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Chairs' Note

A.B. Cunningham & Uwe Schippmann

As you can see from Nina Marshall’s comprehensive report in this issue, the Medicinal Plant Specialist Group held its first formal meeting on 5 September 1996 in Nairobi, Kenya, during the 5th International Congress of Ethnobiology. Following these discussions, we have invited Danna Leaman to act as Executive Secretary for the MPSG. Danna has previously worked on medicinal plant conservation issues for the International Development Research Centre (IDRC) in Canada and is still doing consultancy work for this agency. She now lives in Switzerland and holds a close link with Wendy Strahm, SSC’s Plants Officer in Gland. Danna has agreed to take over the drafting of project proposals and the search for funds especially for the envisaged “Top 50” approach. Danna has kindly accepted our invitation and we are looking forward to a close and productive co-operation.

In January Danna was on a mission in India, Cambodia, Indonesia and Pakistan. Together with our member Vinay Tandon from FRLHT she explored the possible role that the MPSG will play in the forthcoming conference Medicinal Plants for Survival which will be held in Bangalore in February 1998 [see p. 22]. The next MPSG meeting is planned to be organized alongside this conference.

In October 1996, IUCN held its World Conservation Congress in Montreal. At the end of this triennium, George Rabb stepped down as chair of the Species Survival Commission. The new Chair elected is David Brackett who works with the Canadian Wildlife Service.

As most of you know, IUCN works in the form of triennium terms and all Commissions and Specialist Groups formally cease to exist at the end of each period. The 1994-1996 triennium ended in October 1996. This means that the process of re-constituting the SSC and its Specialist Groups will have to be done for the new triennium which involves issuing invitations to join the Specialist Groups.

We were informed by IUCN that this process has been delayed for a few months owing to the implementation of a new membership database system that is supposed to make life easier for SSC staff in Gland and which will, we hope, provide Specialist Group members with an up-dated membership directory which was lacking during the last triennium. Currently, the MPSG is working on the basis of its earlier terms.

At this stage, we want to take the opportunity to thank the members for their interest in medicinal plant conservation. We want to especially thank members who have actively contributed to the efforts of the group and to the products that have so far been put out.

Invitations to join the SSC and its Specialist Groups is a standard process. It is also an important one when an issue is as popular and fast-growing as that of medicinal plants conservation. The beginning of the new triennium is therefore a time when existing membership is assessed and evaluated on the basis of the contribution made to the group. Re-invitations are issued and new members are then invited. This process will take place in a few months time.

The illustrations in this issue were kindly provided by company Salus-Haus, Bruckmühl, Germany. To end with, we want to thank Andreas Gröger, the editor of this newsletter, for his commitment and the overnight hours he has taken to finalize this third volume which we hope you will enjoy reading.

Physalis alkekengi

The production and mailing of this issue was made possible through the generous support of the German Ministry of Environment and the Federal Agency for Nature Conservation, Bonn.
First Formal MPSG Meeting held on 5 September 1996, Nairobi, Kenya

Nina Marshall

The first formal meeting of the Medicinal Plant Specialist Group was held on 5 September 1996 in Nairobi, Kenya, during the 5th International Congress of Ethnobiology. The meeting was attended by Co-Chair Tony Cunningham (South Africa), and MPSG members Alan Hamilton (United Kingdom), Vinay Tandon (India), Henry Heuveling van Beek (Netherlands), and Nina Marshall (USA/Kenya), and invited observers Gary Martin (USA/Morocco), Hugh Prendergast (United Kingdom), Le Cong Kiet (Vietnam), Jonathan Okafor (Nigeria), Xu Jian Chu (China), Esmond Bradley Martin (Kenya), Robert Höft (Germany) and Ajay Rastogi (India).

Alan Hamilton expressed the view that the immediate objective of the meeting was to lay the groundwork for the preparation of an Action Plan. In the past, IUCN focused on producing lists of endangered species, manifested in the form of the Red Data Books. In recent years, however, IUCN has moved towards a more comprehensive approach to conservation, by not only collecting information on threatened species, but also by analyzing the reasons for their threatened status, and by making recommendations to alleviate the situation. This approach embraces the concept of looking not simply at individual species, but at an entire group of species.

Medicinal plants represent a challenge to conservation, and at the same time are essential for human health, and therefore provide a great motivation for conservation and management. At the same time, habitats are declining, and direct harvesting of medicinal plants is contributing to the pressure felt by ecosystems as a whole. Trade often magnifies this pressure by affecting biodiversity more widely. As such, we must identify priorities in the field of medicinal plant conservation, and must expand our focus to include not only species, but also habitats.

Nina Marshall then presented information on the Species Survival Commission and noted that SSC’s mission is to “conserve biodiversity by developing and executing programmes to study, save, restore and wisely manage species and their habitats”. Action Plans help to achieve this mission by serving as useful mechanisms for publicizing the plight of species, and by providing guidance to individuals and institutions on how to manage and conserve species.

Action Plans in general provide information on threats, past and current conservation initiatives such as propagation efforts, re-introductions, or field surveys, conservation assessments for each species, and also provide recommendations for achieving conservation of the species in question. Action Plans should set out a realistic set of goals that can be achieved within a given time period.

One issue highlighted by the MPSG was the need to ensure that Action Plans are implemented, following publication. Not only must Action Plans have reasonable, achievable goals, but there must also be a strategy in place to see that the Action Plan does not simply gather dust on a shelf.

Tony Cunningham then guided the group through the process of proposing steps towards the development of an MPSG Action Plan. He observed that the MPSG is a group formed on the basis of use rather than taxonomy, and that this factor posed difficulties for the speedy preparation of an Action Plan. One might expect that a plant group comprised of thousands of species might require a minimum of five years to prepare, yet at the same time there is a lot of encouraging work that is already underway. We have an opportunity to decide upon a set of practical steps to develop an Action Plan, and must focus our attention so that the impact of the Action Plan is not diffused by a large number of species. A sensible strategy for this focus is to develop a “Top 50” Listing of threatened medicinal plants.

Steps were suggested to reach the “Top 50” Listing (for more details, please refer to Medicinal Plant Conservation 2, pp. 4-5, and pp. 5-7 of this issue), and include:

- **STEP 1**: Identify major sale sites.
- **STEP 2**: Identify medicinal plants in trade.
- **STEP 3**: Prepare a short-list of species in trade which are destructively harvested, slow growing, etc.
- **STEP 4**: Short-list these further on the basis of commonness or rarity.
- **STEP 5**: Within the resulting short-list, set priorities on the basis of phylogenetic distinctness.

Discussion about the proposed steps concerned the problem of having innumerable species in need of
conservation, and that the MPSG needs to be extremely careful about documenting how decisions are made as to the top priority species. It was noted for example, that some species might be more highly valued by a local community for health care than other species with a more endangered conservation status. The suggestion was made that perhaps the Action Plan should at times highlight use, instead of species, but this was questioned as some species do not have active ingredients, but are nonetheless valued and exploited for cultural and spiritual reasons.

At this stage, Vinay Tandon was invited to describe the CAMP (Conservation Assessment Management Plan) process undertaken by his institution in South India, so that participants could benefit from his experiences [see pp. 10-12]. Vinay Tandon described the challenge of prioritizing over 800 medicinal plants occurring in three states. The initial phase involved collection of information on consumption and demand, and took into consideration endemism, personal perceptions, data from the industry, plant part used, and existing information contained in the Red Data Book of Indian Plants. This exercise resulted in a preliminary list of 308 species, which was later refined to 76 species after a second CAMP workshop was held in which experts provided current information and assigned IUCN Red List Categories to the species. This workshop resulted in 53 species being assigned threatened status categories, and recommendations were made for each species, falling into set categories which included monitoring, surveys, life history studies, taxonomic studies, genetic management, habitat management, and translocation [see pp. 10-12 of this issue].

The MPSG then proceeded to deliberate further on the process of developing a list of the "Top 50" medicinal plants, and addressed issues such as: whether the list should include the "Top 50" species worldwide, or whether it should be based on biogeographic regions where five species would be chosen from ten regions; whether the group should profile the "Top 50" genera, as opposed to species; whether there should be separate lists for internationally traded species and species valued at the local/national level; and how the MPSG could replicate the process undertaken in India.

On the issue of the "Top 50" genera versus species, it was noted that if the genus approach was taken, that species that might not otherwise be included in a "Top 50" species listing could be given special attention. On the other hand, this approach could be open to attack by non-environmentalists, as there are cases of a small genus having a number of threatened species, but also including a very common one.

There was considerable discussion on the composition of the "Top 50" list, and it was pointed out that it would be important to have a diversity of species in the list, as this would appeal to a variety of interest groups such as traditional healers, herbal companies, as well as pharmaceutical firms. Species meriting inclusion in the list would of course have to meet the required criteria on the regional level.

The group scrutinized the five steps outlined by Tony Cunningham earlier in the meeting, and agreed that the steps represented a logical process that could be adopted by the MPSG. It was suggested, however, that Step 4 and Step 5 could be undertaken at the same time, and also could include the application of the IUCN Red List Categories [see pp. 5-7]. The group also deliberated about how to catalyze action within the MPSG and beyond with respect to coordinated survey methods to develop the "Top 50" list. Two scenarios were discussed. The first, and cheapest, is to work alongside ongoing initiatives, of which there are already quite a few. The second would involve the development of training courses in each region to train people to carry out the steps outlined above; training courses are however, very expensive and would require concerted fundraising efforts and it might take some time before results would be forthcoming.

