5

Medicinal Plants

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I. Uniqueness of Traditional and Folk Medicine

Introduction

Since times immemorial, medicinal plants have been used to promote good health and treat diseases afflicting people. Tribal and folk healers have amassed a wealth of knowledge about the medicinal uses of plants which has been handed on from person to person mostly by word of mouth. These oral traditions are continuing even today but as more and more villagers migrate into urban areas, this precious knowledge is in serious danger of being lost forever. Although some of these healing prescriptions have been referred to in the classical texts, practical understanding remains inaccessible to most people. Documentation of local health traditions was made a priority decades ago primarily to preserve the knowledge from disappearing. Several organizations have endeavoured to preserve it, but gaps do remain. Not enough work has been done to examine the efficacy of various medicinal uses of plants used by tribal people and villagers; or to protect this knowledge from being purloined and claimed as a discovery. Most importantly, the people that have found these unique medicinal uses have not been given credit except by way of publishing the names of the communities and tribal groups while publishing monographs.

In this sub-chapter an effort has been made by the PI to examine how unique the usage of specific plants by the tribal and folk people has been. The examination is miniscule but the findings point towards originality which should be treasured. This effort is only to motivate policy makers to seek a change in direction in a way that enhances the enormous benefits that could accrue.

Documentation of Tribal and Folk Medicine Practices by CCRAS and CCRUM

Many decades ago the research Councils – the Central Council for Research in Ayurveda and Siddha (CCRAS) and the Central Council for Research in Unani Medicine (CCRUM) understood the outstanding opportunity that was available through preservation and revival of such traditional knowledge.

CCRAS began research on the custodians of indigenous knowledge from the 1970s by undertaking extensive surveys through 17 survey units located at different parts of the country.[2]

Information was also collected by the Council's Tribal Research Units, Mobile Clinical Units and health centers. Each survey unit undertook a detailed study of the ethno-medicinal usage of plants by different communities. For example the CCRAS survey unit situated in Junagadh in Gujarat surveyed tribes like the *Bhils*, *Garasia*, *Siddi*, *Bharwad*, who lived in the tribal pockets in Haripar, Piper Toda, Jambuda, Koteshwar, Vijarkhi and Motathavaria Pipladevi.

Based on the research outcomes, the Council published a book called *An appraisal of Tribal-Folk Medicines* in 1999 containing nearly 2600 folklore medicinal practices.

1. This chapter was co-authored by Dr. Ashok B.K., Research Assistant, Gujrat Ayurved University, Jamnagar, Gujarat and Mr. Chinmay Rath, Senior Research Fellow (Botany), CCRAS, New Delhi. However the recommendations at the end of each of the three sub-chapters are exclusively those of the PI.

2. Bengaluru (Karnataka), Bhubaneswar (Orissa), Kolkata (West Bengal), Guwahati (Assam), Gwalior (Madhya Pradesh), Itanagar (Arunachal Pradesh), Jaipur (Rajasthan), Jammu (J&K), Jhansi (Uttar Pradesh), Junagadh (Gujarat), Mandi (Himachal Pradesh), Nagpur (Maharastra), Patna (Bihar), Tarikhet (Uttaranchal), Thiruvanthpuram (Kerala), Vijayawada (Andhra Pradesh) and Palayamkottai (Tamil Nadu).

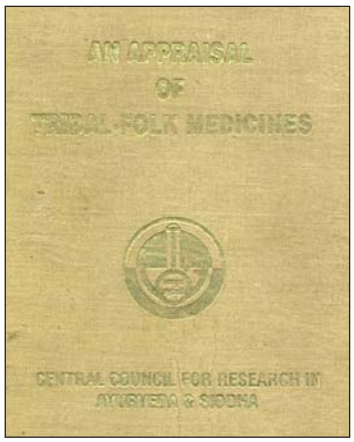


Figure 1. A book "*An appraisal of Tribal-Folk Medicines*" published by CCRAS, 1999.

Under each folklore practice enumerated, the local name of the plant is followed by its Sanskrit name, Botanical/ English name, the area of collection, the part of the plant used and the mode of administration. The compendium is cryptic and uninspiring to look at but represents primary research which was undertaken quite systematically and painstakingly.

The Central Council for Research in Unani Medicine (CCRUM) also took up similar work[3] and, as a result of the surveys, it published over 11,845 folk claims for treating a wide variety of disease conditions and showing the economic uses of thousands of plants. Based on this information, the Council has so far brought out seven publications:

1. *Medicinal Plants in Folklores of Northern India*, Part-I (2001) details of 464 folk drugs.
2. *Medicinal Plants in Folklores of Southern India* (2001) details of 202 folk drugs.
3. *Medicinal Plants in Folklores of Bihar & Orissa* (2001) details of 418 plant species covering 1484 folk prescriptions.
4. *Medicinal Plants in Folklores of Kashmir Himalaya* (2001) details of 181 folk drugs.
5. *Medicinal Plants in Folklores of Northern India*, Part-II (2006) details of 207 plant species covering 291 folk prescriptions.
6. *Medicinal Plants in Folklores of Southern India*,- Part-II (2006) includes 275 plant species covering 686 folk prescriptions.
7. *Medicinal Plants in Folklores of Orissa*, Part-II (2006) includes 252 plant species covering 652 folk prescriptions.

Survey Methodology of Research Councils

The survey teams of CCRAS and CCRUM comprised of a botanist, an Ayurvedic/Unani physician, a field assistant and a driver. Each survey unit of the Council was provided with a vehicle. One is referring to surveys conducted inside forests and village woodlands some 20-30 years ago when communication systems on land and through the telephone were rudimentary.

During the survey the botanist identified the medicinal plants using his knowledge of the regional flora. The final identification and authentication was done after comparison with published literature and herbarium sheets maintained in the regional and national herbaria. Each herbarium specimen was listed with its botanical name, family, local name, ASU name (wherever available), habitat, date of collection, locality, voucher specimen and the medicinal use(s) as observed. The identity was confirmed by matching the samples at reputed herbariums viz., Central National Herbarium (CNH), Howrah; Forest Research Institute (FRI), Dehradun; Botanical Survey of India (BSI), Coimbatore; Regional Research Laboratory (RRL), Bhubaneswar etc. The voucher specimens were docketed in the form of herbarium sheets by adopting the standard procedure. The herbarium sheets and plant specimens were deposited in designated institutes of CCRAS/ CCRUM for future reference.

The physician that accompanied the botanist diagnosed the disease condition for which the plants were being used. The identification of a particular ailment was done through consultation with local people and observation of the symptoms. The folk healers and elderly persons living in the area were interviewed and information regarding the local use of the plants was noted carefully. Sometimes one or two villagers were engaged to stay with the survey team and work as conduits to access the community.

The work was not easy. According to Dr. OP Mishra,[4] who went on such visits over a better part

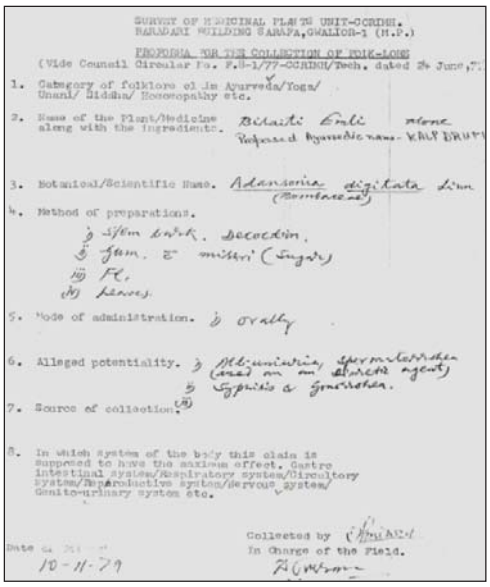
3. Survey of Medicinal Plants Units of the CCRUM are functioning at five places – Aligarh (Uttar Pradesh), Bhadrak (Orissa), Chennai (Tamil Nadu), Hyderabad (Andhra Pradesh) and Srinagar (Jammu & Kashmir).
4. Former Assistant Director (Botany), CCRAS, Department of AYUSH, Ministry of Health & Family Welfare, Government of India, New Delhi.

Figure 2. Seven different books published by CCRUM

of his career, the forests were inhospitable. Mosquitoes made life difficult and the kindness of the forest rangers alone could give them overhead shelter for a few days. The team had to convince the forest dwellers to overcome their initial hesitation about such visitations but eventually it was possible to gather data on the local name of the plant, the part used, its common local uses, method of preparation of the medicine, the way of application, dose and duration of treatment. For work undertaken in the 1980s and 1990s this must have called for remarkable perseverance.

