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RESEARCH ARTICLE

IUCN RED LISTED MEDICINAL PLANTS AND THEIR CONSERVATION ISSUES FROM FLORA OF TELANGANA

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Abstract

The state of Telangana situated on the south central stretch of the Indian Peninsula and on the eastern sideof the Deccan plateau. The regionhas tropical climate with drymixed deciduous, thorny scrub forests and with open grasslands home for a wide variety of medicinal plants. Over centuries many of the medicinal plants have been exploiting from the wild by the locals and the pharma companies. Over exploitation of raw material from the wild resources and habitat losstheir populations have dramatically reduced and threatened. As on today, there is no consolidated information on the medicinal plants exploiting from the wild and which have been listed in the threatened category of the global conservations status IUCN red list. The present study reports ca. 350 medicinal plants occurring wild in the state. Out of them, there are 51 species are categorized under threatened category of IUCN red list. The consolidated list of threatened medicinal plants presented and their global conservation issues discussed in detail.

Introduction:-

After Post-independence, the floristic explorations and documentation of plant wealthabout to wrap from region to national level in India. Majority of the Indian Taxonomists/Botanistsare graduallyshifting towards revisionary studies, publication of floras, field guides and preparation of offline and online data bases. There are only few Taxonomist/botanist are engaged on conservation and species restoration studies on threatened and endemic species. With regard to the conservation of medicinal plants which has been over exploiting from the natural habitats have been kept a side by the many of the taxonomists/botanists in India.Even some of the national and local institutions purely working on medicinal plants:National Medicinal Plant Board (NMPB),Central Institute of Medicinal and Aromatic Plants (CIMAP) and State Medicinal Plant Boardson much engaged on their phytochemical screening, product development and marketing but not on their conservation (either ex-situ or in-situ), multiplication and restoration in the natural habitats. Medicinal plants which are high demand in the national and international markets are under cultivation and promoting them in largescale cultivation is only few but many of the medicinal plants which has been collecting from the wild (Rao, 2010).Evenas of today,there is no consolidated list and databases region wise and nation wise in India. Continuous collection of raw material of medicinal plants from natural habitats keeping pressure on their regeneration, reduction in population and their natural existence in the wild (Rao, 2010).Keeping in this view,there is an urgent need of identification and documentation of medicinal plants which has been collecting from wild, over exploited, threatened at region level for ex-situ and in-situ conservation priority.

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And also formultiplication,re-introduction and introduction in the cultivation for large scale production of raw material for commercial purposes (Rao, 2010). The present study focussed on the preparing in consolidated list of medicinal plants,which are threatened by various reasons and listed in the IUCN red list (https://www.iucnredlist.org).The issues connected to their global conservation status also discussed in detail.The region wise consolidated list of medicinal plants threatened, over exploitedfrom natural habitats will help for strengthening of national and global medicinal plant data bases and for implementation of effective conservation action plans at local, national and global level.

The State of Telangana is situated on the central stretch of the eastern seaboard of the Indian Peninsula and on the eastern side of the Deccan plateau with an geographical area of approximately 1,14,840 square kilometres (44,300 Sq mi) and lies in between 1550' – 1955' North latitudes and 7714' – 7850' East longitudes(Pullaiah, 2015).As per the recent reports of State forest department, the state forest cover is 21,214 sq km (24 %) in its total geographical area(Pullaiah, 2015). The state mostly represents with open dry mixed deciduous forests with few thorny scrubs and grasslands. With varied habitats such as natural forest habitats, open lands, freshwater streams, wet lands, agricultural lands and with various geographical features the geographical area of the state is home for the diversity of plant wealth and wide variety of medicinal plants. The floristic wealth exploredby the various explorers from the universities and central institutions from pre-independence to till today (Patridge, 1911; Gamble, 1925; Khan, 1953; Pullaiah, 2015, Venkat Ramana, 2010).Based on the recent published reportsthe floristic wealth of the state represents a total of 1945 taxa (includes cultivated taxa) spread over 1891 species belongs to 794 genera and 147 families of higher plants(Pullaiah, 2015). The state is representing very high diversity in the higher plants (Angiosperms) but representing very few number of lower group of plants such as (Bryophytes, Pteridophytes) and Gymnosperms completely absent in the wild and only presence in the cultivation.A comprehensive list of plants of Telangana state is available in many published floras, books/field guides but with regard to the medicinal plants there is no such information is available in any published floras, books and articles. Keeping in this view the present study was taken up as a part of the doctoral degree from the year 2018.In a five years duration almost the entire geographical area of the state is fully explored and documented particularly the medicinal plant wealth of the state of Telangana. With the present study, ca. 350 medicinal plants havebeen reported among them to know the threatened plants which are included in the IUCN red list presented here with their consolidated list and their issues on global conservation status(https://www.iucnredlist.org).

