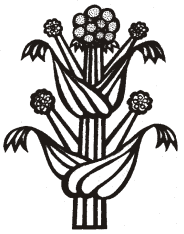
Medicinal Plant Conservation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Chaired by Danna J. Leaman


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Focus on National Parks

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Chair's Note

Danna Leaman

As you will have learned from Uwe Schippmann's "Chair's Note" in the previous volume (6) of *Medicinal Plant Conservation*, Uwe stepped down as Chair of the MPSG last year, coinciding with the round of appointments of all IUCN specialist group chairs and invitation of members for the new IUCN Triennium. Uwe has chaired the MPSG since it was established in 1994, first as Co-chair with Tony Cunningham for the 1994-1997 Triennium, and as Chair during the 1998-2000 Triennium. Uwe and Tony met the huge challenge of forming a globally representative expert network of members committed to the conservation and sustainable use of medicinal plants. Under Uwe's leadership, and with continuing contributions from Tony and other members, the MPSG has become one of the largest, most active, and visible specialist groups of the IUCN SSC. The current and earlier volumes of this newsletter describe many of the research and policy activities in which members of the MPSG are involved. I have accepted the invitation of David Brackett, Chair of the IUCN Species Survival Commission, to chair the MPSG for the current IUCN Triennium, until the next World Conservation Congress in 2003. Having worked closely with Uwe and Tony since 1997 as Executive Secretary of the group, I am assuming this new responsibility with great appreciation for the vision and work involved in what they have achieved.

During the current Triennium (2001-2003), my principal commitments as Chair will be to establish a steering committee and regional sub-group management structure for the MPSG (a proposal that has evolved within the group over the last few years), to work with members and partners to develop, raise funds for, and implement our programme and objectives, and to set up more efficient communication tools for the group (such as an electronic list-serve and a website). Invitation of members for the current Triennium is currently underway, within the context of establishing the steering committee and regional sub-groups where these are most clearly needed (Himalayas and Indian Subcontinent; Caribbean and Central America; North America/Mexico). Uwe and Tony have agreed to continue their guiding role in the group as members of the steering committee, currently joined by Vinay Tandon and Sonia Lagos-Witte. As regional vice-chairs, Vinay and Sonia will be working with members in the Himalayas/Indian Subcontinent, and Caribbean/Central America, to establish regional MPSG sub-groups and develop regional programmes. In partnerships with the International Development Research Centre and the Canadian Museum of Nature, we are embarking upon a fundraising campaign for the Centres of Medicinal Plant Diversity Initiative, which will provide core and programme support for the MPSG and the regional sub-groups.

Enormous thanks to Uwe, to Natalie Hofbauer, and to the Bundesamt für Naturschutz (BfN) for the immeasurable organizational and personal commitments of time and energy required to manage the MPSG membership. I am delighted that Uwe and Natalie will continue to edit, produce, and distribute this wonderful newsletter with support from BfN. *Medicinal Plant Conservation* presently goes to more than 450 recipients throughout the world.

On a sadder note, we regret the loss of Ted Anderson, a member of the MPSG and also of the Cactus and Succulent Specialist Group [see Obituary by STEVEN R. KING, p. 2], and the death of Richard Evans Schultes, who chaired the SSC Ethnobotany Specialist Group from 1982 to 1990.

Obituary Ted Anderson

Steven R. King

The Medicinal Plant Specialist Group is deeply saddened by the death of Edward F. "Ted" Anderson on March 29, 2001. Ted, as many, many people throughout the world knew him, was a consummate plant scientist. He was passionately involved in teaching, cactus and succulent systematic research, ethnobotany, conservation and most of all fieldwork throughout the world. He was devoted to his wife Adele and his family. There are few people and scientists like him, which makes his loss all the more significant.

Ted's work over the past 45 years included a recently finished masterwork "The Cactus family" which he was extremely pleased to have completed after thousands of hours of work. His book on Peyote "Peyote: The Divine Cactus" was first published in 1980. A revised second edition was released in 1996 and dedicated to his wife Adele. He co-authored the "Threatened Cacti of Mexico" and in 1993 he published a beautiful book called "Plants and People of the Golden Triangle" on the ethno-

botany of the tribal people of Northern Thailand. Ted's original fascination with cacti and tropical plants was sparked by a fellowship to study cacti at the Rancho Santa Ana Botanic Garden in Claremont, California. He earned his B.A. in biology from Pomona College and his M.A. and Ph.D. in botany from Claremont Graduate School. He taught botany at Whitman College in Walla Walla, Washington, for thirty years and during that time he received two Fulbright-Hays lectureships to teach in other countries. He spent sabbatical leaves in Latin America and Southeast Asia where he studied cacti and documented the ethnobotanical use of plants.

Ted also served on the Scientific Strategy Team (SST) of Shaman Pharmaceuticals where he contributed his expertise on plant medicines that he had studied around the world. He was also highly focused on the ethics and benefit sharing process that was developed and implemented by Shaman Pharmaceuticals and the Healing Forest Conservancy.

I personally was amazed by how much energy and passion Ted displayed for fieldwork, science and international travel. Each time I spoke to him he described his recent fieldwork and travels in Chile, Argentina, Peru, Mexico, Thailand, the Southwest United States, and many trips to Europe to visit major Herbaria, friends and other scholars. In fact we will all read many different tributes to Ted as person, a scientist, mentor, husband, father, and plant lover. His many passions and facets, like a sparkling gem, radiated into so many interwoven worlds.

Ted Anderson will be missed but never forgotten for the person he was and for his contributions to the world of plants and plant sciences. Thank you, Ted, for following your passions with such gusto. Thank you for teaching so many students. We will think of you, like as a divine cactus: sacred and powerful in your love for the natural world.

For author's address see list of members.

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Focus on National Parks

Utilization of medicinal plants in Bach Ma National Park, Vietnam

Tran Thien An & Stefan Ziegler

Bach Ma National Park, situated in central Vietnam, 40 km southeast of Hue and 65 km northwest of Da Nang, is one of the eleven national parks in the country. The national park was created in 1991 to conserve the only green transect left in Vietnam, stretching from the South China Sea to the border with Laos. The dominant habitats are tropical evergreen monsoon forest in the lowland areas and subtropical evergreen monsoon forest at altitudes between 900 and 1450 m. The park is located within the transition zone of northern (Sino-Himalayan, Indo-Burmese) and southern (Malesian) floras and is regarded to be an important 'Floristic Biodiversity Centre' for Indochina.

A recent survey on the exploitation of medicinal plants in the buffer zone of Bach Ma National Park has shown that 432 of the approximately 1400 described species in the park are used by the local population for a variety of medicinal purposes. The survey was based on direct observations in three communities and interviewing 50 local people, including male and female herbalists. Although most informants were able to name between 20 and 30 species of medicinal plants which can be found in the area, it is the commune's herbalist or practitioner who has sound experience of collecting and processing medicinal plants and preparing the raw material for medical application. Each commune has between five to ten herbalists who also give advice on health and sell plant products for medical treatment. The herbalists usually belong to one of the ethnic minority groups living in the buffer zone of the national park. The main methods applied in harvesting medicinal plants consist of felling the trees, peeling the bark, and removing the roots or the whole plant. Table 1 presents commonly used plants in the studied communes.

Though the effect of harvesting and wild crafting upon the plant populations has not been assessed statistically, local herbalists frequently reported that several species had become rare. This applies particularly to *Coscinium fenestratum*, *Fibraurea recisa*, and *Disporopsis longifolia*. Among the medicinal plants used, a total of 22 species are listed in the red data book of Vietnam (see table 2).

Table 1. Some species of medicinal plants in Bach Ma National Park, their active parts, ways of processing and medical indication.

Species	Parts of plant	Processing	Treatment
Ageratum conyzoides	all parts	boil for drinking	colic, homeostatic and scabies
Ardisia silvestris	branches and leaves	dry and boil for drinking	colic, stomachache
Coscinium fenestratum	old parts or roots	crush and boil for drinking	colic, stomachache
Cryptolepis balansae	branches and leaves	press and use latex	ringworm infection
Dracaena angustifolia	old parts or roots	soak in alcohol or boil for drinking	strengthening the body system
Jasminum subtriplinerve	branches and leaves	boil for drinking	recover after giving birth
Lactuca indica	all parts	boil for drinking	chestache, sore eyes
Phyllantus ruber	branches and leaves	boil for drinking	recover after giving birth
Smilax glabra	roots	soak in alcohol or boil for drinking	backache
Syzygium imitans	leaves	boil for drinking	colic

Their exploitation from wild populations is officially prohibited but proper law enforcement is difficult to achieve. At the current stage of study, it is not possible to assess the quantity of medicinal material extracted from the national park. However, the interviewees mentioned repeatedly that traditional pharmacists from Hue and Da Nang had visited the villages regularly to purchase dried and cut plant material and the herbalists are aware of the market prices they can achieve with plant products. Therefore, we presume that certain species of plants are already commercialized at a larger scale (tab. 2).

Traditional knowledge about using plants for medicinal purposes is particularly common among the ethnic minority groups of Ka Tu and Van Kieu, who are living in the park's buffer zone (fig. 1). The main source of medicinal plants derives from wild crafting within the boundaries of the national park and only a small part is obtained from home gardens and managed areas. The highland areas of Bach Ma National Park, above 900 m in altitude, appear to be the most prominent natural habitat for medicinal plants. Most herbalists consider these areas as their favorite sites to collect wild plants due to the prevailing clean environment and high content of active substances.

Vietnamese traditional medicine is highly influenced by Chinese herbal medicine. China's administrative and military presence in the country for more than one thousand years provided an important requirement to develop and establish a system for the sustainable utilization of medicinal plants at community level. After Vietnam's independence in 1954 and especially during the following difficult years of foreign military aggression, this system was still capable of supporting the primary health sector at community level to a certain degree. The local medicinal plant resource had been sustainably harvested but since the development of the market economy in 1986, and with a growing human population, this system is now threatened by commercial exploitation.

Table 2. Medicinal plants in Bach Ma National Park listed in the red data book of Vietnam (PHAN THUC VAT 1996).

E - Endangered; V - Vulnerable; R - Rare;
T - Threatened; K - Insufficiently Known

Species	Threat category
Alleizettella rubra	R
Anoectochilus chapaensis	R
Anoectochilus roxburghii	E
Ardisia silvestris	V
Cephalotaxus mannii	R
Cibotium barometz	K
Coscinium fenestratum	V
Cunninghamia lanceolata	R
Dacrydium elatum	K
Euonymus chinensis	T
Fibraurea recisa	V
Fokienia hodginsii	K
Indosinia involucrata	T
Lindera myrrha	V
Nepenthes annamensis	R
Paris polyphylla var. chinensis	R
Podocarpus neriifolius	R
Rauvolfia indochinensis	T
Rauvolfia verticillata	V
Smilax glabra	V
Sterculia lychnophora	K
Strychnos wallichiana	R

Nonetheless, our preliminary results from the survey demonstrate that the local people in the buffer zone of Bach Ma National Park still practice and rely on traditional medicine to a large extent. Medicinal plants play a major role in people's health care,

especially for poor communities living in remote areas. Moreover, the use of medicinal plants also reflects the cultural diversity of ethnic groups. At the same time, due to unsustainable resource utilization, several species are at risk of overexploitation and their wild populations are declining rapidly. The vast and inaccessible area renders the control of unauthorized access into the forest a difficult task to fulfill. One measure the park attempts to develop further is the cultivation of endangered and economic valuable medicinal plant species in home gardens within the buffer zone. Some species, such as *Coscinium fenestratum, Ardisia silvestris, Smilax glabra, Rauvolfia verticillata, Paris polyphylla* var. *chinensis, Stemona tuberosa, Stephania sinica*, etc., are thought to have the required market potential to create additional income for the local population. The park management is planning to undertake value-addition projects in the near future and will assist the buffer zone communities in the marketing and promotion of dried plants for pharmaceutical screening, volatile oils and other processed products.

Figure 1. Ka Tu woman collecting medicinal plants in Bach Ma National Park, Vietnam. (Photo: HUYNH VAN KEO)

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Sustainable use of medicinal plants and nature conservation in the Prespa National Park area, Albania

Armin Schopp-Guth & Wolfgang Fremuth

The world-wide increasing demands for medicinal plants and the deregulation of the former state-controlled medicinal plant commerce in Eastern and South-Eastern Europe resulted in an increase of wild collection, often combined with destructive harvesting techniques, over-exploitation and unmonitored trade (LANGE 1998, BERNATH & NEMETH 1999). Besides destructive harvesting and over-exploitation, habitat loss and habitat change are primary threats for medicinal plant species in Europe (SCHIPPMANN 1999).

For the conservation of rare plant species cultivation is often considered an alternative to wild-collection (e.g. DENHAM 1999). Cultivation is even preferred by pharmaceutical firms because supply can be handled more easily and quality control is facilitated (BETTI 1999). However, in regions where habitat loss and habitat change are major threats to medicinal plant species or nature conservation aims in general, continued wild-collection may even support nature conservation. If harvesting and trade are sustainable and controlled, they may be beneficial both for the local economy and for habitat conservation. Sustainable wild-collection may thus increase among local people the awareness for the need to conserve the species and their habitats (MARSHALL 1998, SCHIPPMANN 1999). In the long run it may be even more effective for biodiversity and nature conservation than the prohibition of wild-collection (ELLENBERGER 1999, ROBBINS 1999).

Therefore, in a preliminary study the potential for the sustainable use of medicinal plants was assessed for the region of the Albanian Prespa National Park (SCHOPP-GUTH et al. 1999). Especially considered were the possibilities of trade to Germany, Europe's

largest importer and Albania's most important export destination (LANGE 1999, VASO 1999).

Nature conservation and sustainable development in the National Park region

The Prespa National Park lies within one of the most prominent regions for Europe's biodiversity. Established in 1999 with an area of 27,750 ha, it hosts outstanding alpine meadows, species-rich grasslands, forests and scrublands, and aquatic areas as well as cultivated lands. However, the unstable economic situation in the region is a serious threat to the establishment of the National Park and the fulfillment of its conservation aims: since the 'revolution' in 1991 and the collapse of traditional fruit production, uncontrolled grazing of cattle, sheep, and goats started to predominate. The remaining woods and forests were heavily cut and only small remnants survived. Erosion became an increasing problem. The former State and Forestry controlled collection and trade of medicinal plants now lacks control and plant resources are often over-exploited.

To stop the deterioration of the environment, local people need an alternative income. The sustainable collection, processing and trade of medicinal plants might provide such a substitution together with the development of sustainable tourism. A stable economy derived from the National Park could promote its further establishment and future conservation.

Results of the study

- More than 70 medicinal plant species were recorded in a first field trip in the Ohrid and Prespa region. As only a small part of the area was visited, additional species are certainly present. Most of the species are traded or available on the German drug market. About half of them are listed in the German Pharmacopoeia DAB or Drug Formulary DAC and are thus of interest to the pharmaceutical market. Most of the others are non-officinal drugs in Germany. A few species seem to be used as medicinal or tea plants only in Albania.
- Local collectors are collecting and trading a variety of plants, including camomile *(Matricaria recutita),* cornflower *(Centaurea cyanus)*, sage (*Salvia spp.),* thyme *(Thymus spp.),* burning bush *(Dictamnus albus)* and mountain tea (*Sideritis raeseri*) which is a Red-List-species in Albania. Some collectors deliver to the Albanian market, some trade mainly to Macedonia.
- Albanian law entitles the Forest Authorities to control wild collection. The Forest and National Park Service in the Prespa and Ohrid region can thus provide the basis for independent control of sustainable use of wild plants. It should be responsible for granting licenses to collectors. A collectors' organisation has to be built up to promote sustainable collecting methods, ensure biostandards and acquire labels. The mountainous region is unindustrialised and characterized by low-intensity, traditional agriculture. Clean air can provide a very good quality of plant material and help in marketing of the products.
- For each species harvest zones and harvest amounts have to be fixed in advance according to scientific assessments. Within the National Park boundaries large zones where collection is prohibited are necessary. Rare species may need to be exempted from collection. It is necessary to fix levels of control for harvest and trade and for monitoring the populations for each species, depending on the abundance, threat status, harvested plant parts and harvesting methods.
- Labelled products might gain a better price on the international market. Sustainable wild-collection of medicinal plants as well as cultivation can thus provide an additional income for local people, and at the same time promote their interest to preserve the natural heritage and biodiversity of the region.