Following further discussion, the MPSG decided upon the following recommendations:

1. The MPSG will adopt the strategy of developing a "Top 50" list of threatened medicinal plants.

2. The MPSG recommends the development of two separate lists of 50 species each. The two lists will be:
   a) a list of the "Top 50" species appearing in international trade. The steps required to develop this list are still under development, and will be presented in Medicinal Plant Conservation [see pp. 5-7 of this issue].
   b) a list of the "Top 50" species appearing in local, national and regional trade. Five species will be chosen from ten different phytoecographic regions (based on the publication, Centres of Plant Diversity).

3. The MPSG agreed that determination of the priority species in each phytoecographic region will be based upon the methods suggested in Medicinal Plant Conservation.
Medicinal Plant Conservation 2, with slight modifications as discussed at this meeting. Care will be taken to document the process for each species so that a record exists that can be used for future reference.

Finally, the MPSG discussed several other issues by way of a.o.b. It was agreed that Xu Jian Chu would write an article for the next newsletter summarizing the current situation in Yunnan with regard to over-exploitation of Taxus. The cost of mailing out the newsletter was brought up, and the possibility of charging people for it was raised. Also, in discussions on fundraising, the possibility of commissioning an organization or individual to raise funds for the group was raised, although nothing was concluded.

For author’s address see list of members.

The “Top 50” Listings and the Medicinal Plants Action Plan

A. B. Cunningham

Volume 2 of Medicinal Plant Conservation proposed the “Top 50” listing strategy. Due to the tens of thousands of medicinal plant species, the focus suggested was on medicinal plant species in national or international trade. This followed the approach of the Canary Islands and Pteridophytes Specialist Groups, who first suggested a “Top 50” listing. The aim of the five steps proposed is to use a common methodology to identify the “Top 50” medicinal plant species for conservation action. These will become the “flagship” species for this Specialist Group. This involves an overlap of biological and socio-economic factors in five steps, where we would progressively sharpen the focus towards identifying the “Top 50”. There is more emphasis on medicinal plant species in national or regional trade, as there are many more species traded at this level, sometimes in very high volumes, than in international export trade. Because the MPSG focus is on use rather than on a taxonomic group and includes thousands of species and life history strategies, our aim is to short-list priority species which can then be divided into the eight revised IUCN categories and criteria for threatened species (see table 1).

The strategy was discussed at the MPSG meeting in Kenya [see pp. 3-5]. Three key issues were:

(i) to have two “Top 50” listings, one for species in international trade and a second which covers the “Top 50” species in national or regional trade. This will enable us to highlight far better the diversity of threats, the “footprint” of developed countries on developing country species through export trade in medicinal plants and the implications of this for both conservation and health care.

(ii) to clarify far better than I had done in the previous MPSG newsletter how the five steps will fit into the eight IUCN categories and criteria for threatened species (see table 1).

(iii) to acknowledge in the introductory section of the SSC Medicinal Plants Action Plan examples of species of local concern to resource users and local conservationists which are being locally depleted, but

Table 1. Structure of the revised IUCN Red List Categories (Baillie & Groombridge 1996).
are not included among the "Top 50" (for example because of wide geographical distribution and localized threat over their range). The "toothbrush tree" Salvadora persica is one such example [see pp. 15-16]. MPSG member Dr Shahina Ganzafar has pointed out that this species is being depleted in Oman due to local trade [see pp. 15-16]. Although Salvadora would score well on the basis of taxonomic distinctiveness (only 5 species in the genus, Step 5), it would probably be excluded in Step 4 due to its wide geographical distribution (tropical and sub-tropical Africa to Asia) and the occurrence of large populations in many localities in Africa.

For those that did not receive the previous newsletter, the five steps are outlined here.

- **STEP 1. Identify major sale sites**

  (a) **International export trade** can be investigated through listings of exporting companies, from customs data and phytosanitary certificates, or from surveys of herbal medicine businesses in importing countries.

  (b) **National or regional (informal sector) trade networks**, can be surveyed by starting with the largest (regional and central) markets which carry the widest range of species, then working "up-stream" to source areas identified on the basis of discussions with commercial collectors and traders to collect fresh voucher specimens (see Step 2). The "up-stream" areas can include:

  - **Regional markets**, which cover the largest area, are found in large central places, and generally support several marketplaces;
  - **Central markets**, usually found at a strategic point in the transportation network where wholesaling takes place, and which also can support several marketplaces;
  - **Intermediate markets**, which have an intermediate position in the flow of goods, downwards for localized rural use and upwards to central and regional markets;
  - **Standard markets**, which are the end point for sale of imported items from cities and towns in addition to being places where local exchange takes place. Standard markets also are the starting point for the flow of agricultural goods and crafts into larger central or regional markets;
  - **Minor markets**, characterized by local exchange of goods between local people. Minor markets deal with few goods that are imported into the area. These represent an early stage in the development of markets.

- **STEP 2. Identify medicinal species in trade:**

  This step would focus on three levels of trade: (i) informal sector of **national** trade in traditional medicines from rural source areas to city markets, (ii) **trade across national borders within the same continent** and (iii) **international export trade**. These trade levels are outlined in the previous newsletter and by Farjon (1995). All three of these categories of medicinal plant trade are affected by economic decline, rural unemployment and rapid urbanisation in source countries. Major urban markets and international trade should be the priority for the MPSG "Top 50" listing - not small-scale trade. Results of other research studies would certainly be taken into account. In some cases, however, new ethnobotanical studies of medicinal plants in trade would need to be conducted to correct government department trade statistics of dubious quality. The identification of species in trade can be done at "both ends": in source countries and importing countries.

  It is also important to recognize cases where **substitution** occurs. This is common in traditional medicines trade in Africa, Asia and Latin America, either because species are locally unobtainable due to over-exploitation, or because they are mythical species, such as the Zulu traditional medicine umgazini (which refers to blood), where red-varnished Eucalyptus bark (an introduced genus) is substituted. In the case of substitution of rare species, not only the substitutes but also the original source species need to be identified. This requires the assistance and knowledge of "old-timers" in the herbal trade.

- **STEP 3. Prepare a short-list of species in trade**

  This list should focus on traded species which are:

  (a) destructively harvested (bark, roots, whole plants);
  (b) slow growing (in some cases separation on the basis of life-form is useful);
  (c) found at local markets and are most popular and/or most expensive, or sold in greatest number (small plants) and/or volume;
  (d) considered to be scarce by market traders or commercial collectors.

- **STEP 4. Short-list priority traded species further on the basis of commonness or rarity**

  This step would focus on characters of geographic distribution, habitat requirements and local
population size, with highest priority given to a species with narrow geographical distribution, a restricted habitat and small population size (see table 2; for details of this see Rabinowitz et al., 1986).

As suggested by Vinay Tandon, Step 4 may require a CAMP process of discussion between experts [see pp. 3-5] because in many cases, detailed information on habitat specificity or population sizes is simply not available. The strength of the CAMP process is in overcoming this knowledge gap as far as possible.

Table 2: Seven forms of rarity

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<th>Geographic Distribution</th>
<th>Habitat Specificity</th>
<th>Local Population Size</th>
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<td>wide</td>
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- **STEP 5. Within the resulting short-list, set priorities on the basis of phylogenetic distinctness**

Aljos Farjon (1995) outlines this approach using a rating system, with highest priority for phylogenetic distinctness given in descending order to:

* species in a monotypic families
* species in a monotypic genus
* species in a segregate genus, subgenus or section of a medium to large genus
* species in a small genus (2-5 species)
* species in a medium to large genus
* species which are part of a species-complex
* infraspecific taxon in a medium-size to large genus

There should be no conflict with the process of listing IUCN categories of threat. This is merely a way of leading to the **final step** of placing species in the revised IUCN categories (table 1). A very useful summary of the new IUCN Categories and Criteria is given in Baillie & Groombridge (1996).

References


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**Directory for Medicinal Plants Conservation Published**

Andreas Gröger

*Medicinal Plant Conservation 2* announced the preparation of a directory of networks, organizations, and projects on medicinal plants. In November 1996, the German Federal Agency for Nature Conservation together with the MPSG made this valuable information source available to the public. It aims at providing information for policy makers, scientists and technical experts in the management of medicinal plant resources.

The directory characterizes 139 medicinal plant projects and institutions, based in more than 80 countries worldwide, are characterized by their status, objectives, activities, geographic interest, databases, publications, funding, contact person and address. Additionally, a selection of 43 key journals and newsletters is presented.

The *Directory for Medicinal Plants Conservation* by M. Kaspurek, A. Gröger & U. Schipmann (ISBN 3-89624-606-2, price DM 19,80 plus postage) can be ordered at:

BJN-Schriftenvertrieb im Landwirtschaftsverlag, Postfach 480249, D-48079 Münster, Germany, Fax ++49/2501/801-204.

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![Arnica montana](arnica-montana.png)
Medicinal Plant Conservation Bibliography Published

Uwe Schippmann

Books and papers on medicinal plants count by the tens of thousands worldwide. The bulk of them relate to pharmacology and medicinal properties or to classical ethnobotanical research. Regrettably, information on distribution, life history, biology, population status, levels of extraction and trade, or resource management of the taxa is scarce. Therefore, information urgently needed for setting plant conservation priorities is rare and scattered.

The Medicinal Plant Conservation Bibliography (MPCB) is designed to collect this information from the scattered sources. It systematically reviews about 70 journals for papers with relation to medicinal plant conservation issues.

