



## Innovative approach for assessment of status of lessknown medicinal plants in Sehore and Bhopal districts, M.P.

*Dolly Parmar*

*Govt. N.S.P. Science College Indore (M.P.) INDIA*

**ABSTRACT :** Less known medicinal plants were studied in Sehore and Bhopal districts to suggest appropriate strategies for research development and sustainable management. The status of medicinal plants under different parameters and causes of decline due to natural (drought) and man-made reasons (habitat loss, over harvesting of useful parts by destructive and unsustainable methods) were studied. A new approach has been developed to assess the status of 10 species of medicinal plants. The approach comprise of six criteria viz. habitat (5 parameters), ecology (3 parameters), biology (6 parameters), use/trade (3 parameters), collection (4 parameters), and legal & institutional (4 parameters). All the parameters have been ranked into three categories namely low, medium and high with scoring of 1, 2 and 4 marks. Each of the ten species were studied and ranked according to these parameters. Based on these considerations detailed studies were made on the following species viz. *Boerhaavia diffusa* Linn., *Enicostema littorale* Blume, *Plumbago zeylanica* Linn., *Gardenia gummifera* Linn. f., *Helicteres isora* Linn., *Woodfordia fruticosa* Kuntze, *Celastrus paniculatus* Willd., *Cocculus hirsutus* Linn., *Nyctanthes arbor-tristris* Linn., *Semecarpus anacardium* Linn. f. Attempts were made to know the status of medicinal plants due to degradation of natural habitats, biotic disturbances and their exploitation. Attempts have been made to suggest strategy for the conservation and sustainable utilization. Suggestions are given for capacity building of primary collectors and certification of medicinal plants as “Organic or Natural Products”.

**Keywords :** Medicinal plants, assessment, harvesting

### INTRODUCTION

All plants have potential medicinal value. This was recognized more than 1000 years ago in Asthanga Hridaya. Plants are being used for cure of human ailments since time immemorial in different geographic locales. Ayurveda is one of the oldest systems of medicine in India and a number of ancient texts like the Atharva veda, Charak Samhita, Sushruta samhita etc. This old books indicates that natural habitats were maintained in those times and plants were sustainably harvested ensuring their continuous availability. Subsequently, the exploitation pressure on medicinal plants increased concomitant to the increase in population and requirement, consequently most of the useful plants became rare (Basu & Kirtikar; 1918).

**(i) Assessment of status of medicinal plants.** The result of these CAMP workshops for South India enlists about 112 medicinal plant taxa under various degrees of threats ranging from “threatened” to extinct in the wild. This is mainly due to over use of plants of medicinal and economic significance. The 1997 IUCN red list of threatened plants published by the IUCN Species Survival Commission (SSC) presents a shocking picture of nearly 34000 species, or 12.5 % of the world’s flora, facing extinction. Using the same proportion for recorded medicinal plants, India’s nearly 1000 native medicinal species are expected to fall in to threatened category.

**(ii) The causes of decline.** The entrepreneurs were under pressure to meet the demands for which they resorted to some of the unsustainable practices. These include premature harvesting, destructive harvesting, overharvesting, lack of quality control, compromise on quality of raw material etc. (Kotwal and Bhattacharya, 1999).

**(iii) Trade in medicinal plants.** Adulteration makes the medicines either less effective, ineffective or harmful (Mishra and Ram Prasad, 1994). Though Ayurveda specifies usage of 1200 to 1500 medicinal plants, contemporary Ayurvedic Industry consume around 550-600 medicinal plant species for large-scale production of herbal products. Out of these around 90% are procured from wild areas mostly from the forest. Another category of medicinal plants consists of species which grow in wild as well as cultivated. More than 70% of the collections involve destructive harvesting from the wild for use of the parts like flowers, fruits, seeds, roots, bark, wood, stem and the entire plant (herbs). These pose a definite threat to the distribution and population of medicinal plants. The Government of India banned export of some 29 species of medicinal plants. Various studies being done over a period has indicated risk of extinction of valuable species due to high industrial demand. The results of a series of Conservation Assessment and Management Plan workshops (CAMP) held in various parts of the country to assess the threat status of important medicinal plants are alarming. If conservation efforts are not strictly implemented then these

are likely to become extinct. The turnover of the Indian herbal drug industry was Rs. 2300 crore during 1997 and reached around Rs. 4000 crore by year 2000.] The total estimated quantity of exports was 36200 tones in the year 2000. It is estimated that this raised to Rs. 3000 crore by 2005 and may go up to Rs. 10000 crore by 2010 as per Planning Commission, 2000. At present the share of India in world Herbal Market is quite insignificant due to the lack of organization both at cultivator/ collector as well as industry level.