Control and monitoring for sustainable use

To guarantee sustainable use of wild plants in the region, a consistent control and monitoring system has to be built up. It should comprise three levels, co-operatively accomplished by collectors and collectors' organisations, Forest and National Park Service, and scientific programmes:

- registration and control of collected amounts for all plant species, including standardized information from collectors on the area of collection and estimation of population densities, conservation status and vulnerability
- detailed population monitoring of rare species and species with unclear conservation status by scientific and expert studies; testing and control of harvesting methods may be necessary
- comprehensive monitoring to detect changes in the vegetation (biotopes, plant communities and structure)

Control and monitoring of wild collection should be embedded in a comprehensive monitoring system as part of a management plan for the Prespa National Park and Ohrid Protected Landscape. Only then can possible conflicts between sustainable harvesting and conservation aims be detected and avoided. Proposals for a control and monitoring system, a licensing and training system for collectors as well as requirements for labelling of products were elaborated in the study.

Conclusions

In addition to world-wide growing demands for medicinal plants, economic instability is known to result in increased use of wildlife resources and increased trade in endangered species in many parts of the world (e.g. TRAFFIC 1999, RODRIGUEZ 2000). Sustainable wild collection combined with fair trade is seen as a practicable way for the Prespa region to encourage people to conserve their natural resources and at the same time gain economic benefits. To this end international labels need to incorporate sustainable wild collection criteria in their certification schemes. Especially in the importing countries, the sensitivity and demand for fairly and sustainably harvested products needs to be increased urgently. This cannot be a task only for environment and development NGOs but must also be a task for other groups, including traders, processors, consumers, or governments and legislation.

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Working with Tibetan doctors (amchis) for the conservation of medicinal plants and health care development at Shey Phoksundo National Park, Dolpa, Nepal

Yildiz Aumeeruddy-Thomas

The Himalayas form an uninterrupted mountain range extending across 3500 km, from Afghanistan to China. They host some 7000 species of medicinal plants (PEI 1998). The trade of medicinal plants from the Himalayas to industrialised nations and neighbouring countries is growing at a tremendous rate, for use as pharmaceutical compounds but also as cosmetics and other household products. India's Ayurvedic industry and China's vast medicinal plant market, rooted in ancient medical systems, use hundreds of tons of raw materials from the Himalayas each year.

Dolpa District, north of the High Daulaghiri range of mountains, is a remote area of Nepal near the frontier with Tibetan China. 40-80 tons of raw medicinal plants are exported annually, especially to India (ANSAB 1997, SHRESTHA et al. 1998). Selling medicinal plants is an attractive proposition for many local people, despite problems of loss through poor storage and the low prices paid to collectors. These are from low valleys lying to the south of the district, or from neighbouring districts. The plants are transferred by plane to the Indian border. The opening of an air strip in Juphal 20 years ago has opened the gates to the large-scale collection of a few species, a sword of Damocles hanging over vulnerable, slow growing and highly site-specific species.

Mountains carry complex ecosystems, related to altitude and intricate local variations in the environment. The great diversity of vegetation types at Dolpo includes conifer forest at lower altitudes, sub-alpine and alpine communities above the tree-line. In the rain shadow of high mountain ranges, away from the reach of the monsoon, arid lands support vast areas of trans-Himalayan steppes. A large variety of medicinal plants thrive in these highly diverse habitats. Medicinal plants used locally or subject to trade often grow in micro-habitats and many of them are perennial herbs with slow-growing rhizomes. They are vulnerable to over-harvest; rates of extraction of such species should be regulated carefully.

The inhabitants of Dolpo live a good few days walking distance from modern health care facilities and depend on medicinal plants for their own survival. There is a hospital at the district headquarters of Dunai, which remains empty. Doctors, nurses and assistants are unwilling to work in such a remote area. In villages located up to 4200 m high in the mountains, health-care is provided by traditional doctors, known as amchis, following the Tibetan medical system. Their practices are deeply grounded in the concept of universal compassion associated with the local religions of Buddhism and Bompo, the latter being the ancient religion of Tibet. For the amchis, the healing value of plants and their precise identification is crucial.

Shey Phoksundo National Park, with an area of 3555 km^2, is the biggest national park in Nepal. It covers most of the administrative District of Dolpa. In 1997, the WWF Nepal Program started an integrated conservation and development project, the Northern Mountain Conservation Project, at Shey Phoksundo in collaboration with Nepal's Department of National Parks and Wildlife Conservation (fig. 1). The People and Plants Initiative, a joint programme of WWF, UNESCO, and Kew, is assisting WWF Nepal in conserving biodiversity together with building management capacity of resource users. The conservation and sustainable use of medicinal plants is the overall aim of the WWF- People and Plants project at Shey Phoksundo National Park.

Some 3500 inhabitants mostly of Tibetan origin live inside the Park, a sparse population compared with the more dense Hindu populations living in its southern periphery. Monasteries and monuments associated with Bhuddism and Bompo are an integral part of the park's landscape. Shey Phoksundo is therefore a refuge not only for endangered plants and animals. It is a bastion for the spiritual and cultural values of the ancient culture of Tibet. The involvement of communities living inside Shey Phoksundo and in its buffer zone is crucial to ensure that the harvesting of medicinal plants is sustainable.

Prior to field research, numerous meetings were conducted to identify local conservation priorities and related development concerns. The formation of a multi-disciplinary and multi-cultural team was a major step forward towards consolidating linkages between different stakeholders. The team consists of carefully selected young researchers including:

botanist Suresh Ghimire and sociologist Yeshi Choden Lama; two expert amchis, Amchi Tsampa Ngawang - from the neighbouring District of Mustang and Chairman of the Himalayan Amchi Association - and Amchi Gyatso Bista, personal doctor to the King of Mustang; the customary head of the village of Pungmo, Chupur Baiji; a knowledgeable amchi of Dolpo, Amchi Tangyal lama; seven Park Game scouts who worked in alternation and a coordinator of People and Plants, Yildiz Aumeeruddy-Thomas, who assists the team through joint fieldwork and overall guidance and orientation.

Figure 1. A group of Dolpo amchis at the project inception meeting in June 1997. Rigmo, Shey Phoksundo National Park. (Photo: AUMEERUDDY-THOMAS)

To understand the overall picture of plant knowledge, use and management in Dolpo, the team conducted a baseline survey in 1997. This involved ethnobotanical surveys and assessment of health-care and the status of the amchi profession in Dolpo. The results showed the immense knowledge of the amchis, who use as many as 375 plants (GHIMIRE et al. 2000). Many more plants still need to be identified. Amchis have a good knowledge of areas of collection, including ways of collecting the medicinal plants sustainably. Amchis, however, readily recognize their deficiencies and are keen to learn more about improved harvesting. Diverse information is needed to assess the vulnerability to harvesting of medicinal plants. This includes knowledge of plant life-forms, the parts of plants collected, the amounts used, the sizes of plant populations, and the ecology and growth-patterns of the species. Some 20 species are traded in large quantities (see list of species traded from Dolpa District between 1996/1997 and 1997/1998 in table 1). Most of these have perennial rhizomes which are collected.

They include jatamansi, *Nardostachys grandiflora*, a species listed in CITES Appendix II, and kutki, *Picrorhiza scrophulariiflora,* of which a closely related species, *Picrorhiza kurrooa*, is also in Appendix II; both are known as kutki and are confused with each other in trade. Kutki and jatamansi are highly regarded for local medical and religious use, as well as being traded in large quantities throughout the Himalayas.

Two major targets were set for work in 1998 and later: (i) the development of a community-based model for medicinal plants management and (ii) raising the capacities of amchis and women to improve local health-care. These objectives are interrelated: the amchis are well placed socially to guide the people in developing improved systems of management for medicinal plants because they will certainly remain responsible for provision of much health-care. The village chosen for a pilotstudy is Pungmo, a hamlet located in Phoksundo VDC. Pungmo lies within the park and is an area rich in medicinal plants threatened by encroachment by collectors from outside these communities.

The local economy relies on agriculture - with Tibetan barley growing up to 4200 m - and pastoralism, especially rearing of yaks at high altitudes. While agricultural fields are very restricted, extensive forested and pasture areas yield large amounts of resources on which the inhabitants are highly dependant. The trade of products between Tibet and the lower valleys, using caravans of yaks, is also a major component of the local economy. For centuries, the high pastures have been used for grazing, as well as being natural gardens of medicinal plants It is rare to find species in these pastures lacking some medicinal value. Kunasa, the largest pasture area of Pungmo, has been selected as the site for experiments on methods of harvesting jatamansi and kutki, and for developing a model for the management of medicinal plants based on a good knowledge of local institutions and social systems.

Since 1998, field work in Kunasa has focused on two aspects of the local relationship between people, medicinal plants, and their habitat. A first focus has

aimed at gaining a better understanding at landscape level of how people relate to the pasture - seen here as a management unit with many interlinked dimensions including the geographical, cultural, religious, economic, biological, and ecological. A second focus for field work has concerned the setting-up of experimental plots for testing different levels of harvesting of jatamansi and kutki, in which local amchis have simulated their very selective, choosy system of harvesting. To do this, a clear picture of the local understanding of growth patterns was needed, as well as an understanding of different growth stages of the life cycle of the plants. The monitoring of population dynamics of medicinal plants in trial plots was conducted by local people, amchis and game scouts, using local knowledge and terminology, such as the word pong for a clone and the five different life-stages of the plants as recognized locally.

Table 1: List of species officially traded from Dolpa District between 1992/1993 and 1997/1998, Source: District Forest Office Duinai and field surveys in SHRESTHA et al. (1998) and GHIMIRE et al. (2001).

	Trade name	Scientific name
1	Atis	*Delphinium himalayai* Munz
2	Bhutkesh	*Selinum wallichianum* (DC.) Raizada & Saxena
3	Bojho	*Acorus calamus* L.
4	Chau	*Morchella esculenta* Pers. ex Fr.
5	Chirayita	*Swertia chirayita* (Roxb. ex Kars.) Kars.
6	Dhupi	
7	Dhupjadi	*Jurinea dolomiaea* Boiss.
8	Jatamansi	*Nardostachys grandiflora* DC.
9	Kakarsinghi	*Pistacia khinjuk* Stoeks
10	Kurilo	*Asparagus sp.*
11	Kutki	*Picrorhiza scrophulariiflora* Pennell
12	Nirbisi	
13	Okhar	*Juglans regia*
14	Padamchal	*Rheum australe* D. Don
15	Kaladana	
16	Salla simta	*Pinus wallichiana* A.B. Jackson
17	Satuwa	*Paris polyphylla*
18	Satawari	*Asparagus* racemosa Willd.
19	Sugandhbal	*Valeriana jatamansi* Jones
20	Titepati	*Artemisia* sp.

The health care side of the project has had four main components. First, amchis were brought together for exchange of knowledge, identifying gaps, needs and ways of promoting their profession. Long working sessions with groups of amchis were conducted to understand local vernacular classifications, perceptions of local habitats, size of plant populations and vulnerability to harvesting. Secondly, training of *amchis* and women in small groups has encouraged the exchange of knowledge. Thirdly, a Traditional Health Care Centre has been constructed in Phoksundo VDC to promote the amchi profession. This center has facilitated distribution of Tibetan medical texts and raw plant materials purchased in Kathmandu for the running of the clinic during the first year. Cultivation of medicinal plants in the clinic yard is being attempted as well as in situ cultivation in the high pastures.

Fourthly, the clinic is operating as a monitoring center through providing guidelines for the sustainable use of medicinal plant species and working in close collaboration with Medicinal Plants Management Committees (MPMC) from each village of Phoksundo VDC. A Rapid Vulnerability Assessment was conducted by Susanne Schmitt (People and Plants, WWF UK) and a young Nepali botanist, Mr. Tripathi, to provide precise guidelines to the clinic regarding those species which have been found to be particularly vulnerable to harvesting (GHIMIRE et al. 2001). The MPMC in Pungmo is already operational. Members of these committees are responsible for checking that medicinal plants used by the clinic and by lay-people are sustainably collected. To do so they conduct rapid field assessments along transects and provide feedback to the clinic on stocks available and amounts which can be harvested sustainably.

Ensuring the continuity of age-old traditional medical systems and the continuing availability of plant medicines for health-care at the local level and for trade requires long-term committment from those people who have received training under this project. In the next four years (2001-2004) this project will be focusing on three major aspects: (1) reinforcing the linkages between conservation and health care development through replication of the Traditional Health Care Centre in Upper Dolpo and development of guidelines for the sustainable use of medicinal plants at a national level with the Himalayan Amchi Association; (2) building capacity of the Medicinal Plants Management Committees; and (3) working with commercial collectors located in the southern periphery of Shey Phoksundo National Park, especially to understand the social and ecological strategies of commercial collectors in view of proposing improved management systems.

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Regional File

Trade in the Himalayan medicinal plant product Kutki – New data

Carsten Smith Olsen

Picrorhiza kurrooa Royle ex Benth. was included in CITES Appendix II in 1997 as it was argued that the species would become endangered unless international trade was regulated. The listing only includes trade in *P. kurrooa* rhizomes, not processed products. The rhizomes are commonly known in the trade as "kutki". However, trade studies have shown that kutki is a mix of *P. kurrooa* and *Neopicrorhiza scrophulariiflora* Pennell D.Y. Hong (syn. *P. scrophulariiflora* Pennell); the latter is not covered by CITES. Almost all trade is in air-dried rhizomes; the rhizomes of the two species are morphologically similar and are not distinguished in the trade. There is no distinction in the trade between different kutki products. Both species are used for similar purposes.

There is very little information on amounts of kutki in trade. The original Indian proposal to include *P. kurrooa* in CITES mentions an annual legal export from India in the range 0.3 to 11 metric tonnes, and argues that there is also a large illegal trade. The proposal does not distinguish between the two species. Some estimates are available from Nepal, for *N. scrophulariiflora*, where almost the total kutki harvest is exported. OLSEN & HELLES (1997) reported an annual trade from one district in Nepal of 7-17 tonnes in 1994/95; EDWARDS (1996) estimated an export of 24 tonnes from five districts in eastern Nepal in 1991/92; BURBAGE (1981) an annual export from eastern Nepal of 5-26 tonnes from 1976 to 1979; MALLA et al. (1995) reported an average annual licensed collection in Nepal of approximately 25 tonnes and a trader estimate of annual national trade of 98 tonnes from 1989 to 1992; CECI (1999) estimated the annual traded volume from the five districts in Karnali zone in western Nepal at 60 tonnes in 1997/98.

This paper aims at (i) providing a national level estimate for the trade in kutki from Nepal to India, and (ii) estimating the importance of Himalayan states as suppliers of kutki. It should be noted that kutki from Nepal is from *Neopicrorhiza scrophulariiflora*, see also SMIT (2000) and MULLIKEN (2000).

Methodology. Field work was conducted from August 1998 to September 1999. General data as well as data for the case year 1997/98 were collected. Field work consisted of three separate parts. The first was a district survey covering 15 districts, one randomly selected in fifteen areas covering east-west and north-south variations in Nepal; 152 local traders and 636 collectors were interviewed. The second part was a regional wholesaler survey interviewing all 90 exporters of medicinal plants to India. The third part was an international wholesaler survey covering 53 wholesalers in India. In all parts, data were collected using standardized open-ended questionnaires. A more detailed description of the methodology is available in BHATTARAI & OLSEN (2000). Following are the preliminary findings for *Neopicrorhiza scrophulariiflora*.

Results. Preliminary figures for export of unprocessed *N. scrophulariiflora* rhizomes from Nepal to India are presented in table 1. There is large variation in yearly amount and value; according to exporting traders the annual amount ranges from approximately 100 to 400 tonnes. The export in the case

year 1997/98 was 261 tonnes. The average value of export is approximately 716,000 USD, the export value in the case year was 736,000 USD.

There are differences in amounts and values among the five development regions of Nepal. Statistical tests show significant differences among all five development regions in Nepal (except for the western and mid-western regions). This indicates, for *N. scrophulariiflora*, that there is only a low degree of market integration and thus that agents selling this species to wholesalers exporting to India could significantly benefit from better price information.

previously thought. It is important to note that the figures in table 1 are conservative: exporting traders have a number of reasons for underestimating the amounts traded. A main reason is that, for a majority of the export, no harvesting licenses have been issued, and the exported amounts are not registered at District Forest Offices or customs. Research is presently being done to triangulate findings. Combining findings from tables 1 and 2, it can be roughly estimated that, in an average year, the global supply (excluding China and Pakistan) of kutki is around 375 tonnes, with Nepal supplying around 250 tonnes, India around 70 tonnes, and Bhutan some 50 tonnes.

