MEETING REPORT

Endangered medicinal plant species in Himachal Pradesh*

One of the richest reservoirs of biological diversity in the world, the Indian Himalayan Region (IHR) is undergoing irrational extraction of wild, medicinal herbs, thus endangering many of its high-value gene stock. Community-based *ex situ* cultivation of endangered medicinal plants (EMPs) is acknowledged as a possible solution to meet raw material bulk market demand and to reduce *in situ* harvesting pressure. This requires identification mechanisms and taxa prioritization.

In the International Year of the Mountains–2002, a workshop on 'Endangered Medicinal Plant Species in Himachal Pradesh' was attended by forty experts from diverse disciplines. Four technical sessions deliberated upon

(i) Endangered species diversity, characterization and evaluation,
(ii) Production through cultivation,
(iii) Trade, linkages and ethics, and
(iv) Conservation approaches.

In the inaugural session, M. Pal (Director, GBPIHED, Almora) spoke about R&D activities of the institute and the important role it plays in conservation of EMPs in HP. Defining the workshop theme, H. K. Badola, Convenor (GBPIHED, Kullu) suggested that species prioritization should not ignore the local or global perspective, the techno-feasibility, economic viability, ensured marketability and farmers' acceptance. Explaining the role of agriculture to improve livelihood through intensive EMP farming in mountains, S. James (Rothamsted International, UK) emphasized that effective partnerships from this forum should develop an action plan. I. P. Abrol (CASA, New Delhi) stressed that EMP cultivation will help economic uplifting of the community. The Chief Guest, P. K. Khosla (DBT, HP Government) spoke about the initiatives by the state in the medicinal plant bio-business.

In session-I, reviewing medicinal plant diversity for the IHR, U. Dhar (GBPIHED, Almora) stressed on ranking species for sensitivity in prioritization. C. Aldam (University of Bristol, UK) presented user-friendly genetic techniques for indirect assessment of biodiversity characterization. M. C. Nautiyal (HAPPRC, Srinagar–Garhwal) reported that active contents in high-altitude EMPs increase with plant age and decrease towards lower altitudes. B. Khambay (IACR, UK) explained that bio-efficacy of a plant depends on its nutritional and environmental conditions influencing secondary metabolite production. The paper by M. A. Haque (MoEF, Government of India) in absentia, reviewed the medicinal plant conservation parks.

In session-II, C. Foyer (IACR, UK) elucidated prospects for enhancement of soluble antioxidants that combat environmental triggers, particularly those that cause increased oxidative stress. R. Raina (YSPUHF, Solan) reported poor seedlings in *Gentiana kurroo*, due to premature anther development. In *Valeriana jatamansi*, harvesting of the leaves, though containing less active ingredients than the rhizome, is most sustainable. M. C. Nautiyal (HAPPRC, Garhwal) presented cost–benefit analysis in agro-technology of some alpine EMPs. A. Maitra (IHBT, Palampur) spoke about the initiatives taken by his institute in the cultivation and processing of medicinal plants. A. Ahuja (RRL, Jammu) reported high-frequency *in vitro* multiplication of *Swertia chirata* and *Atropa acuminata*.

In session-III, A. Chopra (Biosys Ltd, Rothamsted, UK) spoke about developing international standards for cultivated

Table 1. Prioritization of endangered medicinal plant species for *ex situ* cultivation in Himachal Pradesh (a workshop-exercise)

Species	Endangered status	Knowledge base	Cultivation prospect	Marketing	Ranking
Cold-desert zone					
Dactylorhiza hatagirea (D. Don) Soo	A	A	B/C	A (N) A (I)	II
Ephedra gerardiana Wall. Ex Stapf	A	C	C	A+ (N/I)	IV
Nardostachys jatamansi D.C.	A+	A	B/C	A+ (N) A+ (I)	I
Saussurea costus (Falc.) Lipsch.	A	A	A	A+ (N)	III
High-altitude zone					
Aconitum heterophyllum Wall. ex Royle	A	A	B	A (N) A (I)	III
Angelica glauca Edgew.	A	A	A	B (N) C (I)	V
Picrorhiza kurrooa Royle ex Benth.	A	A	A	A (N) A (I)	II
Podophyllum hexandrum Royle	A	A	B	A (N) A (I)	IV
Swertia chirata Buch.-Ham.	A+	A	A	A (N) A (I)	I
Mid-altitude zone					
Atropa acuminata Royle	A	B	B	A	II
Valeriana jatamansi Jones	Locally threatened	A	A+	A+	I
Low-altitude zone					
Cinnamomum tamala (Buch.-Ham) Nees & Eberm.	B	A	A	A	III
Gloriosa superba Linn.	B	A	A	A	II
Rauwolfia serpentina Benth.	A	A	A	A	I

N, National level; I, International level.

