

# Chinese Herbs in the 21st Century: Questions for a Sustainable Future

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*China is home to a greater diversity of the world's plants than any other region of the planet. Considering that herbal medicine is a cornerstone of Chinese medicine, the relationship between human populations, market demands and the ecosystems in which Chinese herbs grow warrants closer examination. Can Chinese and global ecosystems support the increased demand of herbal medicine as it is harvested and sold now, largely unregulated? This article explores some of the current challenges we face with Chinese herbal medicine today, at the intersection of conservation biology and international trade of medicinal plants, and the various regulations and guidelines that will ensure, quality, long-term availability of both wild and cultivated Chinese herbs.*

The foundation of Chinese medicine, and its appeal for many practitioners and patients, is a holistic cosmological view, recognizing the pieces to be part of an integrated whole. Whether we are looking at agriculture through seasonal cycles, the relationship of *zang-fu* organ systems, or health in the context of climate and season, the practice and theory of Chinese medicine recognize the interconnectedness of all things. In essence, we practice a medicine that investigates and values relationships. Considering that herbal medicine is a cornerstone of our medicine, the relationship between human populations, market demands and the ecosystems in which Chinese herbs grow warrants closer examination.

China is the native home to a greater diversity of the world's plants than any other region of the planet. With more than 30,000 native species, over half of which are found only in China, the region is a major source of valuable medicinal, crop and ornamental species.<sup>1</sup> However, with China's rapid development and the growing demand for medicinal plants world wide, its flora is significantly threatened. The current rate of population growth and urban development in China and the growth in popularity and practice of Chinese medicine around the globe has created a demand for medicinal herbs that has superseded any regulations or standards that will ensure long-term

sustainability, quality and access. The Global Partnership for Plant Conservation notes that "the cumulative effect of these factors has been an astonishing tenfold leap in the number of threatened plant species in the twelve years between 1992 and 2004, with some 20% of China's native plants now considered at risk."<sup>2</sup>

Clearly, we now find ourselves now at a crux of both global and Chinese environmental challenges including deforestation, pollution and rapid urbanization. The ensuing habitat loss and urban development directly impact the quality of Chinese medicinal herbs and threaten their future availability. Dr. Peter Raven, one of the world's leading botanists and advocates of conservation, biodiversity and sustainability, works closely with many national and international efforts in conservation biology. In an April 2009 presentation at the California Academy of Science in San Francisco entitled "Plants in Peril, China's Ecological Crisis,"<sup>3</sup> Dr. Raven, said that Chinese scientists are eagerly cooperating with international conservation efforts.

China's relationship with medicinal plants spans at least 2,000 years, demonstrated by medicinal herbs found in the Mawangdui tombs of Hunan province which date back to 186 B.C. The Chinese herbal apothecary grew from a few hundred herbs recorded in the oldest version we have of the *Shen Nong Ben Cao Jing* by Tao Hongjing to nearly 1,900 substances in Li Shizhen's monumental encyclopedic work, the *Bencao Gangmu*, published a few years after his death in the late Ming dynasty, 1596 A.D. Jiangsu College of New Medicine spent 25 years creating the *Zhong Yao Da Ci Dian* (Encyclopedia of Chinese Herbal Medicine), published in 1977, which contains 5,767 entries.

Most colleges of Chinese medicine in California teach between 250-300 of the most commonly used single herbs. The number of different plants used for these 250-300 herbs expands significantly, however, when we look at the number of different species that may be used for a single herb. For example, *Xīn Yí Huā* 辛夷化 is the flower bud of *Magnolia liliflora*, *M. biondii*, *M. sprengeri*, or *M. denudata*.