Table 1. Preliminary findings on amount and value of export of unprocessed *Neopicrorhiza scrophulariiflora* rhizomes from Nepal to India, 1997/98. All amounts in kg, all values in Nepali rupees (approx. 68 Nr/USD).

Development region	Low estimate	High estimate	1997/98 estimate	Av. Export value[1]	Export 1997/98 value[2]
Eastern	30,5	126	100,5	15,024,000	19,296,000
Central	9	39	22	4,608,000	4,224,000
Western	16	50	31	6,336,000	5,952,000
Mid-western	37,25	152	78,1	18,168,000	14,995,200
Far-western	8,500	39	29	4,560,000	5,568,000
Nepal	101,25	406	260,6	48,696,000	50,035,200

[1] Calculated as ((low estimate + high estimate)/2)*av. buying price in India in 1997/98
[2] Calculated as (1997/98 estimate)*av. buying price in India in 1997/98

During the field work it was also attempted to estimate the importance of different countries as supply sources for kutki. Only India, Nepal and Bhutan were mentioned as supply countries (China and Pakistan appear to be only minor producers, and they are importing countries, not exporting). Of 32 wholesalers in India trading kutki, 24 provided information on distribution of supplies (table 2). Nepal is estimated to supply 66±12% and is clearly the main supply country. India supplies 19±12%, and Bhutan 14±8%. It should, however, be noted that there are large variations within traders, as seen in the min-max range for each country, due to differences in location.

Table 2. Summary of Indian wholesalers (n=24) perception of supply situation for unprocessed *N. scrophulariiflora* rhizomes. All figures in %.

	Mean	S.d.	Min.	Max.
Nepal	66	12	30	80
Bhutan	14	8	0	25
India	19	12	5	70

Discussion. The export figures in table 1 indicate that trade in kutki from Nepal to India is higher than

Given the distribution of *Picrorhiza kurrooa* and *Neopicrorhiza scrophulariiflora* (see SMIT 2000), all kutki from Nepal and Bhutan will be *N. scrophulariiflora* while most kutki of Indian origin will be *P. kurrooa*. A maximum of 20% of traded kutki is thus of the species listed in Appendix II. There is no information available on sustainable harvest rates for either species, and there is no documentation of the impact of trade on the wild populations (in Nepal all harvest is from wild populations), though such research is in progress.

It should be noted that collection of *N. scrophulariiflora* in Nepal constitutes an important source of income for local collectors. Assuming an average annual harvest of 250 tonnes rhizomes and using the national average price paid to collectors in 1997/98 (119.5 Nr/kg), the value of harvest to collectors is 439,000 USD. According to NHDP (1998), the average household income of small farm rural households in rural hills is 163 USD/year; thus, assuming a national average income from medicinal plant harvest of 20% of total household income per collecting household (OLSEN & BHATTARAI 2000), the harvest of kutki alone is an important source of income for

more than 13,000 households in rural Nepal.

As noted by IUCN (1999), there are two attitudes to assessing risk to species: (i) the commonly accepted precautionary approach advocating a classification of a taxon as threatened unless it is certain that it is not threatened, and (ii) the evidentiary approach arguing that a taxon should only be classified as threatened if there is strong evidence to support the classification. The dependence of rural households on kutki for income argues in favour of an evidentiary attitude to risk when considering whether *N. scrophulariiflora* should be included in Appendix II.

Conclusions. Kutki is traded in large amounts; it is estimated that annual supplies from the three main supply countries of Nepal, India and Bhutan is some 375 tonnes. Furthermore, it is estimated that at least 80% of kutki is constituted of *Neopicrorhiza scrophulariiflora* rhizomes and the remaining being from *Picrorhiza kurrooa*. The trade is important to a large number of rural collectors, and there appears to be scope for improving their income from sale of kutki rhizomes. There is no information on the sustainability of the trade or the impact of collection on wild populations. As the rhizomes of *P. kurrooa* and *N. scrophulariiflora* are similar, an effective implementation of CITES for *P. kurrooa* would be difficult. However, due to the importance of *N. scrophulariiflora* collection to rural collectors, an evidentiary approach to evaluating the appropriateness of including *N. scrophulariiflora* should be considered.

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For author's address see list of members.

Mainstreaming conservation of medicinal plants

Vinay Tandon

In India forests are overwhelmingly state owned. These forests include vast stretches of grassland and alpine pastures, the habitat of many traded medicinal plant species. About 95% of the increasing demand for medicinal plants is met through wild collection mainly from these forest lands. Yet, peculiarly, the conservation and management of medicinal plants is not really seen as the mandate of the forest departments. There are several other government departments and NGOs, such as those of Indian Systems of Medicine of the Ministry of Health, both at the Central and State levels, that control the budget and programmes for medicinal plants conservation. Of late there have been some attempts to involve the forest departments in the conservation and sustainable harvest of medicinal flora.

One such initiative is the "Vana Vanaspati" (literally 'medicinal forest') scheme launched by the Ministry of Health & Family Welfare of the Government of India. The objective of the scheme is to boost production of raw drugs from traded medicinal species (largely facing population depletion in the wild) and simultaneously to benefit groups of local people involved in the harvest and trade. It is well known that rural and tribal people in the country have direct livelihood dependence on herb collection and sale.

In Himachal Pradesh, one of the Himalayan states where this new scheme is being implemented, different approaches to achieve the objective are being tested through the forest department. One such approach is through establishment of community managed "Medicinal Plants Production Areas" (MPPAs). A user or interest group, mostly consisting of forest dependent women or of traditional herb collectors in a village, is organized and allocated 5 to 10 hectares of forest land. This MPPA is then intensively planted with prioritized high value/high demand indigenous medicinal species that have been grown in forest department nurseries. The protection, maintenance and harvest of the area is organized by the group. Under an understanding reached between the group and the forest department, all the harvest of raw drugs belongs to the group/village community. Training sessions aimed at building capacity within the group/village community to handle the management of the MPPA and subsequently the marketing of the raw or value-added products, are periodically organized through NGOs or specialist resource persons. Provision has been made to extend value addition and marketing support to help a federation of several such small groups.

Another approach involves taking *in situ* medicinal plant conservation measures in much larger forest areas of 500 or even a thousand hectares but forming a distinct mini-micro watershed. A group, typically of traditional herb collectors, is organized around such an area and gradually charged with its management and protection. Simplified botanical studies, involving group members, are carried out to establish what would be sustained levels of harvest of selected medicinal species from the area. Training is provided for the group members in working out their own, seasonal harvesting regimes. As in the previous approach, marketing support is extended to the group or a federation of such groups.

In this way it is expected that over a 5-year timeframe, around 4-5000 hectares of carefully selected forest land should be put under community-based and financially viable management for increased production of medicinal plants in high demand and of high conservation value.

Further information on the scheme and marketing queries can be made to: ccf@vsnl.com.

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Conservation of species by protective marking

Jim Corbin

In a 10-day period in 1993, John Garrison, a supervisory ranger with the Great Smoky Mountain National Park, saw 13 pounds of ginseng (*Panax quinquefolius*), the equivalent of approximately 8000 plants, seized from two different groups of poachers. This was a wake up call to law enforcement officers. Garrison invited me (a Plant Protection Specialist with NCDA&CS - North Carolina Department of Agriculture & Consumer Services) to help him address this problem.

My contribution has been to design a marking system to help protect ginseng. The original system involved the use of tiny stainless steel ribbon inserts, coded in Navaho. The code revealed location and date on which individual plants were marked. These plants could then be easily identified and seized from dealers trading in marked ginseng plants. However, this process was not practical owing to the expensive instruments needed to find marked roots. Immediate and more cost-effective marking equipment was needed to deter ginseng dealers from purchasing illegally collected wild roots.

After studying soil, physiology and nutrient needs of native herbaceous perennials like ginseng, a nutrient dye was developed to facilitate instant recognition. The dye contains nutrients in small quantities and proper ratios to allow the root to absorb the dye and mark the plant permanently within an hour of application at the plant's habitat. Since collection is illegal in the national parks it was a perfect solution. In private stands another type of non-permanent dye is utilized so that the plants can be marketed.

To further advance the technology of silicon marking chips, in the size of flour grains, are used in association with the other methods of marking. MicrotaggentJ, a product used by the explosives industry, is being utilized by the Blue Ridge Parkway.

Since its inception, the marking program has expanded to many other ornamental and medicinal plants (Bloodroot, *Sanguinaria canadensis*; Black and Blue Cohosh, *Cimicifuga racemosa* and *Caulophyllum thalictroides*; *Trillium*s; Pitcher Plants, Sarraceniaceae; *Galax;* and many others) that are subject to illegal exploitation.

Application occurs during the growing season by groups of dedicated Plant Protection Specialists

from NCDA&CS, park technicians, and rangers who have become adept at identification and application. Botanists and law enforcement personnel receive adequate training before applying the marker dye to wild plants. Leading the effort have been John Scott of NCDA&CS, John Garrison and Ken Johnson of the Blue Ridge Parkway, Janet Rock of the Great Smoky Mountain National Park, and Gary Kauffman of the US Forest Service. A combined effort of NCDA&CS, GSMNP, US Forest Service, US Fish and Wildlife, North Carolina Wildlife Commission, Blue Ridge Parkway, and North Carolina State University has yielded outstanding results (nearly 80 convictions) in the war against decimation and exploitation of native plant species. To date twelve states and one Canadian province have used the system in some form.

Much work is yet to be done so that the next generation can enjoy the pristine beauty of the native medicinal plants.

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Taxon File

CITES News

Uwe Schippmann

The 10th meeting of the **CITES Plants Committee** was held December 11-15, 2000, at the National Conservation Training Center in Shepherdstown, West Virginia, USA.

The following agenda issues related to medicinal plants:

- The annotations for the medicinal plant species which are currently included in CITES Appendix II define which parts and products are subject to the listing. These annotations are currently revised and streamlined by a working group.
- The Nomenclature Committee addressed problems in the taxonomic understanding of species such as *Taxus wallichiana, Picrorhiza kurrooa* and *Nardostachys grandiflora*.
- The status of *Guaiacum sanctum* in trade was discussed and further action coordinated. In an evening lecture the results of a study on *Guaiacum* carried out by students of the University of Maryland, USA, were presented. A summary of this review is contained in this issue of MPC (see page 19).
- Concern was expressed by one of the two African representatives of the Plants Committee that current exploitaion of *Prunus africana* in Kenya is highly unsustainable and action is required.

The outstanding agenda issue relating to medicinal plants at this meeting was, however, the final discussion and adoption of the **Medicinal Plants Significant Trade Study** which had been tabled by the delegation of Germany.

This study was carried out in response to a decision of the 9th meeting of the Conference of the Parties to CITES in November 1994 to review the trade in CITES-listed medicinal and aromatic plant species. It was carried out by the German CITES Scientific Authority in cooperation with the TRAFFIC Network. The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety provided funds for this study.

The report covers 16 medicinal plant species included in the CITES Appendices and reviews their status in international trade using trade information from the CITES Annual Reports and also other sources which were partly prepared for this purpose by TRAFFIC offices. It includes species-specific recommendations which will be followed up by the Plants Committee in due course.

The study has been recently published: SCHIPPMANN, U. (2001): Medicinal plants significant trade study. CITES project S-109. Plants Committee Document PC9 9.1.3 (rev.). - 97 pp., Bundesamt für Naturschutz, Bonn (BfN-Skripten 39). Copies are available from Natalie Hofbauer (hofbaun@bfn.de).

The Plants Committee will look into these matters again at its 11th meeting which will be held from 3-7 September 2001 in Malaysia.

The 12th **Conference of the Parties** to CITES will be held in Santiago de Chile from 4-15 November 2002.

(Plants Committee logos by courtesy of the CITES SECRETARIAT, Geneva, Switzerland.)

Corrigendum Harpagophytum

Uwe Schippmann

This *corrigendum* refers to the paper "Conservation data sheet 2: Exploitation, trade and population status of *Harpagophytum procumbens* in southern Africa" by BERIT HACHFELD and UWE SCHIPPMANN in Medicinal Plant Conservation 6: 4-9.

Due to a computer error a part of the export figures in table 1 have been wrongly reproduced.

Please note the correct figures:

Table 1. Exports of *Harpagophytum procumbens* from **Namibia**. * Jan-April 1986; nd = no data available. Sources: NOTT (1986); MARSHALL (1998); Ministry of Environment and Tourism, Directorate Specialist Support Services.

Year	Export [kg]	Year	Export [kg]
1973	28,161	1986*	91,078
1974	nd	1987	nd
1975	180,000	1988	nd
1976	180,000	1989	nd
1977	190,000	1990	nd
1978	nd	1991	20,000
1979	nd	1992	95,000
1980	nd	1993	70,000
1981	84,350	1994	160,000
1982	133,619	1995	290,000
1983	124,291	1996	310,000
1984	107,800	1997	250,000
1985	183,370	1998	610,000

Boswellia from Somalia, a source of high quality frankincense

K.P. Svoboda, J.B. Hampson & L. Hall

Frankincense is the oleo-gum-resin harvested from several different trees belonging to the genus *Boswellia*. The resin is formed in cavities within the tree bark (HALL 2000) and is released when the bark tissue is damaged. This is part of the plant's natural defence mechanism. By 'tapping' the tree deliberately, people have been harvesting this resin over many centuries. There is a distinct lack of knowledge about the species in regard to their botany, taxonomy and distribution, although clarification has been attempted several times in the past (HEPPER 1969, MONOD 1979, VOLLESEN 1985, THULIN & WARFA 1987, SEPASAL 1999). The Royal Botanical Garden, Kew, has been extremely helpful in providing up to date information on those aspects of the plant. There is much variation in the species in regard to leaf shape, inflorescence and fruits, number of branches, and size and shape of the trunk. The trunks have distinct swollen bases which, it must be assumed, help in the uptake and storage of water and minerals. All these adaptations allow the trees to cope with the extreme environmental conditions under which they grow.

Two species important for their essential oils are found growing in Somalia, *Boswellia sacra* (syn. *B. carteri*) and *Boswellia frereana.* The territories where these trees grow are divided up into *xiji* (Somalian term indicating an area of land controlled by one specific family for the purpose of harvesting the resin). Traditionally, these areas belong to one family group, and are handed down through the generations (FARAH 1994).

B. sacra is found in northern Somalia, Ethiopia, south Yemen and Oman. It grows on hills, gullies and cliffs up to an altitude of 1230 metres, and for 200 kilometres inland from the coast. As the trees are more abundant in the harsher, steeper, less accessible regions, they have not been exploited as much as those of *B. frereana* that grow in more accessible places (FARAH 1994). The harvest season lasts for eight months from March to October. A tapping is made every 15-20 days in a cyclical harvest, which enables about ten harvests per season. This type of resin does not tend to run down the bark, and upon ripening it becomes a transparent yellow colour. Collected resin can be either deep yellow, reddish or pale white and translucent in colour, and is known locally as *beeyo*. It is used mainly as religious incense as well as in the European flavour and fragrance industry.

B. frereana is native to northern Somalia. It is found only in coastal sites, often on steep vertical slopes to a height of 750 m above sea level. This species prefers a hotter, more humid climate and requires good supplies of water. The harvest season starts in late August with a tapping made about every 25 to 35 days. This longer time lapse between tappings is due to the lower temperatures increasing the time it takes for the resin to mature.

The resin runs down the bark to form long valuable 'tears', which are harvested annually at the end of the season. This resin is of superior quality due to its lemon-scent, sweet taste and pale topaz-yellow colour and is known locally as *meydi*. It is used widely as a type of chewing gum as it is much less bitter than *B. sacra*. On the open market it commands twice the price of *beeyo*. It is possible to find

the two species growing together in areas where the upper growth limits of *B. frereana* cross the lower growth limits of *B. sacra*.

The trees are not harvested until they are 5-7 years old when they will be 4-5 m high with 15 cm diameter trunks. Tapping involves the making of an incision into the bark, initially only a scratch, which develops over the course of the season to be approximately 4-8 cm long, 30 mm wide and 2.5-4 mm deep. Subsequent cuts are made, firstly to clean the wound in the bark and secondly to stimulate further resin production. The depth and number of cuts per tree depends on the age of the tree, the type of bark and the time of the year (FARAH 1994). The yield of resin collected in the first harvest is low. Ideally, to reduce damaging the tree, it should be rested every 5 to 6 years. There is a gradual reduction in the quality of resin over the harvest years. The harvester uses a tool called *mengaff*. It is sharp at one end for cutting the incision in the bark, and blunt at the other for removing the resin. Traditional tapping methods are still used today, but there is now potential for increased yield by improvement of these methods, or even the introduction of chemical flow enhancers, similar to those used in rubber production (HARRIES 1998).