(iv) **Sustainable harvesting.** Sustainability is very important aspect particularly in production and harvesting of medicinal plants. Harvesting of medicinal herbs from the wilderness is economically profitable as compared to cultivated species. Competition for collection of more quantity has resulted in the early and over harvest of such species from the more accessible sites. The bulk is picked when plants are only 2/3rd or even half of their potential size. This is one of the main causes of pre mature harvesting on open access land.

## MATERIALS AND METHODS

(A) **Study area.** The study was conducted in Bhopal and Sehore districts of Madhya Pradesh. Bhopal is situated on 23°16' north latitude and 77°25' east longitude. The total area of the district is 2778.0 sq. km. Sehore is the parent district of Bhopal. It is about 35 Km. West of Bhopal. The area of Sehore district lies between latitudes 23° 33' to 23° 38' 52" N and longitudes 76° 36' to 76° 59". The total area of the district is 6563. 68 sq. km. (Gazetteer, 1999).

(B) **Methodology.** The objectives of the study was to study the traditional uses of less known medicinal plants and suggest appropriate strategies for research development and sustainable management. At the initial stage it was very difficult to precisely decide the names of less known plants

of the study area about which detailed studies were to be made. A list of important medicinal plants of the study area was prepared (Hains, 1916). This was based on frequent field visits, study of literature and discussion with herbal practitioners. Thereafter the species for detailed studies were selected. The criteria for selection were based on occurrence of the species in different habitats, their importance and relatively less known for traditional uses in the area. The web site of *Google* (Internet web site) was searched on the Internet for all the important medicinal plants of the study area. The number of searches was categorized in three categories viz. 1. Less known: Number of searches = upto 1000; 2. More known: Number of searches = 1001 to 3000 and 3. Most known: Number of searches => 3000.

The "Rapid Vulnerability Assessment" (RVA) method was also considered that collects information to identify species, resources or sites that may be at risk of over exploitation. A questionnaire and data format was specially developed for the study covering following aspects :

Based on these considerations the following species were selected for detailed study. *Boerhaavia diffusa* Linn., *Encostema littorale* Blume, *Plumbago zeylanica* Linn., *Gardenia gummifera* Linn.f., *Helicteres isora* Linn., *Woodfordia fruticosa* Kuntze, *Celastrus paniculatus* Willd., *Cocculus hirsutus* Linn., *Nyctanthes arbor-tristis* Linn and *Semecarpus anacardium* Linn. f. For all these species, six categories viz. habitat (5 parameters), ecology (3 parameters), biology (6 parameters), use/trade (3 parameters), collection (4 parameters), and legal & institutional (4 parameters) with a total of 25 parameters were identified. These were arrived after study of relevant literature, discussion with the knowledgeable persons and field situation in the study area. All the parameters have been ranked into three categories namely low, medium and high with scoring of 1, 2 and 4 marks. Each of the ten species were studied and ranked according to these parameters as in Table-1.

**Table 1 : Parameters (Criteria) for study of selected medicinal plants in the study area**

Sl. No.	Parameters	Low	Medium	High
<b>A.</b>	<b>Habitat</b>			
1.	Habitat suitability	Least suitable	Suitable	Highly suitable
2.	Habitat specificity	Very specific	Less specific	Not specific
3.	Climate (Rainfall, Temperature)	Harsh (Extreme)	Medium	Normal
4.	Biotic disturbances (grazing, fire)	Common	Frequent	Least
5.	Protection level	Poor	Good	Very good
<b>B.</b>	<b>Plant ecology</b>			
6.	Occurrence	Wild	Cultivated	Wild & Cultivated
7.	Distribution	Fragmented	Patchy	Contiguous
8.	Abundance	Scanty	Occasional	Common
<b>C.</b>	<b>Plant biology</b>			
9.	Growth	Poor	Medium	Good

(Cont...)