Use of Medicinal Plants by Tribal & Folk Healers

In August 2009, the Principal Investigator who had written the foreword for some of these monographs when she was Secretary in the erstwhile Department of Indian Systems of Medicine decided to investigate how many of the plants listed in the eight volumes of CCRAS and CCRUM monographs were referred in the Ayurvedic, Unani and Siddha classical texts. A study of even a few classical texts would have been daunting. Fortunately the Traditional Knowledge Digital Library (TKDL) had entered all



SURVEY OF MEDICINAL PLANTS UNIT-CCRIMH.
NAVADARI BUILDING SARAFA,GWALIOR-1 (M.P.)

PROFORMA FOR THE COLLECTION OF FOLK-LORE
(Vide Council Circular No. F.8-1/77-CCRIMH/Tech. dated 26 June,77

1. Category of folklore cl in Ayurveda/Yoga/ Unani/ Siddha/ Homeopathy etc.
2. Name of the Plant/Medicine along with the Ingredients. Bilaiti Imli alone. Prepared Ayurvedic name- KHAP BRUTI
3. Botanical/Scientific Name. Adansonia digitata Linn. (Bombaceae)
4. Method of preparation.
   i) Stem bark. Decoction.
   ii) Gum. + mishri (Sugar)
   iii) Fl.
   iv) Leaves.
5. Mode of administration. i) Orally
6. Alleged potentiality. i) Abortifacient, spermatorrhea (used as an abortive agent)
   ii) Syphilis & Gonorrhea.
7. Source of collection. (iii)
8. In which system of the body this claim is supposed to have the maximum effect. Gastro intestinal system/Respiratory system/Circulatory system/Reproductive system/Nervous system/ Genito-urinary system etc.

Date 10-11-79
Collected by
In Charge of the Field.

Typical Note Sheet of field visit

Typical Herbarium Sheet of field visit

Figure 3. Field notes, herbarium specimens held in a standard depository.

the plants used in the three Indian systems digitally. The plants listed in the CCRAS and CCRUM monographs were made into a list and scanned with reference to the Traditional Knowledge Resource Classification (TKRC) that is the foundation of the Traditional Knowledge Digital Library (TKDL). TKRC is a modern classification based on system of the International Patent Classification (IPC) and specially developed in digitized form for the Indian Systems of medicine.

The TKDL team under the leadership of Mr. VK Gupta,[5] was requested to facilitate scanning the lists of plants used in tribal and folk medicine by comparing the names of the folklore species with the TKRC list of plants mentioned in the ASU classical texts. This list was scanned in August 2010 and for the second time in October 2010. During the first Phase 148 texts were used and during the second Phase 173 texts including those which had been added were consulted. Thereby in all 2.27 lakh formulations of ASU were scanned.

5. Senior Adviser and Director, Traditional Knowledge Digital Library, CSIR, New Delhi

As a result of this exercise 122 plants could be located which did not seem to find place in the Ayurveda, Unani or Siddha texts. But even so, in respect of 28 plants, the exact species used in folklore were not known; hence only 94 plants remained on which a preliminary study was possible. The aim of doing this search was to try and look at the medicinal uses of tribal and folk healers compared to what botanical web sites had to say on the known, documented use of these plants elsewhere in India and the world.

After screening and examining those 94 species and taking individual plant species into consideration, four species were identified which had not been mentioned in any of the classical texts, but were extensively used by folk practitioners to treat a variety of ailments.

Information on these four plants was gathered from available botanical sites to ascertain whether these plants are in use elsewhere and if so, for what purpose they were being used.

The selected plants were:-

No.	Local name	Botanical name and family
1	Bischubuti	*Girardinia heterophylla* Decene. (Urticaceae)
2	Bui	*Aerva tomentosa* Forsk. (Amaranthaceae)
3	Nagad Bavachi	*Ocimum americanum* L. (Lamiaceae)
4	Dantyari	*Scoparia dulcis* L. (Scrophulariaceae)

The medicinal use of these four plants found in botanical sites and as documented by CCRAS/ CCRUM were then compared:-

1. *Girardinia heterophylla* Decene.

Common name/ Local name	:	Bichchhoo, Bishcubuti
English name	:	Indian Stinging Nettle, Himalayan, Nettle, Nilgiri nettle
Hindi name	:	Bichchhoo
Botanical name	:	*Girardinia heterophylla* Decne.
Synonyms	:	*Girardinia diversifolia; Urtica heterophylla*
Family	:	Urticaceae (Nettle family)
Part used	:	Leaf
Area of collection	:	Gondla (Himachal Pradesh)
Type of disease	:	Skin disease
Mode of administration	:	Leaves are cooked and eaten as vegetable

(An appraisal of Tribal Folk Medicines. CCRAS publication; 1999. p. 258)

This plant is found in the wastelands and shrubberies at a height of 800 - 2700 meters in the Himalayas, in moist, shady, forested areas and at altitudes of 1200 - 3000 meters in Nepal, (http://www.naturalmedicinalherbs.net//) and also in different parts of India (Hooker J D, editors. The Flora of British India. Vol. V. L. Reeve and Co. Ltd. England; 1885.p.550).

Eating the leaves for medicinal purposes as a vegetable appears to be a unique use of this plant as search engines which were investigated showed completely different medicinal usage.

These are indicated in the footnote below.[6]

6. a. Decoction of the root and basal stem is mixed with wine and drunk as a cure for malignant boils (http://www.naturalmedicinalherbs.net//). b. The decoction of the roots, mixed with *Centella asiatica*, is used to treat gastric troubles (http://www.naturalmedicinalherbs.net//). c. The juice of the root is used to treat constipation (http://www.naturalmedicinalherbs.net//). d. The ashes of the plant are applied externally in the treatment of ringworm and eczema (http://www.naturalmedicinalherbs.net//). e. The fresh juice of the leaves is applied externally in the treatment of headaches and swollen joints (Chopra R N, Nayar S L,Chopra I C, editors. Glossary of Indian Medicinal Plants (including the supplement). Council of Scientific and Industrial Research. New Delhi; 1986. p. 125 and Kirtikar K R, Basu B D, editors. Indian Medicinal Plants. Vol. III. II ed. Lalit Mohan Basu. Allahabad; 1984. p. 2298). f. A decoction of the plant is used to treat fevers (Chopra R N, Nayar S L,Chopra IC, editors. Glossary of Indian Medicinal Plants (including the supplement). Council of Scientific and Industrial Research. New Delhi; 1986. p. 125). g. Dried or boiled leaves are used as diuretic, anti- rheumatic, anti-allergic and as galactogogue for lactating mothers (http://www.flowersofindia.net//). h. The leaf juice of this plant is used in gonorrhea, fever, headache and swollen joints. Locally in case of injuries a fresh root paste is prepared and applied on affected parts (Dhiman A K. Medicinal plants of Uttaranchal State. 1999: 426).

2. *Aerva tomentosa* Forsk.

Common name/ Local name	:	Bui
English name	:	Javanese Wol Plant
Hindi name	:	Bui
Botanical name	:	*Aerva tomentosa* Forssk.
Synonyms	:	*Aerva javanica* (Burm.f.); *Aerva persica* (Burm.f.) Merr.; *Iresine javanica* Burm.f.
Family	:	Amaranthaceae
Part used	:	Whole plant
Area of collection	:	Jaipur (Rajasthan)
Mode of administration	:	Ash of the plant mixed with gingili oil (*Tila Taila*) is applied on burns

(An appraisal of Tribal Folk Medicines. CCRAS publication; 1999. p. 40)

This tomentose herb extensively grows in north-west India mainly Thar desert region, plains of Punjab, Madhya Pradesh, Gujarat, and also in other countries like Myanmar, Srilanka, Arabia, East and West of Tropical Africa (The Wealth of India (raw materials).Vol.I. National Institute of Science Communication (NISCOM), Council of Scientific and Industrial Research (CSIR), New Delhi; 1995.).

The mode of administration which the survey brought out was unique. No one is reported to have used the ash of the plant mixed in oil for treatment of burns.

The medicinal uses available from search engines are given in the footnote.[7]

3. *Ocimum americanum* L.

Common name/ Local name	:	Nagad Bavachi
English name	:	Hoary Basil
Hindi name	:	Ran Tulsi
Botanical name	:	*Ocimum americanum* L.
Family	:	Lamiaceae
Part used	:	Seeds
Area of collection	:	Khareri, Rajasthan
Type of disease	:	Diarrhoea
Mode of administration	:	Powder of seeds is administrated orally with water.

(An appraisal of Tribal Folk Medicines. CCRAS publication; 1999. p. 35)

This plant is widely distributed in the plains and lower hills of India (Hooker, JD, editors. The Flora of British India. Vol. V. L. Reeve and Co. Ltd. England; 1885. p. 607).

However, the use of the powder of seeds for curing diarrhoea has not been listed and again shows the novel use of the Khareri folk/tribal people of Churu district of Rajasthan.