The first volume includes references mainly for the years 1990 to 1996 published in monographs, journals and serial publications. Where appropriate, grey literature has been taken on board (e.g. CITES proposals referring to medicinal plants). For most papers of 1996, short reviews with a summary of the contents have been drafted.

On 63 pages, MPCB volume 1 contains some 775 references, 70 of which are accompanied by a review text. The references are indexed by three types of descriptors: general keywords (e.g. trade volumes, market analysis, ethnobotany, export, population status), country references and taxa references.

The following MPSG members and experts have contributed literature references to this bibliography: Edward F. Anderson, Michael J Balick, Robert Bye, Tony Cunningham, Ermias Dagne, Fiona Dennis, Shahina A. Ghazanfar, Joanna van Gruijen, Michael Heinrich, Steven R. King, Dagmar Lange, Christine Leon, Edelmira Linares, Narayan P. Manandhar, Vivek Menon, Stephen Tillett, and Vivienne Williams.

The first volume of Medicinal Plant Conservation Bibliography will be sent free to all contributors. Apart from that, it can be obtained at the following price:

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<td>Ringbound printed version</td>
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<tr>
<td>On 3.5&quot; Diskette (ASCII /DBF file)</td>
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<td>Printed Version &amp; Diskette</td>
<td>US$ 19.00</td>
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Prices plus postage and packaging. A reduction of 30% is granted for MPSG members and for orders from developing countries.

For orders write to: Andreas Gröger, c/o Bundesamt für Naturschutz, Konstantinstrasse 110, D-53179, Bonn, Germany, Fax ++49/228/9543-470.

Request: For future issues, all members and readers are kindly invited to send relevant papers to Uwe Schippmann. They will be included in the second volume of MPCB which will be published in early 1998.

Organizations and Projects

TRAFFIC Europe Project on the Exploitation of Indigenous European Medicinal Plants

Anne Vanden Bloock

In 1995, TRAFFIC Europe, in co-ordination with the Medicinal Plant Specialist Group, started a three-phase project aiming at examining the exploitation of indigenous European medicinal plants, but also the trade in medicinal plants within Europe in order to develop an understanding of their many parameters and to recommend actions which will ensure legal and sustainable use of the taxa involved. Phase 1 of the study, carried out in the second half of 1995, consisted of a compilation of the existing information on the European medicinal plants trade. These updated data were used to identify source countries and end-markets which should be selected for comprehensive research.

Based on this preliminary survey and the work already undertaken by the Bundesamt für Naturschutz on medicinal plant trade in Germany, a number of European countries, namely Spain, France, Hungary and Albania including both consumer and producer countries, were selected for Phase 2 of the project which consists of the review of the exploitation of and trade in medicinal plants at national level. The surveys, carried out by national experts in each of the selected countries, started in the course of 1996 and are to be completed by March 1997.

During Phase 3 of the project, a final European regional report summarizing the information collected in all four countries surveyed will be
compiled. This document, planned to be finalized in June 1997, will incorporate a strategy developed both at national and EU level carrying forward the recommendations arising from the national surveys.

Anne Vanden Bloock, TRAFFIC Europe, 608 Chaussée de Waterloo, B-1050 Brüssel, Belgien. Fax: 0032/2/343-2565.

UK Medicinal Plant Trade Study
Fiona Dennis

WWF UK have commissioned a UK medicinal plant trade study, based at the Royal Botanic Gardens, Kew. This work is part of an extensive study being conducted throughout Europe in which TRAFFIC Europe are trying to ascertain the exact character of the European medicinal plant trade [see above].

The long term aim of this study is to identify those species currently in the UK trade that may need additional cultivation in order to assure their future in trade and indeed, in the wild itself.

The method used in this study has been to work with the traders in raw plant materials, on the grounds of mutual benefit. With this spirit of cooperation, it has been possible to ascertain a picture of the nature and character of the market. This study has been based upon personal interview and questionnaire. There are approximately 20 main ‘botanicals’ traders in the UK, 15 of whom have agreed to collaborate in this work.

This study is interested in the variety of the species being traded, their volumes, the method of harvest (wild collected or cultivated) and the countries from which these materials derive. A number of the traders have been willing to share not only their expertise in trading ‘botanicals’ but also their actual trade figures, including their annual volumes of sales. From this it has been possible to obtain total UK trade figures on the first of a number of targeted species.

This work represents a breakthrough in the study of medicinal plants in that it may well arrive at reliable figures for the trade in individual species, thus providing actual quantifiable details of the medicinal plant trade in the UK. Without this kind of statistical evidence, the work of conservationists is not only hampered but in danger of misfiring altogether.

The final report will be designed to dovetail into the existing body of work on the medicinal plant trade in Europe (Lange, D. 1996, Untersuchungen zum Heilpflanzenhandel in Deutschland, Bonn) and with the current work of the other five consultants working elsewhere in Europe. The study is due to be completed at the end of March 1997, when an internal report will be compiled and a summary report will be made available.

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A Survey of the Medicinal Plants Trade in Turkey
Sema Atay

The Society for Protection of Nature (DHKD) and the Faculties of Pharmacy of the Istanbul University and the Ankara University have started a small scale project called “A Survey of the Medicinal Plants Trade in Turkey”. With the financial and technical support from WWF UK, the project has been designed as a very basic study to gather information on the collection, the chain of custody and the exportation of Turkish medicinal plants. In the absence of legal measures, a monitoring system and proper records related to the medicinals trade, Turkey, importing countries and consumers in those countries need more and accurate information. Although the project can only provide basic data, this will still help to shed light on the internal and international medicinal plant market. When the study is completed in March 1997, a report will be prepared in Turkish and English. The report will also contain recommendations on the conservation of medicinal plant species using information which has been gathered from collectors, exporters, commercial companies, government officials and state records.

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Herbalist Network in Bangladesh
M. I. Zuberi

Traditional medicine based on plant products is a thousands-of-years old indigenously developed knowledge. Till the 1950’s, the traditional medical system has met the primary health care needs of the people of Bangladesh. Even today, 50-80% of the rural poor depend on herbal medicine for primary
health care. Village herbalists, known as Kaviraj, and village women dispensing folk-medicine based on plants and plant products, have been faced with tremendous pressure from state-supported modern medicine and a widespread destruction of natural vegetation and wild plants all over the region. High population density (over 800 per square-km), wide and intense landuse (71% land under crops) and almost complete dependence on biomass for domestic fuel have been destroying natural plants very rapidly. With this, the herbalists are abandoning their profession, thus the rich indigenous knowledge base of information on plants and their use as medicine will be extinguished.

The Centre for Environmental Research, University of Rajshahi, Bangladesh, and a local NGO, Centre for Environment and Development, Rajshahi, have been engaged in the establishment of a network of Herbalists and a participatory conservation system of medicinal plants through these herbalists since 1990. Supported by IDRC (Canada), a baseline survey is under way. Demonstration gardens are established within the villages, involving the herbalists, to grow and protect medicinal plant diversity. Local people are very enthusiastic and want to develop the system for alleviating rural poverty on a self-supportive and sustainable basis. We call for help in organizing the conservation and utilisation systems and in marketing the cultivated medicinal plant products.

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In-Situ Conservation of Medicinal Plants in the Thar Desert of India

A.K. Sharma

The Thar desert covers 12% part India. Although low and erratic rainfall and a high solar and wind regime make environmental conditions very harsh, the region has very rich biodiversity. About 657 species belonging to 351 genera and 87 families are found in this region. Of these species, 194 belonging to 131 genera and 53 families are known for their economic or medicinal value. Great increases in human and animal populations, overgrazing, mining, canal irrigation, biological invasion, harmful methods of harvesting, etc are rapidly destroying the natural habitats of these plants. Some medicinal plants such as Commiphora wightii and Asparagus racemosus are even at the verge of local extinction.

For the in-situ conservation of medicinal plants, the Central Arid Zone Research Institute (CAZRI) initiated a watershed project near Jodhpur. This is a development program of soil and water conservation with people's participation in areas with controlled biotic pressure. After adopting conservation measures in 1987 the population of Commiphora wightii regenerated naturally and has increased by more than 800% in 1995. Similar rates of increase have been observed in other native plant species.

Work has also been initiated for ex-situ conservation of over-exploited medicinal plants by including them in agroforestry systems to increase the yield of medicinal plants and to develop sound agrotechniques for their production.

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Second CAMP Workshop in Southern India

Vinay Tandon

The Foundation of Revitalisation of Local Health Traditions (FRLHT) in association with Zoo Outreach Organisation (ZOO)/CBSG India, organized a Conservation Assessment and Management Plan (CAMP) workshop between 12-14 February, 1996 at Bangalore in India. Second in the series, this workshop assessed 44 selected species of southern Indian medicinal plants out of a priority list of 308 species developed by FRLHT.

Called CAMP II, the workshop was held with the blessings of Conservation Breeding Specialist Group (CBSG) and the MPSG. Field botanists, researchers, university teachers and other NGOs participated.

The participants formed four working groups with each group being assigned eleven species. These groups then assessed their eleven species and their assessment was circulated among the other three groups for additions and comments. Plenary sessions to review the assessment and resolve controversial points were held in between.

