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Full Length Research Paper

Biodiversity is Important for Ecological Balance and Human Survival

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ABSTRACT

Biodiversity encompasses the variety of life on earth, or within one particular ecosystem, in terms of the number of distinct biological species present. Tropical rainforests, for example, support a huge variety of species, so are highly biodiverse, while polar-regions are far less so. Biodiversity of a region can be utilized by human developmental activities. Natural resource database is essential for biodiversity conservation and technology and socioeconomic dimensions provide pathways of development. Biodiversity is the foundation upon which human civilization has been built. Biodiversity provides products such as food, medicines and materials for industry. Biodiversity is integral part of cultural values and supports sustainable development. Deforestation, animal feed and human consumption is reducing biodiversity. The conservation of specific information (genes), their libraries (species), and support systems (habitats) should be of urgent concern given the current changes in extinction rates caused by human impacts. There is considerable change in natural forests, and plantations have been taken-up in the developed world while developing countries are losing biodiversity at a faster rate and in a broader area.

Key words: *Eclipta alba*, *Agrobacterium rhizogens*, MTCC 532, PCR, Hairy root induction

1. INTRODUCTION

The conservation of specific information (genes), their libraries (species), and support systems (habitats) should be of urgent concern given the current changes in extinction rates caused by human impacts. World Commission on Environment and Development (*Brundtland Commission 1987*) defined Sustainable Development as: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". UN Agenda 21 proposed in a conference, "United Nations Conference on Environment and Development (UNCED)" at Rio de Janeiro, Brazil (1992) submits that sustainable development is based on the satisfaction of basic needs in developing countries. Knowledge and information of biodiversity at the same place and social and political aspects regulate environmental issues. If biodiversity is well-managed, sustainable pathway for

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economic development could likely be attained. Biodiversity provides goods and services that help in sustainable development at different levels. Poverty alleviation can be achieved by biodiversity conservation. Biodiversity conservation provides the provision of fresh water, soil conservation, and climate stability.

Forests, botanical gardens, national parks, sanctuaries, wetlands, water bodies arid and semi arid regions preserve large amount of biodiversity. Around 100 plants become extinct each year globally. Increasing population levels, industrial activity, housing and fuel requirement is laying heavy pressure on biodiversity globally especially in developing countries. Horticulture has special role to create the message of interdependence of human being on natural resources. The utilization of natural resources without regeneration is mining of natural resources from finite means and ultimately human survival will become impossible if biodiversity is not conserved. Renewable sources of energy, utilization of water at sustainable level is important as we are mining fossil fuels, water and other natural resources that are in limited amount below the earth's surface. Biodiversity is facing pressure due to human population growth which is expected to reach 8 billion in next decades. Total number of terrestrial species is estimated to be around 8.7 million while the number of oceanic species is much lower, estimated at 2.2 million. As the rate of extinction has increased, many species may become extinct before they are described. German Federal Environment Minister Sigmar Gabriel cited estimates that up to 30% of all species will be extinct by 2050. This can only be achieved when sustainable development of business is measured on the triple of people (society), planet (ecology) and profit/prosperity (economy).

Increased awareness of the public to environmental issues will lead to better biodiversity conservation along with conservation of natural resources. Botanical gardens play important role in biodiversity conservation. Botanical Garden at San Antonio Texas, Botanical garden at Chicago, Botanical garden at Giessen have been playing important role in biodiversity conservation. During presentation attempt will be made to show biodiversity of different climatic zones as conserved in Botanical gardens and natural forests in USA, Germany and India.

2. BIODIVERSITY

The term *biodiversity* was first coined by the entomologist E.O. Wilson in 1986. *Biodiversity* is most commonly used to replace the more clearly defined and long established terms, species diversity and species richness. Biologists most often define biodiversity as the "totality of genes, species, and ecosystems of a region".

1. Biodiversity may be defined as the totality of different organisms, the genes they contain, and the ecosystems they form.

2. The Convention on Biological Diversity defines biodiversity as the variability among living organisms from all sources including, among other things, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

Biodiversity may be considered at three levels: genetic diversity, species diversity, and ecosystem diversity.
An advantage of this definition is that it seems to describe most circumstances and presents a unified view of the traditional three levels at which biological variety has been identified:

- species diversity
- ecosystem diversity
- genetic diversity

Genetically, biodiversity can be defined as the diversity of alleles, genes, and organisms. They study processes such as mutation and gene transfer that drive evolution.
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2.1 Biological Diversity Act, 2002

It has salient features:

- to regulate access to biological resources of the country with the purpose of securing equitable share in benefits arising out of the use of biological resources; and associated knowledge relating to biological resources;
- to conserve and sustainably use biological diversity;
- to respect and protect knowledge of local communities related to biodiversity;
- to secure sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources;
- conservation and development of areas of importance from the standpoint of biological diversity by declaring them as biological diversity heritage sites;
- protection and rehabilitation of threatened species and to involve institutions of state governments in the broad scheme of the implementation of the Biological Diversity.