Sl. No.	Parameters	Low	Medium	High
10.	Flowering	Poor	Good	Very good
11.	Fruiting	Poor	Good	Very good
12.	Seeding	Poor	Medium	Good
13.	Regeneration	Poor	Medium	Profuse
14.	Pests & diseases	Epidemic	Frequent	Few
<b>D.</b>	<b>Use/ Trade</b>			
15.	Plant parts used	Whole plants, roots	Flowers, bark	Leaves, seeds
16.	Other uses (Wood, tannin, fiber etc.)	> 3 uses	2-3 uses	1 use
17.	Trade	Commercial	Localized	Specific
<b>E.</b>	<b>Collection</b>			
18.	Collection stage	Premature	Sub- mature	Mature
19.	Collection extent	Total	Partial	Least
20.	Collection method	Destructive	Partly destructive	Non destructive
21.	Collecting people	Outsiders/Commercial	Un-Organised	Organised/local
<b>F.</b>	<b>Legal/ institutional</b>			
22.	Legal protection	Poor	Partly effective	Effective
23.	Awareness	Scanty	Some	Common
24.	Institutions (Societies)	Few	Some	Adequate
25.	Capacity building	Least	Some	Frequent

Where scoring: Low = 1, Medium = 2 and High = 4. Ranking; Critical = 25, Vulnerable = 25 – 50 and Not vulnerable = > 50

**Table 2 : Scoring (%) of all species under different parameters**

Species	Habitat	Plant ecology	Plant biology	Use/ Trade	Collection	Legal, institutional	Average %
<i>Boerhaavia diffusa</i>	45.0	41.7	58.3	43.7	41.7	25.0	44.5
<i>Enicostema littorale</i>	45.0	33.3	58.3	41.6	43.7	37.5	43.2
<i>Plumbago zeylanica</i>	30.0	25.0	45.8	58.3	37.5	25.0	38.6
<i>Gardenia gummifera</i>	50.0	25.0	45.8	66.7	62.2	25.0	44.1
<i>Helicteres isora</i>	50.0	41.7	54.1	50.0	68.7	56.2	53.4
<i>Woodfordia fruticosa</i>	50.0	41.6	58.3	50.0	62.5	25.0	47.8
<i>Celastrus paniculatus</i>	40.0	33.3	54.2	66.6	62.5	25.0	46.9
<i>Cocculus hirsutus</i>	60.0	41.7	66.6	58.3	50.0	25.0	50.2
<i>Nyctanthes arbor-tristis</i>	50.0	41.1	54.1	50.0	50.0	25.0	45.0
<i>Semecarpus anacardium</i>	40.0	25.0	45.8	50.0	56.2	43.7	43.5
Average	46.0	34.9	50.7	48.5	53.5	31.2	—

## RESULTS AND DISCUSSION

All the study species were given scoring on the basis of performance of different parameters. The analysis on scoring on all 25 parameters of the 10 species of medicinal plants is given in Table-2.

**Habitat.** Habitat is the home of living organisms. The medicinal plants are affected by the habitat. Among the ten species, *Plumbago zeylanica* has scored a minimum of 30% marks, which indicates the causes of it being so rare. It has a scanty occurrence in specified habitats. Because of its medicinal values, it is in high demand and heavily harvested.

Cultivation of the species is the alternative. *Cocculus hirsutus* has scored a maximum of 60% marks. It has a common occurrence in a variety of habitats. Because of limited medicinal values, it is not in high demand and not much harvested.

**Plant ecology.** On average all the species have scored about 35% marks thereby indicating problems in respect of their ecology. A minimum of 25% marks were scored by *Plumbago zeylanica*, *Gardenia gummifera* and *Semecarpus anacardium*. All these species occur only in wilderness areas and not cultivated in the study area.

