethapathy[4] · R. Ganesan[4] · G. Ravikanth[4] · R. Uma Shaanker[2,3,4]

Received: 27 July 2017 / Accepted: 10 February 2018 / Published online: 15 February 2018

This paper gives a brief account on the adulteration of raw herbal products in the Indian market and how DNA barcoding can bring out a solution for it

Concerns:

A number of studies have shown that there could be widespread substitution and/or adulteration (hereafter referred to as substitution) in raw herbal trade of medicinal plants. Substitution could potentially endanger the health and safety of the consumers. In this study, the extent of adulteration in raw herbal trade of 30 important medicinal plants in South India was analyzed. Biological reference material (BRM) consisting of taxonomically authenticated samples of each of the 30 species along with 14 other co-occurring and congeneric allied species that are likely to be used in adulteration was established. DNA

India. Using these barcodes as reference, the extent of species adulteration in the raw herbal trade samples pertaining to these species was assessed. Species adulteration occurred in nearly 12% of all the market samples examined. These

Species substitution may adversely affect consumer health as it could cause severe allergies and will not have the intended effect (Seethapathy et al. 2014; Santhosh et al.

Solution:

Among these techniques, DNA barcoding has been extensively used as an accurate, cost-effective, and reliable tool to identify medicinal plant material used in trade (Srirama et al. 2010; Wallace et al. 2012; Newmaster et al. 2013; Seethapa-

the species reported to be that of *Saraca asoca*. Several other studies have employed DNA barcoding to detect adulterations, including product substitution, contamination, use of endangered species for medicinal purposes and the use of unlabeled fillers that pose considerable health concerns

Co-relation with our project:

One reason for the substituition could be the conservation status of the required species. We give the evolutionary relation between the species with conservation status labelswhich can be a potent solution for substituition

properties. The drugs which are morphologically similar and cannot be distinguished easily are generally adulterated. The deforestation, extinction

or evolution of many species, insufficient knowledge, and unauthenticated practices about identification, collection, storage and transport of raw material collectively resulted in adulteration.[13,14] The quality

Researchers using environmental DNA must engage ethically with Indigenous communities

The study of environmental DNA can reveal information about the history and presence of Indigenous communities on their lands — potentially even inadvertently. Better engagement with the ethical aspects of environmental DNA research is required in the field as a whole, and especially for researchers working on Indigenous lands.

Matilda Handsley-Davis, Emma Kowal, Lynette Russell and Laura S. Weyrich

This paper focuses on how the Indigenous communities are benefitted and affected by the collection of samples for eDNA processing . It mainly revolves around an example of birth tree under which the tribal women give birth and bury the placenta. The collection of eDNA from this surrounding might give indirect access to the human gene present in a preserved condition under the soil without the consent of the people residing there.

Ethical issue:

other species. Many environmental samples are legally collected from sediments, water and other materials on Indigenous lands, without extensive regard as to how the findings may affect Indigenous traditional owners and knowledge holders. Such

past[4,8]. Indigenous peoples have often been excluded from genetic research, in part because of a history of ethical transgressions and a lack of trusting relationships with researchers[9–11]. Although collaborations

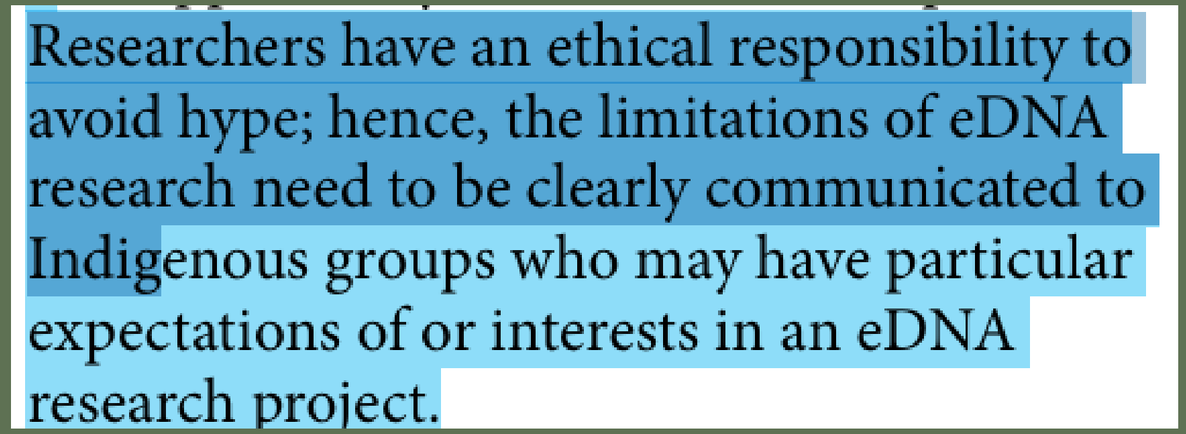
their sequencing efforts. Increasingly, eDNA research is moving away from metabarcoding and amplicon studies that target specific organismal groups and towards whole-genome or shotgun sequencing approaches that can reveal the total diversity of DNA present in a sample[8]. This indiscriminate approach raises key ethical questions, especially in Indigenous contexts. In settler-colonial contexts,