The medicinal uses available from different search engines are listed in the footnote.[8]

7. a. Decoction of flowers and seeds applied externally against swellings. b. Woolly seeds stuffed in pillows relieve headache and protective against rheumatism (http://www.science20.com/humboldt_fellow_and_science/blog//). c. Decoction of the plant is used to remove swelling (Chopra R N, Nayar S L,Chopra I C, editors. Glossary of Indian Medicinal Plants (including the supplement). Council of Scientific and Industrial Research. New Delhi; 1986. p.8 and Kirtikar K R, Basu B D, editors. Indian Medicinal Plants. Vol. III. II ed. Lalit Mohan Basu. Allahabad; 1984.p.2064.) d. Herb is diuretic and demulcent (Anonymous, The Wealth of India (raw materials).Vol.I. National Institute of Science Communication (NISCOM), Council of Scientific and Industrial Research (CSIR), New Delhi; 1995.) e. The seeds are used for rheumatism (Singh, Pandey. J Econ Tax Bot. 1980; 1:137-147.). f. Whole plant decoction is diuretic and demulcent. Leaf paste applied to treat wounds. Leaf decoction used as emetic and purgative. Seed paste applied to treat headache and rheumatism (Raveedra R, Martin P. Ethnomedicinal plants. AGROBIOS. Jodhpur. 2006; 212.) g. Leaves are used in gastric complaints (Jain S K, editors. Dictionary of Indian Folk Medicine and Ethnobotany. 1991; p.15)

8. a. Leaves made in to paste in parasitical skin diseases and applied to the finger and toe nails during fever when the extremities are cold (Chopra R N, Nayar S L,Chopra I C, editors. Glossary of Indian Medicinal Plants (including the supplement). Council of Scientific and Industrial Research. New Delhi; 1986. p. 178.). b.The plant leaves is taken thrice a day to cure dysentery (Sen SK, Behera L M. Ethnomedicinal plants used by tribals of Bargarh district to cure diarrhea and dysentery. Indian J Trad Knowl. 2008; 7(3): 425-428.).c.*Pawar*, *Bhil* and *Pardhi* tribes of Satpuda region of Dhule and Jalgaon districts of Maharashtra (this plant which is locally known as Gandhanya gavat) mostly used for parasitic flies, leaves are rubbed over body of cattle and leaf juice is used in cuts and wounds (Jain DL, Baheti AM, Jain SR, Khandelwal KR. Use of medicinal plants among tribes in Satpuda region of Dhule and Jalgaon districts of Maharashtra—An ethnobotanical survey. Indian J Trad Knowl. 2010; 9(1):152-157.). d.The tribals of the district Bargarh district of Orissa (viz., Sahanra, Binjhal, Gond and Kondh tribes) use this plant for the treatment of diarrhoea and dysentery (Sen SK, Behera L M. Ethnomedicinal plants used by tribals of Bargarh district to cure diarrhea and dysentery. Indian J Trad Knowl. 2008; 7(3): 425-428.).

4. *Scoparia dulcis* L.

Common name/ Local name	:	Dantyari
English name	:	Sweet broomweed
Hindi name	:	Mithi patti, Ghoda tulsi
Botanical name	:	*Scoparia dulcis* L.
Family	:	Scrophularaiaceae
Part used	:	Root
Area of collection	:	Gwalior (M.P.)
Type of disease	:	Dental Pain
Mode of administration	:	Root is chewed to stop toothache

(An appraisal of Tribal Folk Medicines. CCRAS publication; 1999. p. 66)

This plant is a perennial medicinal herb distributed throughout the tropical and subtropical regions and is a native of tropical America. (Riel MA , Kyle DE , Milhous WK . Efficacy of scopadulcic acid A against *Plasmodium falciparum* in vitro. J Nat Prod. 2002; 65: 614-615.)

The use of the plant's root to reduce toothache pain appears to be unique.

The medicinal uses available from different search engines are given in the footnote.[9]

Discussion and Conclusion

The foregoing research shows that indeed the knowledge about the properties of Medicinal plants held by tribal and folk people is enormous. The use of the plants could be unique as the foregoing four examples have shown. Therefore, this needs to be given a useful direction that goes beyond mere documentation and storage of data.

India is fortunate to have a rich reserve of indigenous knowledge on the use of medicinal plants as a multitude of local healers still practice traditional medicine. However, this important source of knowledge is currently under threat. There are over 400 tribal communities besides, grazers, shepherds and other villagers that live close to nature. These people are the real custodians of the medicinal plants which mainly grow in the forests. Out of 45,000 species of wild plants, these tribal and village communities are reported to possess knowledge of about 9,500 species. Of these, medicinal plants account for over 7,500 species – a huge number by all accounts. (Ethnobiology in India. A status Report – All India Coordinated

9. a.Leaves were the most frequently utilized plant part of *Scoparia dulcis* and most herbal remedies were prepared as paste and applied externally; in some cases medicinal preparations were also administered orally. Leaf were ground into a paste and applied topically on affected places to heal wounds. (Ayyanar M, Ignacimuthu, S. Herbal medicines for wound healing among tribal people in Southern India: Ethnobotanical and Scientific evidences. International JApplied ResNatProd. 2009; 2(3): 29-42.). b. Indigenous people in Ecuador consume tea of the entire plant to reduce swellings, aches and pains. The Tikuna Indian women drink the plant decoction for three days each month during menstruation as a contraceptive and/or to induce abortions. The indigenous tribes in Nicaragua use a hot water infusion and/or decoction of the leaves (or the whole plant) for stomach pain, for menstrual disorders, as an aid in childbirth, as a blood purifier, for insect bites, fevers, heart problems, liver and stomach disorders, malaria, sexually transmitted diseases, and as a general tonic. (The Healing Power of Rainforest Herbs. Square One Publishers. New York; 2005.) c. An infusion of the leaves is used in the fever, cough and bronchitis and as a gargle for toothache. Hot infusion is diuretic and cold decoction is used against kidney complains. A decoction of leaves and roots is used in fever (Kirtikar K R, Basu B D, editors. Indian Medicinal Plants. Part. II. Allahabad; 1823.), (Jain. EconBot. 1965: 19-44.), (Anonymous, The Wealth of India (raw materials).Vol.IX. National Institute of Science Communication (NISCOM), Council of Scientific and Industrial Research (CSIR), New Delhi; 1995.). d. This plant has been used as a remedy for treating diabetes mellitus in India and hypertension in Taiwan. Traditionally, the fresh or dried plant has been used as a remedy for treating stomach ailments, hypertension, diabetes, inflammation, bronchitis, hemorrhoids, and hepatosis, and as an analgesic and antipyretic agent (Ratnasooriya WD, Jayakody JR, Premakumara GA, Ediriweera ER. Antioxidant activity of water extract of *Scoparia dulcis*. Fitoterapia. 2005; 76:220-222.), (Riel MA , Kyle DE , Milhous WK. Efficacy of scopadulcic acid A against *Plasmodium falciparum* in vitro . J Nat Prod. 2002; 65:614-615.). e. Hot water infusion and/or decoction of the leaves or whole plant is used medicinally by indigenous tribes of Nicaragua to treat malaria, stomach disorders, menstrual disorders, insect bites, fevers, heart problems, liver disorders, and venereal disease. It has been used for blood cleansing, as an aid to child-birth, and as a general tonic (Latha M, Pari L , Sitasawad S, Bhonde R. Insulin-secretagogue activity and cytoprotective role of the traditional antidiabetic plant *Scoparia dulcis* (Sweet Broomweed). Life Sci. 2004; 75:2003-2014.). f. The herb is used in Brazilian folk medicine to treat bronchitis, gastric disorders, hemorrhoids, insect bites, and skin wounds. The herb is used in Asian medicine to treat hypertension (Freire SM, Torres LM, Souccar C, Lapa AJ. Sympathomimetic effects of *Scoparia dulcis* L. and catecholamines isolated from plant extracts. J Pharm Pharmacol. 1996; 48:624-628.). g. Plant is used as anti-emetic and in the conditions like gout, gonorrhoea, rheumatism, eye disorders (Jain SK, editors. Dictionary of Indian Folk Medicine and Ethnobotany. 1991; p.15) h. An anti-diabetic compound emellin has been reported in the leaf and stem of fresh green plant (Anonymous, The Wealth of India (raw materials). Vol.IX. National Institute of Science Communication (NISCOM), Council of Scientific and Industrial Research (CSIR), New Delhi; 1995.)

Research Project on Ethnobiology (Ministry of Environment and Forests, Government of India, New Delhi, 1994).

