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Can Chinese Herbs Be Produced in North America?

By Jean Giblette*

Any householder who grows peonies knows that Chinese plant species thrive in North America and other temperate regions around the world. Although few gardeners may know the history, the peonies so familiar and beloved in America are not native species, such as *Paeonia brownii* Douglas, but rather descendants of *Paeonia lactiflora* Pall. cultivars developed in China centuries ago, introduced into Europe around 1800, and from there imported to the New World.[1]

A large number of ornamental species have been introduced directly from China since 1906 when Ernest Henry Wilson collected specimens for Harvard University's Arnold Arboretum.[2] Today, Chinese medicinal species commonly available in the North American ornamental trade include *Belamcanda chinensis* (L.) DC, known as blackberry lily and the source of shè gān;[3] *Ligustrum lucidum* Ait., the ubiquitous privet hedges found in California (and source of nǔ zhēn zǐ); *Platycodon grandiflorum* (Jacq.) A. DC., the lovely balloonflower (jié gěng); and several others.

A few Chinese species grow rather too well on this continent. The most famous example is kudzu, *Pueraria lobata* (Willd.) Ohwi, the source of gé gēn, which was imported by a government agency for soil erosion control in the 1920s and, since then, has become a seriously invasive pest in the southern United States.[4] Also in the pest category are *Lonicera japonica* Thunb. (jīn yín huā) and *Polygonum cuspidatum* Sieb. et Zucc. (hǔ zhàng), each introduced as ornamentals through Europe over a century ago.

Medicinal plant cultivation initiatives

Since the early 1990s, several North American investigators have pursued domestic cultivation of Chinese medicinal plants. At present, seeds for dozens of species are available through commercial outlets such as Horizon Herbs, Johnny's Selected Seeds and Richters.[5] Farms such as Pacific Botanicals in Oregon have experimented with crop production on a small scale, for example, with *Astragalus membranaceus* (Fisch.) Bge. (source of huáng qí).

In the Hudson Valley region of New York, High Falls Gardens has been conducting production trials of Chinese medicinal plants since 1996, funded in part by federal and state agricultural agencies which support new crop development.[6] Dozens of species grow well – the peonies, *Angelica dahurica* (Fisch. Ex Hoffm.) Benth. et Hook f. (source of baí zhǐ), *Astragalus mongholicus* Bge. (huáng qí), a northern cultivar of *Lycium chinense* Mill. (dì gǔ pí and gǒu qǐ zǐ), *Phellodendron chinense* Schneid. (huáng bǎi), among others. Production research, in which the economics of bringing a crop to market are investigated, is still preliminary and dependent on continued funding.

The central problems of production

In light of the success of so many introduced species, the appropriate question is not, "Can Chinese medicinal plants be grown here?" but rather a series of more subtle

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inquiries. First, to address the basic question of "why," especially since at present the medicinal herbs are imported at relatively low cost from China, the potential advantages of domestic cultivation will be summarized. Second, the problem of whether we can get medicine from domestically grown Asian plants (the medicine materials issue) will be considered. From the point of view of the practice of Acupuncture and Oriental Medicine, now expanding in North America, this is an essential problem with important implications for the future. Third, there is the important question of whether our farmers can produce the herbs at prices attractive to practitioners and patients (the economics issue).

Some advantages of domestic cultivation

From the industrial or globalist point of view which would segregate production to countries where labor is least costly, the idea that Chinese herbs could be produced anywhere other than in China is fanciful at best. Yet, if examined from other perspectives, the proposition has interesting aspects that could become advantageous given the right set of circumstances. Consider how domestic cultivation would benefit the following objectives.

Advance the assimilation of Chinese medicine. This important intercultural transmission of knowledge must be understood in the context of historical changes in our ideas of humankind's place in nature. In the last century, following the metaphysical implications of relativity and quantum theory, a sequence of new ideas arose which seems to reinforce traditional or classical Chinese medicine, or at least to make it more comprehensible to westerners. Holism, systems and chaos theories, and the new science of ecology[7] are described in the scientific literature, yet also their principles have entered popular consciousness to a considerable degree. In this context, the perceived value of Chinese herbal medicine, to at least a significant segment of patients in the west, lies in its record of finding medicine in nature rather than in the manufacture of drugs.

Many of the westerners attracted to the study of Chinese medicine hold beliefs compatible with the new (but also ancient) philosophical paradigm. Therefore, the American educational system for Acupuncture and Oriental Medicine (A&OM) is the first constituency to realize value in the domestic cultivation of Chinese herbs. Students learn through exposure to living plants, in addition to dried materials in the pharmacy, and gardens are important for educational enrichment purposes at the masters degree level. Now that doctoral programs have been established, the possibility arises for research and advanced degrees following a medicine materials track in education. Ultimately, the profession of A&OM must establish itself as the ultimate authority for accepting or rejecting the inevitable substitute species, if it desires to retain control of its medicine materials.

Conserve wild medicinal plants. Observers in China estimate that approximately 60 to 80 percent of medicinal botanicals are still harvested from the wild.[8] Given the increasing worldwide popularity of traditional Chinese medicine, continued wild harvest can be unsustainable even when a plant appears to be abundant in a given locale. Cultivation is an obvious solution to this problem; however, the methods used are critical

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to acceptance of the products in the marketplace, as described in the section on ecological agriculture that follows.

