'NEW TRENDS IN BIODIVERSITY CONSERVATION'

Mr. Jige Sandipan Babasaheb

S. R. College Ghansawangi Dist- Jalna (Maharashtra)

Abstract-

The term biodiversity refers to the variety of life on Earth at all its levels, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life. Biodiversity describes the variety of life on Earth, including the eight million plant and animal species on the planet, the ecosystems that house them, and the genetic diversity among them. Biodiversity is a complex, interdependent web, in which each member plays an important role, drawing and contributing in ways that may not even be visible to the eye. The abundant foods we eat, the air we breathe, the water we drink and the weather that makes our planet habitable all. Thomas Lovejoy (1980) introduced the term biological diversity to the scientific community in a book. It rapidly became commonly used. 1985 According to Edward O. Wilson, the contracted form biodiversity was coined by W. G. Rosen: "The National Forum on Bio Diversity was conceived by Walter G. Rosen. Biodiversity refers to the variability of life on earth. The values of biodiversity are classified into two broad categories. The direct use value and indirect use value. The direct use value benefits are derived from nature and involve direct human interaction with the natural elements. The indirect use value refers to the benefits derived from nature through ecological functions and the various services provided by the ecosystem for the welfare to human beings.

Biodiversity conserved by new biotechnological approach like germplasm, it is refers to living tissues from which new plants can form. It can be a whole plant, or part of a plant such as leaf, stem, pollen, or even just a number of cells. A germplasm holds information on the genetic makeup of the species. Another is gene banks were created by the middle of the twentieth century to preserve cultivated biodiversity when landraces began to be substituted by modern varieties. The molecular markers are used to map out the genetic base of crops and select favorable traits to come up with a better germplasm for growers; it also helps in biodiversity conservation. The DNA banks can now be considered as a means of complimentary conservation. DNA storage is particularly useful for those species that cannot be conserved in traditional seed or field gene banks.

Keywords- Conservation, Biodiversity, Community, Ecosystem and Gene bank etc.

Introduction-

Biological diversity (biodiversity) is the variability among living organisms: within and between species and ecosystems. Biodiversity is considered as the foundation of agriculture being the source of all crops and livestock species that have been domesticated and bred since the beginning of agriculture approximately 10,000 years ago. The values of biodiversity are classified into two broad categories. The direct use value and indirect use value. The direct use value benefits are derived from nature and involve direct human interaction with the natural elements. The indirect use value refers to the benefits derived from nature through ecological functions and the various services provided by the ecosystem for the welfare to human beings. Some of the services provided by the ecosystem include purification of air and water, pollination of crops, nutrient cycling, waste decomposition, formation of soil, stabilizing climate reducing the risk of droughts, floods and other natural calamities. Direct use value of biodiversity and categorized as: Consumptive or productive use value: Consumptive use value refers to assessing the value of natural resources which are commercially harvested, such as, firewood, fodder, timber, fishery resource, minor forest products, animal meat and others. These are for direct consumption that generates economic benefits. Benefits and can successfully compete with the consumptive value. These are derived by Non-consumptive value: Non-consumptive value of nature also derives economic recreational and educational activities.

Most cultivated plant species have lost their inherent traits that came from their wild ancestors. These traits include resistance to harsh environmental conditions, adaptation to various soil and climate conditions, and resistance to pests and pathogens.19 To utilize these important traits in cultivated varieties, scientists search for the genes that confer such important traits. They use conventional and modern biotechnology to create improved genetic variations of crops. Germplasm refers to living tissues from which new plants can form. It can be a whole plant, or part of a plant such as leaf, stem, pollen, or even just a number of cells. A germplasm holds information on the genetic makeup of the species. Scientists evaluate the diversity of plant germplasms to find ways on how to develop new better yielding and high quality varieties that can resist diseases, constantly evolving pests, and environmental stresses. Germplasm evaluation involves screening of germplasm in terms of physical, genetic, economic, biochemical, and physiological, pathological, and entomological attributes.

Objectives-

- To study the history of biodiversity conservation
- To study the role of modern technologies in biodiversity conservation
- To focus on biodiversity conservation and its effect in society
- To aware young generation about role of modern technologies in biodiversity conservation

Analysis and Result-

In the biodiversity conservation different biotechnological techniques are used in modern days. By using that techniques biodiversity conserved in small place and sufficiently. Some techniques of biodiversity conservation are as follows.

