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Editorial

Depleting medicinal plant resources: A threat for survival of Ayurveda

In developing countries, the usage of medicinal plants in health care practices is relatively high. In China, traditional Chinese medicine (TCM) is largely plant based (80%). India exhibits remarkable outlook in modern medicines that are based on natural products besides traditional system of Indian medicines. According to Hamilton, India has about 44% of flora, which is used medicinally.[1] India with its enormous natural flora is considered as the "herbarium of world" and is one of the 12-mega biodiversity countries harboring two unique "biodiversity hot spot" out of 18 hot spots in the world. It has all known types of agro-climatic ecological and edaphic conditions with varieties of eco systems ranging from dry cold desert (Ladakh), wet evergreen humid tropics (Western Ghats), temperate, alpine and sub-tropical regions (North West Himalayas), dry deserts (Rajasthan and Gujarat) to tidal mangroves of sunder ban. These varied agro-climatic conditions are conducive for the growth of variety of medicinal plants. Nearly 8000 species of medicinal plants are distributed in 386 families and 2200 genera of flowering plants which are the main source of raw drugs. Herbal potential in India facilitates for rapid growth of phytopharmaceuticals, perfumery and allied industry.

An analysis of habitats of medicinal plants indicates that majority of them are flowering plants comprising of 33% trees followed by herbs, shrubs, climbers and lower groups of plants like ferns, algae and fungi. It appears that bulk of plant material is obtained from the roots, whole plant, fruits, seeds and bark which are vital for the survival and regeneration of medicinal plants in nature. Destructive harvesting has brought about depletion and scarcity of medicinal plants. The habitat loss by export of medicinal plants collected from wild sources finally lead to severe and irreplaceable loss of genetic stock of many of these species. The ministry of environment and forests has, therefore, notified 29 species which are banned for export and the list contains some popularly used drugs in Ayurvedic formulations like *Sarpagandha* (*Rauwolfia serpentina* [L.] Benth. ex Kurz), *Raktachandana* (*Pterocarpus santalinus* L.f.), *Aguru* (*Aquilaria agallocha* Roxb.), *Katuki* (*Picrorhhiza kurroa* Royle ex Benth.), *Trayamana* (*Gentiana kurroo* Royle), *Kiratatikta* (*Swertia chirata* [Roxb. ex Fleming] H. Karst.), *Jatamansi* (*Nordostachys grandiflora* DC.), *Ativisha* (*Aconitum heterophyllum* Wall.), *Vatsanabha* (*Aconitum* species) etc.

A number of surveys have been conducted at various places from time to time for estimating the threat status. Using current international union for conservation of nature (IUCN) and natural resources red list criteria plants are categorized as vulnerable, critically endangered, extinct, endangered, low risk, extinct in wild, near threatened at regional and global levels. By using IUCN criteria, about 121 species have been recorded in the red data book of Indian plants from Himalayan Region, of these 17 are medicinal plants.[2] Red listed important medicinal plants species of India are 195 which contain certain drugs used in folk or traditional systems other than Ayurveda.[3]

It is necessary to intensify the efforts to conserve (*in situ* and *ex situ* conservation) and cultivate medicinal plants for prevention of further depletion of herbal wealth. The following measures for conservation of medicinal plants resources suggested are worth considering:[4]

- Government should encourage the traditional methods of conservation of forests
- *In situ* conservation by establishment of natural reserves or biosphere resources
- *Ex situ* conservation through medicinal plant gardens, artificial regeneration of botanical gardens and arboreta
- Creation of medicinal plant gene bank
- Proper assessment of population size mapping and biology of threatened plants
- To popularize the potential avenue of medicinal plants among local farmers for their commercial cultivation
- To conduct regular training camps for the farmers for cultivation, harvesting and sustainable utilization
- Dissemination of all related knowledge (conservation task) through print and electronic media.