With some medicinals, one species may be endangered or threatened while another

accepted species for the same medicinal is not. Such is the case with *Ròu Cǒng Róng* 肉苁蓉, where *Cistanches deserticola*<sup>4</sup> is listed on the Convention on International Trade in Endangered Species (CITES) Appendix 2 list, while *Cistanches salsa* is not. This appendix is a list of endangered species not yet banned, but which require documentation for trade. Most of the dried stems of *C. deserticola* found in the Chinese herbal market are believed to be from wild plants whose populations have declined in recent years due both to over-harvest and to habitat loss.<sup>5</sup>

Despite the growing threat to Chinese medicinal species, current herbal curricula in Chinese medicine schools fail to include a discussion of the conservation status of individual herbs, or even a discussion of the environmental sustainability of herbal harvest and cultivation practices at large. While much of this information does exist, it has largely been the domain of conservation biologists and geographers rather than members of the Chinese medical community. Finding conservation data on medicinal species is a matter of sifting through large databases such as the Red List put together by the International Union for Conservation of Nature (IUCN) Species Survival Commission (SSC), a research network of around 7,500 volunteer experts from all over the world. The Red List is a database of endangered plants listed by species and rated on a scale of:

1. Least Concern (LC) ;
2. Near Threatened (NT);
3. Vulnerable (VU);
4. Endangered (EN);
5. Critically Endangered (CR);
6. Extinct in the Wild (EW);
7. Extinct (Ex).

At a minimum, knowledge of Endangered and Critically Endangered plant species should be integrated into Chinese herbal medicine curricula and included in the ethics portion of our licensing exams.

Can Chinese and global ecosystems support the increased demand of herbal medicine as it is being harvested and sold now, largely unregulated? It is clear that if we want to ensure long-term access to and sustainability of Chinese medicinal herbs, a variety of regulations will be crucial.

## *Comparing cultivated herbs to wild herbs raises the question—“What creates good medicine?”*

### **Wild-Harvested Herbs**

Wild herbs have always been more prized than their cultivated counterparts by Chinese herbal doctors. What is it about a wild plant that makes good medicine? As Chinese medical practitioners, we know that herbs work synergistically in combinations as we build formulas. Similarly, a single herb has its own complexity, with its many components working synergistically. We can know an herb's qualities through use and attentive, clear observation of its effects, even if we do not know every detail of an herb's biochemistry. Though we may not always know the active ingredients of an herb, Chinese medicine boasts a long history of clinical study and observation of herb functions. We inherit this rich understanding of herbal medicine, and many contemporary doctors prefer to stay close to the traditional teachings of valuing wild over cultivated herbs.

In a 2009 presentation at the American College of Traditional Chinese Medicine in San Francisco, Josef Brinckmann of the FairWild Foundation said that many plants thrive in nature because it is a bio-diverse environment and that the biochemistry of a plant changes when cultivated as a mono-crop and/or grown in a significantly different climatic environment. Huáng Qí 黄芪, the dried root of *Astragalus membranaceus*, a drought-tolerant species, has shown less developed taproots and lateral roots due to over-watering and over-fertilization when grown in the Pacific Northwest, by comparison to Huáng Qí harvested from its traditional locations in North China's sandy soil where it adapts to water deficits. Furthermore, plants develop relationships and become interdependent in a bio-diverse environment.<sup>6</sup>

Conservation biologist Dr. Raven, co-presenting a talk entitled “Plants in Peril – China's Ecological Crisis” with Professor Stephen Blackmore of the Royal Botanic Gardens Edinburgh at the California Academy of Sciences in April 2009, outlined some of the major causes of potential plant species extinction in China, one of which was the over-harvest of wild medicinal plants. Other causes include destruction of habitat through dam building, timber exploitation and many other aspects of the country's rapid development, invasive plants and animal species, and global climate change.

In an informative presentation at the American College of Traditional Chinese

Medicine in July 2009, Josef Brinckmann introduced his work with the FairWild Foundation, whose mission is to provide a worldwide framework for implementing a sustainable, fair and value-added trading system for wild-collected natural ingredients and products. He explained that although the World Health Organization's *Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants* provides standards for harvesting wild medicinal plants, these standards are not ample. The implementation of GACP alone does not necessarily assure effective resource management, biodiversity conservation, and sustainable use and trade.

While such standards are a great beginning, the IUCN states that specific guidelines for harvest, cultivation and labor practices are needed as well. And here the FairWild Foundation has done an impressive job of navigating the complex meeting of commercial market, environmental issues and fair labor practices.

