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Biotechnological Tools for Conservation of Bioresources

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Abstract

The rate of loss of natural habitants including forest and bioresources are not only a serious but a complex issue due to several reasons viz. deforestation, agricultural land degradation, ignorance of people, escalating population density, immigration of people toward urban areas etc. On the other hand forest and bioresources offer a variety of habitants for plants, animals and microorganisms. Therefore, conservation and sustainable use of bioresources is the need of the hour. The preference of conservation methods and technologies depends upon the prevailing objective, conservation efforts, breeding methods, adoption and behaviour of the species in question as well as available resources including funds, infrastructure, trained personal, and technologies. The biotechnology implies an approach of creation, invention and innovation. Biotechnological tools can be used to improve and conserve agriculture, horticulture, animals, medicine and environment. In the present article, conservation of bioresources has been highlighted covering multifaceted tools of biotechnology viz. plant genetic resources, micropropagation, *in vitro* conservation, cryopreservation, tissue culture, molecular markers, somatic hybridization and genetic engineering.

Highlights

- Biotechnological tools play gigantic role for genetic improvement of bioresources
- Bioresources can easily be identified and made available through conservation of genetic resources
- Genetically engineered crop-based agriculture can potentially conserve the bioresources

Keywords: Bioresources, biotechnological tools, conservation

Bioresources means resources from biological origin or the total biological variation manifested as individuals such as animals, plants and their gene pools which can be taken by man for use in drug, food, live stocked, construction materials for shelter, environment protection etc. It is also used in the development of improved crops and animals for higher yields and tolerance to biotic and abiotic stresses (Eneobong, 1997). The loss of bioresources due to developmental activities such as hydroelectric projects, road laying, urbanization and changes in agricultural practices. Over-grazing and changes in land-use pattern are taking heavy toll on biodiversity available in the wild species. Globalization and market demand are also contributing indirectly to the loss of biodiversity, particularly of minor and neglected crops (Kameswara, 2004).

The most important point to remember is once these species are vanished, that knowledge along with the potential benefits is also lost. In other words, once these genes are lost, there is absolutely no chance of bringing them back at any cost. Another major concern is the genetic erosion of important plant species that used to be the part of our ecosystem (O'Neill *et al.,* 2001). "Habitats Directive" (2004), of the European Union aims to contribute towards ensuring bio-diversity through the conservation of natural habitats and of wild fauna and flora in the European territory of the member states to which the treaty applies, through a coherent European ecological network of special areas of conservation. An ecological network of special protected areas, known as "Natura 2000", is being set up for this purpose.

According to the summary report of the World Commission on Forests and Sustainable Development, about 15 million hectares of productive forests are being cleared every year. The structural integrity of much of the forest that remains has deteriorated. Forests have virtually disappeared in 25 countries; 18 have lost more than 95% of their forests and another 11 have lost 90%. The highest current estimate of the world's remaining forests areas is about 3.6 billion hectares from an originally forest area of more than 6.0 billion hectares (WCFSD, 1999). After considering the interpretational changes, the actual loss in Indian forest cover between two assessment periods i.e. 2009-2011 works out to 367 km^2 (Indian State of Forest Report, 2011). Forest biodiversity is under serious threat due to both habitat loss and degradation of forest ecosystems, as confirmed by the key studies such as the State of World's Forests (FAO, 2007).

The concept of genetic conservation is the knowledge and methodologies necessary for conception, assessment and development of sustainable technologies. This can be attained economically through ecologically sound biotechnological tools namely plant genetic resources, micropropagation, *in vitro* conservation, cryopreservation, tissue culture, molecular markers, somatic hybridization and genetic engineering.

Plant Genetic Resources

Plant genetic resources for food and agriculture (PGRFA) are the basis of global food security. They comprise diversity of genetic material contained in traditional varieties, modern cultivars and their wild relatives as well as other wild species. Loss of plant genetic resources has serious implications for food security in the long term. The full spectrum of PGR consists of diverse type of collections such as those derived from centres of diversity, centres of domestication and from breeding programmes. Advances in biotechnology, especially in the area of *in vitro* culture techniques and molecular biology provide some important tools for improved conservation and management of plant genetic resources (Kameswara, 2004).