**Plant biology.** The intrinsic factors within the plant body play important role in growth, flowering, fruiting, seeding, regeneration and resistance to pests and diseases. The species under reference have been studied in respect of all these parameters. *Plumbago zeylanica*, *Gardenia gummifera* and *Semecarpus anacardium* have scored 45.8% marks. All these species have poor regeneration due to different reasons. In case of *Plumbago zeylanica* the entire plant is useful and collected. In case of *Gardenia gummifera*, birds eat the fruits. In case of *Semecarpus anacardium*, the (mature fruits) seeds are collected for medicinal use. *Cocculus hirsutus* has scored 66.6% while, the average score is 50.7.

**Use/trade.** On average all the species have scored 48.5% marks which is within vulnerability. *Enicostema littorale* (41.6%) and *Boerhaavia diffusa* (43.7%) have scored less marks. This is because of use of entire plant and roots. In such cases some plants should be left in situ for regeneration. *Gardinia gummifera*, gum (66.7%) and *Celastrus paniculatus*, seeds (66.6%) have scored more marks due to use of only one part on local scale only.

**Collection.** The average score of all the species is 53.5%, which is slightly more, than limits of vulnerability. It is because of less availability of the required material and collection at local level. *Plumbago zeylanica* (37.5%), *Boerhaavia diffusa* (41.6%) and *Enicostema littorale* (43.7%) have scored fewer marks. It is because of destructive method of collection by uprooting of entire plants. Some plants must be left in situ. *Helicteres isora* (68.7%), *Gardenia gummifera* (62.2%), *Celastrus paniculatus* (62.5%) and *Woodfordia fruticosa* (62.5%) have scored more marks. It is because of less destructive method of collection of useful parts

**Legal/Institutional.** This is also very important aspect that affects various aspects of the medicinal plants. Certain species that come under threatened categories of IUCN, in appendices of CITES, listed in negative list of export and in Wildlife (Protection) Act have legal protection with provisions of punishment. Most of the species have scored 25% marks due to no effective legal protection. *Helicteres isora* has scored maximum marks (56.2). It is due to more awareness of people about the importance.

**Conservation and sustainable utilization.** In context of Madhya Pradesh it is necessary to develop appropriate programme for conservation and sustainable utilization of medicinal plants particularly for the health care of rural poor and also to help in their livelihoods. The unregulated trade of medicinal plants has serious implications on the survival of many species, which are threatened. Techniques for cultivation of prioritized species that are in high demand but in short supply from wilderness also need to be developed and the technology should be transferred from lab to the land for wider use (Govt. of Madhya Pradesh 2002).

The present study suggests strategy for the conservation and sustainable utilization of medicinal plants. One of the suggestions is capacity building of primary collectors for sustainable harvesting of medicinal plants in terms of time, methods and quantity to be collected. The training component should also include conservation, cultivation, value addition and marketing of medicinal plants. Beside, it is also important to develop appropriate harvesting standards based on scientific studies. Value addition is very important aspect for fetching better returns to primary collectors. Marketing of medicinal plants is ticklish due to poor storage, poor transport and lack of definite consumers/purchasers (Bisen 2001).

The deterioration in quality leads to poor marketing. The manufacturers and other stakeholders in the sector should ensure "quality standards" in collection, value addition, transport, storage and processing of end products to ensure the efficacy of Ayurvedic medicines. Attempts should be made to develop standards for certification of medicinal plants as "Organic or Natural Products". Similarly, cultivation of medicinal plants should also be done without use of pesticides or chemical fertilizer so as to ensure their medicinal properties and standard quality.

**Conclusion.** As has been indicated earlier that utilization of medicinal plants in the remote past was quite sustainable. The traditional ethics were followed which imposed several restrictions on time of collection, method of collection, extent of collection etc. The practitioners followed the traditional ethics due to which the natural habitats maintained, natural regeneration ensured with continued availability of medicinal plants (FRLHT 1997). But in the recent times the traditional ethics were not followed possibly due to high demand and greed. This has reversed the situation from plenty to scanty. This is the situation with respect to most of the natural resources. Therefore appropriate strategies covering above-mentioned parameters need to be developed and implemented for conservation and continuous availability of medicinal plants. The parameters of study and the approach of assessment of all parameters for each species is quite holistic covering all the aspects. This innovative approach has the potential to assess weaknesses and gaps in the present position and practices with indications for sustainable management of medicinal plants.

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