Of the 44 medicinal plant species considered, 14 are endemic, and 27 species are native but extend to the
<table>
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<tr>
<th>Species</th>
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<td></td>
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<td>Asparagus rotleri</td>
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<td>Buchanania lanzan</td>
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<td>Cayratia pedata</td>
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<td>Cleome burmannii</td>
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<td>Symlocos racemosa</td>
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</tr>
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<td>Tinospora sinensis</td>
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<td>Tragia bicolor</td>
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<td>EO</td>
</tr>
<tr>
<td>Vateria macrocarpa</td>
<td>LC(R); DD(G)</td>
<td>EO</td>
</tr>
</tbody>
</table>

The IUCN Red List categories abbreviated in the table stand for: EX = Extinct, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LR = Low risk, LC = Least Concern, DD = Data Deficient, NE = Not Evaluated, G = Global, R = Regional.

Abbreviated criteria on which threat category is assigned: EO = Extent of Occurrence, PR = Population Reduction, NM = Number of Mature Individuals.
whole of India of Southeast Asia or Africa.

Of the 14 endemics, four were categorized as Critically Endangered, three as Endangered and five as Vulnerable. Two of the endemics were categorized as Extinct since all surveys over the last 80 years failed to relocate any individuals. Among the 27 non-endemics, 26 were categorized as Data Deficient at the global level, but regionally two were classified as Endangered, twelve as Vulnerable, six Near Threatened, six of Least Concern and one as Data Deficient.

The CAMP participants formed three working groups to discuss issues relating to (i) follow-up actions after CAMP workshops, (ii) the design of field data sheets based on CAMP needs and (iii) development and use of links with commercial trade of each threatened CAMP species. The recommendations of these three groups are detailed in the CAMP II report available from FRLHT. The recommendations will lead to a more refined CAMP process and more effective and focused conservation action on the threatened species. Many of the participants made commitments to survey and conduct research on species categorized as Data Deficient.

A new and interesting feature of CAMP II was that the participants selected 27 species of medicinal plants including some from FRLHT’s priority list for the CAMP III workshop. The final report of the CAMP II workshop was brought out in May 1996.

For author’s address see list of members.

Medicinal Plant Conservation
Activities at Bogor Botanic Garden, Indonesia

Syamsul Hidayat

Bogor Botanic Garden (BBG), which has 87 ha, is located in Bogor city nearby Jakarta. It was founded in 1817 by Reindwart. Generally, botanic gardens play an important role in the preservation of genetic biodiversity. One specific concern of the BBG is the collection of medicinal plants.

Indonesia has 25,000-30,000 plant species, approximately 30% of which are not yet scientifically documented. According to the studies of the Forestry Faculty of Bogor Agricultural University and a survey conducted by the NGO Lembaga Alam Tropika Indonesia (LATIN), 1,259 medicinal plants of Indonesian tropical forest have been documented. They are used as traditional remedies and modern medicine resources. Their distribution is as follows:

- lowland rain forest 42%
- mountain forest 18%
- monsoon forest 18%
- savannah 15%
- beach forest 4%
- mangrove 3%

The conservation of medicinal plants is very strategic for the future. They provide not only income for the government, but also increase benefits for farmers, traders and industries, serving as a stock of material resources of modern medicine.

For those reasons, one of the BBG research programs is concentrating on the conservation of medicinal plants. The Medicinal Plant Group (MPG) of the BBG was founded in 1995 to support this research program. Its research staff consists of nine members who are working on specific families, such as Zingiberaceae, Compositae, Fabaceae, Apocynaceae, Euphorbiaceae, Simaroubaceae, and Malvaceae.

Flora exploration has been conducted by BBG since 1991. Meanwhile, MPG has led several medicinal plant explorations in villages and forests of the Indonesian archipelago. Besides the collection of the plant specimens, information from people about the use of these plants is documented. The plants are collected, preserved, and cultivated as ex-situ conservation measure in BBG. Today, the medicinal plant section at BBG comprises 595 living specimens from 73 families.
For the future we hope to collaborate with more individuals or institutions who are interested in medicinal plant conservation.

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Short Communications

Trade in Botanical Drugs in Bulgaria

Dagmar Lange

A rich source for botanical drug species within Europe are South-eastern and Eastern European countries. In a preliminary study (Lange 1996), it was shown that Bulgaria is the most important European source country for botanical drugs, especially for Germany. Thus trade in botanical drugs concerning Bulgaria was the subject of an investigation conducted on behalf of the Federal Agency for Nature Conservation in Bonn and carried out in cooperation with the author and the Bulgarian Agri-business Centre in Sofia (Mladenova 1996).

Collecting of botanical drugs in Bulgaria has long a tradition. Prior to the collapse of communism, the botanical drugs were traded in Bulgaria almost exclusively by two state-controlled united cooperative enterprises and the export was carried out through their own foreign trade bureaus. During the last few years, the structure of trade has changed considerably. The state-owned companies were privatized, but still remain the market leaders. Additionally 50-60 smaller private companies became involved in the collecting, purchasing and export of botanical drugs.

In Bulgaria about 700 botanical drug species were gathered, cultivated and processed in the past. This number decreased over the last few years, and today around 300 species remain involved in trade. More than 2/3 of them are known to be exported to Germany. Most of these species are collected in the wild, but important cultivated plants are peppermint, rosehips, valerian, chamomile, marsh-mallow, and milk thistle.

Every year 7,000-10,000 tonnes of botanical drugs are collected, purchased and processed in Bulgaria. Around 60-70% of this material is exported, amounting to about 6,200 tonnes annually in the period of 1987-1994 (table 1). Germany is by far the largest market for Bulgarian exports, buying 4,400 tonnes or 68% of the total volume exported. This figure is more than ten times as high as the volumes exported on average to France (400 tonnes), Spain (390 tonnes), or Italy (340 tonnes). The only non-European country importing botanical drugs directly from Bulgaria is the USA. The remaining 30-40% of the above mentioned 7,000-10,000 tonnes is used in Bulgaria for the production of herbal teas, spices, cosmetics, or plant-based pharmaceuticals.

Compared with the exports the imported volumes of botanical drugs into Bulgaria are very low. From 1992-1995 Bulgaria imported on average 400 tonnes annually, mainly from Turkey and Macedonia.

Trade in botanical drugs in Bulgaria is subject to different laws and regulations established since 1991. The most interesting in this context are the following:

(A) Wild-collecting of botanical drugs in the forests is seen as a business and thus fees have to be paid for using the so-called forest by-products. The rates are species-specific and are paid in leva per kilogram. For example, the charge for 1 kg of the roots of cowslip (Primula veris) is 4 leva, and for the leaves of ribwort plantain (Plantago lanceolata) 2.50 leva have to be paid.

(B) Several fees are related to clearances of import/export certificates. This includes fees for each wild-collected species: (i) To export a plant species not covered by any regulation costs 50 levas, and for

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<td>20</td>
<td>276</td>
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Table 1: Bulgarian export volumes for botanical drugs for the 8 leading countries of import listed according to average export volumes (in tonnes) corresponding to the years 1987-1994. Source: Foreign trade statistics of Bulgaria.

28. February 1997
those which are subject to species conservation regulations 200 levas have to be paid. (ii) To export a Bulgarian species included in CITES the fee amounts to 1,000 levas, and to export or import a foreign species included in CITES the charge is 1,500 levas. (iii) For the allocation of quotas for using threatened biological resources 200 levas for each species have to be paid.

(C) Since 1991 wild-harvesting of and trade in threatened botanical drug species are subject to restrictions and prohibitions, issued by the Ministry of Environment. Several ordinances regulate the gathering, trade and export of selected wild botanical drug species, with the aim to protect them and their natural habitats: (i) 14 plant species cannot be collected from the wild for commercial purposes. This item includes, inter alia, Rubia tinctorium, Helichrysum arenarium and Althaea officinalis. (ii) The collecting, processing, and trade of 29 species are subject to restrictions. For these species a quota-system was set up. The volumes of each species (according to plant parts used) which can be collected from their natural habitats in the different Bulgarian countries, and which are allowed to be exported have been published in the Official Gazette every spring since 1992. The volumes which can be gathered vary according to the species and the regions from year to year. For example, in 1996 collection of 500 kg Herba Adonis (aerial part of Adonis vernalis) in Razgrad district was allowed, whereas it was forbidden in the previous year. Collection of 6,000 kg of Folia belladonnae, obtained from the leaves of Atropa bella-donna, was allowed in 1996, but only half of the volume was destined for export. Additionally the export of six botanical drugs collected from the wild is strictly prohibited: these include the aerial parts of Leucojum aestivum, the bark of Rhamnus frangula, and the roots of Primula veris.

The quota-system described is based on scientific research done by specialists of the Ministry of Environment in cooperation with the Institute of Botany of the Bulgarian Academy of Science, and the National Centre of Phytotherapy and Popular Medicine.

References

For author’s address see list of members

The Situation of Prunus africana in Madagascar

Sven Walter

Prunus africana is an internationally traded medicinal plant of high commercial value. Its bark is used to extract active substances to treat benign prostatic hyperplasia. One country of origin is Madagascar, where Prunus africana is probably the most valuable medicinal plant for exportation. Nevertheless, little is known about the socio-economic and ecological consequences of its exploitation in the mountain forests of the Malagasy High Plateau.

In 1994/95 a study was carried out to evaluate the “Sustainability of Non-Timber Forest Products Utilisation in the Peripheral Zone of the Nature Reserve of Zahamena”, a project run by Conservation International. Whereas a variety of plants play an important role for local health care in this region, only one medicinal plant in the surroundings of the Nature Reserve is exploited commercially: Prunus africana.