Natural products have been our successful sources of medicines. Each plant is like a factory, capable of synthesizing unlimited number of highly complex and unusual chemical substances whose structures could otherwise escape forever, those can be conserved (Kinghorn and Soejarto, 2002). There are at least 120 distinct chemical substances derived from plants that are considered as important drugs currently use in the world, while several other drugs are simple synthetic modifications of the natural products (Farooqi and Sreeramu, 2001). Important features of an *ex situ* conservation programme reported by Amaral and Yanchuk (2004) are (a) Acts as a backup measure to *in-situ* conservation (b) Ensures that the wide range of diversity in a species is conserved (c) Manages the regeneration of the species outside the natural range.

The plant Genetic resources (PGR) are vulnerable to losses due to introduction of new crop varieties in agriculture, growing urbanization, natural hazards, etc. Over the years, genebanks have been established in a number of countries and the number of accessions conserved in about 1400 genebanks now exceeds six million (FAO, 1998). Several landraces of some of the crops are conserved in the ICRISAT genebank at Patancheru, India have now disappeared from their natural habitats in Africa and Asia. The results of joint evaluations have led to better understanding of the germplasm material conserved at ICRISAT gene bank by the NARS scientists. Germplasm sets were evaluated for agronomic performance in India, Nepal, Thailand, Indonesia, Ethiopia and Kenya in collaboration with the National Bureau of Plant Genetic Resources (NBPGR), New Delhi and NARS (National Agricultural Research Systems). It is necessary to set standards based on current scientific knowledge and available technologies for the proper handling and storage of seeds in genebanks that will ensure their conservation over the longest possible time, without the need for frequent costly regeneration.

Micropropagation

The art and science of plant multiplication *in vitro* know as micropropagation. The simplest type of *in vitro* plant propagation is the stimulation of axillary bud development. One of the most exciting and important aspects of *in vitro* cell and tissue culture is the capability to regenerate and propagate plants from cultured cells and tissues. Usually derived from meristem (or vegetative buds) without a callus stage, tends to reduce or eliminate somaclonal variation, resulting in true clones (Table 1). Axillary bud proliferation and culture of individual nodes are the techniques most widely used in commercial micropropagation and which show the least variation among the propagated plants.

Plant is our natural wealth and its conservation is important for economic, ecological, scientific, medicinal and ethical reasons. Therefore, there is a great need to conserve forest ecosystems by biotechnology. In recent years, *in vitro* approaches have been used as an efficient tool for micropropagation of trees and it proved that tissue culture technology is suitable for large-scale propagation of trees in short time (Pena and Seguin, 2001). Plants containing beneficial and medicinal properties have been known and used as sources of food, fodder, oils, medicines, fuel, wood, fibbers and timber by increasing population growth. Due to increased demand for pulp, paper, construction materials, farmlands and fuel, status of woody trees especially forest trees are greatly affected (Giri *et al.,* 2004). Propagation of woody trees through tissue culture has many advantages over conventional propagation method like fast multiplication of the important genotypes, quick release of improved cultivars, production of disease-free plants, season-independent production of plants, germplasm conservation and facilitating their easy exchange (Asthana *et al.,* 2011). The micropropagation is to reproduce abundant of clonal population very rapidly. More than 1000 plants species have been micropopagated, including more than 100 forest species (FAO 2001).

***In Vitro* Conservation**

Today, the conservation of germplasm can take advantage of innovative techniques which allow *in vitro* preservation. *In vitro* conservation refers to the techniques enabling the slow growth storage of shoot cultures in aseptic conditions by reducing the frequency of periodic subculturing, without affecting the viability, regrowth of shoot cultures and the consequent risks of contamination. In live gene bank, there are lot of problems to maintain the plant species, it require lot of land, labour, money, documentation etc. and often damaged by biotic and abiotic stress agents. On the other hand germplasm collection required little space to maintain thousand of genotypes during storage, movement and exchange of germplasm. It is very much useful in vegetative propagated crops like banana, yam, cassava etc.