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produce. S. Mohan (Hari Industries, Mandi) explained the need by scientists to develop strains of EMPs for commercial cultivation. D. R. Nag (RIISM, Jogindernagar) discussed future raw-material requirements by pharmaceuticals. M. Kapoor (Mediroma International, Kullu) informed about the decline and adulteration of raw materials available to local units. J. Sodhi (Ayush Herbs, Kangra) highlighted licensing problems for trade in HP, resulting in illegal markets.

In session-IV, Judy Man (Rothamsted International, UK) covered aspects related to building partnerships. L. Singh (HRG, Shimla) expressed the concerns of NGOs in the cultivation of EMPs. R. R. Bhalaik (HFRI, Shimla) felt that it was important to enumerate and quantify EMP resources and develop a database. N. A. Farooquee (GBPIHED, Almora) spoke about barter exchange practices in *Zanthoxylum armatum* among the Himalayan tribes.

Pal led the plenary session on the second day, focusing on technical and commercial dimensions of cultivation. A two-step cultivation initiative was identified: short term (demonstrations) and long term (community-based cultivation). Four basic criteria were considered to prioritize species-endangered status (based on literature and local perception), knowledge base (on population studies, multiplication technology and cultivation trials), cultivation prospects (technical and economic feasibility) and marketability. Four agro-climatic zones were identified for cultivation (Table 1). Species identified for each zone were assessed for their elite populations, availability of propagule and quality planting stock, certification, processing, quality production, value-addition and ensured-markets. *Swertia chirata*, though ranked among the top for high-altitudes was excluded for immediate cultivation due to its long gestation period and delicate field-handling requirements. *Picrorhiza kurrooa* and *Aconitum heterophyllum* were highly recommended.

A follow-up committee (Pal, James, Abrol, Chopra, Man and Badola) was formed to carry forward the programme. James revealed that a pilot-fund is available. Other recommendations were: review knowledge on targeted species, identification of best cultivation practices, R&D to reduce long-gestation periods, cost-effective technology, organic-farming, buy-back mechanisms, policy-revision in the interest of stakeholders, protocols for post-cultivation management, quality-control and awareness training.

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MEETING REPORT

International Ornithological Congress*

The International Ornithological Congress (IOC) is one of the oldest and most widely attended of international scientific meetings. This event is held once in four years, and unlike other biological conferences, attracts a large number of amateur nature-lovers (especially bird-watchers). The 23rd IOC was attended by over 1000 ornithologists and bird-watchers from all over the world. The congress included over 700 presentations.

A wide range of topics, including biogeography, ecology, taxonomy, behaviour and molecular biology were covered in these presentations. The greatest strides in ornithological research have been made in the study of bird migration and in the use of molecular biology tools in resolving taxonomic problems. It was heartening to listen to presentations that questioned the validity of revised systematics of birds of the world by Charles Sibley and colleagues, that was published around 10 years ago based on molecular biology tools. Recent studies on galliform birds (pheasants, jungle fowl, peafowl, partridges, etc.) based on a number of attributes such as behaviour, colour pattern, morphological traits and also molecular genetics have suggested that the traditional Linnaean systematics may still be adequate for dealing with the often complex groups of birds.

Probably, the best component of the IOC was the two-day exhibition of fossils of birds unearthed in China. These 100–150 m.y. old fossils included sparrow-like birds to typical bird-dinosaurs. What was however disappointing was the general lack of participation from South Asia and Africa in the IOC. There were 13 Indians (although not all of them represented institutions in India), a couple of Pakistanis and none from Sri Lanka, Nepal or Bangladesh.

The papers from North America addressed issues of ecology, systematics and behaviour without specifically focusing on regional influences. Further, many of the general papers were based on laboratory experiments conducted in Europe and North America.

The 24th IOC is scheduled to be held during August 2006 at Hamburg (Germany). It may be most useful if we have a delegation of Indian ornithologists in this congress, since there has been for

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