The commercial exploitation of Prunus africana in Madagascar began in 1979 in the north-eastern part of the High Plateau and reached Zahamena in 1988. The intensive collection of Prunus africana in and outside the Reserve has led to an extinction of exploitable trees and consequently to an expansion of the extraction area southwards. As a result, the amount of exploited bark enormously increased in 1995: Between January and March 1995 more bark was extracted than in all of 1994 (100 t). The total quantity of bark extracted in 1995 was estimated to reach 600 t.
Trade in *Prunus africana* in Madagascar is under control of only one Malagasy exporter and one Italian importer. The exploitation is organized by middle-men who are the official permit holders. They establish local markets in the exploitation area, buy up bark and transport it to the exporter where it is transformed. The harvesting of bark is exclusively done by local farmers. They remove the bark inside the forest after having cut the tree and sell it to the middle-men. Timber and other parts of the trees are not used.

Although the quantity of bark exploited in Madagascar is small in comparison to Cameroon, the world largest *Prunus africana* exporter (about 2,000 t/yr), concern has to be expressed regarding the consequences of this exploitation in Madagascar.

Ecologically, the exploitation has led to an over-exploitation of the natural stock. Governmental concessions are not developed on the basis of the size of *Prunus africana* populations. Besides, they are neither controlled by the Forest Department nor followed by the middle-men nor known by the farmers.

Socio-economically, the monetary value of bark or extract represents an important income resource on the national, regional and communal level as well as for every participant in the trade. Even for the farmers, who receive less than 2% of the export value, the collection of bark is an important additional income-generating activity.

Radical changes are necessary to transform the harvest into an ecologically and socially sustainable one. First of all, more basic information has to be collected regarding the ecological situation of *Prunus africana* in Madagascar (e.g., regeneration, geographical distribution). Along with this, research is needed to assess the ecological and economical feasibility of bark-stripping and other sustainable collection methods as well as ways of artificial cultivation (e.g., integration into agroforestry systems). Secondly, property-rights must be guaranteed to the gatherers to secure a long-term exploitation. They have to be allocated on the community level and not to individuals, and combined with regulations of harvesting.

At the moment, the Forest Department seems to be aware of the seriousness of the situation but has not yet undertaken concrete activities. The industry concerned does not realize any need for action. The Italian importer in particular denies any responsibility for the Malagasy forests. But only a co-operation among official authorities, industry and science can contribute to an improvement of the current situation in Madagascar.

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**Conservation of Medicinal Plants on the Arabian Peninsula: Two Case Studies**

*Ahmed H. Alfarhan & Shahina A. Ghazanafar*

The roots and stems of *Salvadora persica* GARC., (the plant is called *rak* in Arabic; the roots and stems *mitswak*), is used as tooth brush stick throughout Arabia and parts of SW Asia. Its importance as an effective means of cleaning teeth is widely accepted, both in rural and urban areas. The bark is reported as an effective agent for removing plaque from teeth. At least one commercial product made from it is available under the trade name "Fluoroswak", which is now popularly sold. *Rak* grows commonly in the coastal areas and wadi beds in Arabia, but is seldom found in the central regions. In Saudi Arabia, it is mainly distributed in the Tihama (southwestern Saudi Arabia), where it is not reported to be common. At present, a sizeable population occurs at a single location, Qunfudhah, where thickets occur in about two square kilometers. Conservation of this natural habitat in Saudi Arabia is required in order to conserve this valuable species. Small scale efforts are being made for its cultivation, but in most cases it is only to fulfill personal needs. The plant grows well when propagated vegetatively; seeds can also be used effectively. It is suggested that, together with the protection of the natural habitat of *Salvadora persica*, a program for the cultivation of this popular plant for commercial purposes should also be undertaken.

*Glycyrrhiza glabra* L. var. *glandulifera* REGEL & HERDER is native to the warmer regions of the Mediterranean. It is also distributed in Iran, Afghanistan, Pakistan and is widely cultivated in many countries for its roots which are used in traditional medicine for coughs, conjunctivitis, digestive disorders, menstrual irregularities and for improving fertility. In the Sultanate of Oman, it occurs at a single locality, in a desert wadi, close to the village of Manah, about 150 km south of Muscat. The local inhabitants use the roots extensively in traditional herbal treatments to cure headaches, fevers, digestive problems and as general health tonic. To the villagers it is known as a gifted plant.
capable of curing as many as 70 illnesses. Whether the species is native to northern Oman or an escape from cultivation is difficult to establish. The traditional uses of the aqueous extract of the roots are so many and so beneficial that mutak, as this plant is locally called, is listed as one of the more important herbal medicines in the local Society Guide Book. In Oman there are many developmental and expansion projects underway to fulfill human needs for houses, roads and other amenities. There is also a great awareness of the need for conservation, but the balance between utilization and conservation is not always easy to maintain. Although the medicinal properties of Glycyrrhiza glabra var. glandulifera are well known and the plant is used as a pharmaceutical, to the people of Manah, this plant is special and used as an alternative medicine for primary health care. To conserve it and its habitat or suggest a program for its cultivation would be well worth considering.

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Table 1: The 12 world leading countries of export of commodity group pharmaceutical plants (SITC:3:29249 = commodity group 1211) - Source: UNCTAD COMTRADE database, International Trade Centre Geneva.

<table>
<thead>
<tr>
<th>Exporting Country</th>
<th>Volume (t)</th>
<th>Value (1,000 US$)</th>
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<td>China</td>
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<td>264,500</td>
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<tr>
<td>India</td>
<td>32,600</td>
<td>45,950</td>
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<tr>
<td>Germany</td>
<td>14,400</td>
<td>68,500</td>
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<tr>
<td>Singapore</td>
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<td>54,000</td>
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<td>11,250</td>
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<tr>
<td>Chile</td>
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<tr>
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<tr>
<td>France</td>
<td>4,700</td>
<td>26,300</td>
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<td>Thailand</td>
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<td>6,900</td>
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</table>

According to UNCTAD trade figures the global trade in botanical drugs on average amounts to a value of USD 800 million annually. China is by far the leading country of export for botanical drugs, exporting between 1992 and 1995 more than 120,000 tonnes annually (table 1). This figure is about four times as high as the volumes exported from India and 10 times as high as those from Germany. Other countries exporting on average in excess of 10,000 tonnes annually are Singapore, Egypt, Chile, and the USA. Regarding import figures (table 2) Hong Kong is by far the the most important country of import for botanical drugs, importing an annual average of approximately 77,000 tonnes during 1992-1995. Japan and Germany are in second and third place with about half of the volume imported by Hong Kong. Other countries importing more than 10,000 tonnes annually are the USA, the Republic of Korea, France, and Pakistan.

Trade Figures for Botanical Drugs World-wide
Dagmar Lange
The UNCTAD COMTRADE database contains all import and export statistics available world-wide since 1962, based on the classification of the SITC coding system. The majority of the traded botanical drugs is included in SITC:3:29249 pharmaceutical plants, that corresponds to commodity group 1211.90 of the Harmonized Commodity Description System. The latter is used by all member states of the GATT.

UNCTAD trade figures concerning commodity group pharmaceutical plants are available from approximately 90 countries during the period 1992-1995. This heading includes not only plants or parts of plants used in pharmaceuticals or herbal remedies, but also plant species manufactured in cosmetics, household products, sweets or colouring agents. Therefore the term botanical drug is preferred.
The figures shown in tables 1 and 2 lead to the following conclusions:  (1) As China's imports are low compared to its very high export figures, China can be regarded primarily as a source country for botanical drugs. Although the quantities involved are much lower, the same is true of India, Chile and Egypt. (2) Hong Kong is the world-leading consumer country. Probably a major portion of the botanical drugs imported is processed in the huge pharmaceutical industry located in Hong Kong. Japan and the Republic of Korea are also consumer countries, manufacturing herbal remedies or phytopharmaceuticals, and the products are sold either in-country or exported. (3) Both Germany and the USA are important importers and exporters as well as consumers. Both countries have large industries that process botanical raw material. (4) Among the 12 leading import countries, five are European, all of them European Union members. No developing country is a major importer (table 2). (5) Amongst the 12 leading export countries, there are only two European countries, both European Union members. The majority of the countries included in table 1 are developing countries. (6) With regard to Europe, Germany is the largest importer of botanical drugs.

### Table 2: The 12 world leading countries of import of commodity group *pharmaceutical plants* (SITC.3:29249 = commodity group 1211) - Source: UNCTAD COMTRADE database, International Trade Centre Geneva.

<table>
<thead>
<tr>
<th>Importing country</th>
<th>Volume (t)</th>
<th>Value (1,000 US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>77,250</td>
<td>133,700</td>
</tr>
<tr>
<td>Japan</td>
<td>43,500</td>
<td>114,150</td>
</tr>
<tr>
<td>Germany</td>
<td>42,800</td>
<td>96,250</td>
</tr>
<tr>
<td>USA</td>
<td>35,000</td>
<td>95,200</td>
</tr>
<tr>
<td>Rep. of Korea</td>
<td>27,350</td>
<td>41,950</td>
</tr>
<tr>
<td>France</td>
<td>15,950</td>
<td>39,500</td>
</tr>
<tr>
<td>Pakistan</td>
<td>12,000</td>
<td>12,950</td>
</tr>
<tr>
<td>Italy</td>
<td>9,500</td>
<td>34,400</td>
</tr>
<tr>
<td>Singapore</td>
<td>7,300</td>
<td>36,150</td>
</tr>
<tr>
<td>China</td>
<td>7,200</td>
<td>7,100</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>7,100</td>
<td>22,150</td>
</tr>
<tr>
<td>Spain</td>
<td>6,500</td>
<td>21,550</td>
</tr>
</tbody>
</table>

For author's see list of members

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**CITES News**

**CITES Conference Coming Up**

Uwe Schippmann & Alison Rosser

Medicinal plants have become a standing item in CITES over the last three years. Also at the 6th meeting of the CITES Plants Committee, held in Costa Rica from 11-15 November 1996, the agenda included medicinal plant issues, including the implementation of the Appendix II listing of *Prunus africana*. Since this listing came into force in early 1995, all international trade in parts and derivatives of this species requires an export permit of the country of export. Main exporters are Cameroon, Madagascar and Kenya. However, CITES annual trade shows very little reported trade data for this species. This supports the view that CITES requirements are often not fulfilled and a lot of the material traded internationally would hence be illegal [see also report by A.B. Cunningham below].