3. Cryopreservation

Cryopreservation (Gr. *Kryos* means frost) refers to "preservation in the frozen state". It means storage at very low temperature such as over solid carbon dioxide (- 79°C), in deep freezers (- 80°C), in vapour phase nitrogen (- 150°C) or in liquid nitrogen (- 196°C). The plant material is generally preserved and maintain in liquid nitrogen. The conventional methods of storage fail to prevent from losses due to pathogens and pests, climatic disorders, natural disorders and political and economic causes. However, the conventional methods could not save the viability of short lived seeds of economic plants, for example, oil palm *(Elaeis*

Table 1: List of the plants with virus eliminated by meristem culture

Sl. No.	Plant species	Virus eliminated
1.	*Solanum tuberosum*	Leaf roll, potato virus- A, X, Y, S
2.	*Nicotiana tabacum*	Tobacco mosaic virus
3.	*Saccharum officinarum*	Mosaic virus
4.	*Allium sativum*	Mosaic virus
5.	*Brassica oleracea*	Cauliflower Mosaic virus, turnip mosaic virus
6.	*Armoracia rusticena*	Turnip Mosaic virus
7.	*Musa paradisiaca*	Cucumber Mosaic virus
8.	*Hycinthus spp*	Hycinth Mosaic virus
9.	*Dahlia spp*	Dahlia Mosaic virus
10.	*Petunia spp*	Tobacco mosaic virus
11.	*Iris spp*	Iris Mosaic virus

guineensis), rubber *(Hevea brasiliensis), Citrus* sp. and *Coffee* sp (Table 2). Therefore all cryopreserved collections must confirm three core responsibilities (Day, J. G. and Harding, K. 2008; Stacey and Day, 2007) such as 1. Purity: freedom from contaminating organisms 2. Authenticity: correct identity 3. Stability: including functionality. Steps involve in cryopreservation are:

(a) Selection of Materials: Young, meristematic, highly cytoplasmic and small cells which are non-vacuolated thin walled and in small aggregates, are good materials to be selected for this purpose. Different types of explants which are used in cryopreservation are apical meristem and plant organs, ovules, anther/pollen, embryos, protoplasts etc.

(b) Addition of Cryoprotectors/Cryoprotectant: Cryoprotectors are the chemicals which decrease cryodestruction. Dimethyl sulfoxide (DMSO), sucrose, glycerol and proline are most frequently used cryoprotectants. DMSO has proved an excellent cryoprotectant.

(c) Freezing: Freezing should be done in such a way that it does not cause intracellular freezing and crystal formation. The following types of freezing can be done:

(i) Rapid freezing: After placing the plant material, the cryovials are put into liquid nitrogen which causes a decrease in temperature. Freezing is done quickly so that there should be least change or development of intracellular crystals. Ultra cooling prevents ice crystals. To achieve this objective, dry ice (Co_2) can be used instead of nitrogen. Rapid freezing of several plant materials has been done, for example, somatic embryos and shoot tips of *Brassica napus,* strawberry, potato, etc. **(ii) Slow freezing:** In this method the rate of freezing is slow i.e. 0.1 -10° C per minute. Therefore, extracellular ice crystals are formed but not intracellular crystals. Meristems of potato, cassava, strawberry, etc. have successfully been cryopreserved. **(iii) Stepwise freezing:** In this method temperature gets lowered by -20 to -40°C. It allows protective freezing of the cells. Further, freezing is stopped for 30 minutes. Thereafter, it is rapidly freezed in liquid nitrogen to get -196°C. By doing such stepwise decline in temperature, formation of big crystal is increased and good results are obtained. Excellent results have been obtained with suspension cultures and strawberry by adopting this method.

(d) Storage in Liquid Nitrogen: This can be simply achieved with the help of liquid nitrogen, which keeps the temperature -196°C.

(e) Thawing: Thawing is the process of releasing the vials containing cultures from the frozen state to elevate the temperature between 35 and 45°C. It should be done quickly but without overheating. As soon as the last ice crystals disappear, the vials are transferred into a water bath maintained at 20-25°C.

(f) Washing and Reculturing: Washing of plant materials is done only to remove the toxic cryoprotectants. If non-toxic cryoprotectants are used, the cultures should not be washed, but simply recultured.

(g) Regeneration of Plantlets: The viable cells are cultured on non-specific growth media to regenerate into plantlets.