Relation with our project:

The collection of dataset for both DNA Barcoding and Conservation status in regions where Indigenous communities reside is crucial as medical plants are available in such regions also. So by knowing about such concerns through this paper we can enhance the way we create our dataset without affecting the ethics of people residing there.

Solution: Informed consent

As per the solution given in the paper the researchers should communicate the purpose and benefits of the research so as to convince the community.


Researchers have an ethical responsibility to avoid hype; hence, the limitations of eDNA research need to be clearly communicated to Indigenous groups who may have particular expectations of or interests in an eDNA research project.

Benefits of collaborating with such communties:

or Indigenous Advisory Committees, it is critical to include Indigenous communities and researchers in all stages of an eDNA study (design, sample collection, analysis and interpretation) to help minimize risks and maximize benefits of research. Ideally,

structures. In the absence of dedicated structures, researchers should look to local Indigenous communities, regional and national Indigenous organizations, Indigenous scholars and/or regional and national guidelines for research with Indigenous people in the country in which they conduct their research. In

Relation with our project:

The collection of dataset for both DNA Barcoding and Conservation status in regions where Indigenous communities reside is crucial as some medical plants in the region might not be recorded officially to be existing or its conervation status is unknown. By collaborating with these people we can get to know more about such plants.

GENERAL ARTICLES

DNA barcoding: access to biodiversity and benefit-sharing policy issues in the Indian context*

Haribabu Ejnavarzala

This paper highlights the ethical concerns that comes with the usage of DNA Barcoding and how the National Biological Diversity Act (NBDA) governs the use of biological resources under the authority of National Biodiversity Authority(NBA)

Two major concerns in this paper are the access to biological data and how it is used and the sharing the benefits with communities that are involved in the conservation of the species

NBDA regulates access to biological diversity for research and development. The Act allows access to biological resources for research by individuals and corporation, association or organization of foreign origin only after they obtain prior approval from NBA.

barcoding of millions of species. However, the consequences of barcoding – especially of species which provide livelihood for communities – need to be addressed in consultation with community representatives before barcoding takes place. They must be informed about the benefits, both monetary and non-monetary, of barcoding of species, and their rights as stewards of the species. The

DNA metabarcoding of orchid-derived products reveals widespread illegal orchid trade

Hugo J. de Boer[1,2,3], Abdolbaset Ghorbani[2], Vincent Manzanilla[1],

This paper focuses on identifying ingredients in a product called salep which is a beverage made of dried orchid tubers. This paper uses DNA metabarcoding to identify orchid and other plant species present. Understanding species diversitythrough this work will enable the commercialization of endangered species to be traced back to the harvesters and their natural habitats, and thus allow for targeted efforts to protect or sustainably use wild populations of these orchids.

impossible. Species level identification of orchid species used in prepared salep would allow us to identify which species are targeted the most, detect the presence of rare, threatened or narrow endemics, and enable us to identify priority species for conservation efforts. The objectives of this study were to:

monly added spices, adulterants and substitutes, (iv) study the prevalence of adulterants in salep, and (v) study the prevalence of endangered species in salep.

remained high for those seeking authentic salep [7]. Scarcity of wild orchids in Turkey has forced traders to tap into new sources in adjacent countries [16]. Due to conservation concerns, orchid tuber collection is illegal in Greece, Turkey and Iran, but collection bans are poorly enforced [12,16]. All orchid species are included in the Convention on International Trade of Endangered Species of Fauna and Flora (CITES) in Appendices I or II [17], which means that international trade of products from these species requires specific permits. This