Figure 1. Beeyo - White Erigavo *(Boswellia sacra)*, graded white resin collected from North West region. (Photo: SVOBODA)

Harvesting is extremely difficult because of the dangerous and not easily accessible terrain. High physical demands are made on the harvesters, who work in high temperatures in regions with poor road systems (FARAH 1994). Usually, the collector has to carry supplies of food and water for both himself and his donkey or camel, enough to last several weeks. Occasionally, a motorized vehicle may now be used. The resin is taken back to the village, where women work long hours sorting the resin according to colour, size and shape. *B. sacra* (*beeyo*) is graded by colour into red, white or mixed (fig. 1). *B. frereana* (*meydi*) is graded according to colour and also the size of the 'tears'. Grade 1 has the largest and most valuable, and grade 6, the smallest pieces.

Frankincense resin is a natural renewable resource that provides a living for a great number of Somalians (MOYLER & CLERY 1997). Somalia is the only country identified as having *B. frereana* growing naturally that produces the precious *meydi* resin. At present, an Irish development organisation, 'Progressive Interventions', is working in Somalia with the remit of looking at ways to increase the income of local collectors. It is thought that one way to do this might be to set up small distillation plants in local areas. With a strictly supervised collection and quality control system, distillation *in situ,* and with direct export links to a reliable company abroad, this could be made into a viable option in trying to increase local income and raise standards of living. The oil has a higher monetary value than the resin and is less bulky to transport.

The resins from several species of *Boswellia* are traded as frankincense with sources from many countries within the African continent as well as the Middle East and Southern Asia. Industrial distilleries will buy resin from a mixture of species and grades. If their sorting systems are not strictly quality controlled, the distillation of mixed batches of resin will occur. Also, differences in distillation methods can produce oils of different quality. They can be de-terpenized by re-distillation and also adulterated. This all adds to the general confusion in what is sold as frankincense oil in the general market place.

In the Plant Biology Department at the Scottish Agricultural College (SAC), we were involved in the distilling of authentic resin samples from Somalia, and assessing oil yield and quality by GC analyses. This gave us a blueprint of an authentic type of oil against which comparisons could be made with those commercially produced. The samples had been collected and graded by local groups in Somalia from two separate regions. Additional samples were obtained via a London dealer. All samples were

distilled using the British Standard method (BRITISH STANDARDS 1985) and analysed by GC (SVOBODA et al. 1998). Several representative samples were also sent for independent GC-MS analyses at three external sites. All oils had the similar distinct fragrance, very rich, sweet, balsamic and spicy. Distinct visual differences were observed between the *beeyo* and *meydi* resin pieces. Also, resin samples of the same species but from different regions differed visually both in colour and size. This variability could be attributed to several factors: the actual environment in which the tree is growing; annual rainfall; the age of the tree; the timing of the tapping; the number of tappings; and post-harvest storage. These factors all contribute also to the final quality of the oil. It must be remembered that the resin is a naturally produced plant material, growing under uncontrolled conditions, and as such will exhibit much variation. It may be that an inexperienced trader would find it extremely difficult to differentiate between the different sources and species. This variation was also apparent in the chemical composition of the distilled oil.

A copy of all our results is available on request from the SAC, Department of Plant Biology.

An extensive but unsuccessful literature search was made to look for any previous definitive investigations on the components of various frankincense oils. It appears that there are no existing standards, and it was evident that there is much confusion and misunderstanding over this species and its volatile oil. There is an increasing demand for qualitative standards for the oil in respect of chemical composition, colour, viscosity, density and refractive index from the industry. Although the use of resin in churches has declined world-wide, industrial demand from perfumery and pharmaceutical companies has grown. There is a lack of official statistics on the trade of resin, along with the fact that there is a great deal of unofficial trading across borders. In 1987, before the civil war, 800 tonnes of *meydi* and 200 tonnes *beeyo* were exported. Undoubtedly, Somalian resin production has been affected by the war.

It is not known how the indigenous collectors harvest the trees – whether they go by the botanical description of the trees or have their own method of distinguishing between them. If they have collected in the same area for many seasons, they will perhaps recognize a tree by its position and size, and also by the colour and type of resin exuded. In order to be able to provide essential oil suppliers with a guaranteed pure and correctly identified frankincense oil, and at the same time protect these vital natural resources from overexploitation, the following recommendations were passed on to Progressive Interventions:

- Efforts are needed to correctly identify the tree species and harvested resin. This would involve co-operation between a botanist and the local collectors.
- Advice should be given to the local collectors on the means of preserving the *Boswellia* tree populations and to maximize sustainable collection rates.
- Sustainable harvest levels must be determined, and methods that enable local collectors to monitor, manage, and control harvest within these levels must be devised.
- The distillation process must be regulated and strictly supervised to ensure that a consistent high oil quality is maintained.
- The quality of the essential oil should be checked using GC and GC-MS analysis.
- A niche market could be sought for the by-products of the distillation i.e. floral water and resin residues.
- A dialogue should be opened between the producers and the main standard-producing organisations such as AFNOR (Association Francaise de Normalisation) and ISO (International Standards Organisation).
- Additional funding should be sought to further classify and clarify the *Boswellia* species in respect of: botanical identification; DNA fingerprinting - as a marker system for classification and variability within the species; research into the bark formations to establish the most profitable and suitable harvesting regime; set up a data base of oil components from different areas; establish the bioactivity of the oil.

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The status of *Guaiacum* species in trade

Shelly Grow & Ed Schwartzman

Guaiacum species have been used throughout the western hemisphere and Europe for a variety of medicinal purposes for at least 500 years. Native Americans used the trees of this genus before the arrival of the Spanish and instructed explorers in the properties of the wood and the resin. When the wood was brought to Europe in 1508, its supposed medicinal properties were so revered it was called Lignum vitae or "wood of life" and quickly became a valuable commodity (RECORD 1921).

The ailments treated with *Guaiacum* vary depending on location and on the species. *G. officinale* has been widely used to treat high blood pressure, to bathe stiff legs, as a poultice on rheumatic swellings and for rheumatic pains, to alleviate skin diseases, for abortifacients, diuretics, and in treatments for sexually transmitted diseases like syphilis (MARTINEZ 1959, LIOGIER 1978, MORTON 1981). *G. sanctum* has served as a laxative, an antidote for poison, to improve the appetite, as a remedy for gonorrhea and syphilis, to treat gout and rheumatism, and as a remedy and expectorant for coughs and tuberculosis (LIOGIER 1978, MORTON 1981). *G. coulteri* used to be found in markets and was sold as an expectorant and a blood purifier (MARTINEZ 1959). However, despite the claims of the healing properties of *Guaiacum* species, there is little clinical evidence to support their medicinal value (MILLSPAUGH 1903, STANDLEY & STEYERMARK 1946).

Guaiacum species are known to contain important chemical compounds: saponins in both the wood and bark and guaiaretic acid and other phenolic compounds of the lignan group in the resin (LIOGIER 1978, MORTON 1981). The resin is most esteemed for medicinal use and makes up 25% of the heartwood dry weight (COLEMAN 1966). The resin turns greenish upon oxidation or in reaction with certain enzymes, thus enabling its use to differentiate nucleated from non-nucleated blood cells (MILNE 1967). The resin can either be extracted by heating logs with a hole at one end, by boiling wood chips, or by mixing sawdust with alcohol or ether (RECORD & HESS 1943).

Although historically much of the trade was for medicinal purposes, current trade is primarily for timber. *Guaiacum* timber is used in pulley sheaves, bearings, casters, bowling balls, and, most importantly, marine propeller shafts. It is one of the heaviest commercial woods currently in trade and has a self-lubricating quality that makes it especially useful for mechanical uses (LIOGIER 1978). Many of the non-timber *Guaiacum* products that enter the market are residual products from timber production (GONZALEZ 2000). Though still present in small quantities in the medicinal market, *Guaiacum* is not widely known or used by herbal vendors and only one shipment of *Guaiacum* has reportedly entered the international medicinal trade since 1985 (USFWS 2000, SCHIPPMANN 2001).

Four, possibly six, species of *Guaiacum* occur naturally throughout the American tropics. All species mature very slowly, occupy arid or semi-arid environments and can be difficult to distinguish from each other. *G. officinale* occurs in Venezuela, Colombia, and the Caribbean. *G. sanctum* occurs in the Florida Keys, the Caribbean, Mexico from Chiapas to the Yucatan, and Central America (PORTER 1972). Two *Guaiacum* species are endemic to Mexico, *G. coulteri* and *G. unijugum*; the former is distributed along the Pacific slope from Oaxaca to Sonora and the latter is restricted to the Cape Region in Baja California (BURQUEZ MONTIJO 2000, JENKINS 2000). Though its generic taxonomy is still unclear, *G. angustifolium* occurs in northern Mexico and southern Texas (LITTLE 1979). *G. guatemalense* is found in Central America and has been alternatively considered a synonym for *G. sanctum,* a hybrid of *G. sanctum* and *G. coulteri*, and a distinct species in its own right (PORTER 1972).

While the range of *Guaiacum* spp. is widespread and some of the species are locally common, *Guaiacum* species populations are declining. Both *G. officinale* and *G. sanctum* were heavily exploited for their wood in the past and intensively so until the 1980's. They are now listed in CITES Appendix II and the World Conservation Monitoring Centre considers them threatened (WCMC 2000). Though population estimates are not known, both species have been reported to be threatened or close to extinction in much of their range in the Caribbean (RECORD 1921, LIOGIER 1978). Trade in *Guaiacum* species continues and Mexican *G. sanctum* has become the principal species in commerce (SCHIPPMANN 2001).

The following activities pose threats to Guaiacum in Mexico: disturbances such as habitat conversion, fire, logging, and the introduction of non-native plants. *G. sanctum* has borne the brunt of these pressures, with deforestation representing the most serious problem. Past over-harvest of *G. sanctum* has raised concern as to its present status. It is not known to what extent current exploitation levels affect wild populations. *G. coulteri*, though widely distributed and not a highly coveted species, is sought for local use and is affected by land use pressures. As availability of *G. sanctum* declines, trade in *G. coulteri* could increase due to its resemblance to *G. sanctum*. *G. coulteri* is presently in trade in small amounts. Canada imported 1450 kilograms of *G. coulteri* in 2000 (GERSON 2000) and reports indicate that it has been exported as *G. sanctum* from Mexico (CURIEL 2000). Much of the confusion regarding the status of *Guaiacum* species results from misidentification of wood specimens.

Heavy harvests of *G. sanctum* took place in Mexico from the 1950's to mid-1980's but have decreased since that time (GONZALEZ 2000). The declining harvest and trade are primarily due to the replacement of *Guaiacum* with synthetic substitutes in the manufacture of propeller shafts. Transforesta, S.A. is currently the primary exporter of *G. sanctum* from Mexico and claims to be responsible for 60% of CITES authorized exports of the species between 1993-1998 (TRANSFORESTA 2000). Operating in an area of relatively dense *G. sanctum* distribution, Transforesta claims to be harvesting in a sustainable fashion. The company contracted with two *ejidos*, community owned lands, to harvest their trees and has implemented management plans in accordance with Mexican forestry laws (TRANSFORESTA 1994a and 1994b). The plans are aimed to support sustainable development in the *ejidos*, by providing a positive economic alternative to land conversion that guarantees habitat protection as well.

However, the management of *G. sanctum* and of other *Guaiacum* species outside of this area is questionable due mainly to two factors: first, species cannot be easily distinguished from each other and, secondly, because declines in wild populations stemming from conversion of habitat is difficult to quantify. Confusion regarding the different species has made accurate accounts of exportation and threats to the genus difficult to assess. Improving the conservation of *Guaiacum* species begins with proper identification keys and tools. A taxonomic review of the genus by students at the University of Maryland, USA, is underway and should help to clarify the status of individual species. This study focuses on *G. sanctum* and *G. coulteri*, two species that are commonly confused in Mexico and whose populations are thought to be declining. A clarification of taxonomic differences between the two species will help local forestry managers and CITES Authorities to better monitor wild populations and international trade.

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Return of the pepper-bark

Tony Cunningham

When we hear about rare species re-introductions, we usually think of large mammals such as rhino or elephant. This is the story of the re-introduction of an IUCN Red Data Listed medicinal tree into the area where it originally occurred, but in this case, as an agroforestry tree crop.

The pepper-bark tree, *Warburgia salutaris* (Canellaceae) produces the most favoured traditional medicinal bark used in southern Africa. Locally known in the region as *muranga* (Shona), *isibaha* (Zulu, si-Ndebele, *siSwati*) or *chibaha* (Tsonga), it is sold in urban marketplaces in Mozambique, Swaziland, South Africa, Lesotho, and Zimbabwe. The only southern Africa representative of the ancient angiosperm family the *Canellaceae*, it is one of only four *Warburgia* species found in Africa, all of which are highly valued for their effectiveness as herbal medicines. This medicinal value is probably due to biologically active drimane sequestiterpinoids, typically warburginal and mannitol, the latter being more widely used as a diuretic and to treat dyspepsia.

In Zimbabwe, *Warburgia* became locally extinct due to overharvesting for medicinal purposes, resulting in bark supplies being brought into Zimbabwe from the Mozambican side of the Chimanimani mountains. This destruction of *Warburgia* populations not only represented a conservation problem: it was (and is) also an issue of concern to local people and traditional healers in particular, for whom this represents loss of access to their most important herbal medicine. This is a widespread problem for this genus in Africa. The high demand for, and commercial trade in, *Warburgia* bark has raised conservation concerns in East Africa for the endemic species *W. stuhlmannii* and in southern Africa for *W. salutaris*. In the early 1930s, for example, the botanist Jacob Gerstner, who spent many years living in northern KwaZulu, South Africa, recorded that bags of isibaha bark were being transported from Hluhluwe to Durban for sale. In a vain attempt over more than a decade to collect flowers or fruits of this species for scientific identification, all he found were sterile coppice shoots sprouting from already exploited trees.

This species has a limited distribution in southern Africa, where it is listed as a vulnerable species in the recent Red Data List for this region. The situation in Zimbabwe, however, is particularly acute. The reason for this is that high commercial

demand for *Warburgia* bark in Zimbabwe focussed on a very limited supply as wild populations of *Warburgia salutaris* were restricted to forest ecotones on a few moist, high altitude sites in south-eastern Zimbabwe.

In 1996, a local needs survey by the WWF/UNESCO/Kew People and Plants Initiative concluded that re-introduction of this species through transplanting of rooted cuttings was considered a viable alternative for four reasons. Firstly, the high cultural values associated with this tree species as the most important medicinal plant species in Zimbabwe. Secondly, that re-introduction of this species was considered useful from a conservation perspective. Thirdly, the high value of the bark (around US$ 30 per kg (dry weight) in Zimbabwe), coupled with its vigorous re-sprouting ability and reasonably rapid growth rate suggested that it would be an economically viable agroforestry tree species. Fourthly, there were several thousand rooted cuttings available. This went back to discussions I had had in 1987 with Peter Schon at HL&H (now Mondi forests) in White River, South Africa, a forestry company producing millions of *Eucalyptus* cuttings annually and the commitment they made then to start a provenance collection (of plants from different parts of South Africa) and produce one million *Warburgia salutaris* by 1996, when the pepper-bark tree was nominated South Africa's "Tree of the Year". Fortunately, there were several thousand rooted cuttings left over from this exercise, some of which we bought, and some which were kindly donated by Pieter de Kok, who by then was dealing with this species at Mondi's White River Nursery.

In late 1997 and early 1998, a pilot project began, under the auspices of WWF-Zimbabwe and the local Zimbabwean NGO, SAFIRE (Southern Alliance for Indigenous Resources), to re-introduce *Warburgia* seedlings to south-eastern Zimbabwe. It was not without trauma, however. Despite meticulous documentation (phytosanitary certificates, export and import permits), careful packing in cooler boxes and the expense of air-freighting 1200 cuttings (temporarily removed from the soil for phytosanitary reasons), the young trees were delayed at Zimbabwean Customs for several hot summer days before finally being rescued by Isla Grundy of SAFIRE. Several hundred died, but enough survived for planting out in south-eastern Zimbabwe - the former heartland of this species in Zimbabwe. Importantly, the re-introduction was not done back in forests in the wild, where lack of individual rights of the species was likely to lead to overharvest again, but rather into the home gardens of local farmers, all of whom knew and valued the species.