To save this rich repository of traditional folk knowledge, many Central and State government organizations like CCRAS and CCRUM, the Tropical Botanic Garden & Research Institute (TBGRI), Thiruvananthapuram and several NGOs, such as Foundation for Revitalization of Local Health Traditions (FRLHT), Bengaluru, Herbal Folklore Research Centre (HFRC), Tirupati; Rural Communes Medicinal Plants Conservation Centre (RCMPCC), Servants of the People Society, Lajpat, Deendayal Research Institute, Chitrakoot, Indian Society for Youth Development, Chandigarh; Dr. Hedgewar Birth - Centenary Service Society, Jabalpur; Vanavasi Kalyan, Bengaluru, etc. are working on community-based participatory approaches to support the conservation of medicinal plants and folk medicinal knowledge. Among them the documentation of FRLHT has received extensive coverage. This organization has promoted 'green health' among rural communities by facilitating the establishment of over 200,000 home herbal gardens and dozens of community gardens. It has also supported the creation of a network of over 250 Taluka based folk healer associations across seven States in India. The foundation presently has its main focus on outreach and to a comparatively lesser extent on education and research. TBGRI also has done substantial work since 1979 by carrying out ethnomedical surveys among the tribal/folk healers of different districts in Kerala. The documentation is reported to cover 545 single drugs and 15 simple combinations.The districts brought under this study include Palakkad, Thiruvananthapuram, Wayanad, Idukki and Kottayam.

Although a lot of work on folk medicinal practices has been carried out by many research organizations, it has been confined to specific regions of the country. However the work done by CCRAS/CCRUM covers several parts of the country and spans nearly 40 years. At present eight peripheral units of CCRAS and six peripheral units of CCRUM are working on various aspects of traditional knowledge. The surveys have shown that the same plants are used by different folk practitioners to treat different ailments in different regions. Thus, because of its wide canvas the work of the Councils is unique. It deserves to serve the public more meaningfully.

To bring these medicinal plants which are not referred in the classical texts but are extensively used in tribal medicine and folklore, a detailed project on "Extrapharmacopeial drugs" is underway in CCRAS with special emphasis on the standardization aspect. This is a welcome development. In the next two sub-chapters the linkage with raw drug trade and the demand and supply of medicinal plants is made. Also how enormous knowledge that has been retrieved and stored can be used to stimulate further enquiry.

II. Raw Drug Trade – Interaction with Dealers

Introduction

There is evidence of growing commercialisation in the manufacture, marketing and export of plant and plant based products. The supply chain of medicinal plants is informal, casual and sometimes even negligent. As a result, in the absence of macro level data about consumption patterns by different users, including manufacturers and medical practitioners of the ASU systems, it is difficult to plan for conservation or cultivation, except by rule-of-thumb.

Sustainability issues have also become a matter of serious concern. Exporters of medicinal plants would like to continue to export plants in high demand, while there are equally strong groups that warn against over exploitation of forest produce. More regulation is fraught with increasing the dangers of hoarding and black marketing. An atmosphere of free-for-all ultimately impacts on the quality of ingredients making public health and safety concerns a cause for anxiety.

In order to understand how the raw drug dealers operate, and how greater coordination can be brought about between the collectors of medicinal plants and the dealers, the Principal Investigator decided to meet with the raw drug dealers at Khari Baoli in Chandni Chowk, Delhi. Khari Baoli is just one of the large *mandis* in India, the other two big ones being located at Amritsar and Chennai.

The meeting was held on the 15th December, 2010 at Sales Office-2, Gopal Bhavan, Ramdev Market, Khari Baoli. The details of those who attended the meeting are at **Annexure-I**.

Methodology used to elicit information

Before the meeting a questionnaire **(Annexure-II)** had been sent to three associations of dealers of medicinal plants. The questions included:

1. How did you acquire knowledge about medicinal plants? Was it passed down as a part of family tradition or was it through self education?
2. How many different species are used on an average? How do you sort out and process the raw material for sale?
3. Are some plant species becoming extinct or rare and what should be done according to you?
4. How do you determine the price of raw material?
5. Do you think the responsibility for certification of drug quality and authenticity should be given to the provider or the manufacturer who purchases the raw drugs?
6. What do you suggest should be done to modernise your trade and would you be willing to participate in a scheme whereby only packed, labelled and certified raw drugs can be sold with a Best Before date?

Reaction of the dealers

Initially the dealers were not clear about the purpose of the visit and some of them tried to speak in an antagonistic way. It had to be explained that the purpose was not to police what they were doing but to find a way of improving the supply chain. The dealers indicated that they purchased the drugs without any treatment or processing and the critical areas related to the seasonality of plants which made continuous supply difficult. All the dealers admitted that there was significant variation and fluctuation in the quality and prices of raw drugs. Often the purchasers (representative of manufacturers) were unwilling to pay a fair price and therefore the traders sold the quality that the buyers were willing to pay for.

The dealers identified the quality of raw drugs through their own experience and organoleptic characters. Almost all the dealers recommended that drug testing laboratories should be recognised and regional pharmacognosy laboratories should be set up where the identification and certification of raw material could be done before the dealers sold the drugs to industry. It was their view that manufacturers should be made responsible for maintaining quality.

Regarding modernisation, they gave examples of facilities set up by the Agricultural Produce Marketing Committees (APMCs) for processing food items and strongly wanted the same approach to be adopted for medicinal plants. They felt that godowns with sorting space should be provided and persons working in the *mandis* should be properly trained.

They pointed out that in many parts of the country the produce collected from forests could not be transported without several changes en route as very often road connection was not available. With several change of hands, the produce deteriorated in transit. The suggestions they made included the following:

- Export of medicinal plants should be banned. On the other hand some dealers stated that the existing ban on several prime plant ingredients used in ISM, had led to surreptitious export and sale in neighbouring countries like Nepal and Pakistan.
- All drugs (medicinal plants) should be brought under price control when they are used as ingredients for medicine. A national plant-based medicines pricing authority should be set up.
- All drugs that come from cultivated sources should be exempt from taxes and duties.
- All the dealers wanted a cold storage facility to be established for the storage of raw drugs.

The suggestions of the raw drug dealers and the observations of the PI have been dealt with in detail in the next sub-chapter on Demand and Supply of Raw Drugs.

After the meeting the PI accompanied by the research officers and a few dealers visited some of the shops stocking and selling medicinal plants. The manner in which the merchandise was stocked was disturbing. The interiors of the shops were dark and the walls were grimy. Gunny sacks containing dry leaves, roots, barks and seeds were lying haphazardly on the floor. There was dust almost everywhere. Even the botonist could not identify the contents lying in the open sacks.

The traders were not perturbed by the visit or by questions posed to them and emphasized that it was for Government to find a proper place for them to sort, stone and label the produce. Since this is only one link in the supply chain, comprehensive recommendations are made subsequently.

III. Demand and Supply of Raw Drugs

Medicinal plants are the oldest known healthcare essentials. In India, about 2500 species are used for medicinal purposes, and about 90 percent of the raw material base used in ASU and traditional medicine is plant based. The drugs of the herbaceous categories are frequently used as whole plants, but it is common to use specific plant parts like the root, stem, leaf, flower, seed, fruit, bark of a stem, root wood, exudates or gum for making single drugs.

The National Medicinal Plant Board was established in response to a felt need for co-ordinating all aspects of the Medicinal Plant sector. The Government has not only set up the organisation with an independent CEO, but NMPB has persuaded the states to establish State Medicinal Boards. The current status of the work done is commendable. But there seems to be a need to use available technical and organisational resources more forcefully because there is an urgent necessity to bolster the safety profile and public acceptance of ASU drugs. There is a need for a clear and efficiently managed process which requires management at several levels. The questions the PI had asked the CEO and the responses, he gave are given in **Annexure-II & III**.

The PI met the CEO NMPB and requested for information relating to the major tangible achievements of NMPB in terms of improvement in supplies of raw drugs in high demand; the views on becoming a certification agency and to indicate examples of at least 3 highly successful projects that had performed well with assistance from NMPB, giving reasons for success and related issues. The response of the CEO NMPB at **Annexure II** provides data on the work done or planned to be done. However the details of oversight of collection, grading, packaging testing, certification with best before date have not been mentioned.

A nationwide study carried out by the Foundation for the Revival of Local Health Traditions (FRLHT), Bengaluru sponsored by the National Medicinal Plants Board (NMPB), which assessed the demand and supply of medicinal plants revealed that:

- The annual demand of botanical raw drugs in the country is 3, 19,500 MTs. The quantity estimated to be sourced from cultivation was 14,400 MTs.
- Annual trade value was estimated to be around Rs.1, 069 crore.
- 178 species used in trade used volumes in excess of 100 MTs per year.
- Out of the 178 species, 34 were reported to be sourced through cultivation, 46 from waste/ fallow lands, 91 from forests and the rest were imported.
- Out of the 178 species in high demand, 21 species have been categorized RET (rare, endangered and threatened).

(Ved, D.K. & G.S. Goraya, 2007. Demand and Supply of Medicinal Plants in India. NMPB, New Delhi & FRLHT, Bangalore, India.)