The tenth meeting of the Conference of Parties to CITES (COP 10) will be held in Harare, Zimbabwe from 9-20 June 1997. The deadline for the submission of proposals to amend the Appendices of the Convention was January 10, 1997. The following medicinal plant species were proposed for inclusion in Appendix II of CITES (proponent country in brackets):

- *Hydrastis canadensis* (United States of America)
- *Picrorhiza kurrooa*, roots only (India)
- *Nardostachys grandiflora*, roots only (India)

Appendix II allows for a trade in plants and their derivatives from wild sources provided the consignments are accompanied by the relevant export documents from the country of export and the harvest is not detrimental to the survival of the species.

The MPSG, with the knowledge and experience of its members on medicinal plants and trade, has an important role to play in providing scientific advice on the medicinal plant proposals.

All members and readers are therefore invited to provide information on the current population status of the species concerned, on the levels of international trade (both legal and illegal), and the levels of protection and management.
IUCN/SSC and TRAFFIC collaborate to provide the Parties to CITES with an authoritative evaluation of all amendment proposals submitted for consideration by the Parties. These evaluations are dependant on the provision of sound information by the IUCN/SSC Specialists Groups and other experts. The English text of the Analyses of Proposals to amend the CITES Appendices is expected to be completed by 21 March 1997. 

Therefore we would be grateful if any comments could be sent immediately to: Alison Rosser, IUCN/SSC Trade Programme, 219c Huntingdon Road, Cambridge, CB3 0DL, United Kingdom; Tel. +44/1223/277-966; Fax: +44/1223/277-845; e-mail: iucn-ssc@wcmc.org.uk.

In addition, the IUCN/SSC Trade Programme produces a booklet to assist the Parties in dealing with the procedures for amending the CITES Appendices. The booklet includes copies of the new criteria for amending the Appendices and also provides guidance in interpreting the new listing criteria and will be available from late February 1997 on IUCN's world-wide-web site: http://www.iucn.org/....themes.

**Prunus africana Products in Trade**

Monitoring of exports and imports under Appendix II CITES regulations would be extremely useful, but is complex, as *Prunus africana* products are traded in five forms. This complexity is typical of the international medicinal plant trade. *Prunus africana* therefore provides a very interesting test case for CITES, which is currently considering three other medicinal plant species for inclusion in Appendix II [see above]. The five forms of the product in trade are:

1. Unprocessed, dried bark (570-580 tons/yr) from Zaire, Cameroon, Tanzania and Kenya and Madagascar to France, Italy and Spain. This was the major form of export until the late 1980's, when bark processing factories were built in Madagascar and Cameroon. Today, most bark is processed and exported as extract.

2. Bark extract (about 14.6 tons/yr extracted from 3,000 tons of bark in Cameroon and Madagascar) to France and Italy. Three companies, based in France, Italy and Spain, are the main wholesale sources of bark extract. This is often re-exported, for example from Europe to the USA, Argentina, Brazil or Venezuela.

3. Herbal preparations as brand-name capsules sold from companies in Europe (mainly France, Italy, Spain) and to a lesser extent, South America (Argentina, Brazil, Venezuela).

4. As a component of a hair-tinge in Japan.

5. As sawn timber and furniture within Africa, primarily in local markets, but with some cross-border barter trade.

Key products for monitoring are bark and bark extract sales, but importing countries in Europe (particularly France, Italy and Spain) must become involved in monitoring of imports. One of the reasons for this is that local production of bark extract, rather than export unprocessed bark, is a feature of the current trade. This has resulted in a shift from the need for CITES monitoring of standard shipping containers at ports to monitoring air-freighted bark extract at airports.

**Identification Guide for Prunus africana: Bark and Products in International Trade**

A.B. Cunningham

*Prunus africana* is a forest tree restricted to mountain highlands of Africa (Angola, Cameroon, Ethiopia, Kenya, Malawi, Somalia, Sudan, Swaziland, South Africa, Tanzania, Uganda, Zaire, Zimbabwe) and the islands Madagascar, Grand Comore, Sao-Tome and Fernando Po.

In 1994, based on a proposal from Kenya, *Prunus africana* was included in Appendix II of CITES in response to over-exploitation of wild populations in Africa and Madagascar. Between 3,200-4,900 tons/year of *Prunus africana* bark are exploited for export, either as dried bark or bark extract. At present, all of this bark comes from wild populations. Bark exploitation has caused serious damage to *Prunus africana* populations, particularly in Madagascar [see report by Sven Walter pp. 14-15] and Cameroon, including exploitation inside "protected" forests and national parks.

**Identification Guide Produced**

At this stage, there are large discrepancies between trade volumes shown in data submitted to the CITES database at the World Conservation Monitoring Centre (WCMC) and volumes of bark and bark extract in international trade. There are three main
reasons for this. One reason is that to date, Cameroon has not yet appointed an appropriate CITES Scientific Authority for flora, yet is the major exporter of over 70% of Prunus africana bark extract or bark. According to the records of the Cameroon Ministry of Environment and Forests, for example, in the 1994/95 financial year, 1,915 tons of Prunus africana bark were exploited. This would represent the production of 9.5 tons of bark extract - yet WCMC (and CITES) have no record of any exports from Cameroon at all. A second problem is that CITES annual reports may not be filed with WCMC until two years after the transaction. Thirdly, there is a need for greater awareness amongst customs officials of what to monitor and why.

A review of Prunus africana products in trade and an identification guide have recently been completed by Michelle Cunningham for the Bundesamt für Naturschutz. In terms of implementation of Appendix II regulations for this species, the report makes recommendations that follow three themes. First, there is a need to focus on effective identification and monitoring of import and export of two of the five categories of Prunus africana products, namely bark extract and dried bark. Secondly, there is a need to encourage the establishment of registration systems for farmers growing Prunus africana in Africa, and potentially, in Madagascar. Thirdly, a series of different awareness campaigns are needed at four different levels: (i) Customs Departments in exporting and (ii) importing countries; (iii) Forestry Departments and NGO’s working with farmers growing Prunus africana to ensure that neither national nor international legislation act as a disincentive to commercial cultivation of Prunus africana and (iv) pharmaceutical companies involved in the trade. The aim of these campaigns should be to raise awareness of the destructive effects this trade has on wild populations in high conservation priority sites, and the need for pricing changes and a shift to cultivated sourcing of bark, rather than from wild populations. This should take place before there is more extensive marketing of herbal extracts from Prunus africana in North America, which is considered the major potential market for Prunus africana herbal products in the future.

Identifying Unprocessed Prunus africana bark

Four factors assist in identification of unprocessed Prunus africana bark without resorting to time consuming and costly microscopic analysis:

(i) with the possible exception of Prunus crassifolia (the definite classification of which still needs confirmation), Prunus africana is the only Prunus species (in a genus of 400 species) indigenous to Africa and Madagascar.

(ii) the smell of the freshly broken bark. This has the characteristic smell of “bitter almonds” (or cyanide), due to the presence of hydrocyanic acid (prussic acid). Bark and sometimes the leaves of some other Prunus species also have this smell, but none are native to Africa. The smell persists long after the bark has been removed from the tree, but it is necessary to break the bark to get the smell.

(iii) the rough, blocky texture of the outer dark bark, which is sometimes almost black in colour. Although younger trees (less than 20 years old) have fairly smooth bark, older trees develop bark with a characteristically blocky texture. This blocky structure is still noticeable when bark is collected in commercial bundles or chopped into small pieces. Freshly cut bark has a fibrous, pink slash, turning darker on exposure to air.

(iv) bark thickness relative to that of other Prunus species: Prunus africana grows to a greater size (30m) than other Prunus species. If the African or Madagascar source is uncertain, it is useful to know that Prunus africana bark gets far thicker (up to 2.5-3 cm thick from large trees) than that of other Prunus species in trade for medicinal purposes.

CITES and Cultivation

Finally, there is the dilemma of how to distinguish between cultivated and wild collected bark resources. As a relatively fast growing indigenous tree, Prunus africana also has great potential for reforestation and agroforestry systems in deforested areas around forest remnants in Cameroon, Madagascar, Kenya, Uganda and Zaire. The commercial importance of Prunus africana in north-west Cameroon has been an important stimulus to rural farmers to start growing this tree from seed, started as early as 1977 but most Prunus cultivation has taken place since 1990.

This raises a dilemma that CITES has encountered before with crocodile farming, orchids and the Turkish bulb trade: how to encourage intensive production of a species to take pressure off wild stocks that have been over-exploited in the wild, yet avoid wild harvested products being sold under the guise of legally produced stocks? If trade is suppressed by international or national legal constraints on cultivation and trade in Prunus
*Hydrastis canadensis* - A Candidate for CITES Appendix II

*Chris Robbins*

The United States has submitted a proposal to list *Hydrastis canadensis* (Goldenseal), an herbaceous perennial native to North America, in CITES Appendix II at the tenth Conference of Parties (COP 10) in Zimbabwe in June 1997. This species appears to be under increasing pressure from intensive and extensive harvest for domestic and international medicinal markets as well as from habitat loss.