In 1999 the re-introduction was assessed by a multidisciplinary group of botanists, economists and rural development field workers as part of a training course held under the auspices of the University of Zimbabwe, with support from the People and Plants Intiative and the University of Alberta. The economic analysis from this pilot project of *Warburgia* re-introduction, as well as on market price data from a survey of local herbal medicine markets strongly suggests that the re-introduction of *Warburgia salutaris* in south-eastern Zimbabwe has great potential to enhance conservation of an endangered species and, simultaneously, improve the livelihoods of local rural people.

For author's address see list of members.

Conservation status of *Cimicifuga rubifolia*, *C. americana*, and *C. racemosa*

Julie Lyke

Black cohosh (*Cimicifuga racemosa*, syn. *Actaea racemosa*) is a medicinal plant native to the eastern woodlands of North America. A member of the Ranunculaceae family, it is one of 15 species of this genus found worldwide.

The root of this plant has been used by native Americans for a variety of conditions for hundreds of years and in European phytotherapy for the treatment of menopausal symptoms for over 40 years. Numerous clinical trials indicate that black cohosh preparations offer an effective alternative to hormone replacement therapy in the treatment of menopause (FOSTER 1999).

Worldwide, this species outsells goldenseal (*Hydrastis canadensis*) (ABI 2001). Already popular in Europe where most of the harvest is shipped, black cohosh has recently experienced a dramatic increase in consumption, especially in the United States. Identified as one of the fastest growing herbal products in 1998, with a 511 percent increase over 1997 sales, black cohosh posted the largest percent increase in retail sales for any single herb in the first eight months of 1999, rising 477 percent over comparable 1998 figures (BREVOORT 1998; BLUMENTHAL 1999). Remifemin, a derivative of black cohosh, is now marketed in the United States by GlaxoSmithKline (www.remifemin.com, viewed: 25 June 2001). U.S. demand for this species is expected to continue increasing as American consumers age

and their health concerns grow. *Cimicifuga racemosa* is also in demand in China and Korea (ABI 2001).

The American Herbal Products Association (AHPA) estimates that a total of over 1.1 million pounds (499,400 kgs) (dry) *Cimicifuga racemosa* were harvested in 1997-1999 (ANDERSEN 2000). Though *C. racemosa* is grown on a small scale for native herb gardening and landscaping purposes, commercial-scale cultivation is very limited. At present, only 10-20 acres (4-8 ha) are known to be cultivated for black cohosh (ABI 2001). Cultivated black cohosh accounted for little more than three percent of the total harvest during 1997-1999 (ANDERSEN 2000) (fig. 1). Research is underway to develop commercially feasible propagation techniques for this species (*e.g.* www.yellowcreek.org/ycbiweb/joeannproj.html; www.ncpmh.org/frames2.html [both viewed: 6.4. 2001]).

Data on the distribution and abundance of black cohosh in the wild are lacking. Several thousand populations of *Cimicifuga racemosa* are estimated to be extant rangewide, including 100 in Indiana, "hundreds" in Maryland, 750-1000 on Forest Service lands in North Carolina, "thousands" in New York, 20-30 in South Carolina, and "hundreds" in Tennessee (ABI 2001). In general, it is considered to be relatively more abundant in the southern portion of its range. Larger populations can consist of 250-500 individuals (ABI 2001). A standard rich cove forest in North Carolina may contain an estimated 2000-5000 individual plants, or approximately 400-600 individuals per acre (162-243 individuals per ha) (KAUFFMAN, *pers. comm.*).

of about 9.2 million plants collected from the wild annually, or approximately 18,300 populations of 500 individuals each per year.

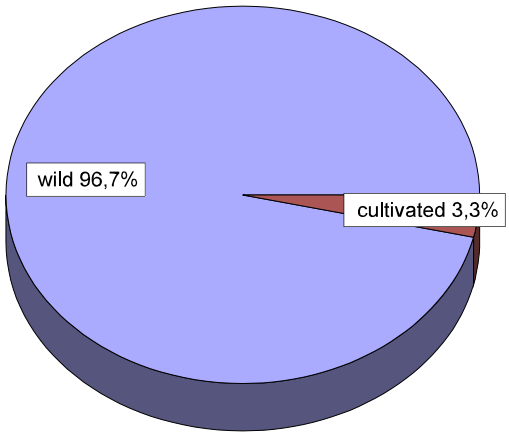

Figure 1. *Cimicifuga racemosa* harvest (1997-1999). Source: ANDERSEN (2000).

Populations of *Cimicifuga racemosa* have declined or disappeared in some states due to collection pressure (MOHLENBROCK 1981; ROBBINS 1999). This species is suspected to be declining more precipitously where there are concentrations of public lands because these areas are favoured by collectors for their large, intact forested areas (ABI 2001). From 1997-1999, the National Forests of North Carolina issued collection permits for less than two percent of the total amount of *C. racemosa* reportedly collected from the wild in each of those years (tab. 1). Information from other National Forests is unavailable. Collection from National Parks is not allowed.

Table 1. *Cimicifuga racemosa* harvest from the wild

	1997	1998	1999
Estimated total harvest (lbs. dry) (Source: ANDERSEN 2000)	227,002 (103,059 kg)	725,984 (329,597 kg)	145,367 (65,997 kg)
National Forests of North Carolina collection permits issued (lbs. dry) (Source: ABI 2001)	2,200 (999 kg)	12,000 (5,448 kg)	2,150 (976 kg)
Proportion of estimated total harvest allowed on Forest Service lands (%)	1.0	1.7	1.5

Collection of *Cimicifuga racemosa* from the wild for the medicinal plant trade occurs rangewide, especially on Forest Service and National Park Service lands in North Carolina (ABI 2001). An average of 366,000 pounds (166,164 kgs) (dry) per year, almost 97 percent of the total collected, was gathered from the wild during 1997-1999 (ANDERSEN 2000) (fig. 1). At an estimated 25 roots per pound (11 roots per kg) (dry), this is the equivalent

As with other medicinal herbs, the amount of collection pressure appears to be highly dependent upon wholesale prices, which dropped last year from a peak of $12-17 per pound ($5.45-7.72 per kg) (dry) to a current level of approximately $3 per pound ($1.36 per kg) (dry) (ABI 2001). However, the number of requests for permits to collect this species from Forest Service lands has increased over the

long term (ROBBINS 1999; ABI 2001).

The Nature Conservancy (TNC) ranks *Cimicifuga racemosa* among the top species of concern in a list of 184 medicinal plants native to the United States arranged in order of the degree to which they are threatened by medicinal plant collection (NIELSEN 2000). It is also listed as "At Risk" by United Plant Savers and the National Center for the Preservation of Medicinal Herbs, their highest category of concern (www.plantsavers.org/friends; www.ncpmh.org/blacoh.html [both viewed: 6 April 2001]).

Cimicifuga racemosa has been recommended for inclusion in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an action that would require black cohosh traded internationally to be legally acquired and sustainably harvested (University of Maryland Graduate Program in Sustainable Development and Conservation Biology *in litt.* to USFWS Office of Scientific Authority, Oct. 25, 1999). This recommendation is currently under consideration by the U.S. Fish & Wildlife Service Division of Scientific Authority.

The Plant Conservation Alliance Medicinal Plant Working Group, a consortium of U.S. government agencies and non-governmental organizations, has initiated a study of *C. racemosa* on Forest Service lands near Asheville, North Carolina. In September 2000, volunteers from the Garden Clubs of America, working with the Forest Service, U.S. Fish and Wildlife Service, and Strategic Sourcing, Inc., initiated a pilot project to collect black cohosh population data on the Pisgah National Forest. This study will continue and expand to other parts of the range in subsequent years.

Though collection of *Cimicifuga rubifolia* and *C. americana* has not specifically been documented, these species are probably also subject to significant collection pressure as they are present in areas where the most intense collection of *C. racemosa* from the wild occurs (NIELSEN 2000). Both are also listed by The Nature Conservancy (TNC) among their top species of concern (NIELSEN 2000). *C. rubifolia*, number one on the TNC list, is known from seven states, five of which list it as Rare (Illinois, Indiana, Kentucky, Tennessee, and Virginia). It is also present in Pennsylvania and extirpated in Alabama (KARTESZ 1999). It is listed as Rare in the 1997 IUCN Red Book of Threatened Plants; Endangered in Alabama, Indiana, and Virginia; Rare in Tennessee; and Vulnerable in Illinois and Kentucky (WALTER & GILLETT 1998). *C. americana*, known from ten states, is Rare in Illinois, Maryland, Pennsylvania, and South Carolina (KARTESZ 1999).

Limited quantitative data are available to support assessments of the status of these species and the impact of wild harvesting on them. The U.S. Fish & Wildlife Service Division of Scientific Authority is currently seeking information on the status of these three species throughout their range and the nature and extent of collection pressures on them for both foreign and domestic medicinals markets. Please forward comments to Julie Lyke.

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Assessment of resources and sustainable harvest of wild *Cibotium barometz* in China

Jia Jiansheng & Zhang Xianchun

Cibotium barometz, a tree-fern in the Dicksoniaceae (fig. 1) is distributed in India, Malaysia, Myanmar, Indonesia, Thailand, Vietnam, Japan, and China. In China, it is concentrated in valleys and forest margins in the tropical and subtropical south and southwestern regions at elevations ranging mostly from 200-600 m asl. *Cibotium barometz* usually grows with *Alsophila spinulosa*, *Gleichenia chinensis*, *Dicranopteris pedata,* sometimes forming large stands on acid soils.

Cibotium barometz rhizomes are very thick, woody and covered by long soft, golden yellow hairs, for which it is named, in Chinese, "Jinmao Gouji" (Golden Hair Dog), or "Huanggoutou" (Yellow Dog Head). *C. barometz* rhizomes are a famous traditional Chinese herbal medicine called "Gouji" used to replenish the liver and kidneys, strengthen the bones and muscles, and ease the joints. The hairs on the rhizome are also used as a styptic for bleeding wounds.

Recently in China, with the increased commercial trade, the wild stocks of *Cibotium barometz* have been depleted, resulting in the attention of international and national authorities. So far, there is no record of cultivation of *C. barometz* in China, all the materials traded in markets are collected from wild populations. Therefore, a project on the *Assessment of Natural Resources and Sustainable Harvest of Wild C. barometz in China* was set up with the support of the CITES Management Authority of China and Fauna and Flora International (FFI).

The aims of the project were:

- to obtain information about the distribution in nature and the trade levels of *C. barometz* in China;
- to implement the CITES provisions for this species;
- to achieve the goal of sustainable use of the natural resources of this species.

Distribution of *C. barometz*

On the basis of results obtained from field expeditions, as well as information gathered from the collections preserved in the important Chinese herbaria, it is known that in China, *C. barometz* is mainly distributed in Guangxi, Guizhou, Guangdong, Yunnan, Sichuan, Chongqing, Hainan, Xizang, Hunan, Zhejiang, Jiangxi, and Taiwan. Table 1 lists all the counties in each province where *C. barometz* is found.

Cibotium barometz is a common species in southern subtropical regions and tropical regions. Guangxi, Guangdong and Guizhou are the main areas of its distribution, followed by Yunnan and Sichuan. The northernmost distribution of this species in China reaches the Yangtze River in Chongqing.

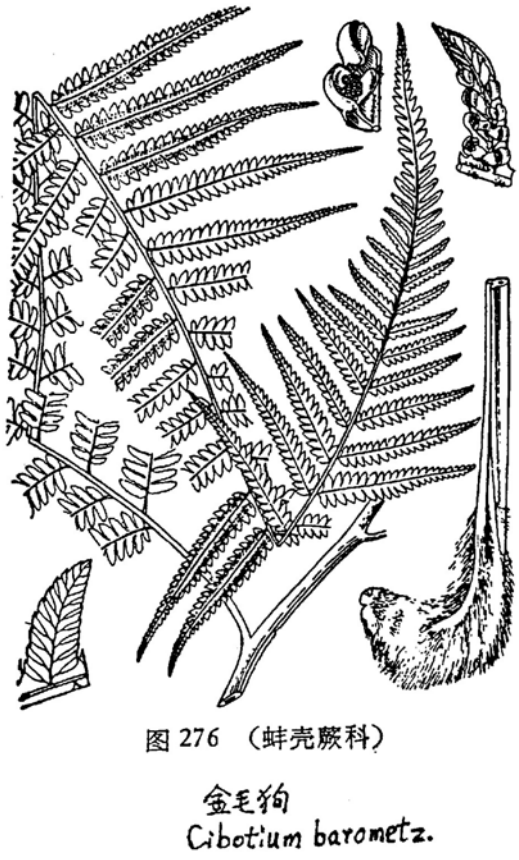

Figure 1. Leaflets and leaf base of *Cibotium barometz*.

Natural populations of *C. barometz* in China

According to the distribution survey, all counties were assigned to one out of four categories of natural population richness. The first category includes the richest counties such as Luocheng of Guangxi and Luodian of Guizhou. In the second category are the counties such as Zhaoqing of Guangdong and Sandu of Guizhou. The third category includes Gaoyao of Guangdong and Changjiang of Hainan, and the fourth category includes the least rich populations such as Tongliang of Chongqing.

Other counties, including Nanchuan and others in Chongqing, Shenzhen in Guangdong, Xinning and Jianghua in Hunan, Taishun and Pingyang in Zhejiang, Medog in Xizang and counties in Taiwan Province are not accounted for in these categories, either because of their very low *Cibotium barometz* population densities or inadequate information.

Table 1. The geographical distribution of *Cibotium barometz* in China

Province	Counties with Cibotium barometz
Guangxi	Luocheng, Rongshui, Huanjiang, Rongxian, Cangwu, Guiping, Pingnan, Hexian, Longsheng, Xingan, Wuzhou, Longzhou, Yulin, Lingle, Nanning, Baise, Hengxian, Bama, Yangshuo, Napo, Fengshan, Donglan, Hechi, Wuming
Guangdong	Zhaoqing, Fengkai, Xinyi, Deqeng, Huaiji, Ruyuan, Yuechang, Lianshan, Yangshan, Lianxian, Liannan, Gaoyao, Yangchun, Xinfeng, Wongyuan, Lianping, Yunfu, Luoding, Yingde, Shixing, Yunan, Heping, Jiaoling, Nanxiong, Enping, Shenzhen, Conghua, Zhuhai, Dongguan, Zengcheng, Huiyang, Yangjiang
Yunnan	Jiangcheng, Luchun, Jinping, Pingbian, Menglian, Cangyuan, Jinghong, Mengla, Menghai, Gengma, Suijiang, Ximeng, Tengchong, Hekou, Maguan, Luoping, Mengzi
Guizhou	Congjiang, Rongjiang, Luodian, Wangmo, Chishui, Xishui, Lipo, Cexiang, Dushan, Zhenfeng, Sandu, Liping
Sichuan	Gulin, Xuyong, Luzhou, Jianwei, Ebian, Leshan, Muchuan, Yibin, Hejiang, Nanxi, Bishan, Emeishan, Weiyuan, Pingshan, Yuechi
Hainan	Tongshi, Yuedong, Changjing, Baisha, Dongfang, Dingan
Fujian	Liancheng, Longyan, Nanjing, Shanghang, Yongding, Nanping, Jiangle, Cong an, Sanming
Jiangxi	Dayu, Xunwu, An yun, Quannan, Congyi, Suichuan
Chongqing	Nanchuan, Puling, Tongliang, Tongnan, Dazu
Hunan	Xinning, Jianghua
Zhejiang	Taishun, Pingyang
Xizang	Motuo
Taiwan	Taizhong, Nantou

Six counties representing all four categories were chosen for a field survey in which a minimum of 5 primary and 20 secondary plots of 5x5 m^2 were studied in each county. In the primary plots, all rhizomes were dug out, dried and weighed. In the other plots, a presence index was calculated. Using the distribution information, the total stock of *C. barometz* rhizomes was extrapolated for the county and later for the provinces.

According to these field plot investigations, we estimate the total standing stock of *C. barometz* rhizomes in each province as follows: Guangdong: 9820 tons; Guangxi: 9120 tons; Yunnan: 7520 tons; Guizhou: 6000 tons; Sichuan: 3240 tons; Hainan: 1800 tons; Fujian: 1100 tons; Jiangxi: 500 tons; Chongqing: 40 tons. Therefore, there are about 39,140 tons of standing stocks of "Gouji" in China, mainly distributed in Guangdong, Guangxi, Yunnan, Guizhou, and Sichuan.