A recent study, brought out by the Associated Chambers of Commerce and Industry (ASSOCHAM), has shown that the domestic herbal industry will grow rapidly and by 2015 it is expected that the size of the domestic market would rise to Rs. 15,000 crore, reflecting a compound growth rate of over 20 percent.

Markets	Present Demand	Projected Demand (for 2015)
Europe	US$ 35 Billion	US$ 70 Billion
North America	US$ 6.5 Billion	US$ 25 Billion
China	US$ 4.0 Billion	US$ 12 Billion
India	US$ 1.5 Billion	US$ 3 Billion
Others	US$ 13 Billion	US$ 30 Billion
Total	**US$ 60 Billion**	**US$ 140 Billion**

[(http://www.trade india.com//) reported on 17.04.2011. (SME Times News Bureau, 06 March 2010.)]

The rising demand for plant-based drugs is creating heavy pressure on selected high-value medicinal plant populations found in the wild. Several of these medicinal plant species have slow growth rates, low population densities, and narrow geographic ranges. These factors increase pronenes to extinction. Increased use of medicinal plants coupled with the harsh harvesting methods are threatening to sustainability. Collection is associated with the livelihoods of tribal and rural communities that overharvest to earn more. The raw-material supply situation is already unsustainable in respect of certain key species.

The quality of medicinal plants has also become a major concern following reports of heavy metal content in Indian herbs. Adulteration and substitution of plants is a serious problem. Some of the common adulterants and non-permissible ingredients include botanicals, toxic metals, microorganisms, microbial toxins, pesticides, and fumigation agents. One study showed that 64% of samples collected in India contained significant amounts of lead (64% mercury, 41% arsenic and 9% cadmium). (Saper RB, Kales SN, Paquin J et al RS Heavy Metal Content of Ayurvedic Herbal Medicine Products *JAMA* 2004; 292:2868-2873). Although rebuttals have been made those have not had much impact on public perception.

Trade in medicinal plants is highly complex as it involves different individuals at different stages of marketing. A typical chain of such transactions starts with the collection of plant materials from the wild. The collectors are tribal people, villagers, including women and children. The material is collected at a local hub and a network of local traders delivers the medicinal plants to "road head centers" which lead to regional wholesale markets located in bigger towns or cities. The plants are often plucked indiscriminately in order to earn a little more.

The major problems include:

- Trade in crude drugs is monopolized by a few wholesale dealers in most of the markets and the rest of the shopkeepers are small traders, generally dependent for supplies on wholesale dealers;
- Due to high fluctuation in market rates, it is difficult to ascertain the actual price of a particular crude drug;
- The quality of crude drugs is not up to the mark as the material is stored in an unhygienic manner and is often infested with insects and fungus. The godowns where the drugs are stored are dark and dingy. This results in the deterioration of the crude drugs.
- The margin of profit is very large. The actual producer/cultivator does not get a reasonable price for the raw material.

Once the items are purchased it is impossible for the naked eye to distinguish good quality from poor quality. Storage at the factory premises is also haphazard.

Recommendations

Recommendations relating to the three sub-chapters are presented below:

I. Recommendations relating to 'Traditional and Folk Medicine'

The Department of AYUSH may consider setting up an institute on the lines of the Indian Institute for Foreign Trade (IIFT) for trade in medicinal plants having a division for tribal and folk medicine. The institute should offer postgraduate diplomas and MBA qualifications for students from multidisciplinary backgrounds with the objective of providing competencies required for managing trade, commerce and quality control of medicinal plants, including for export. The suggested group of students could include:

1. Medical graduates and post-graduates of Ayurveda, Unani and Siddha, medicine;
2. Graduates of: Pharmacy; Chemical engineering; food, flavour or oil technology related professional courses;
3. Post-graduates in agro-technology, pharmacognosy, botany, pharmacology, and industrial chemistry;
4. Graduates of Science or agriculture (B.Sc. with botany and/or chemistry as majors) with more than 5 years experience in the pharmaceutical industry.

The institute should be able to build capacity to conduct demand and supply analysis for medicinal plants based on international trends, forecast

market opportunities and manage supply for a variety of stakeholders.

The institute should build the competency to identify, supervise grading, packaging, labelling and certification of raw drugs; also to manage and supervise the import and export of medicinal plants by assisting customs authorities as well as agents. The management of trade of pre-processed drugs should also be taught from the angle of certification. The institute can also undertake consultancies on behalf of NMPB, industry or the state governments in due course.

In the sub-chapter on demand and supply of medicinal plants the need for creating a computerised database of all licensed products manufactured in the ASU sector has been made. The introduction of unique product codes for both classical and proprietary drugs has been suggested to be harmonised with the drug codes used by customs and at ports to be able to monitor imports and exports. Students can be trained to manage these functions and also to become equipped to deal with bar codes which should be made mandatory in due course.

In order to ensure that the all-important aspects of preserving biodiversity and undertaking commercial utilisation in a sustainable way receives attention, the Governing board of the Institute should operate with a Consortium of allied organisations like FRLHT and others that have domain knowledge of collection practices. Organisations concerned with sustainable development of medicinal plants should also be inducted on the Governing board so that sufficient emphasis is placed on sensitising students about the precariousness of the situation when it comes to plants that have been banned from being extracted or are on the verge of extinction. In this way competencies that are needed to manage the raw drugs sector professionally would be built and there would be a pool of managers available to support both the public and the private sector in quality control, enforcement of regulations, facilitate import and export and extend oversight to ancillary activities connected with the preparation of packaged and certified raw material.

Division for Tribal and Folk Medicine: The proposed institute should have a division for tribal and folk medicine and the survey of medicinal plant units run by CCRAS and CCRUM should be made the field units of this division. Funds should be earmarked for upgrading at least a few units so that they are capable of providing basic facilities for examining herbarium specimens, facilitating research, holding seminars and lectures, besides providing internet facilities, scanners and photocopiers for students.

The work of CCRAS and CCRUM should not stop with the publication of monographs and storage of survey data and herbarium sheets. These should be made accessible to students of botany and allied subjects who should be given access to the material that has been stored in survey units at 22 places in the country. University and college departments of Botany, Ethno-botany, Anthropology and institutes engaged in work on tribal people, should be encouraged to organize visits of college students to selected units. During the 12th plan, efforts could be made to upgrade at least five such units and to make them capable of imparting practical knowledge. Lectures should be arranged using modern forms of presentation and inviting speakers from related institutions concerned with local health traditions, ethnobotany and tribal affairs to work as part-time or guest faculty. Internships should be offered to students who wish to study the findings stored in the CCRAS herbarium with current availability and uses of the plants. Apart from Indian students, even foreign students can be given an opportunity to intern at the Councils' units after the facilities are upgraded and paying guest facilities are tied up locally.

II. Recommendation relating to 'Raw Drug Trade'

In the 12th Plan, looking at the general conditions in the market, there would need to be a complete overhaul in the management of raw drugs because that is fundamental and critical to the quality of medicine and the country's credibility for using high quality ingredients. Although the suggestions made by the raw drug dealers are correct in their own place, simply upgrading one part of the supply chain will not yield much result. While registration of the traders should be undertaken, certain non-negotiable requirements should be made mandatory for industry to follow when they purchase drugs. In the ultimate analysis the supply chain itself would have to be examined link by link to introduce checks that can reduce spoilage in transit.

III. Recommendations relating to 'Demand and Supply of Raw Drugs'

All crude drugs need to be given unique identification (ID) codes: It should be made mandatory for suppliers and manufacturers to label a particular raw material by its assigned codes. This would also ensure quality of raw materials supplied to physicians and industry.

Adopt successful systems/processes of other countries: There is a need to learn from countries like China, Thailand, Korea and Japan, who manage their raw material collection, drying, storage and packaging in ways that ensure that the raw material is free from microbial and fungal contamination when supplied to the end users. China exports quality assured raw material all over the world. NMPB should lead a delegation of professionals to study collection, sorting, storage and packaging centres in China, Thailand, Korea or Japan to view best practices. Following this, NMPB should support the establishment of model demonstration field units in collection centres in different regions, where medicinal plants are presently being traded. Best practices in post-harvesting technology for low temperature drying and storage of raw materials in well designed, moisture free godowns, including installation of processors for hygienic packaging should be introduced with the assistance of expert institutions that have the technical know-how and have been using such devices for grading, packaging and storing similar commodities. This experience can be used for preparing the outline of a DPR for the proposed Institute for Trade in Medicinal Plants also.

Establishment of co-operatives to improve supply chain: Collection, production and marketing co-operatives organized for dairy workers, spinners, handloom weavers, sugarcane growers and cottage industries have played a major role in economic upliftment of those groups. On similar lines Rural Cooperative Societies for medicinal plants should be set up where farmers can deliver cultivated medicinal plants. Such Rural Cooperative Societies should deliver the produce to cooperatives at the Taluka level, which can be transported to the District Cooperative Societies. The District Cooperative Societies should be guided and trained to clean and grade the raw materials collected. Graded material should be sent to the main depots by road or train. Each centre should have access to a notified laboratory to conduct tests before accepting the raw material. The raw material should be sold to manufacturers along with the test reports.