DNA Banks-

It is most effective conservation strategies in which plant turns into DNA technologies. It is simple, efficient and long term method used in genetic resources conserving for biodiversity. This method as compared to traditional or field gene bank lessens risk of exposing genetic information in natural surroundings. In this method small sample size store and keep in stable nature of DNA in cold storage. This stored material introduced by genetic techniques. In world many DNA banks established it managed by International Rice Research Institute, South African National Biodiversity Institute, and National Institute of Agro biological Sciences in Japan. Gene bank documentation has been enhanced with the advances in information technology, geographical information systems (GIS), and DNA marker technology. Information on DNA assessment of variation derived through these technologies help search for important genes. Information from DNA collections is available online through biodiversity initiatives such as Global Biodiversity Information, Species 2000, and Inter-American Biodiversity Network.

In vitro techniques are also valuable for conserving plant biodiversity. Such techniques involve three basic steps: culture initiation, culture maintenance and multiplication, and storage. For medium-term storage few months too few years, slow growth strategies are applied. For undefined time of storage, cryopreservation is applied. The plant tissues processed to become artificial seed and stored in very low temperature in cryopreservation method. It allows 20% increase in regeneration process as compare to other process. The DNA Bank of the Botanic Garden and Botanical Museum Berlin (BGBM) comprises approximately 50.000 DNA and tissue samples. The DNA bank holds samples obtained from plants, fungi, algae and protists collected in the wild, or of documented origin, associated with full relevant documentation. Its declared purpose is to enhance taxonomic and evolutionary studies world-wide by providing at-cost availability of DNA material for further, complementary or corroborating studies, subject to the recipient’s compliance with the letter and spirit of the Convention on Biological Diversity.

Molecular Markers-

It is used to map out the genetic base of crops and select favorable traits to come up with a better germplasm for growers. Molecular markers are short strings or sequence of nucleic acid which composes a DNA segment that are closely linked to specific genes in a chromosome. Thus, if the markers are present, then the specific gene of interest is also present. Marker-assisted selection such as single nucleotide polymorphisms (SNPs), is widely used in different agricultural research centers to design genotyping arrays with thousands of markers spread over the entire genome of the crops. After observing the desired traits in selected plants, these are then incorporated through modern or conventional breeding methods in existing crop varieties. Generated plants with the desired trait may be tested in the field for agronomic assessment and resistance screening against pests and diseases. Selected plants will be multiplied through tissue culture and other techniques.

DNA and Protein Profiling-

The effective conservation management programs for endangered crop varieties, it is important to evaluate their genetic relatedness and distances from other relatives. Such information could be derived through DNA profiling commonly conducted through electrophoresis.

Through this method, an individual organism is identified using unique characteristics of its DNA. DNA profiling depends on sections of the DNA that do not code for a protein. These areas contain repetitive sections of a sequence called short tandem repeats (STRs). Organisms inherit different numbers of repeated sequences from each parents and the variation in the number of repeats within an STR lead to DNA of different lengths. The targeted STR regions on the DNA are multiplied through polymerase chain reaction (PCR) and then separated by electrophoresis in a genetic analyzer. The analyzer is composed of a gel-filled capillary tube where DNA travels. When electric current is passed through the tube, the DNA fragments move through the gel tube by size. The digital output of the analyzer is read and interpreted through genotyping software.

Gene Banks-

A germplasm is a collection of genetic resources of an organism. Storing seeds of plants or sperms, eggs, embryo and tissue parts of animals in gene banks help in conservation of germplasm. Currently thousands of species are on the brink of extinction. Gene banks preserve the genes and recreate them through cloning, so that it can bring back the desired species. Many landraces or crop cultivars, livestock breeds and their wild varieties are stored in gene banks. Moreover, the transfer of genes around the world is becoming increasingly complex, and stock farming methods are continually evolving to meet the needs for preservation of important traits in livestock and crops. Gene banks also promote research for scientific studies. The DNA content of the genes is regarded as blueprints and the process of cryopreservation restores long-term viability of the genes. For preservation in gene banks, suitable breeds are identified and genetic materials are collected from them. The seeds, sperms and eggs may belong to important cultivars, or to rare and threatened species. Thus, this process of ex-situ conservation actually aims to maintain genetic diversity.