Avoid difficulties with importation. Government regulations concerning the importation of herbs and other foods are becoming more complex and onerous. The new and proposed federal legislation is too substantial to be summarized briefly in this article.[9] Continued over-reliance on long-distance, fossil-fuel based transportation is becoming more problematic given estimates of dwindling supplies.

Maximize freshness and other health benefits. Locally-produced food is becoming more popular in America following revelations concerning contamination and other aspects of the poor quality of the industrial food system. On the positive side, the fresh taste, nutrient quality assurance and other health benefits are the perceived advantages of local food. To informed consumers, the same perceptions apply to medicinal herbs.

Support local agriculture. In many locales, support of local agriculture has been connected to issues of land use preservation, esthetic values, and reduction of environmental pollution, in addition to its role in food production. More people recognize that food security and cultural values are tied to the continuation of farming knowledge. Medicinal herb crops fit into this picture as additional crops in diversified fruit and vegetable operations, responsible harvest from the wild, or as stewardship of forest lands and wetlands.

Medicinal qualities of domestically grown Chinese plants

As High Falls Gardens investigators have found, the serious student of medicinal plant cultivation learns to think of the medicine materials issue with some flexibility. To use the example of peonies once again, the question is not, "Which peony species or cultivars can be grown for medicine?" but rather, "Where do we find the qualities of bái sháo, chì sháo, or mǔ dān pí in domestically grown peonies?" This approach directs investigations toward the possibility of regional substitutions, and over time we may find the desired qualities in different species or even genera than those used in China.

Even a brief review of the Bensky and Gamble translation of the Chinese materia medica reveals the inheritance of regional substitutions. For example, a number of species in three different genera are listed for dú huó.[10] Historically in Asia, morphological variations within a medicinal species were observed and accepted. We can infer this fact from the beautiful woodcut block prints which illustrate differences in samples of *Saposhnikovia divaricata* (Turcz.) Schischk (fáng fēng) from different provenances, found in editions of the Da-Guan Ben Cao in 1108 and 1581 C.E.[11]

Local variations in soil and climate type influence the qualities of the mature plant, a concept the French refer to as *terroir* in the taste of wine.[12] In wild plant species, morphology, genetic composition and chemical constituents vary from one population to another, as demonstrated by Professor He Shan-An of the Nanjing Institute of Botany in a study of samples of *Atractylodes lancea* Thunb. (cāng zhú) collected from different areas.[13]

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At present we are faced with a large number of questions, enough to provide subject matter for hundreds of future masters and doctoral theses. For example, can the North American species *Cimicifuga racemosa* (L.) Nutt., commonly known as black cohosh, be used as a substitute for shēng má? When the Asian species *C. dahurica* (Turcz.) is grown in a New York woodland edge, does it retain the qualities of shēng má or become more like the native species? Further, how can we determine the differences?

Either we must engage the services of Chinese specialists in medicine materials or acquire these skills ourselves. Most would consider this a daunting task, equivalent to gaining the long-term experience of a perfumer or wine-taster. Recently, however, a group in Minnesota, the Medicinal Herb Network, has begun to address this problem by adapting a technique used for decades in the food industry.[14] A type of organoleptic (taste and smell) analysis, the protocol has yielded replicable results using graduate students trained as tasters.

The work of the Medicinal Herb Network in Minnesota offers hope that a straightfoward method of medicinal herb quality evaluation may be developed in America. Chemical or genetic analysis of plant constituents does not provide the fine discriminations needed to distinguish properties of *terroir* and, in any case, is very expensive for farmers and students of medicine materials.

There is evidence that cultivation practices, in addition to soil and climate variations, affect medicinal herb quality. For example, the Chinese have long recognized the different medicinal values of Asian and American ginseng, *Panax ginseng* C.A. Meyer and *P. quinquefolius* L., and are now cultivating both species. Yet the marketplace makes a distinction between wild ginseng and the cultivated root. Wild-cultivated American ginseng from the woodlands of the Allegheny Mountains is still prized enough to command wholesale prices of $400 per pound, and up, for dried roots over ten years of age,[15] while conventionally-cultivated ginseng sells for around one-tenth of that price.

The explanation for this phenomenon relies only partly on humankind's longing for a panacea. Like other tales from folklore, the perceived potency of wild ginseng is based on an elusive truth, and one that must be addressed in this age of human overpopulation and loss of wild habitat. The problem is less superstition than the challenges of agriculture.

Toward an ecological agriculture

Recently, even casual observers have become aware that worldwide food production has diverged into a two-tiered system, that of modern industrial agriculture and "ecological" agriculture.[16] Ecological agriculture includes both traditional agriculture as practiced by indigenous peoples (of which the Chinese were the masters[17]) and also a new advance guard that applies principles of ecology to all aspects of cultivation practices.