4. Tissue Culture

Tissue culture is the *in vitro* cultivation of plant cells (protoplasts, anthers, microspores, ovules and embryos) in an unorganized mass. The technique was developed initially to demonstrate the totipotency of plant cells. It is used to propagate plants under sterile conditions or in a controlled environment, often to produce mass clonal propagation plants, to create genetic variability, increase the number of desirable germplasms, incorporate specific traits and eradicate pathogens from clones as well as utilized

Table 2: List of cryopreserved plants in various forms

Sl. No.	Plant materials	Plants species
1.	Cell suspensions	*Oryza sativa, Glycine max, Nicotiana tabacum, Zea mays, Capsicum annum*
2.	Callus	*Oryza sativa, Capsicum annum, Saccharum spp.*
3.	Protoplast	*Zea mays, Nicotiana tabacum*
4.	Meristems	*Solanum tuberosum, Cicer arietinum*
5.	Zygotic embryos	*Zea mays, Hordium vulgare, Manihot esculentum*
6.	Somatic embryos	*Citrus sinensis, Daucus carota, Coffea arabica*
7.	Pollen embryos	*Nicotiana tabacum, Atropa belladonna, Citrus spp.*

Table 3: List of secondary metabolites obtained from plant tissue cultures along with their applications

Sl. no.	Product	Plant species	Applications
1.	Shikonine	*Lithospermum erythrorhizon*	Dye, pharmaceutical
2.	Codeine, morphine	*Papaver somniferum*	Analgistic
3.	Quinine	*Cinchona officinalis*	Antimalarial
4.	Atropine	*Atropa belladonna*	Muscles relaxant
5.	Digoxin	*Digitalis lanata*	Cardiovascular disorder
6.	Reserpine	*Rauwolfia serpentina*	Hypotensive
7.	Vanillin	*Vanilla spp.*	Vanilla
8.	Jasmine	*Jasmium spp.*	Perfume
9.	Vinblastine, ajmalicine, vincristine	*Catharanthus roseus*	Anticancer
10.	Pyrithrins	*Tagetes erectaChrysanthemum spp.*	Insecticide
11.	Rotenoids	*Derris ellipticaTephrosia spp.*	Insecticide
12.	Nicotine	*Nicotiana tabacum*	Insecticide
13.	Saffron	*Crocus sativus*	Food colour and flavouring agent
14.	Stevioside	*Stevia rabaudiana*	Sweetener
15.	Rosamarinic	*Coleus blunei*	Antioxidant
16.	Berberine	*Coptis japonica*	Antibacterial
17.	Sarcoplasmine	*Datura stramonium*	Treatment of nausea

secondary metabolites obtained from plant tissue cultures (Table 3). Brazilian strawberry crop is cultivated from tissue culture plant material using somatic embryogenesis (Smy´kal *et al.,* 2007). This technique makes it possible to produce a great number of clones, free of pathogenic fungi and bacteria (Siragusa *et al.,* 2007). In the world of growing population and dwindling nonrenewable resources, the demand for food security, wood and wood products is expected to rise over the next several decades. Definitely tissue culture techniques may provide new dimensions for tree improvement programmes.

5. Molecular Marker

Molecular markers have highly polymorphic nature, show co-dominant inheritance, occur frequently in genome, unbiased to environmental conditions or management practices and easily available, highly reproducible and allow easy exchange of data between laboratories (Joshi *et al.,* 2004). According to general guidelines for methodologies on research and evaluation of traditional medicines by the WHO, first step in assuring quality, safety, and efficacy of traditional medicines is correct identification and this can be done very successfully with the application of molecular markers. DNA-based molecular markers have been used extensively for a wide range of applications in food crops and horticultural plants. These applications include study of genetic variation, cultivar identification, cross-breeding studies, identification of disease-resistant genes, identification of quantitative-trait loci, diversity analysis of exotic germplasms, sex identification of dioeceous plants, phylogenetic analysis, etc. Recently, the application of DNA-based molecular markers is being explored in the field of nutraceuticals (Wang, *et al.,* 2001 and Tusa *et al.,* 2002).

Maiti *et al.* (2006) studied genotypic variability in salinity tolerance of rice hybrids and their parents and thereby giving opportunity to the breeders for genetic improvement for salinity tolerance. The scope for enhancing salt tolerance in maize through selection and breeding on the basis of root length was found by Khan *et al.,* 2003. Genotypic variability of salinity tolerance is observed and some hybrids were selected for salinity tolerance lines (Maiti, *et al.,* 2009, 2010). Salicylic Acid could be used as a potential growth regulator to improve salt tolerance in plants (Hussain *et al.,* 2010). Drought tolerant inbred lines showed distinct root system than sensitive lines by presenting larger root length, surface area, volume and greater contribution of roots to total root length (Fernando Rodrigo *et al.,* 2008). Scientists found that the terminal drought tolerant lines have a relatively more profuse rooting in the deeper layers than the sensitive lines (Vadez *et al.,* 2005). The heat stress considerably reduced anther dehiscence and pollen fertility rate in sensitive lines whereas, its effects were much smaller in tolerant (Yun-Ying Cao *et al.,* 2008). There are different types of widely used marker genes obtained from various sources and used for antibiotic resistance, herbicide resistance, etc. (Table 4).