Gene banks are regularly evaluated and monitored to test the viability and standards of the stored samples. Gene banks were created by the middle of the twentieth century to preserve cultivated biodiversity when landraces began to be substituted by modern varieties. This move was generally accepted as a necessary step to safeguard the future. After about 75 years of collecting and maintaining genetic resources, the increasing ability of biotechnology to create new variability brings the roles of gene banks in the present and near future into question. Gene banks play a key role in the conservation, availability and use of a wide range of plant genetic diversity for crop improvement for food and nutrition security. They help bridge the past and the future by ensuring the continued availability of genetic resources for research, breeding and improved seed delivery for a sustainable and resilient agricultural system. An ancient management of gene banks through application of standards and procedures is essential for the conservation and sustainable use of plant genetic resources.

Gene Banks in India-

1988, India signed the Indo-US project on plant genetic resources that led to the foundation of National Gene Bank Seed Repository'. It has a storage facility at -20°C, In agriculture, periodically seeds are sown and new seeds are harvested, but samples tend to perish even if they are stored in best conditions, Seed banks solve this problem where seeds are to be collected from at least five population of a single species, throughout its geographical range. About 10 to 50 seeds are to be collected from each population, only after ensuring their complete viability! Seeds in banks are kept at very low temperatures. Short-term storage is done (storing seed for a year) when the seeds are sun dried and stored in sealed airtight containers at room temperatures. Medium term storage preserves seeds for 15 to 20 years where the sun dried seeds are stored in sealed containers between temperature 0-5°C. In the Long-term Storage seeds are preserved for decades at a temperature of -10 to -20°C at a moisture level of 2-5%. Recently seeds are cryo-preserved in liquid nitrogen at -196°C which remain viable for hundreds of years Orthodox seeds are easily stored in banks as they are tolerant to low humidity and temperatures. Recalcitrant seeds cannot tolerate low humidity or low temperature conditions, therefore, alternative methods have been developed for storing them. According to FAO, there are approximately 6 million plant accessions in over 1300 gene banks around the world, out of which 60 per cent are in long-term or medium-term facilities, 8 per cent in short-term and the remainder are either in field gene banks, or are cryo-preserved. Only 15 per cent of these plants are wild or weedy. Storing dormant seeds preserve the genetically representative samples of rare and endangered species that provide "genetic insurance" in case the organism is extinct from the wild.

Seed Gene bank-

A place where germplasm is conserved in the form of seeds is called seed gene bank. Seeds are very convenient for storage because they occupy smaller space than whole plants. However, seeds of all crops cannot be stored at low temperature in the seed banks. The germplasm of only orthodox species (whose seed can be dried to low moisture content without losing variability) can be conserved in seed banks. In the seed banks, there are three types of conservation, viz., (1) Short term, (2) Medium term, and (3) Long-term. Base collections are conserved for long term (50 years or more) at -18 or -20°C. Active collections are stored for medium term (10-15 years) at zero degrees Celsius. Working collection is stored for short term (3-5 years) at 5-10°C.

Field Gene banks-

Field gene banks also called plant gene banks are areas of land in which germplasm collections of growing plants are assembled. This is also called ex-situ conservation of germplasm. Those plant species that have recalcitrant seeds or do not produce seeds readily are conserved in field gene banks. In field gene banks, germplasm is maintained in the form of plants as a permanent living collection. Field gene banks are often established to maintain working collections of living plants for experimental purposes. They are used as source of germplasm for species such as coconut, rubber, mango, cassava, yam and cocoa. Field gene banks have been established in many countries for different

Seed bank-

Seed banks are established to conserve germplasm at both geographical (international, regional, national and local) and taxonomic levels. Gene banks are extremely useful for maintaining genetic diversity and employ the use of biotechnology for better options. Seeds are stored in International Seed Banks, National Seed Banks, Regional Seed Banks and Local Seed Banks. The Kew Seed Bank in England stores over 4000 species which is 1.5 per cent of the world's total flora. Activities of gene banks are based on the rules provided by the 'Rare Breeds Survival Trust' of the United Kingdom which states that 33 per cent of the straws are to be preserved for long-term storage, while 20 per cent of the straws are employed for conservation programmes.