Regulation and monitoring of plant-based products: With the long term aim of improving regulation of quality products the Department of AYUSH may commission reputed IT agencies to develop a computerized master database of all approved, licensed products manufactured in the AYUSH sector. This database needs to be prepared with unique product codes, for both classical and proprietary drugs. The codes should have provision for recording manufacturing sites, dosage form, licensed approvals. These codes should be harmonized with the drug codes used by customs and at ports so that they can also be used for monitoring exports. All manufacturers should be required to adopt the unique product codes for licensed products.

Bar coding: In due course this database can be used for linking manufactured products to bar codes which should be made mandatory. This approach should however not prevent licensed physicians from manufacturing and dispensing their own home pharmacy products to their patients which is perfectly legal.

Use of pre-certified crude drugs: There are thousands of licensed and a similar number of unlicensed manufacturing units which are operating despite cancellation of GMP. The large number of manufacturing units can be attributed to comparatively low infrastructure costs, non-enforcement of Pharmacopoeial standards and absence of standardization. All licensed manufacturers should be GMP compliant and should procure raw drugs only from certified co-operatives or dealers which should be made a legal requirement.

Need to establish a Federation to support collection/ transportation and grading of medicinal plants

Presently the State Medicinal Plants Boards do not appear to have the wherewithal to coordinate this work. It would be better to initially outsource this work to established organisations like the

Horticulture Board, Spices Board or to any organisations that has set up a supply chain. In the long term NMPB should set up a Federation which can organise this work.

The Federation can have representations from the following agencies:-

- **Department of Forests:** For overall development & conservation of the biodiversity.
- **State Electricity Board:** To provide need-based power supply to the processing units. The unit(s) should be able to avail duty free diesel for power generation as per EXIM policy.
- **State Medicinal Plants Board:** For coordination with schemes for cultivation funded by NMPB.
- **Minor Forest Produce Federation Limited:** For collection and trading of non-wood forest produce.
- **Forest Development Corporation:** For Economic plantation and harvesting in forests.
- **Industrial Development Corporation and Agricultural Marketing Boards:** For financial and infrastructural support.
- **State Agriculture Universities and Colleges:** For research and development and training students.
- **CG-CERT:** For organic certification of medicinal plants, agriculture and processed items.

The organisational structure could be as follows:

National level Federation
(Planning, Oversight and Monitoring)
The Indian Institute of Packaging (IIP), Mumbai and the Agricultural and Processed Food Products Export Development Authority (APFPEDA) should be permanent numbers of the Federation

⇧

Regional or State level Federation
(Marketing arrangement and quality testing centre)

⇧

District level Centre
(Equipped with **ware house /cold storage facility (APMC module)**
(Establish linkage with other similar rural oriented development societies like National tree grower co-operative federation, Society for Promotion of Waste Land Development, NGO's like FRLHT etc.)

⇧

Collection Centre at Taluka level

⇧

Rural Cooperative Societies (RCS)
(Membership of farmers, medicinal plant collectors, cultivators, local Vaidyas.)

General Recommendation

Unless the approach for collection, grading and storage of raw material is handled professionally India will lose the opportunity to sell high quality products or to export raw drugs in a planned and sustainable manner. Therefore this needs to be given high priority in the 12th Five Year Plan but it is important to leverage the strength of existing organisations already having expertise in aspects like collection, grading/storage, packaging and certification, instead of waiting until NMPB is able to upgrade itself incrementally. An inter-agency group needs to draw up a road map and NMPB should outsource these activities once they are defined.

Annexure-I

Details of Meeting held on 15th December 2010 with Raw Drug Dealers of Khari Baoli

The Principal Investigator was accompanied by:

1. Dr. Ashok B.K (Research Assistant IPGT and RA, Gujarat Ayurved University, Jamnagar, Gujarat).
2. Shri Chinmay Rath (Senior Research Fellow (Botany), CCRAS, New Delhi).
3. Dr. Rasikh Javaid, (Unani Consultant, New Delhi)

On the side of the traders, the following attended:-

Sl.No.	Name of trader	Company
1	Anand Kumar Gupta	Uni Pharma India
2	Anand kumar	Anant overseas
3	Raj Kumar HarChand Rai	Hardwari Mal
4	Anil Kumar	Radhika Enterprises
5	Pramod Goel	Durga Prasad & co
6	Raj Kumar	Om trading Co
7	Rajiv Maheshwari Nathi	Ruggan Mal
8	Jitender Maheshwari Salig Ram	Maheshwari & Co
9	Saket Aggarwal	International Traders
10	Chetan Arora Satya	Tara & Co
11	Shyam Kapoor S.	Kapoor & Co
12	Satish Mehra	S.V. Marketing's
13	Aziz Bhai	Capital Traders

Annexure-II

Questionnaire sent to Medicinal Plant Dealers supplying Raw Drugs to Industry

उद्योगों को कच्ची औषधि की आपूर्ति में संलग्न औषधीय पौधों के डीलरों के लिए प्रश्नावली

मुखपत्र

पत्र कवर में स्पष्ट किया गया है कि हस्ताक्षरित प्रधान अन्वेषक श्रीमती शैलजा चन्द्रा ने एक विवरण लिखना प्रारम्भ किया है जो कि सार्वजनिक हितों को ध्यान में रखते हुए भारतीय चिकित्सा प्रणाली (आयु., यूनानी तथा सिद्ध चिकित्सा) की वर्तमान स्थिति का वर्णन करेगी साथ ही उन प्रमुख कमियों को पहचानने में मदद करेगी जिन्हें भारत सरकार के आयुष विभाग द्वारा 2012 से 2017 वर्षावधि के लिए तैयार की गई 12वीं परियोजना में पूरा करने की आवश्यकता हैं।

प्रमुख अन्वेषक द्वारा वर्तमान दस्तावेजों का अध्ययन किया गया है तथा शिक्षा, अनुसंधान, व्यवसाय, औषधि निर्माण तथा विपणन के क्षेत्र में हितधारकों के साथ साक्षात्कार किया जा चुका है।

कच्ची दवा की उपलब्धता तथा गुणवत्ता को प्रदर्शित करने वाले प्रश्नों को सूचीबद्ध किया गया है कृपया उनका उत्तर दें। कृप्या यह ध्यान रखें कि इस विवरण का उद्देश्य जनता द्वारा औषधीय तथा चिकित्सीय प्रक्रिया से सम्बन्धित सकारात्मक विशेषताओं को प्रस्तुत करना, तथा उन महत्वपूर्ण क्षेत्रों का पता लगाना है जो कि सार्वजनिक ज्ञान, सामर्थ्य तथा कमियों की विस्तार से व्याख्या कर सकते हैं, जिससे की भविष्य में व्यापक जनता इससे लाभान्वित हो सके। कच्ची दवा की गुणवत्ता उससे बनी आर्युवेद, सिद्ध तथा युनानी औषधियों की गुणवत्ता को प्रभावित करती है, अतः इस क्षेत्र में सुधार अति आवश्यक है।

मुद्दा

ASU उपयोगकर्ता में सभी अनुभागों द्वारा कच्ची औषधी की गुणवत्ता के खिलाफ आलोचना की गई है। यह कहा गया है कि सामान्यतः इन औषधियों की आपूर्ति वनों से एकत्र करके थोक में की जाती है, जो कि धूल तथा अशुद्धियों से भरी हुई होती है। इनकी गुणवत्ता का आश्वासन किसी भी स्तर पर नहीं दिया जा सकता कि उनके संग्रह तथा आपूर्ति में किसी प्रकार की मिलावट तथा प्रतिस्थापन नहीं किया गया है। ASU उत्पादों की गुणवत्ता तथा मानकीकरण पूर्णतया उसके स्रोत पौधों पर निर्भर करती हैं। उद्योगों, चिकित्सालयों तथा व्यक्तिगत औषधालयों द्वारा पौधों के स्वच्छतापूर्ण संग्रह, परिवहन, भंडारण तथा परिरक्षण की आवश्यकता पर जोर दिया गया है।

उद्योगों को कच्ची औषधि की आपूर्ति में संलग्न औषधीय पौधों के डीलरों के लिए प्रश्नपत्र

1. कच्ची औषधियों की खरीद का स्रोत क्या है?

   .....

2. आप कच्ची औषधियों का भंडारण कहाँ करते हैं?

   .....

3. औषधियों के भंडारण की अवधि को जानने के लिए क्या कोई रजिस्टर बनाया गया है?