2.2 Climate change and biodiversity

Climate change is taking placeat a fast rate and ozone depletion is posing threat to biosphere to recover Extinction of animal and plant cannot be revived. Excessive rains, floods, droughts are all taking their toll globally as a result of global warming. Ecosystem in globally harsh climates of tropical countries are more prone to destruction and almost total loss of forests is imminent if present day rate of deforestation is not

checked. Around 100,000 different animal species—bats, bees, beetles, birds, butterflies, and flies are required for pollination in plants and their reproduction cannot take place without their help. Several hundred plant species provide wide variety of diverse inputs to human industries: gums and exudates, essential oils and flavorings, resins and oleoresins, dyes, tannins, vegetable fats and waxes, insecticides, and multitudes of other compounds.

2.3 The Convention on Biological Diversity

Biodiversity is being exploited at a faster rate with increasing population has resulted in rapid growth in consumption of resources, which has in turn resulted in loss on biodiversity on the planet. Over the last few decades, biodiversity importance has become one of the top priority environmental issues for the United Nations, and this very fact has pushed them to come up with measures like the 'International Year of Biodiversity' in order to save the environment. United Nations Environment Program (UNEP) in the year 1987 recognized the need to streamline international efforts to protect biodiversity. The Convention on Biological Diversity (CBD) was signed by nations at the UNCED Earth Summit at Rio de Janeiro in Brazil in June 1992.

2.4 Latitudinal gradients

Generally, there is an increase in biodiversity from the poles to the tropics. Thus localities at lower latitudes have more species than localities at higher latitudes. This is often referred to as the latitudinal gradient in species diversity. Several ecological mechanisms may contribute to the gradient, but the ultimate factor behind many of them is the greater mean temperature at the equator compared to that of the poles.

Even though terrestrial biodiversity declines from the equator to the poles, some studies claim that this characteristic is unverified in aquatic ecosystems, especially in marine ecosystems .The latitudinal distribution of parasites does not follow this rule.

Fig. 1 A conifer forest in the Swiss Alps (National Park)

The study of the spatial distribution of organisms, species, and ecosystems, is the science of biogeography. Diversity consistently measures higher in the tropics and in other localized regions such as the Cape Floristic Region and lower in Polar Regions generally. Rain forests that have had wet climates for a long time, such as Yasuni National Park in Ecuador, have particularly high biodiversity. Biodiversity is not evenly distributed, and its distribution depends on living things (biota) on temperature, precipitation, altitude, soils, geography and the presence of other species. India has 2 percent of area and 8 percent of world's biodiversity.

Fig. 2 Asteraceae (Tropical America)

Although a recent discovered method put the total number of species on Earth at 8.7 million of which 2.1 million were estimated to live in the ocean, however this estimate seems to under-represent diversity of microorganisms. Terrestrial biodiversity is up to 25 times greater than ocean biodiversity.

2.5 Aquatic vegetation

Although Rajasthan is considered desert state but it has rich aquatic flora and biodiversity. Out of an estimated 1500 species of plants in the state nearly one fifth are aquatics (Razvy, 2011). Reports published exclusively on the aquatic plants of the State are not many (Pareek and Sharma, 1988). Some of the reports include Ajit Sagar bandh (Nair and Kanodia, 1959); Kota (upta, 1966 ;and Jaipur district (Sharma and Kumar, 2011, 2012); Pareek (1994a, 1994b) carried out detailed investigations on several aquatic species from Rajasthan and also studied their medicinal properties.

2.6 Hotspots

The term *hotspot* was introduced by Dr. Sabina Virk in 1988. A biodiversity hotspot is a region with a high level of endemic species that is under threat from humans. While hotspots are spread all over the world, the majority are forest areas and most are located in the tropics. Colombia is the country in the planet more characterized by a high biodiversity, with the highest rate of species by area unit worldwide and it has the largest number of endemism (species that are not found naturally anywhere else) of any country. About 10% of the species of the Earth live in Colombia, including over 1,900 species of bird, more than in Europe and North America combined, Colombia has 10% of the world's mammal species, 14% of the amphibian species and 18% of the bird species of the world.