While the U.S. proposal currently seeks to regulate all specimens of Goldenseal, including finished pharmaceutical and herbal products, the United States may annotate the proposal to exclude certain parts or derivatives. An Appendix II listing would not prohibit the commercial trade in Goldenseal, but would require CITES export or re-export permits for international trade.

Growing wild in rich, often moist, U.S. and Canadian eastern deciduous forests, Goldenseal occurs from the U.S. eastern coast to middle west and to southern Ontario, Canada. The species is most plentiful in the U.S. portion of the Appalachian mountain range, which extends from the middle Atlantic state of New York through Pennsylvania and the montane parts of several southern states, including Kentucky, Tennessee, Virginia, West Virginia, North Carolina, South Carolina, and Georgia (Catling & Small 1994).

The Nature Conservancy (TNC), a conservation organization based in the United States, has ranked the rarity of Goldenseal in each U.S. state where it occurs based on the estimated number of occurrences and individual plants reported by states (rarity is also determined by other factors such as absence of suitable habitat, habitat loss, and overexploitation). Of the 25-27 states reporting native populations of Goldenseal, and according to TNC's Global Ranking System, 17 of them consider the species critically imperiled (5 or fewer occurrences and fewer than 1,000 individuals), imperiled (6-20 occurrences and fewer than 3,000), or uncommon (21-100 occurrences and fewer than 10,000). Four other states report some rarity (100 occurrences or more) and no state ranks Goldenseal as common (Kartesz 1996; TNC 1995). Although Goldenseal receives protection in some states, there is little regulation of harvest on a state level and none at all at the federal level.

Within Canada, Goldenseal is native only to Ontario, which is the most northern part of its range, and has been designated as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

The parts of the plant most frequently collected are the rhizomes and roots, although leaves are also harvested for commercial trade, particularly as the demand for roots increases. Hydrastine, berberine, canadine, as well as other minor alkaloids and chlorogenic acid, are Goldenseal's most active constituents and are believed to lend this plant its pharmacological potency. Historically, Goldenseal has been used among Native Americans to treat a variety of ailments, including digestive disorders, weakened appetite, pneumonia, whooping cough, diarrhea, flatulence, and heart trouble (Meerman 1986). Goldenseal also has contemporary medicinal application. It is used as an antiseptic, laxative, anti-inflammatory for inflamed mucous membranes, and is reportedly ingested to benefit the gastrointestinal tract, bronchial tubes, nasal passages, and bladder.

Goldenseal, whose wholesale value in the United States has increased by as much as 600% in the last five years, was the second most popular herb purchased by U.S. consumers after garlic in 1994 (Oliver 1994). Although the United States is the largest consumer of Goldenseal, a wide array of herbal and homeopathic remedies, nutritional food products, and phytomedicines listing Goldenseal as an ingredient are also available in Canada, the United Kingdom, Germany, Italy, and possibly other European countries. In Canada, Goldenseal, or some active ingredient of the plant, is reportedly available in more than 40 over-the-counter medicines ranging from elixirs, tablets, capsules, or suppositories (Catling & Small 1994). Goldenseal is an ingredient in at least 300 homeopathic remedies marketed in Europe, where it has been imported from the United States since the late 19th century (Dennis et al. 1996).

Cultivation of Goldenseal has been established, but much of the commercial demand for this species continues to be met from wild sources (Catling &
Small 1994, Foster 1991). Goldenseal is reportedly cultivated in six states, although the volume of cultivated plants produced is not known. As many as 68,000 kg of Goldenseal root may be collected annually from the wild (Foster 1995). At 200-300 roots per pound, this amounts to as many as 45 million roots. Complete export data are not available but, according to data compiled by TRAFFIC from phytosanitary certificates issued by the U.S. Department of Agriculture, at least 7,700 kg of Goldenseal roots were exported from the United States in 1994-95. This may be equivalent to the export of 3-5 million roots in 1994 and 1995 alone.

Goldenseal may be a good candidate for CITES regulation because harvest for domestic and international commercial trade has or may have a detrimental effect on the species. The trade in this species needs to be carefully monitored, and its cultivation should be promoted to alleviate heavy collection pressures on wild populations.

References


Chris Robbins, TRAFFIC USA, 1250 Twenty-Fourth Street, Washington, DC 20037, USA; Tel. ++1/202/293-4800; Fax ++1/202/775-8287

Recent Events

5th International Congress of Ethnobiology

This meeting, organized under the Chairmanship of Christine Kabuye (ISE President) was held in Nairobi between 2-6 September 1996 under the theme "Ethnobiology and Conservation of Cultural and Biological Diversity". Within a broad ranging congress, several papers dealt with medicinal plant conservation, including papers by H. Heuveling van Beek and Le Cong Kiet on Aquilaria malaccensis, Nat Quansah on resource management and people in Madagascar, and A. Karem on the FRLHT process in South India. (A. B. Cunningham)

Plants for Food and Medicine

A joint meeting of the Society for Economic Botany and the International Society for Ethnopharmacology was held in London, England, 1-6 July, 1996 on the topic "Plants for Food and Medicine". The four principal symposia addressed following topics: Food, Medicine and Health; Cross-cultural Plant Exchange; Botany - What's in it for Drylands Development; and Modern Treatments and Traditional Remedies. Many of the presentations were relevant to the challenges of medicinal plant conservation. A digest of the meeting has been published in the Society for Economic Botany Newsletter, Plants & People 10, 1996. Proceedings will be published in 1997. Ordering information will be published in the forthcoming issue of Plants & People. (Danna J. Leaman)

Allium sativum
Conferences and Meetings

18th Annual Health Sciences Congress (in collaboration with the 14th Epidemiological Society of Southern Africa Conference), 14-18 April 1997, Belville Inn, Cape Town, South Africa.

The conference is sponsored and organized by the South African Medical research Council (SAMRC) in consultation with the Kenya Medical Research Institute (KEMRI). The aim of the conference will be to provide a forum for discussing the complete scope of health sciences, and will include the following topics: infectious diseases, health and development, mental health and health systems research. Contact: Conference Secretariat, MRC, P O Box 19070, Tygerberg, 7505, Cape Town, South Africa. Tel: ++27-21-938 0435; Fax: ++27-21-938 0395. e-mail: confsec@eagle.mrc.ac.za. (A.B. Cunningham)

The 1997 meeting of the Society for Economic Botany will be held at Washington University, St. Louis, Missouri, June 4-8.

Information is available from Dr. M. Elvin-Lewis, Dept. of Biology, Washington University, Box 1137, St. Louis MO 63130-4899, USA; Tel. ++1/314/935-6059; Fax: ++1/314/935-4432. e-mail: elvin@wustl.wustl.edu. Information about the society and publications is available from The Society for Economic Botany, PO Box 368, Lawrence KS 66044, USA. (D. Leaman)


The conference is being organized by FRLHT, which is represented on the MPSG and is extremely active in in-situ medicinal plants conservation efforts in India. Contact: FRLHT, No. 50, 2nd Stage, 3rd Main, Anandagari, Bangalore, 560 024, fax: ++91-80-333 4167, e-mail: root@frlhternet.in. (A.B. Cunningham)

The Second World Congress on Medicinal and Aromatic Plants for Human Welfare (WOCCMAP II) will be held from 10-15 November 1997 in Mendoza (Argentina).

This congress is organized by the International Council on Medicinal and Aromatic Plants (ICMAP), the International Society for Horticultural Sciences (ISHS), and the Sociedad Argentina para la Investigación de Productos Aromáticos (SAIAPA). Contact address: Dr Arnoldo L. Bandoni, WOCMAP II, José Hernández 1621, 6’A, 1426 Buenos Aires, Argentina, fax: 0054-1781-6906, e-mail: time@starnet.net.ar. (D. Leaman)

The forthcoming meeting of the Society for Ethnopharmacology will be held in Kerala, India, in 1998.

Information about this Society is available from Prof. Nina Etkin, Dept. of Anthropology, University of Hawai'i; 2424 Maile Way, Honolulu, Hawai'i 96822, USA; Tel. ++1/808/956-7726 or -4815; Fax ++1/808/956-4893; e-mail: etkin@hawaii.edu. (D. Leaman)

Reviews and Notices of Publication

A.B. Cunningham & Uwe Schippmann

This selection is not meant to be an exhaustive list of publications that relate to medicinal plant conservation. See also the report in this issue on the recently published Medicinal Plant Conservation Bibliography.

Author abbreviations: abc = A.B. Cunningham, schp = U. Schippmann, mp = medicinal plant. Key words in < > brackets relate to taxa dealt with in the reference.