Lack of coordination among various stakeholders in India is identified as one of the major constraints faced by the medicinal plant sector. Several Boards and Councils have been formulated to overcome these constraints. Among them National Medicinal Plants Board (NMPB) has drawn policies and strategies for conservation, proper harvesting, cost-effective, cultivation, research and development, processing, marketing of raw material to promote and develop this sector. Pharmaceutical Export Promotion Council (PHAREXCIL) handles various pharmaceutical items like bulk drugs and intermediates, formulations of herbal products, nutraceutical products, biotech and biological products, contract manufacturing, clinical trials and consultancy. Shellac and Forest Products Export Promotion Council (SHEFEXCIL) supervises export of lac and minor forest products such as gums, resins, natural dyeing substances (e.g., myrobalan fruits) and herbal extracts, basic Chemicals, Pharmaceuticals and Cosmetics Export Promotion Council (CHEMEXCIL) promotes basic inorganic and organic chemicals, essential oils and castor oil.[5]

Application of techniques of biotechnology in cultivation of medicinal plants was successful in producing a better yield of plant parts with more quantity of phytoconstituents. For examples:

- An experimental study was carried out during 1996–2000 to improve seed yield and L-Dopa content of *Mucuna pruriens* Baker. through conventional breeding. Total 17 parental lines of *M. pruriens* were collected and evaluated from various regions of India for seed associated characters including L-Dopa content and subjected to conventional breeding program. The parental itching and nonitching lines were taken and after breeding a stable line which is named as "*Zandu Kauncha*" with high yield and L-Dopa content and absence of trichomes on the pods was developed. Can we call this newly developed plant without trichomes as *Kapikachhu*?
- *Chlorophytum borivilianum* Sant. *et* Fernand. is a medicinal herb of commercial importance valued for its aphrodisiac activity and reached rare status in nature due to overexploitation. Owing to its increased demand, the species has attracted the attention of farmers as well as researchers in several institutions. In view of market demand, experiments were conducted to increase the yield of the root by controlling CO_2 levels and sucrose concentrations. The study shows an increase in the number of shoots.[6]

Fact of facts is that most popular Ayurvedic formulations like *Chyavanaprash*, *Dashamoolarishta*, *Ashokarishta* etc., are not genuinely prepared and marketed as per classical reference. It is generally observed that manufacturer is substituting or deleting or incorporating the adulterated drugs in the place of original drugs while preparing classical formulations. Most of the metals and minerals also require herbs for their purification and incineration processes. Depletion of forest area and medicinal plants finally lead to disappearance of classical prescriptions from the clinical practices and industry is being subjected to a critical situation to process even their proprietary medicines. Ban on mercurial preparations is another threat for the survival of Ayurvedic medical system.[7] So it becomes imperative to take up cultivation of medicinal plants of classical formulations as regular or intercrops on war footing basis.

A proper audit with regards to annual consumption of raw drugs being used by individual pharmacies should be carried out and insist them to go for cultivation of highly used plant material either in their own area or through buy back policy with the farmers. In current scenario the pharmacies are using raw herbal material of poor quality due to improper harvesting methods, post-harvesting, and primary processing methods. Drug with optimum potentialities alone is useful in the treatment of the ailments and poor quality raw material processed and marketed with exorbitant prices will tarnish the image of physician as well as Ayurvedic medical system.

If the same situation continues in coming years, classical Ayurvedic formulations will be put into cold storage and Ayurvedic drugs are going to be costlier in comparison to allopathic drugs without showing the desired therapeutic effect. It is a general observation that most of the pharmacies are marketing formulations for the treatment of life style diseases. Certain life style diseases like diabetes, hypertension, bronchial asthma, etc., require lifelong usage of medicines for effective management and prevention of complications. Thus it becomes mandatory to manufacture drugs with optimum therapeutic potentialities.

The list of medicinal plants to be cultivated must be drafted basing on the demand which falls into three categories: Plants in demand of export value, plant required for manufacture of most important Ayurvedic classical formulations and plants required for processing proprietary medicines. So the slogan "Wild to cultivation" must be adopted to prevent the depletion of medicinal plant resources in letter and spirit to abort the threat and to facilitate the survival of Ayurveda.

In this issue one invited article on Symbio-health; certain review articles about *Dhatusarata*, bioethics, medical geography; original researches on life style disorders like diabetes, bronchial asthma, hypertension, antioxidant and analgesic activities of folklore claims and standard manufacturing procedure of *Makardhwaja*, etc. are incorporated.

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