   हाँ (1) ☐ नहीं (2) ☐

4. (क) कौन सा पौधा (1) ASU उद्योगों द्वारा उच्चतम माँग में हैं (2) खरीद में मुश्किल (3) विलुप्त प्रायः? 20–से 30 कच्चे औषधियों को उनके नाम तथा पौधों के उपयोगी हिस्सों द्वारा सूचीबद्ध करें?

ASU उद्योगों द्वारा उच्चतम माँग में हैं	खरीद में मुश्किल	विलुप्त प्रायः

   (ख) क्या यह संभव है कि कच्ची दवाओं की खरीद पर तब तक रोक लगा दि जायें जब तक की उनका स्रोत प्रमाणित न हो चाहे उन्हें देश के बाहर से मँगाया गया हो या देश में उत्पादित (उपजाया) किया गया हो?

   .....

   (ग) किस आधार पर ASU मण्डियाँ/सौदागर औषधियों की असलियत का निर्णय करते है?

   .....

   (घ) क्या औषधीय पौधों की सप्लाई करने वालों को ASU कि औषधियों में अधिकांशतयः उपयोग होने वाली 20–50 कच्ची औषधियों को प्रमाण पत्र देने कि जिम्मेंदारी दी जा सकती है?

   हाँ (1) ☐ नहीं (2) ☐

5. (क) कृपया सुझाव दीजिये कि डीलर अपना उत्पाद उद्योगों को बेचने से पहले, उत्पादों की पहचान तथा प्रमाणिकता कहाँ से करवा सकते हैं?

   .....

   (ख) क्या ड्रग तथा कोस्मेटिक एक्ट, 1940 में कोई नियम सम्मिलित किया जा सकता है जिससे कि निर्माता केवल प्रमाणित उत्पाद ही खरीदें?

   .....

(ग) पहचान तथा गुणवत्ता की परख की जिम्मेदारी किसकी हैः आपूर्तिकर्ता, जिसने वनों के उत्पाद को खारी बावली को बेचा, या डीलर जिसने औषधीय पौधों को उद्योगों को बेचा? (किसी एक पर √ करें)

(अ) आपूर्तिकर्ता की जिम्मेदारी (ख) डीलर की जिम्मेदारी

(1) ☐ (2) ☐

6. (अ) कृपया ASU औषधियों में प्रयोग होने वाले पौधों तथा पौधों के हिस्सों का प्रतिशत प्रकट करें जो आयात की जाती हैं।

.....

(ख) औषधियों की आपूर्ति करने वाले देश कौन से हैं?

.....

(ग) क्या सीमाशुल्क पर सामग्री की जाँच तथा पहचान करना सम्भव है?

हाँ (1) ☐ नहीं (2) ☐

(घ) यदि नहीं तो आयात की गई औषधि की गुणवत्ता को किस प्रकार प्रमाणित किया जा सकता है?

.....

(ङ) क्या इस प्रकार की प्रमाणिकता आयातकर्ताओं के सम्मिलित प्रयास से की जा सकती है?

हाँ (1) ☐ नहीं (2) ☐

(च) यदि नहीं तो क्या इसे कानून द्वारा किया जा सकता है?

हाँ (1) ☐ नहीं (2) ☐

7. क्या उत्तर भारतीय निर्माताओं तथा दक्षिण भारतीय निर्माताओं के मध्य उच्चतम माँग वाले पौधों के बीच कोई क्षेत्रीय अन्तर है?

हाँ (1) ☐ नहीं (2) ☐

8. औषधीय पौधों से सम्बंधित मण्डियों को किस प्रकार आधुनिक तथा स्वचालित बनाया जा सकता है कि उनके द्वारा ASU निर्माताओं को औषधियाँ प्रमाण पत्र, पैक करने की तिथि तथा सर्वश्रेष्ठता की तिथि के साथ बेची जाये?

.....

Annexure III

Letter of PI to CEO, National Medicinal Plants Board

Shailaja Chandra
Principal Investigator
Former Secretary, Department of AYUSH
& Former Chief Secretary, Government of NCT, New Delhi

Date: September 17, 2010

To,
The Chief Executive Officer,
National Medicinal Plants Board, New Delhi

Subject: Project on Status of Indian Medicine and Folk Healing in India

Dear Bala Prasad,

I was looking forward to receiving an analytical note from you by 3ist August according to our discussions when I had met you in your office. Just to recall our discussions, I had requested for:

1. Major tangible output of the NMPB in terms of improvement in supplies of raw drugs in demand State-wise.
2. With so many other agencies supporting the production of medicinal plants for export and drug formulation to what extent has the efforts of NMPB been able to register an impact? Does NMPB have a network with all agencies dealing with the development and export of medicinal plants?
3. It is learnt that NMPB is largely concerned with funding projects proposed by the State Medicinal Plant Boards. Does NMPB have an idea of the availability of high demand raw drugs required for formulation of ASU drugs by industry? How is this demand assessed? Is there a formal mechanism for consultation? Is there an Industry association that projects requirements to NMPB?
4. NMPB was stated to be extremely low on human resource. Is it feasible to use 50 botanists and Ayurveda /Unani experts (with training) to become a certification agency for raw drugs sold by the Mandis for medicinal purpose?
5. To what extent have the GAP requirements been fulfilled by growers of Medicinal plants supported by NMPB. How is incremental improvement being aimed for and with what success?
6. Give examples of at least 3 highly successful projects that have performed well with assistance from NMPB. Give reasons for success.

*. Mention main challenges in implementing the NMPB schemes.

7. Among all the players in the Medicinal Plant sector what is the role of NMPB? Is it recognized as a pivotal player or only as one among several players?

Kindly have the information sent at the earliest.

Regards,

Shailaja Chandra

Dr Bala Prasad
National Medicinal Plants Board, Department of AYUSH
Ministry of Health & Family Welfare, Government of India
Chandralok Building, 36, Janpath
New Delhi - 110001

Annexure-IV

Response of CEO NMPB to PI's Letter dated September 17, 2010

D.O.No. (C)-12/CEO/NMPB/2010
21st September, 2010

To,
The Principal Investigator,

Subject: Note in respect of National Medicinal Plants Board – reg.

Respected Madam,

Kindly recall our discussion and refer to your e-mail dated 17th September, 2010. Accordingly I have to provide point-wise information as follows:

1. Major tangible output of the NMPB in terms of improvement in supplies of raw drugs in demand State-wise.

   The compiled information on total plantation/cultivation under the major components of the NMPB Scheme under Resource augmentation, Contractual Farming and National Mission have been given in Annexure-I. The plantation status Statewise in different species have been given in Annexure-II. It is obvious from Annexure I that with the assistance of NMPB, 81658.98 ha area have been brought under medicinal plants cultivation/plantations till 31-3-2010. This has not only resulted in availability of good quality raw material to ASU industry, but also largely stablised prices of medicinal plants products. Besides, some key achievements of NMPB in this regard are as follows:

   - Mainstreaming of medicinal plants in forest departments. Guggul in Kutch; Dashmool in Valsad, Nasik, Orissa are a few examples.
   - Cultivation of species like Senna in Rajasthan; Atish and Kuth in Uttarakhand are some of the highlights.
   - Cultivation of Jatamanshi, Kuitki, Chirata by Sikkim Forest Department (FD) in high altitudes of Nathula through JFM.
   - First time plantation on extensive scale of Asoca by Orissa FD. They never did it in the past though Asoca naturally used to occur in the forests of Orissa.
   - Gradual but definite recognition of the need to share raw material data with Government. Earlier there was complete opacity and non-cooperation (thanks to the notification issued by Government due to NMPB's intervention).
   - School herbal garden a big success.
   - Amla campaign.

2. With so many other agencies supporting the production of medicinal plants for export and drug formulation to what extent has the efforts of NMPB been able to register an impact ? Does NMPB have a network with all agencies dealing with the development and export of medicinal plants?

   Though it appears that many agencies are involved in supporting the production of medicinal plants for exports and drugs formulations, they have very little and scaltered contribution in these fields, if it is seen in terms of the totality of impact. Over a period of time NMPB have developed networking with these organizations as well as many other scientific organizations, State Forest Departments etc. The position of the NMPB has emerged as main agency, which is duly appreciated by these agencies. NMPB has been able to give a boost to this sector in terms of making quality

raw-material available at reasonable price to the ASU industry and creating awareness about the importance of the sector as well as the conservation of the medicinal plants.

3. It is learnt that NMPB is largely concerned with funding projects proposed by the State Medicinal Plant Boards. Does NMPB have an idea of the availability of high demand raw drugs required for formulation of ASU drugs by industry? How is this demand assessed? Is there a formal mechanism for consultation? Is there an Industry association that projects requirements to NMPB?