An extremely useful book with records of plant uses, including a large section dealing with medicinal species, mentioning Griffonia simplicifolia export data (58-80 tons of seeds per year) and other species in trade. (abc)

Miombo woodlands, characterized by Brachystegia and Julbernardia trees, cover a vast portion of southern, central and eastern Africa. This well researched book links ecological, economic and social issues in the management of miombo woodlands, including chapter (6) by Brigham & al. (pp. 137-174) on trade in miombo woodland products. (abc)


Working with two elderly Mayan healers (curanderos), the author identified 81 species of mp's used in the study area, a record of knowledge threatened by the lack of apprentice healers. The most important families were Asteraceae and Rubiaceae. (abc)


The report reviews the current international trade in Prunus africana and makes recommendations for a better implementation of its listing in Appendix II of CITES. Trade structure and volumes are summarized and identification help for the main commodities unprocessed bark and bark extracts is presented. (scbp)


The use of Artemisia species within the traditional medicine of tropical countries is illustrated with examples from Asia, Africa and Latin America. The use of high value-added essential oils in aromatherapy has commenced in France. Nowadays, extracts from Artemisia annua are tested and applied by WHO as new anti-malarial agent. A list of about 80 Artemisia taxa is given with German common names, plant parts used and general distribution data. (from summary)


Plant diversity in arid environments is low compared with most other biomes. Yet the number of species in a given area is not necessarily a good measure of either their functional or economic importance. In the Wadi Allaqi Biosphere Reserve in Egypt's southeastern desert, 127 species of vascular plants have been recorded, with an 'importance value' being attributed to each species for 7 different use categories. Two main uses are in grazing (65%) and as medicinal plants (45%). Around 20% are edible and 18% are used as fuel. (from summary)


A survey was conducted in 1991-94 of two villages inhabited by Bhotiya tribal people in Uttar Pradesh, India. Medicinal herbs constitute 12-13% of total income to the villages. 15 cooperatives with a 1992 membership of 7,009 herb collectors exist, and marketing is through two specialist government agencies. Conservation measures have not generally been successful. Cultivation is proposed as a viable option for the resource and thus for the income of the traditional peoples who depend on it. (from summary)


The current use of Spanish medicinal plants is described (table with scientific, common names and companies involved). Chapter analyzes the Spanish market in detail (diagrams of volumes and values of imports and exports). The Annex contains a list of about 100 species which are recommended not to be extracted from the wild in large numbers (common and scientific names). (scbp)


<Drosera rotundifolia, Drosera anglica, Rhodiola rosea, Echinacea>

The paper describes the situation of mp production in Scandinavian countries (FI, NO, SE, IS). Owing to economic and climatic reasons, Scandinavia was always a net importer of mp's. The popularity of alternative healing methods has now led to increasing interest in herb growing. The paper also gives some information on imports. (scbp)


Recent studies on nwp have emphasized the economic value of these products and the sustainability of present harvests. Many of these studies rely upon a set of untested assumptions about the effect of harvesting upon the forest and the economic value of nwp in both the market-place and daily life of rural people. These assumptions are formulated as a series of hypotheses. They will be tested in future research. (from summary)

This is the first of a series of 3 papers (see also Murali et al. 1996). They clarify several issues on nwfp values and sustainable harvest levels. The contribution to rural income covers an issue widely recognized but seldom quantified by researchers: that although nwfp's account for large proportion of gross income, people essentially get a minimal wage for their efforts. (abc)


The use of mp's has a long tradition in Mexico and has been influenced especially by the medical systems of the numerous Mexican indigenous groups. Mps are grown as house remedies, are collected in the environment of the communities, are sold on markets or by healers or ambulant vendors. 6 species are discussed in a phytochemical and biological-pharmacological perspective. (from summary)


This book is a valuable and detailed account of the medicinal plant trade in SW Puebla, Mexico, based on research work and interviews with mp gatherers and traders. It has detailed information on mp species in trade and is highly recommended reading for those wanting to understand the dynamics of trade which underlie mp conservation problems not only in Mexico, but in many other parts of the world. Contact: INAH, Cordoba 45, col. Roma, CP 06700, Mexico. (abc)


The comprehensive book lists lists ethnomedical and pharmacological information for the mp's used by Zulu traditional healers, arranged by family and genus. 1,032 species from 537 genera and 147 families are covered. Data on levels of utilization, distribution or an assessment of the population status of the taxa is not given. Contact: Private Bag X01, Scottsville, Pietermaritzburg 3209, South Africa, fax +27/33/260-5599, e-mail: books@press.unp.ac.za, paperback US$ 48, hardback US$ 74. (schp)


It is to the credit of Dr Jain that this volume has been published within a relatively short period of time after the congress. The book contains a great variety of papers on ethnobiology with a significant section on health care (pp. 71-232). Of most interest are the paper by S. Mehrotra & al. on Picroliv, the hepatoprotective drug developed from Picrorhiza kurrooa (although no mention is made of its threatened status or of the trade from Nepal), the short paper by M.P. Kaul on strategies for sustainable use of western Himalayan mps and papers by N.P. Manandhar on economically important plants in Nepal. Contact: A3/27A DDA Flats, Paschim Vihar, New Delhi 110063, India, fax ++91/11/5437621, US$ 120. (abc)


The author summarizes data on population status, economic value and distribution of Berberis asiatica and B. chitrī in India. (schp)


The author summarizes data on population status, economic value, cultivation and distribution of A. heterophyllum in India. (schp)


The brochure provides an overview of ongoing financial, technical and human resources cooperation projects carried out by the German Gesellschaft für Technische Zusammenarbeit (GTZ) in the field of implementing the Biodiversity Convention. Worldwide, Germany is supporting about 160 projects in which the conservation and sustainable use of biological diversity constitute the focus or a major subactivity. However, only 3 projects relate to mps (CR, ID, VE). (schp)

reciprocity and maintaining relationships. - Journal of Ethnopharmacology 51: 45-57.

The relationship between the stability of the rainforest cultural biodiversity, the development of agro-forest resources and the long-term benefits to the forest people is highlighted. Examples of initiatives taken by Shaman Pharmaceuticals Inc. and the Healing Forest Conservancy are described and discussed in the context of exploring appropriate use of intellectual property law to address the ethical issues facing all business and research groups working in the tropics. (from summary)


The report reviews the general trade structure and legal background of the medicinal plant market in Germany. More than 1,500 plant taxa were discovered to be present in trade. Provenances are worldwide, the important patterns are discussed. Import and export data are summarized on the basis of German trade statistics. Also, the species protected by CITES and German national legislation are tabulated. (schp)


The paper lists the medicinal plant taxa in the German market which are protected by CITES, the EC Regulation and the German national legislation. German vernacular names and pharmaceutical names are cross-referenced to the scientific names. (schp)


The paper compares the medicinal and food floras of the native peoples of North America based on the data in a database on native North American plant use (currently 44,775 items in use as medicine, food, dye and fibre plants). There is a surprising overlap of the medicinal and food floras by both family and taxon. Yet there are also substantial differences: food and medicine tend to involve different plant parts, plant habit, and plant character. The similarities and differences are considered in an evolutionary context. (from summary)


This is the second of a series of three papers (see also Hedge et al. 1996 and below). It quantifies and ranks the densities, frequency and importance values, as well as size class distributions and amounts of key products collected, some of the most important of which are mp's such as Phyllanthus emblica, Terminalia chebula and T. bellirica. (abc)


This is the third of a series of 3 papers (see also Hedge et al. 1996 and above). It focuses on Phyllanthus emblica (which has 496.6 tons of fruit sold). They show that 60-80% of all fruits in the local P. emblica population are currently harvested, and that this may have a negative effect on recruitment of new trees into the population. Together, these 3 papers are important reading - particularly for those northern NGO's which have glamorized ntfp collection in terms of effort, returns or ecological impacts. (abc)


In this investigation, the impact of harvesting on wild populations of Panax quinquefolius and Allium tricoccum was assessed and their extinction thresholds and minimum viable populations were estimated. For both species it was evident that existing populations in Canada, which rarely exceed several hundred individuals cannot support any harvesting without serious threat to their long-term persistence. (from summary)


The report aims to provide companies and organisations with a detailed account of the Chinese medicines market in China. Contents: Healthcare provisions; legislation; production of Chinese medicines; end products; research and new product development in China; market size, structure and main players; distribution; marketing, advertising and price; current trends and future prospects for Chinese medicines in China; r&d opportunities; joint venture opportunities; profile of TCM markets in selected countries. Very little information on wild-harvesting, threatened species and resource management is given. The price is 975 Pound Sterling. (schp)

Aloe ferox is the only species used in South Africa (ZA) for the extraction of bitters sap and aloe gels. Wild stocks bear an estimated 95% of the harvesting pressures. The leaves of app. 17 million plants are harvested to produce an estimated 700 tons crystalline bitters p.a. These estimates also serve to illustrate the size of A. ferox populations in ZA. As only leaves are harvested, the plants continue to grow, but no scientific research has been conducted into survival rates, susceptibility to fires or habitat destruction. Aloe tappers and land-owners apply non-abusive harvesting techniques. The authors conclude that A. ferox is a flagship example for sustainable harvesting of a valuable resource. (schp)


In a question-and-answer mode, the book offers advice on how indigenous and local communities worldwide should approach and deal with the many issues surrounding intellectual property rights, traditional resource rights and the patenting of life. It contains a bibliography of 207 annotated references. (schp)


The paper outlines the importance and usage of medicinal plants in health care, national conservation activities in selected countries, and in World Bank development projects. The final section focuses on developing country strategy needs for implementing policies covering medicinal plant conservation, cultivation, processing and marketing. (from summary)


This book is an account of the 2,575 species of flowering plants and ferns in the Sierra de Manantlan Biosphere Reserve in SW Mexico. Of mp interest is the chapter by Cuevas, R. & al. (pp. 82-89) on cultivated plants in the Sierra which includes a number of cultivated medicinal plant species like Jacobinia spicigera (mickle, Acanthaceae) and Giovamphora decumbens (olotillo, Amanthaceae).

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Copies of the Newsletter are available from the editor.

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