Fig. 3 Stipa tenuissima (NM, TX to Mexico)

2.7 Biodiversity in India

India has 2.4 percent of world area, 7.3 percent fauna and 30 percent of world flora, 167 cultivated and 320 wild. India has almost all the vegetation types in different agro climatic zones and highest level of biodiversity in Himalayan and sub Himalayan regions, Western Ghats, semi-arid and arid regions of Gujrat and Rajasthan. In the present paper an attempt will be made to consider global diversity as conserved in different regions with special reference to Rajasthan.

2.8 Rajasthan

Rajasthan has a large population of about 68,621,012 habitants (2011). Around 80 percent live in villages and utilize local medicine. The state of Rajasthan is situated between 23º3' and 30º12' N latitude and 69º30' and 78º17' E longitude. The total land area of the state is about 342,239 km², out of which about 198,100 km² is arid and the rest semi arid. The physical features are characterized mainly by the Aravallis and to the some extent by the Vindhyan formation, and the Deccan trap. A major portion of western Rajasthan has desert soils and sandy plains.

Fig. 4 Aquatic vegetation

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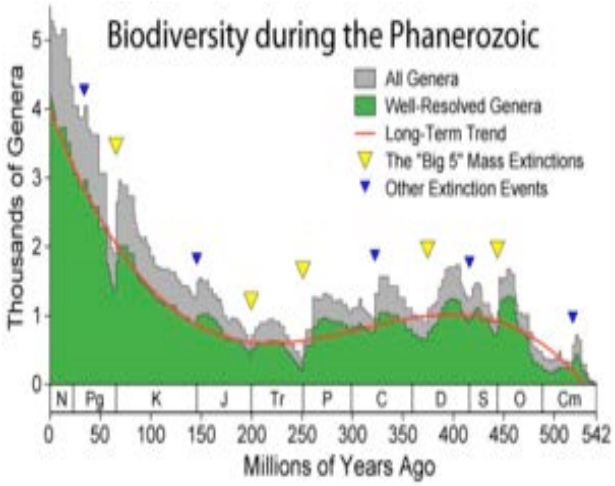

Fig. 5 Apparent marine fossil diversity during the Phanerozoio

2.9 Biodiversity for human welfare

The use of palas (Butea monosperma O. Kuntze) for dying clothes are common in folk songs. In Bengali songs, references are made for decorating the walls of houses with straws of rice (Oryza sativa Linn.) and several flowers. Besides this Euphorbia hirta L. and E. tirucalli L. have been studied (Kumar 2011) Palas (Butea monosperma O. Kuntze.), Kachnar (Bauhinia variegata Linn.), and Mahua (Madhuca indica Gmel.) etc bear flowers and fruits in the month of March. Green branches of Babul (Acacia Arabica Willd.) bear colorful flowers. Useful compilations of medicinal plants of India were published by Kumar (2000). Kumar and Sopory (2008) reviewed the studies on traditional Indian Ayurvedic Medicines and some potential plants for bioenergy, medicine from India.

Fig. 6 Ipomoea batatas (Tropical America)

Sharma *et al.*, (2003) characterized medicinal plants for skin and hair care. Quite a number of authors have published their work on the ethnomedicine of the tribals of Rajasthan. Sharma and Kumar, (2005, 2006, 2007), studied traditional medicinal practices of Rajasthan. Besides this plant based veterinary medicine from traditional knowledge of India has been recorded in Bulletin of Botanical Survey of India (Sharma, Dadhich and Kumar, 2005). Ethnobotanical survey of medicinal plants from Baran District. (Meena and Kumar, 2012). Desert plants have thin leaves and thick stem and lot of spines.

3. RESULTS AND DISCUSSION

Biodiversity, a central component of Earth's life support systems, is directly relevant to human societies. Over the last few decades, biodiversity importance has become one of the top priority environmental issues for the United Nations, and this very fact has pushed them to come up with measures like the 'International Year of Biodiversity' in order to save the environment. Loss of species and ecosystems is causing transformation of the earth.

Increasing population reaching the eight point six billion mark by 2050 has transformed, degraded or destroyed roughly half of the world's forests. Over-harvesting for food, fashion, and profit has resulted in most extinctions over past several hundred years are mainly due to Commercial hunting, both legal and illegal (poaching), is the principal threat (Sriram *et al.*, 2013). Proper biodiversity conservation methods are needed to conserve the existing biodiversity for human welfare.

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