Material and Methods:-

The present study is based on the regular field visits covering in three seasons with the help of local and forest officials.For the convenient and intensive studies the study area divided into northern, southern and central regions.The studies were more intensively made in the northern and southern regionsdue to availability of natural forests. Non-forest areas such as Agricultural fields, Open lands, Wetlands, Freshwater streams etc., also made seasonal studies.A total of ca. 350 medicinal plants have been reported (excluding cultivated crops and vegetables)which has mentioned in the ancient ayurvedic texts and Indian Materia Medica (Nadkarni, 1982) and medicinal plants (Basu & Kirtikar,1935) and a very recently published book on Healing Plants of Peninsular India (Parrotta, 2001). During field tours, medicinal plant have been photographed in various stagesfor preparation of medicinal plant data base of the state and GPS coordinates being recorded for GIS mapping for implication of conservation measures. In the enumeration part, species are arranged alphabetically and the following details are provided such as scientific name followed by its citation, family its belongs, local and common names Sanskrit, Telugu, Hindi and English languages, diagnostic morphological characters, phenological details, local distribution, parts used in local and traditional medicine and medicinal properties. In the present communication the study was focussed only on consolidating the threatened medicinal plants reported from the geographical area of Telangana state and their global conservation issues discussed.

Results and Discussions:-

The state of Telangana is very poor in endemism and represents only few numbers of endemic species, but it is rich in diversity of plants due to its varied geographical features. Concern to the medicinal plants,40% of the plants have been used in traditional and modern healthcare systems in its total floristic wealth. This shows the abundance presence of medicinal plants in the state. Continuous collection, over exploitation, expansion of agricultural lands,regular weeding in agricultural crops, shrinking and disappearing of field hedges in the crop lands, conversion of natural forest habitats for industrial development,rapid urbanization and habitat transformation, rapid spread and domination of alien weedsmany of the medicinal plant’s populations are tremendously decreased and some of them

are completely disappeared and falls under threatened category. There are 52 species,out of ca. 350 medicinal plants falls under threatened categorybased on the (IUCN red list https://www.iucnredlist.org)among 51threatened species one (01) "*Calamaria coromandelina*" represents lower group plants "Pteridophytes" and the remaining (50) represents higher group plants "Angiosperms".Among all, *Chlorophytum borivilianum,* categorized under Critically Endangered (CR); *Decalepis hamiltonii* under Endangered (EN); *Chloroxylon swietenia* and *Santalum album* under Vulnerable (VU); *Aegle marmelos* under near threatened (NT) and remaining all categorized under least concern (LC). List of the threatened species given alpha betically with their scientific name, family, IUCN status and their occurrence in the wild and cultivation for the clarity of presentation (Table 1). The filed images are provided for all the species (Figure 1-3).

Plate 1.:- a. **Abelmoschus ficulneus** (L.) Wight &Arn., b. **Abelmoschus moschatus** Medik., c. **Acmella paniculata** (Wall. ex DC.) R.K.Jansen, d. **Aegle marmelos** (L.) Corrêa, e. **Alangium salviifolium** (L.f.) Wangerin**,** f. **Barringtonia acutangula** (L.) Gaertn., g. **Butea monosperma** (Lam.) Taub., h. **Cassia fistula** L., i.**Centella asiatica** (L.) Urb., j.**Chamaecrista absus** (L.) H.S.Irwin& Barneby**;** k.**Chlorophytum borivilianum** Santapau & R.R.Fern., l.**Chloroxylon swietenia** DC., m.**Crateva adansonii** DC., n.**Crateva religiosa** G. Forst., o.**Cullen corylifolium** (L.) Medik., p.**Cyperus rotundus** L.