   NMPB gives preference to the project proposals, submitted by or through SMPBs, the projects being implemented under the schemes by NMPB have much wider catchment area. The National Mission on Medicinal Plants scheme is being implemented through State Horticulture Missions. The resource augmentation of RET species are being successfully implemented through the State Forest Departments of Gujarat, Rajasthan, Madhya Pradesh, Orissa etc. NMPB has been able to conduct a comprehensive study on demand and supply of medicinal plants in India in 2007. This study has highlighted the fact that although the data from the published records in Ayurveda, Siddha, Unani, Sowa-rigpa, Homoeopathy and Ethno-botanical literature estimates the total number of species used in Indian System of Medicine at around 6000, only 960 of these have been recorded in trade. A significant suggestion of this report is that in the next few years the priorities for conservation efforts and cultivation should be sharply focused on 178 of these 960 species, which are traded in high volumes in quantities exceeding 100 MT per year. The study had duly covered ASU industries. NMPB is also preparing for another comprehensive study of demand and supply. While sanctioning the project particularly on cultivation/plantation, the demand and supply condition of the species are kept in reference. ASU Industries Association are always in touch with NMPB with formal and informal consultations.

4. NMPB was stated to be extremely low on human resource. Is it feasible to use 50 botanists and Ayurveda/Unani experts (with training) to become a certification agency for raw drugs sold by the Mandis for medicinal purpose?

   The matter needs to be considered in context of existing legal provision particularly with reference to Pharmacopoeias of Ayurveda and Unani where the legal power is vested with the drugs inspectors and PLIM/HPL. Further, it is important to ensure that good quality raw-material is used by ASU industries. In this context NMPB may play an active role in this field. The legal position needs to be broadbased and practical. Developing NMPB as Certifying Agency is an excellent idea . NMPB has already roped in Quality Council of India to develop standards.

5. To what extent have the GAP requirements been fulfilled by growers of Medicinal plants supported by NMPB. How is incremental improvement being aimed for and with what success?

   Though Good Agricultural Practices (GAPs) have been notified by NMPB, sincere efforts needs to be made for its comprehensive compliance. We need to make State Missions more active on the GAPs of medicinal plants and organize training workshops for the farmers and certification agency in this field. Further, there is need to develop GAP for each important species. Board will take up this aspect of GAP soon.

6. Give examples of at least 3 highly successful projects that have performed well with assistance from NMPB. Give reasons for success.

   Isabgol project in Rajasthan, Guggul in Gujarat and Asoca in Orissa.

   - Isabgol has huge domestic and international demand and climate of Rajasthan is very suitable for its cultivation.
   - India has been importing large quantity of guggal. Through research, propagation technique of Guggal could be successfully developed. Forest Department, Guajarat and Rajasthan are efficient implementing agency.

- Ashoka bark is in huge demand and it is naturally found in Orissa Forest. Forest Department could take up successful plantations of Ashoka.

In all above projects pro-active role played by NMPB was one of the reason for success.

7. Among all the players in the Medicinal Plant Sector what is the role of NMPB? Is it recognized as a pivotal player or only as one among several players?

Gradually the role of NMPB as a pivotal player is being appreciated. Though there are many players in this field but they have their own limitations whereas the NMPB is fully focussed on medicinal plants sector. It is contributing substantially for growth of the sector. The constitution of NMPB is being appreciated by almost all groups of stakeholders.

With regards

Yours sincerely,

(BALA PRASAD)

Ms. Shailaja Chandra
Chairman, Delhi Public Library &
PI (Project on Status of Indian Medicine and Folk Healing),
H-Block, Sarojini Nagar,
New Delhi-23.

Encl.:As above.

State-wise Area Covered Under Various Medicinal Plant Species Under Centally Sponsored Scheme of National Mission on Medicinal Plants During 2008-09

(Area in ha)

S.No.	State	Name of the Species	Area Coverd (ha)
1.	Assam		
		Ocimum sanctum (Tulsi)	50
		Piper longum (Pippali)	30
		Swertia chirata (Chirata)	20.5
		Saraca asoca (Ashok)	20
		Aegle marmelos (Bael)	20
		Rauwolfia serpentina (Sarpagandha)	20
		Emblica officianlis(Amla)	20
		Withania somenifera (Ashwagandha)	20
		Tinospora cordfolia (Giloe)	20
		Sub Total	**220.5**
2.	Bihar		
		Aloe Vera (Ghrit kumari)	1
		Emblica officianlis(Amla)	0
		Ocimum sanctum (Tulsi)	20
		Andrographis paniculata (Kalmegh)	40
		Stevia rebaudiana (Stevia)	0
		Asparagus racemosus (Shatavar)	20
		Chlorophytum borivillianum (Shwet musli)	16
		Madhukari	2
		Withania somenifera (Ashwagandha)	4
		Acorus calamus (Bach)	2
		Sub Total	**105**
3.	Karnataka		
		Withania somnifera (Ashwagandha)	1491.0
		Ocimum sanctam (Tulsi)	250.9
		Sanatalum album (Chandan)	227.7
		Emblica officinalis (Amla)	270.2
		Coleus barbatus (Patharchur)	111.0
		Garcinia indica (Kokum)	22.4
		Acorus calamus (Bach)	1.2
		Andrographis paniculata (Kalmegh)	0.0
		Asparagus racemosus (Shatavar)	0.0
		Stevia rebaudiana (Stevia)	13.4
		Gloriosa superba (kalihari)	14.9
		Aegle marmelos (Bael)	5.0
		Cinnamomum zeylanicum (Dalchini)	2.8

(Area in ha)

S.No.	State	Name of the Species	Area Coverd (ha)
		Aloe Vera (Ghrit kumari)	2.6
		Azadirachta indica (Neem)	2.2
		Bacopa monnieri (Brahmi)	2.0
		Ghambhari	0.8
		Sub Total	**2418**
4.	Kerala		
		Emblica officinalis (Amla)	50
		Saraca asoca (Ashok)	50
		Aloe Vera (Ghrit kumari)	30
		Piper longum (Pippali)	15
		Rauwolfia serpentina (Sarpagandha)	25
		Bacopa monnieri (Brahmi)	30
		Ocimum sanctum (Tulsi)	
		Asparagus raecemosus (Satavari)	25
		Convolvulus vettiveroides (Shankpushpi)	30
		Sanatalum album (Chandan)	30.2
		Sub Total	**285.2**
5.	Maharashtra		
		Chlorophytum borivillianum (Shwet musli)	310.04
		Cassia angustifolia (Sena)	0
		Andrographais paniculata (Kalmegh)	0
		Withania somenifera (Ashwagandha)	0.2
		Asparagus racemosus (Shatavar)	0
		Piper longum (Pippali)	78.71
		Stevia rebaudiana (Stevia)	22.15
		Ocimum sanctum (Tulsi)	0
		Phyllanthus amarus (Bhumi amlaki)	0
		Macuna prurita (Konch)	0
		Bacopa monnieri (Brahmi)	0
		Gymnema Sylvestirs (Gudmer)	0
		Terminalia arjuna (Arjun)	0
		Saraca asoca (Ashok)	0
		Terminalia bellerica (Bahera)	0
		Terminalia chebula (Harad)	0
		Aegle marmelos (Bael)	0
		Embelia ribes (Vai Vadang)	0
		coleus	2.48
		Sub Total	**413.58**

(Area in ha)

S.No.	State	Name of the Species	Area Coverd (ha)
6.	Manipur		
		Aloe Vera (Ghrit kumari)	50
		Stevia rebaudiana (Stevia)	50
		Sub Total	**100**
7.	Mizoram		
		Emblica officianlis(Amla)	66
		Cinnamomum verum	16
		Sub Total	**82**
8.	Nagaland		
		Aquilaria agallocha (Agar)	165
		Swertia chirata (Chirata)	
		Sub Total	**165**
9.	Tamil Nadu		
		Cassia angustifolia (Sena)	1623.16
		Gloriosa superba (Kalihari)	514.69
		Catharanthus roseus (Sadabahar)	28.95
		Emblica officinalis (Amla)	200.34
		Azadirachta indica (Neem)	98.33
		Solanum nigrum (Makoy)	25.12
		Coleus (Patharchur)	1039.82
		Aloe Vera (Ghrit kumari)	28.65
		Cymbopogan flexuosus (lemnongrass)	0
		Mentha piperita (Mentha)	0
		Acorus calamus (Bach)	82.12
		Ocimum sanctum (Tulsi)	77.01
		Sida cordifolia	55.96
		Gymnema Sylvestirs (Gudmer)	0
		Withania somenifera (Ashwagandha)	0
		Aegle marmelos (Bael)	0
		Piper longum (Pippali)	39.48
		Phyllanthus amarus (Bhumi amlaki)	1
		Macuna prurita (Konch)	0
		Andrographais paniculata (Kalmegh)	0
		Santalum album	44.2
		Total	11.03
		Sub Total	**3869.86**
		Total	**7659.12**