The Millennium Seed Bank Project is an international conservation project coordinated by the Royal Botanic Gardens, Kew in 2000, at the Well come Trust Millennium Building. Here 24,000 angiosperms are stored[11]61. The project aims at collection and storing seeds of endangered or rare plants to save them from extinction. The large underground frozen vaults preserve almost one billion seeds, which is the world's largest collection. Started by Dr. Peter Thompson and presently run by Roger Smith, a part of the collected seeds are kept in their country of origin, while the rest is preserved in the Millennium Seed Bank. Partnerships of the project have been extended to most of the continents, to meet with the objectives for Global Strategy for Plant Conservation and the Millennium Development Goals of the United Nations Environment Programme. Some of the seeds of rare plants are Oxytenanthera abyssinica (African bamboo), Musa itinerans (wild banana) and many others. Seed banks, zoos and botanical gardens afford ex-situ conservation, in which the plants or animals are kept for breeding and reintroduction programmes. These conventional methods provide facilities of housing and caring of endangered species. A seed bank preserves dried seeds by storing them at a very low temperature. Spores and pteridophytes are conserved in seed banks, but other seedless plants, such as tuber crops, cannot be preserved this way the largest seed bank in world .A seed bank is the reservoir of viable seeds present in a plant community. Seed banks are evaluated by a variety of methods. For some species, it is possible to make careful, direct counts of viable seeds. In most cases, however, the surface substrate of the ecosystem must be collected and seeds encouraged germinating by exposure to light, moisture, and warmth. The germinating seedlings are then counted and, where possible, identified to species. Gene-banks have collected over 34,000 cereals and 22,000 pulses grown in India. India has 27 indigenous breeds of cattle, 40 breeds of sheep, 22 breeds of goats and 8 breeds of buffaloes.

Orthodox seeds-

It is the principal conservation method for species producing orthodox seeds that withstand desiccation to low moisture content and storage at very low temperatures. Most arable and forage species, and many tree species, produce seeds in this category.

Recalcitrant seeds-

Several important tropical and sub-tropical tree species produce seeds that do not survive desiccation and cannot tolerate low temperatures, and which are therefore not easy to store; these are known as recalcitrant seeds. Techniques exist for storing some recalcitrant seeds, but the seeds are usually short-lived and each species requires its own method.

Intermediate seeds-

A third category of seeds showing intermediate behavior has also been recognized: these seeds tolerate combinations of desiccation and low temperatures. There is, in fact, a gradient from orthodox to recalcitrant, with no sharp boundaries between categories. Although research has been conducted to overcome problems associated with seed conservation, little progress has been made beyond short-term storage of non-orthodox seeds.

In vitro bank-

In this technique, buds, protocorm and meristematic cells are preserved through particular light and temperature arrangements in a nutrient medium, which is either jellified or in liquid form. This technique is used to preserve seedless plants and plants that reproduce asexually or that require preservation as clones such as commercial cultivars.

Cryo bank-

In this technique, a seed or embryo is preserved at very low temperatures. It is usually preserved in liquid nitrogen at -196 °C. This is helpful for the conservation of species facing extinction. Cryo banks are utilized for the cryopreservation of animal genetic resources.

Vegetative Bank-

The vegetative bank is for storing the vegetative propagules of plants in cold storage. Propagules of tuber crops such as potato, sweet potato, yam and cassava are conserved in cold storage at 4-20 °C for several months between two successive cropping seasons. Cold storage avoids deterioration of fresh tubers or stems cuttings and also protects from the attack of pests and pathogens.

Cryopreservation-

Cryopreservation is a cost-effective, safe method of preservation that provides options for long-term storage of genetic materials. Sperms, ova, embryo, tissue culture of animals, recalcitrant seeds or vegetative propagules of plants can be effectively stored by this method. In vitro preservation of tissues at cryogenic temperatures (-196°C) is in liquid nitrogen, whereby all metabolic processes and cell divisions are temporarily arrested. This ensures the long-term stability of stored germplasm that requires limited space, little maintenance with less chance of contamination.

Genome Resource Bank-

A Genome Resource Bank (CRB) is a frozen repository of biological materials, including sperm, ova, embryos, tissue, blood products and DNA for protection and preservation of biodiversity. The bank serves as a source for genetic material for analyzing genetic diversity, paternity and disease exposure of animals. This inexpensive cryobiology program extends the generation interval, increase the efficiency of captive breeding and also minimize the number of captive animals. It has significant impact for conservation of genetic diversity. Frozen semen or eggs can be used to fertilize with sperms and ova of previous generations. The tiger GCS strongly recommends a systematic Genome Resource Bank (GRB) for Sumatran tigers. Further cheetah sperm GRB in Namibia, giant panda in China have been already set up. Efforts to set up GRB of Asian elephants, clouded leopards and fishing cats are underway.