Public awareness of ecological agriculture (known in the U.S. as "organic" and in Europe as "biological" agriculture) is focused on avoidance of the use of petroleum-based fertilizers, pesticides, herbicides and other synthetic chemicals in the production of food

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crops. Less well understood are two factors closely intertwined with the use of chemicals, which also furthered the expansion of industrial agriculture during the 20th century. These are (a) the practice of monoculture, that is growing only one variety of crop in a large field to optimize the use of farm machinery; and (b) a change in the philosophy and practice of plant breeding, which resulted in the development of crop varieties resistant to specific pests rather than the promotion of broad-spectrum resistance in whole populations.[18] Both these practices have increased the usage of chemicals, in fact prompting a seemingly endless cycle in which new crop varieties and new chemicals are introduced, the target pests adapt within a few years, and another round of development is required. The problem is analogous to the over-use of antibiotics in human and animal disease control. Genetic engineering of crop plants is seen by the ecological agriculturalists as yet another phase of this cycle.[19]

In contrast, the ecological advance guard is committed to a style of operations characterized by relatively small scale and high biodiversity, including the preservation of genetic diversity which allows for adaptation. In a farming operation of this type, chemicals are not needed because the natural balance of organisms prevents pest infestation. The trend is toward imitating nature as closely as possible. Even plowing is being called into question, and agroforestry receives increased attention.

Between these two polarities of industrial and ecological agriculture, the nutritional (and medicinal) value of plants is affected. American ginseng, for example, when cultivated outside its ecological niche in a monoculture without its companion plants, and dosed with synthetic chemicals that kill benign microorganisms as well as pests, has been shown to display an altered profile of biochemical constituents.[20] Folk wisdom reflected in the marketplace leads to an unintended consequence of industrially-cultivated ginseng: increased demand for wild-harvested, perhaps illegal, products.

The economics of ecological agriculture

The net effect of 20th century trends has been to make conventional farming unprofitable for all but large industrial concerns subsidized by governments. A counter-trend is well underway and, at the present time in North America, ecological production is rewarded with premium prices in the marketplace.

Small-scale production must be highly distributed to serve large numbers of people. While the U.S. has lost most of its small farms since the 19th century, countries such as India and China that still practice traditional agriculture have the opportunity to skip the so-called "green revolution" and adopt the most advanced ecological practices.

Various forms of direct marketing are an economic innovation that supports both local and ecological production. Green markets, farm stands, web-based approaches and mail order techniques maximize the farmer's profit. Farmers' cooperatives buy processing equipment and facilities to add value to their products. In the late 1980s, a significant form of direct marketing entered the United States from Japan, via Switzerland. This is the community-supported agriculture concept,[21] in which a group of customers buy a farm's harvest usually in advance of the season. Community-supported

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agriculture has enjoyed considerable success and has increased consumer awareness of how agriculture is tied to place and local economies.

Specific to medicinal herbs, in 2000 a group in California originated a direct marketing technique known as the Sonoma County Herb Exchange. Herb growers cooperate to support a non-profit association that solicits and bundles orders directly from herbal practitioners. At present, the association does not have enough supply to meet demand (with Chinese medicinal herbs among the most popular), and is attempting to find more farmers and land. While this innovation is on a very small scale and confined to one locality, the Exchange provides a model which is being studied by other medicinal plant growers around the country.

Prospects for the future

The economics issue has been explored by High Falls Gardens, most recently in a 2003 market research study.[22] The findings show the numbers of Acupuncture and Oriental Medicine practitioners in New York to be sufficient to commence a small-scale direct marketing effort. While development may take a few more years, no substantial capital is required to begin. The advantage of a model such as the Sonoma County Herb Exchange is that all crops are grown to order. Such commercial activity, if it develops, will be analogous to growing for chefs in restaurants, a market niche currently filled by a number of small, local farms in New York. Key to this approach, both chefs and herbal practitioners are fully invested in the quality of their products.

The medicine materials issue is central to the domestic production of Chinese herbs. To that issue, the profession of Acupuncture and Oriental Medicine in America holds the key. In 2001, to stimulate work on medicine materials, High Falls Gardens founded the Student Gardens program, in which seeds and plant starts are distributed to the colleges of Acupuncture and Oriental Medicine for their own demonstration and study purposes. Comparisons of plants grown in climate regions as different as New York, Arizona and Hawaii, among others, are expected to indicate where optimum growing conditions may be found.

The prospects for domestic cultivation of Chinese herbs suggest a back-to-the-future scenario. China's gift to the world of its vast treasure of herbal scholarship, given the historical practice of identifying regional substitutes, has the potential to restore indigenous plant medicine in places where only an oral tradition existed and cultural disruption occurred. This describes the history of both North America and Europe, which are ripe for a renaissance of plant medicine beyond the reductionist practice of mining plants for biochemicals.

Among the greatest glories of Chinese culture, its medicine and its agriculture were developed on principles that are being rediscovered through the science of ecology. Sir Albert Howard, an English scientist who worked in India in the early 20th century and was influenced by reports of Chinese agricultural practices, paid tribute to this knowledge when he observed, "the health of soil, plant, animal and man is one connected chain."[23]

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[4] See invasive plant descriptions at: http://www.invasivespecies.gov/profiles/main.shtml.
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