Annual sustained yield of collection

To ensure that the wild resources of *C. barometz* will be utilized sustainably, the collection of "Gouji" must be strictly controlled. Above we have got the total standing stocks of "Gouji" per province. The annual sustained yield allowed for collection is the quantity that can be collected in a year without negative effect for the natural regeneration of the populations.

According to local collection habit and the buying standard of medicinal departments, we have to consider that the wet rhizome is usually collected only when it weighs more than 2 kg. Therefore, the commercially harvestable rhizomes are only 80% of the total standing stock of an area. For example, in Luocheng county, based on the results from plot investigations, we calculate that the commercially harvestable rhizomes in this county are about 912 tons (about 80% of the total stocks).

For most rhizome-harvested plants, the annual sustained yield is estimated at about 10% of the standing stocks. In our example we can calculate that the annual allowed collection quantity in Luocheng county is 91.2 tons per year. Based on the estimated 39,140 tons of "Gouji" resource deposited in mainland China, the total annual harvest of rhizomes which could be sustained would be about 3131 tons.

International and internal trade

"Gouji" is very popular in traditional Chinese medicine. The trade of "Gouji" is mainly concentrated at the Yulin medicinal material market in Guangxi and the Anguo medicinal material market in Hebei. An

average of 2000 tons/year was sold from 1991 to 1999 in Yulin market alone. It is estimated that about 3000 tons of "Gouji" went to the market for internal trade each year.

According to data from the CITES Management Authority of China, the total quantity of *C. barometz* exported from mainland China and Hongkong between 1993 and 1997 was about 459 tons, so the average amount exported per year was more than 90 tons.

Conclusions

From the above investigation and analysis, we can see that the wild populations of *C. barometz* are not evenly distributed, but are found mainly in southern and southwestern regions, such as Guangdong, Yunnan, Guizhou, and Sichuan. In recent years, because the control of collection has not been strictly implemented in China, combined with the increasing demand at internal and international markets, the wild resources of *C. barometz* have been seriously depleted in some areas. Generally speaking, however, the resource standing stocks of *C. barometz* in China are still abundant with about 39,140 tons, while the annual sustained yield which should be allowed for collection is estimated at about 3131 tons.

In recent years, the export of *C. barometz* was restricted, so the medicinal materials collected mainly circulated at internal markets. Considering all kinds of circulation channels, the overall collection quantity was less than or equal to the annual sustained yield for the whole country. However, it has to be considered that the demand for "Gouji" differs from region to region. In some regions, nobody bought "Gouji" over a long period of time, so the wild populations are preserved well or destroyed for other man-made reasons. But in some other regions, because of heavy collection, the wild resource deposits have decreased sharply, as well as being affected by habitat loss.

Recommendations for the sustainable harvest of *Cibotium barometz*

The government should try to control the export of *C. barometz*. The export quantity must be confined strictly, taking into consideration many factors. A quantity of no more than 130 tons per year for export is suggested by the results of this study. In the future the export of final products rather than raw materials should be encouraged.

With the increasing demand for "Gouji" in internal and international markets, combined with the absence of relevant regulations to control it, the natural resource of "Gouji" has been seriously depleted in recent years in some areas in China. In order to ensure the sustainable utilization, the following measures are recommended:

- strengthening education and awareness of local people of the importance of sustainable use of economic plants,
- collecting the resources sustainably on the basis of forestry management plans based on inventories and assessments of sustainable yield,
- confining the annual quantity of export trade,
- setting up nature reserves for *Cibotium barometz* where no collection is allowed,
- developing scientific research programs and establishing a cultivation base for *Cibotium barometz*.

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Conferences and Meetings

Coming Up

Natalie Hofbauer

✎ **Follow-up Seminar to the International Symposium on Ethnobotany, Medicinal Plants, Folk Traditions, History, Ethnomedicine, Pharmacology.** 14-18 September 2001, Antigua, Guatemala.
Contact: Ronald Chaves · Tel.: +506/283-0363 · Fax: +506/283-0363 · Email: simposio@racsa.co.cr.

✎ **Third International Congress of Ethnobotany.** 22-30 September 2001, Naples, Italy.
Etnobotanica Napoli 2001 - Ethnobotany in the Third Millenium: Expectations and Unresolved Issues.
Contact: infoetno@unina.it · Website: www.ortobo

tanico.unina.it/congress (viewed: 22 June 2001).

✎ **Congress on Conservation of Biodiversity in the Andes and Amazon Basin: Linking Science, NGOs, and Indigenous People. (Conservación de la Biodiversidad en los Andes y la Amazonía - reuniendo a Científicos, ONGs y Comunidades Locales).** 24-28 September 2001, Cusco, Peru.
Organized by Red Internacional para la Conservación de la Biodiversidad y la Diversidad Cultural - INKA, München, Germany (www.inka-ev.de); Centro Bartolomé de las Casas - CBC, Cusco, Perú (www.cbc.org.pe); Fundación Científica San Francisco - FCSF, Del Mar, EEUU; Loja, Ecuador (www.fcsf.org); CERINKA, Cusco, Perú (all websites viewed: 22 June 2001).
Contact: INKA e.V. · Gravelottestr. 6 · 81667 München · Germany · Fax: +49/89/4591-1920 · Email: sigrun.lange@inka-ev.de.

✎ **Industrial Leadership in the Preservation of Medicinal and Aromatic Plants Symposium.** 27-28 September 2001, Philadelphia, Pennsylvania, USA.
This symposium, which is organized by the Medicinal Plant Working Group (member of the Department of the Interiors Plant Conservation Alliance, website: www.nps.gov/plants/medicinal/index.htm; viewed: 22 June 2001), will bring together industry users and collectors of plants, conservationists, environmentalists, a Native American Council of Elders, etc. It aims at learning about impending problems and discussing and planning ways forward for industry using herbal and aromatic plants to take part in a leadership role in sustainable use of plant material.
Contact: Natasha Hall · American Herbal Products Association · 8484 Georgia Avenue · Suite 370 · Silver Spring · MD 20910 · USA · Tel. +1/301/588-1171 ext. 106 · Fax: +1/301/562-7058 · Website: www.aveda.com/conference/default.asp (viewed 17 July 2001).

✎ **Fachtagung Heil- und Gewürzpflanzen 2001.** 12-15 November 2001, Bad Neuenahr-Ahrweiler, Germany
Contact: SLVA · Walporzheimer Str. 48 · 53474 Bad Neuenahr-Ahrweiler · Germany · Tel.: +49/2641/ 9786-0 · Fax: +49/2641/9786-66 · Email: poststelle. slva-aw@agrarinfo.rpl.de.

✎ **International Conference on Medicinal Plants, Indigenous Knowledge and Benefit Sharing.** 16-19 April 2002, The Hague, The Netherlands.
This conference takes place under the auspices of the Dutch Ministry of Agriculture, Nature Management and Fisheries as a parallel session to the COP 6 of the CBD. It will contribute to the outcomes of the COP 6 for issues relating to benefit sharing, indigenous biodiversity and health knowledge, and protection of intellectual property rights.
Contact: Prof. Dr. L. Jan Slikkerveer · Institute of Cultural and Social Studes & the Leiden Branch of the National Herbarium of the Netherlands · Wassenaarseweg 52 · 2333AK Leiden · The Netherlands · E-mail: slikkerveer@fsw.leidenuniv. nl.

✎ **Symposium Biodiversity and Health. Using and Sustaining Medicinal Resources.** May 2002, Ottawa, Ontario, Canada.
Objectives: To augment knowledge of medicinal resources, essential for their effective management, conservation, and comprehensive use.
Contact: Nina Edson · Program Coordinator Tropical Conservancy · 94 Four Seasons Drive · Nepean, Ontario · Canada K2E 7S1 · Tel. +1/613/ 729-5916 · E-mail: tropical@synapse.net · Website: www.synapse.net/~tropical (viewed: 8 June 2001).

✎ **2ème Congrès International Plantes Médicinales/ Santé/Environnement. / 2nd International Colloquium Medicinal Plants/Health/Environment.** 2-4 May 2002, Rabat, Morocco.
Topics: Ethnobotany and Traditional Medicine; Biodiversity, Conservation of Medicinal and Aromatic Plants Resources; Phytochemistry; Pharmacology, Toxicology, Biology, and Biotechnology; Technology, Quality, Economic and Legal Aspects; Phytodrugs and Phytofoods; Round table.
Contact: Prof. Dr. Mohammed Hmamouchi · Université Mohammed V-Souissi · Faculté de Médecine et de Pharmacie · B.P. 6388 Rabat Institutes · Rabat · Morocco · Tel: +212/6/1303778 · Fax: +212/3/725 6091 · E-mail: hmamouchim@hotmail.com; hmamouchim@wanadoo.net.ma.

✎ **Symposium 6 - The Future for Medicinal and Aromatic Plants.** 11-17 August 2002, Toronto, Canada.
Topics of this symposium are: Ethnobotanical resources - understanding, utilizing and protecting biodiversity; Chemistry - comprehending and managing constituent synthesis; Standardization - meeting societal needs for medicinal extracts; Production - developing sustainable and saleable production technologies.
Contact website: www.ihc2002.org/ihc2002/cgi.html (viewed: 22 June 2001)

Recent Events

BMZ-funded workshop held in Hong Kong

Samuel Lee

A one-day stakeholder workshop entitled *Medicinal Plant Trade and Sustainable Use* was held in November 2000 to dicuss the role of Hong Kong in the medicinal plant trade. The event was organized by TRAFFIC East Asia under the auspices of a project supported by Germany's Federal Ministry for Economic Co-operation and Development (BMZ).

Participants included members of the local trader associations as well as representatives from the Hong Kong CITES Management Authority, the Department of Health, and Hong Kong Chinese University's School of Chinese Medicine.

The final report, *The Role of Hong Kong in the Regional Medicinal Plant Trade in East Asia* (in Chinese) will be made available to all participants and other identified stakeholders in the region.

The purpose of the workshop was to obtain information from the traders to complement documented trade and customs data collected and analysed by TRAFFIC East Asia. The workshop also aimed to involve stakeholders in the research and to alert them to possible future regulatory developments. The results of the process are, for TRAFFIC East Asia, more accurate information on the trade and, for other stakeholders, increased understanding of the relationship between conservation, CITES, and trade in medicinal plants.

Samuel Lee • TRAFFIC East Asia - Regional Office • Room 2001, Double Building • 22 Stanley Street • Central, Hong Kong • China (Hong Kong SAR) • Tel: +852/2530-0587 • Fax: +852/2530-0864 • E-Mail: samuelee@wlink.net.

Cited from: *TRAFFIC Dispatches* 16: 11, 2001.

Medicinal Plants Forum for Commonwealth Africa

3-6 December 2000, Cape Town, South Africa.

Nina Marshall

The Medicinal Plants Forum, organized by the Commonwealth Secretariat, London in collaboration with the Centre for the Development of Enterprise (EU-ACP), Brussels and the South African Department of Trade and Industry, was convened with the aim of discussing production, processing and trade in African medicinal plants. Presentations covered a broad range of topics including regulations and licensing, cultivation, conservation, value-added production and launch of new herbal products. Participants represented public and private sector interests and came from over 20 countries with approximately 75% representation from Commonwealth Africa.

The Forum provided Africans and Europeans the chance not only to explore new opportunities within the medicinal plant sector, but also to discuss the many challenges that face the industry. Participants with varied interests and concerns were exposed to new topics, in a positive and open environment. From a conservation perspective, participants heard several presentations about the precarious status of some African medicinal plant species, dwindling supply, and current efforts to address unsustainable harvest and trade.

While participants benefited from hearing about a diversity of topics, what was unique about the Medicinal Plants Forum, the organizers succeeded in bringing together numerous relevant but extremely different issues, to which participants responded with enthusiasm. Undoubtedly, there is a definite need for future meetings that will bring together participants from such a diversity of sectors, interests and countries. The Medicinal Plants Forum set an excellent example and foundation for future events.

For author's address see list of members.

Reviews and Notices of Publication

Boxed reviews refer to books which have been sent to us by the publisher.

Abbreviations: djl: *Danna J. Leaman*; schp: *Uwe Schippmann*

ABBITT, R.J.F., J.M. SCOTT & D. WILCOVE (2000): The geography of vulnerability. Incorporating species geography and human development patterns into conservation planning. - Biological Conservation 96(2): 169-175.

AL-DOURI, N.A. (2000): A survey of medicinal plants and their traditional uses in Iraq. - Pharmaceutical Biology 38(1): 74-79.

ANON. (1990): An illustrated dictionary of Chinese medicinal herbs. - 184 pp., Times Editions & Eu Yan Sang Holdings, Singapore.

> The photos in this nicely illustrated book mostly show the habitus of the living plant and to a lesser extent the drugs in use. Plants are arranged in alphabetical order according to their genus name. Two indices in the back list vernacular English and Chinese names. Each entry includes a brief description of the plant, the plant part used and its medical indication. Overall, information on the species is limited and so is the usefulness of this publication. (schp)

ANON. (1999): Healthy people, healthy wildlife. Proceedings of the second Australian symposium on traditional medicine and wildlife conservation. - ii+68 pp., Environment Australia, Melbourne.

ANON. (2001): Open to plunder. Smuggling is stripping India of rare medicinal plants. - Down to Earth (January): 28-41.

> This well-written, journalistic summary of the illegal collection practices in Indian forests is mainly based on interviews with stakeholders, officials and researchers. Using various plant examples, the exploitation of local collectors is described who are paid 800 times less than the price the product fetches in the market as is the case in Solanum xanthocarpum. Forest officials are accused of turning a blind eye to illegal practices. The government is said to be only interested in banning certain species or liberalizing trade without any support mechanisms. For Saussurea lappa all confiscated consignments for 1989-1996 are listed but seizures are said to be etremely rare. In another table the availability trends for three taxa are given. (schp)

AUMEERUDDY-THOMAS, Y., S. SAIGAL, N. KAPOOR & A.B. CUNNINGHAM (1999): Joint management in the making. Reflections and experiences. - 58 pp., UNESCO, Paris (People and Plant Working Paper 7).

BABULKA, P. (2000): Arzneipflanzen und Phytotherapie in Ungarn. - Zeitschrift für Phytotherapie 21: 257-263.

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BALICK, M.J., F. KRONENBERG, A.L. OSOSKI, M. REIFF, A. FUGH-BERGMAN, B. O'CONNOR, M. ROBLE, P. LOHR & D. ATHA (2000): Medicinal plants used by Latino healers for women's health conditions in New York City. - Economic Botany 54: 344-357.

BARDEN, A., N. AWANG ANAK, T. MULLIKEN & M. SONG (2000): Heart of the matter. Agarwood use and trade and CITES implementation for Aquilaria malaccensis. - viii+52 pp., TRAFFIC International, Cambridge.

BARNETT, R. (2000): Traditional medical practitioners in Kenya. Putting theory into practice. - TRAFFIC Bulletin 18(3): 87-89.

BARRETT, C.B. & T.J. LYBBERT (2000): Is bioprospecting a viable strategy for conserving tropical ecosystems?. - Ecological Economics 34(3): 293-300.

BARTHLOTT, W., W. LAUER & A. PLACKE (1996): Global distribution of species diversity in vascular plants. Towards a world map of phytodiversity. - Erdkunde 50: 317-328.

> Although biodiversity and genetic resources are standing items in both the scientific and political fora, no accurate map of plant species diversity exists. The authors have based their map on the data from 1400 floristic and ecological papers. The species numbers of these works were transformed to the standard area of 10,000 km^2. Ten diversity zones from <100 to >5000 species per 10,000km^2 are distinguished. Since the data basis mostly covers political areas rather than natural zones, the map had to be extrapolated with climatic data. Six maxima are visible: Choco-Costa-Rica; tropical east Andes; atlantic Brazil; eastern Himalaya-Yunnan; northern Borneo; New Guinea. The tropical maxima are associated with ocean surface temperatures of above 27°C. (schp)

BHADULA, S.K., A. SINGH, H. LATA, C.P. KUNIYAL & A.N. PUROHIT (1996): Genetic resources of Podophyllum hexandrum Royle, an endangered medicinal species from Garhwal Himalaya, India. - Plant Genetic Resources Newsletter 106: 26-29.