In order to ensure sustainability in the wild collection system, thus guaranteeing a constant and reliable supply of raw materials to industry and traders, the International Standard for Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP) was developed between 2001 and 2006. ISSC-MAP defines guidelines and provides tools to collectors, producers and decision makers for the planning and implementation of a sustainable resource management system to support the Good Agricultural and Collection Practices (GACP) outlined by the WHO. The development of ISSC-MAP was supported by the German Federal Agency for Nature Conservation (BfN),<sup>7</sup> TRAFFIC,<sup>8</sup> the World Wildlife Fund (WWF),<sup>9</sup> and IUCN.

Moving far beyond standards, ISSC-MAP compliance requires creation of a Harvesters Manual for each species that outlines: resource assessment from local people, maximum optimal sustainable yield, rate of regeneration, and inventory of other species within the ecosystem. The purpose of ISSC-MAP is to ensure continued use of Medicinal and Aromatic Plants (MAP). While this program is still relatively new, it is a crucial and informative resource. As Chinese medicine practitioners, we can make the most of such a resource by encouraging our herb suppliers and companies to participate in FairWild Foundations programs.

### **Cultivated Herbs**

An alternative to using wild medicinal herbs is to cultivate herbs either in Asia or here in the U.S. While numerous species are harvested from the wild, most of the herbs traded in the international market come from fewer than 100 mostly cultivated sources. In comparing cultivated herbs to wild herbs, the question is raised—“What creates good medicine?”

Some of the qualities valued in wild herbs probably come from growing in a bio-diverse environment and sprouting naturally from seed, without pesticides or fertilizers. Continuing with this rationale, we may expect that herbs cultivated with similar methods may provide a more similar product to a wild herb. These methods include crop rotation, organic growing methods, and using plants propagated from sprouted seeds. These cultivation practices would more closely replicate a wild herb.

As the global market for medicinal herbs has grown rapidly and with technology now strongly influencing agriculture, cultivation techniques vary widely. For example, different techniques of plant propagation include sprouting from seed to making cuttings to cloning. Cloning creates a plant that is genetically identical, and cloned plants are often mono-cropped. Both mono-cropping and cloning present growing conditions that deviate far from that of a wild environment, resulting in unknown results in terms of the quality and medicinal value.

Additionally, the use of pesticides and synthetic fertilizers deviates significantly from the condition of an herb growing in the wild. While many practitioners and patients of Chinese medicine choose to spend the higher price for organic food, we remain largely ignorant of pesticide use and Chinese herbs. While many pesticides used in China may be milder and approved in the U.S., a number of them are not approved in the U.S. and continue to be used regularly in China.

China has published regulations requiring herb growers to follow standards that minimize pesticide use and residues. Still, some of the specific Environmental Protection Agency (EPA) restrictions on pesticide use in the U.S. are not used in China, meaning that some of the pesticides used in China on herbs are not permitted in the U.S. “Andrew Ellis [founder of Spring Wind Herbs], has reported that most herbs prove

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to be free of pesticides, but that quinterozone is sometimes detected in ginseng; he has sought out and found quinterozone-free ginseng supplies. He also pointed out that one or more batches of tang-kuei<sup>11</sup> contained residues indicating a DDT type pesticide had been used; the batch of herbs was rejected."<sup>12</sup>

Many traditionalists emphasize the importance of growing herbs in their traditional environments and are weary of exploring the outcome of herbs grown in the U.S. Following this line of thinking, Spring Wind Herbs,<sup>13</sup> based in Berkeley, California, is the single largest supplier of Chinese-grown organic herbs and is certified by the California Certified Organic Farmers (CCOF). Since 2005, Spring Wind Herbs has been providing pesticide-free and certified organic Chinese herbs. Spring Wind currently carries about 30 organic herbs which are certified by a third-party international certifying agency, and then re-certified when they enter the United States. Additionally, Spring Wind offers about 200 "pesticide-free" herbs, and administers the most rigorous pesticide-testing program in the industry, testing for at least 135 pesticides, and in

most cases over 250 pesticides.<sup>14</sup> Andrew Ellis, founder and owner of Spring Wind, wrote, "We whole-heartedly support organic farming not only for the purity of the herbs but for the benefit it provides for the people doing the farming and for the environment in general. We feel the holistic approach to healing that characterizes Chinese medicine begins with an attitude that treats the earth with respect and the realization that the health of the environment and the health of the body are not separate."<sup>15</sup>

