

## Bio-Prospection and Bio-Piracy

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Bio-prospection is the systematic scientific tool for the search of genes, natural bio-active compound that has the potential for the product development by biological observation and bio-physical, bio-chemical and genetic methods, without disruption to nature. Most of the bio-prospection is performed on a small scale by various academic and research groups throughout the world. However, there are some larger programmes based on collaborations as well. These include the various International Cooperative Biodiversity Groups (ICBG) funded by the NIH in the USA. This is an international network that aims to promote successful drug discovery from bio-diversity by developing pharmacological screening methods that could be readily transferred to other countries. Different approaches have been developed to use the structural diversity of isolated natural products like in silico drug discovery or virtual screening technique. In this, the chemical structures and physico-chemical properties of compounds are gathered in a computerized database that could be searched to find matches either to complement the three-dimensional structure of a drug target or the chemical features of a compound with the desired activity. Chemists submit structures to the Portal's database and biologists further establish their therapeutic targets. Compounds are screened by virtual screening techniques by computational chemists within the Portal with reference to the targets and the predicted hits are informed. The chemists then can further supply compounds to the biologists for testing by real assays against the target.

Methodology for bio-prospection of natural resources using traditional knowledge:

1. Survey of herbal text (Indigenous or Traditional or Ethno-botany or Ethno-pharmacology)
2. Collection of samples and Taxonomical identification
3. Chemical fingerprinting and identification of chemical moieties
4. Characterization, isolation and purification of bioactive compounds (HPTLC, HPLC, RP-HPLC, FTIR, NMR)
5. Pharmacological investigations (In vitro and in vivo)

6. Toxicological studies and Clinical trials

7. Development of formulations (using solid state characterization like DSC, XRD etc and its licensing and marketing)

Bio-prospection is advantageous as it generates income for the developing countries and at the same time it can provide incentives for the conservation of biological resources and biodiversity. In addition, it can lead to the development of new products like medicines. On the other hand, if not properly planned or managed, bio-prospection may create a number of hurdles and problems, including environmental problems related to unauthorized exploitation and socio-economic problems related to unfair sharing of benefits leading to disrespect for the rights, knowledge and dignity of local communities. Bio-prospection has been conducted by local people, such as traditional healers, since a long time. This has not created any major conflict or an issue since they conducted their bio-prospection activities in their own region and on a relatively small scale level. Problems started occurring once the private organizations or prospectors start exploiting bio-resources in areas to which they were not inhabiting, without equitable benefit sharing basis while neglecting the interests and wishes of local people. This phenomenon is termed as bio-piracy. There are many factors and issues associated to it. Some of these are:

1. The legal claims of local inhabitants to royalties from sale of drug remains unjustified.
2. There is lacunae in regulation to ensure that source countries of these plants will be compensated.
3. Monetary offer by multinational firms to resource countries are insufficient.
4. The intermediate non-profit organization or person are indigenous people to precisely know to whom they are providing their information and genetic material.

Bio-prospection has been the focus of international negotiations for more than a decade, yet the debate on the terms for access to genetic resources, traditional knowledge and benefit-sharing is far from settled.

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