> The paper presents the results of field surveys which were conducted in different subalpine (2300-3000 m) and alpine (3000-3700 m) ranges of Garhwal Himalaya to determine the distribution pattern and population polymorphism of P. hexandrum. The natural populations are distributed in restricted and small pockets, population sizes vary from 40-700 plants. Numbers of plants are decreasing in all populations. Some have been observed since 1982 and now have dissapeared completely, mainly due to anthropogenic activities and over-exploitation. Considerable variation in a range of morphological characteristics exists between the distinct populations. Since exploitation far exceeds natural regeneration, the authors call for local community cultivation programmes. (from summary)

BLANCO CASTRO, E. & C. CUADRADO PRIETO (s.dat.): Etnobotanica en Extremadura. Estudio de La Calabria y la Siberia extremeñas. - 218 pp., Appendix, Autoedicion, Madrid.

> This book summarizes the ethnobotanical work of the authors in a region of south-central Spain, at the intersection of the provinces Cáceres, Badajoz, Ciudad Real, and Toledo. It has been published by the authors themselves. 276 taxa have been identified as being in use, 56 as medicinals for man or animal. The main part consists of a 100-pages floristic catalogue arranged by common names (scientific names in page index). Main information is on the various traditional uses as food, fodder, medicine, and for technical and cultural purposes. (schp)

BLANK, P. & al. (2000): Guaiacum sanctum. Population status and trade in Mexico with CITES recommendations. - 54 pp., University of Maryland. Unpublished report, s.loc.

BLASZCZYK, T. (1999): Anbau der chinesischen Heilpflanzen in Hamm. - Zeitschrift für Arznei- und Gewürzpflanzen 4: 199-202.

BRENDLER, T., J. GRÜNWALD & C. JÄNICKE, Eds. (1999): Heilpflanzen 1999. CD-ROM. - s.pag., Medpharm Scientific Publishers, Stuttgart.

CARLSON, A.W. (1986): Ginseng. America's botanical drug connection to the orient. - Economic Botany 40: 233-249.

The paper presents an analysis of the factors that have lead to the continuous exporting of Panax quinquefolius, nearly 21,000 metric tonnes in the period between 1821-1983. Over 95% of this material was exported to the Far East, mostly through Hong Kong as the center for re-export. American ginseng became a cultivated crop in the late 1800's. Production in the US is nowadays concentrated in Marathon County in Wisconsin with a production of an estimated 90% of the cultivated American ginseng in the US. (from summary)

CHAZDON, R.L. & F.G. COE (1999): Ethnobotany of woody species in second-growth, old-growth, and selectively logged forests of northeastern Costa Rica. - Conservation Biology 13: 1312-1322.

CHUNG, R.C.K. & PURWANINGSIH (1999): Aquilaria malaccensis Lamk. In: Oyen, L.P.A. & N.X Dung (Eds.): Essential-oil plants. pp. 64-67, Backhuys, Leiden (Plant Resources of South-East Asia 19).

COUPLAN, F. & P. DANTON (2000): L'harpagophytum. Un cadeau d'Afrique à menager. - La Garance Voyageuse 50: 16-19.

CROUCH, N., G. SMITH, R. SYMMONS & M. TOMALIN (2000): Gasteria croucheri. The magical impundu of the Zulu. - British Cacti and Succulent Journal 18(2): 70-78.

Davydov, M. & A.D. Krikorian (2000): Eleutherococcus senticosus (Rupr. & Maxim.) Maxim. (Araliaceae) as an adaptogen. A closer look. - Journal of Ethnopharmacology 72: 345-393.

While concentrating mainly on the medicinal properties of this and other ginseng species, the paper has an interesting historic overview of the use history, especially about the shift from Panax ginseng to E.s. According to the authors this was partly induced by scarcity of true ginseng. The species was first collected between 1830 and 1841 and is today marketed as Siberian ginseng. (schp)

CUNNINGHAM, A.B. (2000): Applied ethnobotany. People, wild plant use and conservation. - xviii+300 pp., Earthscan, London (People and plants conservation manuals).

This detailed manual on wild plant resources sets out the approaches and field methods involved in participatory work between conservationists, researchers and the primary resource users. Supported by 97 excellent illustrations, 16 tables and 22 text boxes, it explains how local people can learn to assess the pressures on plant resources and what steps to take to ensure their continued availability. This guide is invaluable for all those involved in resource management decisions regarding plants and diversity, and in particular those studying or working in conservation, rural development and park management. (from summary)

DEMPSEY, D. & I. HOOK (2000): Yew (Taxus) species. Chemical and morphological variations. - Pharmaceutical Biology 38: 274-280.

Needles and twigs of various Taxus species are presently of commercial importance as the natural sources of some anticancer agents. To determine inter- and intraspecific morphological similarities the authors have collected needles of six Taxus (the species names are not given) and of 25 varieties of Taxus baccata in an arboretum. Needle dimensions, stomata length and numbers, and the content of Paclitaxel were examined. Significant intra-specific differences were found to occur between the varieties of T. baccata, but no "sufficiently distinctive inter-specific differences of taxonomic value" were obvious between the species. (schp)

DENNIS, F. & G. OWUSU-AFRIYIE (1999): Development of medicinal plant gardens in Aburi, Ghana. -

CHAND, K. (1996): Medicinal plants sourcebook. India. - iv+598 pp., International Library Association, Dehra Dun.

This publication provides information on all facets of medicinal plant issues in India. It is organized into 3 parts, subdivided into 22 chapters: (a) Institutions: information on the objectives, research areas and resources of government and non-government organisations, university research centres as well as phytopharmaceutical research and manufacturing companies. (b) Education, information services and publications: information on audiovisual material, books, consultants, events, extension services, information systems and services, libraries, and periodicals. This part includes information on various databases. (c) Products, miscellaneous services and resources: information on analytical facilities, certification, gardens, germplasm banks, etc. (schp)

Botanic Gardens Conservation News 3(3): 37-39.

DERY, B.B., R. OTSYINA & C. NG'ATIGWA (1999): Indigenous knowledge of medicinal trees and setting priorities for their domestication in Shinyanga region, Tanzania. - vi+87 pp., ICRAF, Nairobi.

DHAR, U., R.S. RAWAL & J. UPRETI (2000): Setting priorities for conservation of medicinal plants. A case study in the Indian Himalaya. - Biological Conservation 95: 57-65.

> The paper aims at developing a method of identifying species with highest priority of conservation action in a given area, here the Indian Himalaya. The authors have created two numerical indices which reflect the quantified needs of industrial supply (use value index - UVI) and the biological sensitivity index (SI) which includes the mode of harvesting, the distribution and the cultivation potential. The importance value index (IVI) is combining the two, thus considering perceptions of priority from both users' and conservationists' perspective. When viewed separately, the priorities of UVI and SI do not match in most cases. Using the IVI, the paper identifies 20 top ranking medicinal plants for conservation in each life form herbs, shrubs and trees. (schp)

DOUNIAS, E., W. RODRIGUES & C. PETIT (2000): Review of ethnobotanical literature for central and west Africa. - The African Ethnobotany Network Bulletin 2: 5-117.

> This extensive bilingual (French and English) literature review covers 27 countries of central and western Africa. Only data on cultivated plants were excluded from the survey. More than 4600 bibliographic references constitute the basis for this review. The authors announce that these will soon be available at a searchable internet site. In the paper, only 600 references are listed, 400 of which are referred to in the text. Of special interest is a list of 20+ searchable databases available on the web. Medicinal plants s.str. are dealt with on four pages of the text. This paper contains a tremendous wealth of information. (schp)

DUTFIELD, G. (2000): Intellectual property rights, trade and biodiversity. Seeds and plant varieties. - xvi+238 pp., Earthscan, London.

> The author elaborates the various legal aspects of intellectual property rights in the field of plant trade and illustrates this with seven case studies (Kani and jeevani; Aguaruna; terminator technology; turmeric; neem; quinoa; basmati rice). A most valuable feature of this book is the annotated bibliography of 60 pages with keywords and abstract for each reference. (schp)

DUTTA, R. & P. JAIN (2000): CITES listed medicinal plants of India. An identification manual. - 85 pp., TRAFFIC India & WWF India, New Delhi.

> This bilingual booklet describes Indian medicinal plant species protected by CITES. Besides photos of the drug and a line drawing of the plant's habit, information on uses, common names and a rough description of the raw drug is given. The distribution data only relate to India although some species also occur in other countries. No medicinally used orchids (all included in CITES App. II) are covered. Some Euphorbia species are not succulent and hence not protected. The biggest shortcoming, however, is that the information under the heading "Form in which International Trade is Permitted" is erroneous since it only summarizes the information contained in the CITES Annotations (= footnotes) and does not refer to the general Appendix II regulations. (schp)

FEISTEL, B. & F. GAEDCKE (2000): Analytische Identifizierung von Radix Harpagophyti procumbentis und zeyheri. - Zeitschrift für Phytotherapie 21: 246-251.

FORERO PINTO, L.E., J.F. CHAVEZ RODRIGUEZ & H. YESID BERNAL (2000): Agrotecnologia para el cultivo de sangre de drago o sangregrado. In: Martinez A., J.V., H. Yesid Bernal & A. Caceres (Eds.): Fundamentos de agrotecnologia de cultivo de plantas medicinales Iberoamericanos - pp. 157-190, Convenio Andres Bello, Santafé de Bogota.

FORTIN, D., M. LO & G. MAYNART (2000): Plantes médicinales du Sahel. - 278 pp., Enda, Dakar.

FRANKE, R., R. SCHENK & G. ABEL (2000): Cimicifuga racemosa (L.) Nuttal. Ein Kandidat für Inkulturnahme. - Zeitschrift für Arznei- und Gewürzpflanzen 5: 62-67.

FREMUTH, W., A. SCHOPP-GUTH, M. MERSINLLARI, P. HODA & L. DINGA (1999): Assessment of the sustainable use of medicinal plants from the Ohrid and Prespa region. - 67 pp., ECAT & Euronature, Tirana, Rheinbach.

GALAMBOSI, B., N. TAKKUNEN & M. REPCAK (2000): The effect of regular collection of Drosera rotundifolia in natural peatlands in Finland. Plant density, yield and regeneration. - Suoseura 51(2): 37-46.

> This is one of the rare cases where research is focussed directly on resource management practices. D. rotundifolia is collected in Finland commercially for 10 years. In an experimental study the authors investigated the effect of harvest on the regeneration of natural populations at 37 sample plots during 1993-99. They found that the plants regenerate well from the seed bank stock of the peat. On the basis of these findings a sustainable harvesting scheme was initiated among the collectors. They are obliged to leave 5-10 plants per m^2 to spread seed and to ensure natural regeneration of the sundew populations. (schp)

GLEICH, M., D. MAXEINER & M. MIERSCH (2000): Life counts. Eine globale Bilanz des Lebens. - 288 pp., Berlin Verlag, Berlin.

GRÜNWALD, J. (2000): European herbal market update. - ICMAP News 7: 10-11.

HARNISCHFEGER, G. (2000): Proposed guidelines for commercial collection of medicinal plant material. -

Journal of Herbs, Spices and Medicinal Plants 7(1): 43-50.

The paper presents draft guidelines for "Good Harvesting Practices" (GHP) which aim at setting standards for ensuring that wild collection of medicinal plants is sustainable. Besides other requirements relating to the collection, processing, storage, and documentation, the guidelines contain a section on the collection itself with 14 paragraphs. Of these only three deal with conservation precautions. 2.14 states: "The danger of plant extinction should be avoided through special care to avoid overharvesting within a particular collecting area." This is too general and not helpful in practice. These draft GHP guidelines are strongly focussing on the quality of the collected material and too little on sustainability issues. (schp)

HEINRICH, M. & J. LEIMKUGEL (1999): Arzneidrogen im deutschen und europäischen Arzneibuch. - Zeitschrift für Phytotherapie 20: 264-267.

HOFFRITZ, J. (1999): Grüne Aussichten. Deutsche Kräutermedizin ist auch in Amerika ein Hit. - Die Zeit 7: 22.

HÖFT, M., S.K. BARIK & A.M. LYKKE (1999): Quantitative ethnobotany. Applications of multivariate and statistical analyses in ethnobotany. - 46 pp., UNESCO, Paris (People and Plant Working Paper 6).

HONNEF, S. & V. HOMES (2000): Zurück zu den Wurzeln. - WWF-Journal 3/2000: 25-28.

HONNEF, S., V. HOMES & R. MELISCH (2000): Gegen alles wächst bald kein Kraut mehr. - WWF-Journal 4/2000: 14-19.

HU SHIU-YING (1999): An enumeration of Chinese materia medica. 2nd edition. - xxvii+287 pp., Chinese University Press, Hong Kong.

This book is a reference list to the Chinese pharmacopoeia. In its first part 2270 drugs of plant, animal and mineral origin are listed in tabular form. They are arranged by their Chinese names which were transliterated in the Roman alphabet using the Wade system. Additional columns list the Chinese name in Chinese, the scientific botanical name (or several if all linked to the same Chinese name), the English name and the official pharmaceutical name. The second part of the book is a systematic summary of the entries of part 1. It covers 1716 plant species, 120 animals, 79 minerals, and 41 miscellaneous preparations. The vascular plants are arranged by their families. (schp)

HURLBURT, D. (1999): Endangered Echinacea, what threat, which species, and where?. - United Plant Savers Newsletter 2(1): 4,6.

IUCN & TRAFFIC (15.2.2000): Analyses of proposals to amend the CITES Appendices. Prepared by the IUCN Species Survival Commission and the TRAFFIC Network for the 11th Meeting of the Conference of the Parties to CITES. - <www.iucn.org/themes/ssc/cites/index.html> (viewed 5 March 2000)

Before each Conference of Parties to CITES a report is prepared by IUCN & TRAFFIC which gives additional data on the proposals that have been submitted to amend the Appendices. For the 11th CITES conference, again a number of horticultural and medicinal species were proposed. In datasheets of 2-4 pages much additional information on distribution, habitat availability, population status, , trade, identification problems, conservation measures, and management was put together with many references and personal communications. (schp)

JIA JIANSHENG & ZHANG XIANCHUN (2001): Assessment of resources and sustainable harvest of wild Cibotium barometz in China. - 21 pp., Appendix, CITES MA. Unpublished report, Beijing.

JAIN, A. (2000): Regulation of collection, transit and trade of medicinal plants and other non-timber forest products in India. A compendium. - xxix+529 pp., TRAFFIC India & WWF India, New Delhi.

This very comprehensive book describes the legislative policies, regulations and forest acts not only on the national Indian level (part 1) but also in detail for all Indian states and Union Territories (part 2: 20 chapters). For each state an introduction summarizes the state legislation and each of the numerous legal acts is cited in its relevant parts. Also listed are the names of the NTFP species occuring there. It is, however, a pity that the book does not have a full species index for easy references. (schp)

KALA, C.P. (2000): Status and conservation of rare and endangered medicinal plants in the Indian trans-Himalaya. - Biological Conservation 93: 371-379.

The author criticizes that both the red data book and the random selection of species for CAMP workshops are not based on sound field data for their threat assessments. He carried out an ethnobotanical interview survey with local amchis and a field investigation of random plots of different habitat types. The methods of the latter remain a bit unclear, it appears that numbers of individuals and ground coverage have been extrapolated to arrive at regional density figures. While not stating which set of taxa he had started off with, the author gives a list of 23 rare and endangered medicinal plants. Of these, 2 are included in the national red list and 15 had been evaluated by a 1998 CAMP workshop. After all, the CAMP process cannot be too bad. (schp)

KAY, D. (1999): The Wildlife Protection Act and traditional medicines. In: Anon.: Healthy people, healthy wildlife. Proceedings of the second Australian symposium on traditional medicine and wildlife conservation - pp. 11-13, Environment Australia, Melbourne.

KELLER, K. (1999): Pflanzliche Arzneimittel in der EU. - Herba Polonica 45: 290-293.

KOERPER, H.C. & MOERMAN, D.E. (2000): Coinage of Greek Cyrenaica, the Silphium economy, and exaggerated advertising. - Herbalgram 48: 46-49.

KONDA REDDY, C.V. (1972): Red Sanders and its history of utilisation. - Indian Forester 98: 589-593.

> Besides four lively historic photos taken at the occasion of confiscations of Red Sanders timber, this article gives a splendid overview of its use history, extensively citing from old colonial documents. The oldest source dealing with Red Sanders dates back as early as 1681. In these days, the timber was mainly used for dyeing purposes. Today, the wavy grained timber is very much sought after by Japanese traders. The useful paper has many hard facts about trade volumes and prices over the centuries and decades. (schp)

KUMAR, S., J. SINGH, N.C. SHAH & V. RANJAN (1997): Indian medicinal and aromatic plants facing genetic erosion. - 219 pp., Central Institute of Medicinal & Aromatic Plants, Lucknow.