Table 4: List of selected marker genes, their sources and substrates used for selection

Selected marker gene(encoded enzyme)	Abbreviation	Source of gene	Substrate(s) used for selection
Antibiotic resistance			
Neomycin phosphotransferase II	nptII	*E. coli*	Kanamycine, geneticin (G418)
Neomycin phosphotransferase III	nptIII	*Streptococcus faecalis*	Kanamycine, geneticin (G418)
Hygromycin phosphotransferase	hpt/hyg	*E. coli*	Hygromycin
Bleomycin resistance	ble	*E. coli*	Bleomycin
Aminoglycoside adenyltransferase	aadA	Shigella	Streptomycin, spectinomycin
Antimetabolites markers			
Dihydrofolate reductase	dhfr	Mouse	Methotrexate
Dihydropteroate synthase	dhps	*E. coli*	Sulphonamides
Herbicide resistance			
Phosphinothricin acetyltransferase	bar/pat	*Streptomyces hygroscopicus/S. Viridochromogenes*	Glufosinate, L-Phosphinothricin, biolophos
Enolpyruvyl shikimate phosphate synthase	epsps/aroA	*Agrobacterium sp*/Petunia hybrid	Glyphosate
Acetolactase synthase	als	*Arabidopsis* sp/maize/tobacco	Sulfonylureas
Glyphosate oxidoreductase	gox	Achromobacter LBAA	Glyphosate
Bromoxynil nitrilase	bxn	*Klebsiella pneumonia*	Bromoxynil
Others			
Â-glucuronidase	gus/uidA	*E. coli*	Cutokinin glucuronide
Xylose isomerase	xylA	Thermoanaerobecterium thermosulfurogenes	Xylose
Mannose 6-phosphate isomerase	pmi/manA	*E. coli*	Mannose
Bataine aldehydes dehydrogenase	bath	Spinach	Bataine aldehydes

Random Fragment Length Polymorphism (RFLP) occurs when the length of a detected fragment varies between individuals. Each fragment length is considered an allele, and can be used in genetic analysis (Joshi *et al.,* 2004). Interspecies variation has been studied using RFLP and RAPD (Random Amplification Polymorphic DNA) in different genera such as *Glycerrhiza* (Nakai *et al.,* 1996), Echinacea (Barth *et al.,* 2002) and *Arabidopsis* (Kapteyn *et al.,*2002). RAPD-based molecular markers have been found to be useful in differentiating different accessions of *Taxus wallichiana* (Tava, 2002), neem (Khanuja, 2002), *Juniperus communis* L. (Tava, 2002), *Codonopsis pilosula* (Farooqui *et al.,* 1998), *Allium schoenoprasum* L. (Zhang *et al.,* 2003) and *Andrographis paniculata* (Zhang *et al.,* 2003) collected from different geographical regions. Genetic variation within *Brassica campestris* cultivars has been studied using AFLP and RAPD markers (Singh *et al.,*1999). Varietals identification and genetic purity test in pepper and *Capsicum annuum* were carried out using RAPD markers. RFLP technique was used for interspecific genetic variation within the genus *Capsicum* and also for DNA fingerprinting of pepper cultivars (Hosokawa, *et al.,* 2000).

7. Somatic Hybridization Using Protoplasts

Protoplasts can be induced to fuse (complete/partial) genome with one another using cell wall degrading enzymes through electrofusion and Polyethylene glycol (PEG) techniques to overcome the prezygotic incompatibilities in crossing. An efficient plant regeneration system from protoplast has proved a very useful technique for crop genetic improvement programs, a prerequisite for somatic hybridization and genetic transformation by direct DNA uptake (Chen *et al.,* 2004; Veera *et al.,* 2009; Sheng *et al.*, 2011) (Table 5). The most widespread use of protoplasts involves somatic hybridisation experiments either to overcome barriers in sexual crosses or modify cytoplasmic traits by altering organelle populations (Glimelius, 1999). The genus *Brassica* includes a wide range of crop species with great economic value worldwide. Therefore, they attract not only breeders using conventional methods but also those concerned with biotechnological methods (Klý´ma *et al.,* 2009). Since the early days of somatic hybridization, many intergeneric somatic hybrids in *Brassica sp*.have been developed through symmetric fusion, asymmetric fusion and microfusion (Arumugam *et al.,* 2000; Hu *et al.,* 2002a, b; Chen *et al.,* 2007; Tu *et al.,* 2008; Sheng *et al.,* 2008; Du *et al.,* 2009).