Plate 2:- a. **Decalepis hamiltonii** Wight &Arn., b. **Eclipta prostrata (L.) L.,** c. **Enicostema axillare** (Poir. ex Lam.) A.Raynal, d. **Ficus racemosa** L., e. **Ficus religiosa** L., f. **Firmiana simplex** (L.) W.Wight, g. **Gloriosa superba** L., h. **Holarrhena pubescens** Wall. ex G.Don, i. **Isoetes coromandeliana** L. f., j. **Justicia adhatoda** L., k. **Kydia calycina** Roxb., l. **Naringi crenulata** (Roxb.) Nicolson**,** m. **Nelumbo nucifera** Gaertn., n. **Nyctanthes arbor-tristis** L., o. **Nymphaea nouchali** Burm.f., p. **Phyla nodiflora** (L.) Greene.

Plate 3:- a. **Phyllanthus emblica** L.**,** b. **Pistia stratiotes** L., c. **Pterocarpus marsupium** Roxb., d. **Pupalia lappacea** (L.) Juss., e. **Santalum album** L., f. **Semecarpus anacardium** L.f.**,** g. **Senna occidentalis** (L.) Link, h. **Sphaeranthus indicus** L., i. **Syzygium cumini** (L.) Skeels, j. **Terminalia bellirica** (Gaertn.) Roxb., k. **Terminalia chebula** Retz., l. **Tribulus terrestris** L., m. **Vanda tessellata** (Roxb.) Hook. ex G.Don, n. **Vitex negundo** L., o. **Woodfordia fruticosa** (L.) Kurz, p. **Wrightia arborea** (Dennst.) Mabb., q. **Wrightia tinctoria** R.Br., r. **Ximenia americana** L.**,** s. **Ziziphus jujuba** Mill.

Conclusions and Recommendations:-

After consolidating the list of threatened medicinal plants based on the IUCN red list (https://www.iucnredlist.org),there was a surprise most of the common plants which are self-prorogated profusely in the natural conditions and also introduced under large scale cultivation and plantations as avenues and the common weeds in the cultivated fieldslisted in the threatened category such asAegle marmelos **(NT)**;Azadirachta indica (LC); Cyperus rotundus (LC); Ficus racemosa **(LC);** Ficus religiosa **(LC);**Tectona grandis (EN); Tamarindicus indica (LC) and the medicinal plants which has been using in the local and traditional systems of medicines since Vedic period (ca. 3000 years). Their continuous exploitationfrom the wild resource almost their populations are reduced and gradually disappearing from the natural habitats such as Andrographis paniculata,Aspragus racemosus, Centella asiatica,Cissus quadrangularis,Eclipta prostrata, Hemidesmus indicus,Maerua oblongifolia, Plumbago zeylanica, Terminalia chebula,Terminalia bellirica etc.,has not been under threatened category. And also,the species which are highly traded in the national and international marketsand their populations are almost wiped out from the natural habitats and they have already been enlisted in the Red Data Books by Nayar & Sastry (1987 -1990) and by Ahmadullah& Nayar (1999)such asGloriosa superba,Plumbago indica; Rauvolfia serpentina; Saraca asoca, etc.) has not been under threatened category in the IUCN red list (https://www.iucnredlist.org).The local and national government organizations which is working on medicinal plants, their support policies and programs for growth of trade, export, conservation and cultivation such as Ministry of AYUSH, Ministry of Environment and Forests (MOEFCC), National Medicinal Plant Boards (NMPB) and state medicinal plant boards, National Biodiversity Authority (NBA) and State Biodiversity boards are funding for the ex-situ, In-situ conservation, multiplication, reintroduction of the threatened plants which are listed in the IUCN red list considered as criteria(Goraya & Ved 2017; DBT 2019; NBA 2020; NMPB 2020a,b.). The plants which are listed in the IUCN red list is giving priority for conservation and the other plants which are highly medicinal and economical potential and exploited from the wild omitting for the conservation. This is an alert for the local and national governments and research institutes there is a need of identify the species which are highly exploited from the wild and threatened at regional and national level and assessing the local conservation status and making the conservation action plans. The regional level conservation status will support for the assessing global level conservation status (https://www.iucnredlist.org) for the species which are widely distributed in a more than one geographical region/country. There is also other information missing under species conservation status of threatened species in the IUCN red list portal. Species like C. borivilianum(EN), and D. hamiltonii (EN) their wild populations are almost wiped-out and they have been introduced in the cultivation in large scale for their commercial demand in the national and international markets. The introduction of the species under cultivation information is not cited under species conservation statusin the IUCN portal(https://www.iucnredlist.org) for many such species. This information will help the update the species threatened category and assign the status extinct in the wild and common under cultivation (EW). Such information will help for making speciesonsite and offsite conservation action plans regional level, national level and global level.

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