Yet another innovative alternative is to grow Chinese herbs organically and locally here in the U.S. Pioneers in their field, farmers Peggy Schafer of Chinese Medicinal Herb Farm in Petaluma, CA and Jean Giblette of High Falls Gardens in Philmont, NY, have joined together to lead a national group of farmers working together since 2000 as the Medicinal Herb Consortium (MHC). These farms are certified organic, bio-diverse, and grow plants from seeds and cuttings. MHC offers domestically and ecologically grown Chinese medicinal herbs directly to practitioners of Oriental Medicine which are grown to order.<sup>16</sup>

Understanding these sustainability issues, becoming educated about endangered

or over-harvested medicinal herbs and requesting, or even requiring, the companies we buy from to implement standards of sustainable wild harvest has become an ethical issue for Chinese medical practitioners and consumers of herbal products. We must become aware of these issues and take action towards more sustainable practices of harvest and cultivation if we want to continue to use and have access to Chinese medicinal herbs.

*Jasmine Rose Oberste LAc and Bria Larson co-founded the Chinese Herb Garden Project under the sponsorship of the Trust for Conservation Innovation. The Chinese Herb Garden Project's mission is to promote the sustainable use of Chinese medicinal flora, online at [www.chineseherbgarden.org](http://www.chineseherbgarden.org).*

## References

1. Botanic Gardens Conservation International website <http://www.bgci.org/plants2010/news/0377/>
2. Botanic Gardens Conservation International website <http://www.bgci.org/plants2010/news/0377/>
3. "Plants in Peril: China's Ecological Crisis" at the California Academy of Science in San Francisco, was a fundraiser for Quarryhill Botanical Garden in Glen Ellen, CA, whose mission is "Advancing the conservation, study and cultivation of the flora of Asia." The talk was given by Dr. Peter Raven, director of the Missouri Botanical Garden, and Professor Stephen Blackmore, director of the Royal Botanic Gardens, Edinburgh.
4. <http://www.cites.org/eng/cop/11/prop/59.pdf>.
5. For more information on Ròu Cóng Róng, see Subhuti Dharmananda's article at <http://www.itmonline.org/arts/cistanche.htm>
6. Harvard botanist Judith Sumner has elucidated some of the beautiful complexities of such relationships in her book *The Natural History of Medicinal Plants*.
7. Germany is the single largest importer of Medicinal and Aromatic Plants (MAP) of all the countries in the world. English site at: <http://www.bfn.de/index+M52087573ab0.html>
8. TRAFFIC is a wildlife trade monitoring network: [www.traffic.org](http://www.traffic.org)
9. WWF's mission is the conservation of nature. Using the best available scientific knowledge and advancing that knowledge where we can, we work to preserve the diversity and abundance of life on Earth and the health of ecological systems. WWF is one of the world's leading conservation organizations: [www.worldwildlife.org](http://www.worldwildlife.org)
10. For more information on ISSC-MAP and the FairWild Foundation, see [www.fairwild.org](http://www.fairwild.org), and also the forthcoming article by Josef Brinckmann in the next issue of *HerbalGram* on FairWild's work with Nan Wu Wei Zi 南五味子, the fruit of *Schisandrae sphenantherae*.
11. Tang-Kuei is the Wade-Giles spelling for Dāng Gūi 当归 *Angelica sinensis*
12. "How clean and pure are Chinese Herbs?" by Subhuti Dharmananda, <http://www.itmonline.org/arts/cleanhrb.htm>
13. [www.springwind.com](http://www.springwind.com)
14. Spring Wind administers two standard testing protocols. The first tests for the following classes of pesticides: organophosphates, chlorinated hydrocarbons, methyl carbamates, organonitrogens and pyrethroids (over 250 pesticides total). The second tests for organophosphates, organochlorines, pyrethroids and the pesticide potentiator, Piperonyl butoxide (over 135 pesticides total).
15. [http://practitioners.springwind.com/index.php?main\\_page=about\\_our\\_herbs](http://practitioners.springwind.com/index.php?main_page=about_our_herbs)
16. For more information about the MHC see [www.localherbs.org](http://www.localherbs.org) as well as an article published by Jean Giblette in *Acupuncture Today* available at <http://www.acupuncture-today.com/mpacms/at/article.php?id=31676>.