> The 17-page introduction (with a somewhat awkward layout) summarizes a range of conervational aspects of medicinal plants: rarity, plant endemism, categories of threat, and strategies for conservation. Following are 65 data-sheets of 1-4 pages (including 6 Aconitum and 5 Berberis species). The sheets have a standard layout and include the following information: common and trade names, botanical description, flowering and fruiting time, habitat, distribution in India (including a dot map), distribution in other countries, major chemical constituents, biological activity, plant parts used, therapeutics, economic significance, status in the country, and conservational strategies. The taxonomic coverage includes all 10 Indian CITES plant species. (schp)

LANGE, D. (2000): Conservation and sustainable use of Adonis vernalis, a medicinal plant in international trade. Plant species conservation monographs 1. - 88 pp., xvi, Landwirtschaftsverlag, Münster-Hiltrup.

> This review is the first of a new series of monographs published by the German Federal Agency for Nature Conservation focussing on the conservation status of taxa threatened by over-utilization. Adonis vernalis has long been used for its medicinal properties in the treatment of heart diseases. The report summarizes available information on the species' biology and use, resource management and legislation in the countries of export, and analyses its conservation status. While facing extinction risks by both habitat loss and over-harvesting for international trade, the species may benefit from the recommendations presented by the author. At a price of DM 19.80 the book is a bargain. (schp)

LEE, S. & S. HONNEF (2000): Der Schatz des "Göttlichen Landmanns". - WWF-Journal 4/2000: 30-31.

LEV, E. & Z. AMAR (2000): Ethnopharmacological survey of traditional drugs in Israel at the end of the 20th century. - Journal of Ethnopharmacology 72: 191-205.

> The survey presented in this paper covered selected markets in medicinal materials belonging to various religious and ethnic communities. The study yielded information on 310 medicinal materials of which 264 belonged to plant species (85.1%), 20 to animal species (6.5%), 19 to minerals (6.5%) and seven others (2.3%). Analysis of the data showed that a significant proportion of the materials were of local origin (51.5%) and some were imported from other countries. The species are tabled indicating the common and scientific name, the part used and the medicinal use. (from summary)

LYKE, J. (2000): The Medicinal Plant Working Group. - Endangered Species Bulletin 25(1-2): 20-21.

MARSHALL, N. & V. HOMES (2000): Der Heiler ist nah, der Arzt unerreichbar. - WWF-Journal 4/2000: 34-35.

MAYER, J.G. & F.C. CZYGAN (2000): Die Ringelblume, Calendula officinalis L. Kulturgeschichtliches Porträt einer Arzneipflanze. - Zeitschrift für Phytotherapie 21: 171-178.

MCGUFFIN, M. (1999): Having our goldenseal, and growing it too. - United Plant Savers Newsletter 2(1): 3.

MELISCH, R., S. HONNEF & V. HOMES (2000): Heilkraft aus der Wildnis. Medizin und Artenschutz. - Dr. med. Mabuse. Zeitschrift im Gesundheitswesen 25 (123): 52-55.

MILLS, J., C.S. ROBBINS & S.K.H. LEE (2000): Conservation measures and international trade controls for wild and cultivated ginseng. - United Plant Savers Newsletter 2(2): 23-24.

MORS, W.B., C. TOLEDO RIZZINI & N. ALVARES PEREIRA (2000): Medicinal plants of Brazil. - xlviii+501 pp., Reference Publications, Algonac (Medicinal plants of the world 6).

MULLIKEN, T. (2000): Implementing CITES for Himalayan medicinal plants Nardostachys grandiflora and Picrorhiza kurrooa. - TRAFFIC Bulletin 18(2): 63-72.

MURANGI, F. (1999): Directorate exploring ways of protecting Devil's Claw. Forestry takes action on illegal harvesting. - New Era 5.-7.Feb.1999: 15.

NDE SHIEMBO, P. (1999): The sustainability of eru (Gnetum africanum and Gnetum buchholzianum). An over-exploited non-wood forest product from the forests of central Africa. In: Sunderland, T., L.E. Clark & P. Vantomme (Eds.): Non-wood forest products of central Africa. Current research issues and prospects for conservation and development - pp. 61-66, FAO, Rome.

OCAMPO SANCHEZ, R.A. & R. VALVERDE (2000): Manual de cultivo y conservacion de plantas medicinales. - 147 pp., Tramil, San Jose.

PENGELLY, A. & A. COWPER, Eds. (2000): Medicinal plants for the future. Sustainability and ethical issues. Conference Proceedings. Byron Bay, NSW Australia, 13-14.8.1999. - 116 pp., National Herbalists Association of Australia, Annandale.

PENSO, G. & G. PROSERPIO (1997): Index plantarum medicinalium totius mundi eorumque synonymorum. 2nd edition. - 1062 pp., OEMF, Milano.

This book goes back to a WHO decision of 1978 which requested "to compile an inventory of medicinal plants used in different countries". The checklist is presented here in its 2nd edition but not much information is given what the second author has changed. He has screened 14 new references and added them to the many national official publications which have been used for the 1st edition of 1980, many of which are now out-dated and should have been replaced. The 1st edition had some 21,000 names in it, no total figure is given for the new edition. Arranged alphabetically, each genus account lists the accepted species names, synonyms with reference to their accepted names, few common names, the relevant literature references and a 6-code use category. (schp)

RIVERA, A., X. BUITRON & P. RODRIGUEZ, Eds. (2000): Uso y comercio sostenible de plantas medicinales en Colombia. Memorias del seminario-taller, 18-19.9.2000, Villa de Leyva, Colombia. - xi+73 pp., TRAFFIC America del Sur, Quito.

ROBBINS, C.S. (2000): CITES approves trade controls for three medicinal plants. - Herbalgram 49: 22-23.

ROBBINS, C.S. (2000): Comparative analysis of management regimes and medicinal plant trade monitoring mechanisms for American ginseng and goldenseal. - Conservation Biology 14: 1422-1434.

The paper analyses strengths and shortcomings of the resource management programs for Panax quinquefolius and Hydrastis canadensis in the US. Both species are subject to Appendix II of CITES. Overall, both regimes which differ in various aspects are considered by the author to be successful. For ginseng the paper holds a number of interesting tables on harvesting volumes on state level over the years. (schp)

ROSSER, A., N. ASH & M. SIROLA (2000): Approaches to the conservation of species used in traditional medicine. - Species 33: 36-38.

SCHEERER, J. (2000): Jaborandi. Pilocarpous microphyllus Stapf ex Wardleworth. - Zeitschrift für Phytotherapie 21(4): 220-230.

SCHIPPMANN, U. (2000): Green Card für Ginkgo & Co. - WWF-Journal 4/2000: 25-28.

SCHIPPMANN, U. (2001): Medicinal plants significant trade study. CITES project S-109. Plants Committee Document PC9 9.1.3 (rev.). - 97 pp., Bundesamt für Naturschutz, Bonn (BfN-Skripten 39).

SCHRÖDER, J.M. (2000): The case of Prunus africana (J.H.Hook.) Kalkman. Lessons from a non-timber forest product from Cameroon. - International Tree Crops Journal 10: 337-346.

SEITZ, R. (1999): Arbeitsgemeinschaft für Pharmazeutische Verfahrenstechnik. Nachhaltige Nutzung pflanzlicher Rohstoffe. - Deutsche Apotheker Zeitung 139: 4271-4273.

SHARMA, R. (1999): Vulnerable and threatened plants of economic value. Colchicum luteum. - MFP News 9(2): 13.

SHARMA, R. (2000): Vulnerable and threatened plants of economic value. Curcuma caesia. - MFP-News 10(4): 14.

SINCLAIR, A. & P.M. CATLING (2000): Status of goldenseal, Hydrastis canadensis (Ranunculaceae), in Canada. - Canadian Field-Naturalist 114(1): 111-120.

While being more abundant in the northern US, Hydrastis canadensis is restricted in CA to southwestern Ontario where 26 populations have been reported, 21 of which have been located and visited during this field survey. Attempts to discover additional populations with newly acquired ecological data have failed suggesting that there are few overlooked populations. The authors state that despite recent increase in the popularity in goldenseal as a herbal remedy, there appears to have been little if any decline in Ontario populations since the species was officially listed as threatened in 1991. (schp)

SMALL, E. & P.M. CATLING (1999): Canadian medicinal crops. - x+240 pp., NRC Research Press, Ottawa.

Canada has approx. 3200 native plant species, of which nearly 1000 have medicinal uses. This volume provides excellent and detailed summaries of ecological, ethnobotanical, and pharmacological information for 25 species with current or potential commercial value as crops, including CITES Appendix II Hydrastis canadensis and Panax quinquefolius. For each of the species, conservation considerations are included within a discussion of the agricultural and commercial aspects of their development as crops. The volume also includes extensive reference lists, including relevant web sites, as well as a thorough treatment of the regulatory and commercial environment for medicinal plant production in Canada. (djl)

SOEHARTONO, T. & A.C. NEWTON (2000): Conservation and sustainable use of tropical trees in the genus Aquilaria. 1. Status and distribution in Indonesia. - Biological Conservation 96: 83-94.

One rarely finds papers which primarilary focus on research of the conservation status of species threatened by over-utilization. Therefore, this study is most welcome, especially in the context of additional CITES listings. Presently, only A. malaccensis is on Appendix II. 6 Aquilaria species occur in ID. The annual export trade value from ID is estimated at US$ 6 million. The authors found population concentrations in Sumatra and eastern Kalimantan. Analysis of national forest inventory data indicated that population densities are low (<1.2 individuals/ha). Continuous recruitment was found in some areas but also a general absence of larger trees. All Aquilaria species in Indonesia are assessed as Vulnerable according to the IUCN threat categories. (schp)

SOEHARTONO, T. & A.C. NEWTON (2000): Conservation and sustainable use of tropical trees in the genus Aquilaria. 2. The impact of gaharu harvesting in Indonesia. - Biological Conservation 97: 29-41.

In the second part of their study the authors assess the impact of agarwood or gaharu harvesting on populations of A. malaccensis and A. microcarpa in ID and the sustainability of the current harvesting levels. This was achieved by observing and measuring the harvesting activities of gaharu collectors by accompanying them on collecting trips. The quantity of gaharu obtained from felling was very low, 100-180 g per tree for the high grade gaharu. Combining these yield and overall trade figures the authors estimate that 30-100,000 trees per year are felled. The matrix model approaches used showed that A. malaccensis populations will decline if trees with a dbh of <10 cm are harvested. A. microcarpa populations are only safe if trees >30 cm dbh are used. (schp)

SPORER, F. & S. CHRUBASIK (1999): Präparate aus der Teufelskralle (Harpagophytum procumbens). - Zeitschrift für Phytotherapie 20: 335-336.

SUMNER, J. (2000): The natural history of medicinal plants. - 235 pp., Timber Press, Portland.

The author teaches botany, medicinal botany, and ethnobotany at the Arnold Arboretum of Harvard University. She gives a comprehensive summary of the many aspects of medicinal plants directed to the lay reader. Students will appreciate this excellent introduction in a fascinating research field. In 10 chapters Sumner covers: history of medicinal botany, ethnobotany, habitats, plant chemicals, plant physiology, a number of case studies (the usual ones), prospecting for new medicines, and conservation. Maybe the most unusual in this collection of standard issues is the one on "zoopharmacognosy and botanical toxins". It refers to some interesting examples of self-medication of animals, mainly primates, birds and elephants. (schp)

STOCKINGER, G. (2000): Nierenkiller aus Fernost. - Der Spiegel 6/2000: 182-186.

The report in the weekly newspaper describes serious cases of kidney and liver failure of patients in Germany, Belgium and Britain after the long-term use of traditional Chinese herbal teas and patent medicine. A reason for this is seen in the lack of regular testing of imported raw drugs regarding identity, safety and efficacy. (schp)

SUBEDI, B. & A. KOONTZ (1999): Sustainable harvesting means more than amount harvested. - Himalayan Bioresources 3: 2.

SUNDERLAND, T. & C.T.TAKO (1999): The exploitation of Prunus africna on the island of Bioko, Equatorial Guinea. - <www.ggcg.st/bioko/bioko_prunus.htm> (viewed 21 March 2000)

TRAN VAN ON, DO QUYEN, LE DINH BICH, B. JONES, J. WUNDER & J.RUSSELL-SMITH (2001): A survey of medicinal plants in Ba Vi National park, Vietnam. Methodology and implications for conservation and sustainable use. - Biological Conservation 97: 295-304.

UNIYAL, R.C., M.R. UNIYAL & P. JAIN (2000): Cultivation of medicinal plants in India. A reference book. - 161 pp., TRAFFIC India & WWF India, New Delhi.

WEGENER, T. (2000): Devil's claw. From African traditional remedy to modern analgesic and anti-inflammatory. - Herbalgram 50: 47-54.

WICHTL, M. (1999): Porträt einer Arzneipflanze. Eisenkraut. Verbena officinalis L. - Zeitschrift für Phytotherapie 20: 353-358.

WIERSEMA, J.H. & B. LEON (1999): World economic plants. A standard reference. - xxxv+749 pp., CRC Press, Boca Raton.

This checklist of economic plants of the world is arranged alphabetically by scientific names. Each entry contains the following elements: plant name author, common names, use category and distribution. For each of these elements, the comprehensive introduction tables the underlying classification systems. An index of common names in the back covers 213 pages. Almost 150 reviewers have been involved in the making of the catalog which holds data on over 9500 vascular plants that are traded, regulated, or otherwise important to international commerce. It is based on 71,700 taxon-literature records held in the GRIN database of the Agricultural Research Service of the US Department of Agriculture. See also their website at: www.ars-grin.gov/npgs/tax/index.html (viewed 6 July 2001). (schp)

WILLIAMS, V., K. BALKWILL & E.T.F. WITKOWSKI (2000): Unraveling the commercial market for medicinal plants and plant parts on the Witwatersrand, South Africa. - Economic Botany 54: 310-327.

"Knowing what species are traded commercially is the foundation for identifying threatened taxa" (p.324). A sample of 50 herb-traders of the formal sector in the Witwatersrand area around Johannesburg was surveyed. An inventory of all plants and parts sold was compiled.

Shop-keepers were questioned on the scarcity and popularity of the plants traded, as well as their suppliers and origins. About 511 plants are traded in the region. The authors found that a number of plant families have a higher probability of entering utilization than would be expected from their percentage representation in the South African flora. In table 3 the 14 taxa are listed that have been nominated as "scarce" by 10% or more of the interview partners. (schp)

WOOTTON, J.C. (2000): Directory of databases for research into alternative and complimentary medicine. - The Journal of Alternative and Complimentary Medicine 3: 179-190.

The paper briefly describes the content, access and contact details for 56 databases. 35 of them are available online over the Internet and of these, 17 are freely, publicly available. The directory itself is directly accessible under cpmcnet.columbia.edu/dept/rosenthal/databases.htm (viewed 16 March 2001). (schp)

WOOTTON, J.C. (2000): Directory of databases for research into alternative and complimentary medicine. - The Journal of Alternative and Complimentary Medicine 4: 401-403.

The paper contains updates on 10 entries to supplement the earlier paper of the author. (schp)

WWF DEUTSCHLAND & TRAFFIC EUROPE-GERMANY, Eds. (2001): Tagungsband. Proceedings. Symposium. Medizin und Artenschutz. Herausforderung für Mensch und Natur im neuen Jahrtausend. Medicinal utilisation of wild species. Challenge for man and nature in the new millenium. - 107 pp., WWF Deutschland & TRAFFIC Europe-Germany, Frankfurt am Main.

ZSCHOCKE, S., T. RABE, J.L.S. TAYLOR, A.K. JÄGER & J. VAN STADEN (2000): Plant part substitution. A way to conserve endangered medicinal plants?. - Journal of Ethnopharmacology 71: 281-292.

In southern Africa many medicinal plants are slow-growing forest trees, bulbous and tuberous plants. The fact that mainly bark and underground parts are utilized makes them especially sensitive to over-exploitation. This paper outlines a concept to substitute the use of these critical plant parts with other plant organs of the same species. Four of the most important and most threatened South African medicinal plants were used as case studies and extracts of various plant parts were compared chemically. The results presented show that the potential for plant part substitution is highly species specific. In principle, this seems to be a promising conservation strategy and more investigations need to follow. (schp)

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