Table 5: Selected examples of plant species regenerated from protoplasts

Sl. No.	Category	Plant species
1.	Cereals	*Oryza sativa, Zea mays, Hordeum vulgare*
2.	Vegetables	*Cucumis sativus, Brassica oleracea, Capsicum annum*
3.	Woody trees	*Larix eurolepsis, Coffea canephora, Prunus avium*
4.	Ornamentals	*Rosa spp, Chrysanthemum sp, Pelargonium spp*
5.	Tuber & roots	*Beta vulgaris, Ipomoca batatas*
6.	Oil crops	*Helianthus annuces, Brassica napus*
7.	Legumes	*Glycine max*

Genetic Engineering

The present techniques for genetic material transfer are based on the natural process of transformation. They are mainly recombinant DNA technology plus tissue culture, aided by several molecular biology tools such micro-injection, electroporation, agrobacterium e.g. agrobacterium-mediated transfer which is quite successful for dicots but not monocots (Eneobong, 2003) (Table 6).

Table 6: List of some transgenic plant

Crops	Trade name	Bt protein	Resistance to insect
Cotton	Bollgard	Cry 1Ac	Cotton bollworm, Tobacco budworm
Maize	YieldGard Knockout	Cry 1Ab	European corn borer
Maize	Starlink	Cry 9c	European corn borer
Maize	Herculex I	Cry 1f	European corn borer
Maize	Bt-Xtra	Cry 1Ac	European corn borer
Potato	New-leaf	Cry 3A	Colorado beetle

Table 7: List of transgenic crop plants (GM crops approved in USA) for commercial use

Crop plants	Genetically altered trait	Product name
Cotton	Insect resistance	Bollgaurd
	Glyphosate resistance	Roundup ready
	Bromoxynil resistance	BXN
	Sulfonylurea resistance	-
Maize	Insect resistance	Yield Guard
	Insect resistance	Maximizer
	Glyphosate resistance	Roundup ready
	Glyphosate resistance	Liberty link
Rice	Vitamin A enrichment	Golden Rice
Tomato	Delayed ripening	Flavr Savr
	Delayed ripening	Endless Summer
	Virus resistance	-
Soybean	Glyphosate resistance	Roundup ready
Potato	Insect resistance	Newleaf
	Modified starch	-
Oilseed rape (canola)	Glufosinate resistance	Innovator
	Glyphosate resistance	Roundup ready
	High lauric acid	Laurical
	male sterility hybrid	-
Squash	Virus resistance	Freedom II
Tobacco	Virus resistance	-
Capsicum	Virus resistance	-
Carnation	Modified flower color	-

Management practices used to control the disease are varied, for example, chemical control

with fungicides (Nel *et al.,* 2003), modification of plants to obtain organisms with improved genetic capabilities carried out by plant breeding and by integrating foreign DNA into plant genomes to produce transgenic plants (Hwang and Ko, 2004) (Table 7).

The bar-code of life concept is evolving in bar-code as they diversify in terms of their roles and operational procedures (Williamson and Day, 2007). Cryopreserved collections usually form the basis of the bar-code (Day *et al*., 2008; Day and Stacey, 2007) and provide cryobanks with several distinct roles in delivering documented and authenticated cultures and cell lines for use in medicine, bio-resources, environmental industries, strains and cultures for biological assays to ratify their use as authenticated materials in research publications, type strains for taxonomic studies and repositories for conserving biodiversity.

Conclusion

Bioresources are the different forms of living organisms those have potential to generate wealth and improved the lives. Conservation of bioresources creates innovative mechanisms for sustainable development that encompasses the interface between health and the environment. Therefore, exploration, conservation and preservation of bioresources are the centre of attention around the world. On the contrary, the latest advancement in biotechnology play an important role to create awareness, conservation and sustainable utilization of immense biodiversity. Biotechnology tools perform an significant role in creating effective *ex-situ* and *in-situ* conservation strategies, groupings of bioresources through molecular lineages, identify useful genes through gene maps and develop a genetically modify bioresources.

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