Field Gene Banks-

This is an area of land in which collections of growing plants are assembled which includes as many individuals of one species as possible for maintaining genetic diversity. Field gene banks are living collections that aim for long-term conservation of perennials, recalcitrant species with the objective of their propagation. The main drawbacks of field banks are that they take up large space and are susceptible to diseases or natural calamities. However, this method is the only available option for the conservation of recalcitrant seeds.

Pollen Preservation-

Pollen grains of desired fruits and wild plants are often cryopreserved at -180°C to -196°C or freeze-dried and stored between 5°C to -18°C, for effective use in future![1]6]. The later facility stores for 12 years.

Tissue Preservation-

As recalcitrant seeds are difficult to preserve in gene banks, tissue cultures of these plants are cryo preserved in liquid nitrogen at -196°C. These plants reproduce vegetative including potato, banana and several citrus fruits161, Animal tissues are also conserved.

Sperm and Egg Bank-

Sperms, eggs and tissue cultures of rare and endangered species of animals are cryopreserved in zoological freezers. Genetic resource of endangered animals can be preserved in gene banks, which consist of cryogenic facilities. A "Frozen zoo" has been established by the Zoological Society of San Diego to store genetic information of about 355 species of threatened animals.

The first mammalian embryo was cryopreserved in 1972. Till date embryos of mouse, rabbit, cow, rat, horse, humans, baboon, antelope, cat etc. are preserved in liquid nitrogen. Storing of sperms may affect their viability although sperms from 200 species have been stored. Sperms are generally preserved in buffer solutions containing cryoprotectant. The genetic diversity within a population allows plants and animals to survive and adapt to the changing environment, and protect them from invasion of new pests and pathogens. Storing germplasm in seed banks is both cost effective and space efficient that saves species from extinction with minimal genetic erosion. Besides preserving species, gene banks also provide materials for scientific research with easy availability of rare and endangered species. Germplasm conservation is the most successful method to conserve the genetic traits of endangered and commercially valuable species. Germplasm is a live information source for all the genes present in the respective plant, which can be conserved for long periods and regenerated whenever it is required in the future.

Conclusion-

Biodiversity provides us sustainable benefits to meet immediate human needs such as clean, consistent water flow, protected from flood and storms and stable climate. A lack of clean water, fewer fish in the sea means less food for our survival, lack of forest resources such as food or plants for medicine is dangerous impact of biodiversity loss occur in the future. So more biodiversity protect human and earth also fewer opportunities for live hoods for the better life. This type saving biodiversity is a good wealth for man and for country for its better development happy live hoods. So the biodiversity conservation and saving is every person's duty. For the natural and peaceful environment biodiversity conservation is necessary. This conservation protects plant, animal, microbial and genetic resources for food production. The species preservation helps in sustainable management and utilization of species and ecosystems. The greater species diversity ensures natural sustainability for all life forms.

References-

- E.O.Wilson (1988) 'Biodiversity' Washington, National academy press Publication.
- Hawksworth, David l. and Bull Alan T. (2007) 'Plant conversation and Biodiversity' Germany Springer Publication.
- K.P. Laladhas, Preetha Nilayangode and Oommen V. Oommen (2017) 'Biodiversity For Sustainable Development' Switzerland, Springer International Publishing Publication.
- K.V. Krishnamurthy (2003) 'Text book of Biodiversity' New Hampshire, Science publisher Publication.
- Pandey B.P. (1982) 'Taxonomy of Angiosperms' New Delhi S. Chand And Company publication
- Prabodh K. Maiti Paulami Maiti (2011) 'BIODIVERSITY Perception, Peril and Preservation' New Delhi, PHI Learning Private Limited Publication.
- Rita Singh and Ghosh S.K. (2003) 'Social Forestry and Forest Management: Social Forestry New Delhi Global Vision Publishing House Publication.

- Sharma P.D. (2007) 'Ecology and Environment' Meerut Rastogi Publication.
- Singh S.K. (2015) 'Textbook of Wildlife Management' New Delhi International Publication.