

Good Agriculture Practice (GAP) and Sustainable Resource Utilization of Chinese Materia Medica

Wenyuan Gao^{1*}, Wei Jia¹, Hongquan Duan¹, Luqi Huang², Xiaohe Xiao³, Peigen Xiao⁴,
Kee-Yoeup Peak⁵

¹The College of Pharmaceuticals and Biotechnology, Tianjin University, Tianjin 300072, China; ²Department of Pharmacy, 302 Hospital of PLA, Beijing 100039, China; ³Institute of Chinese Materia Medica, China Academy of Traditional Chinese Medicine, Beijing 100700, China; ⁴Institute of Medicinal Plant, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing 100094, China; ⁵Research Center for the Development of Advanced Horticultural Technology, Chungbuk National University, Cheongju, 361-763, Korea

Key words: Good agricultural practice (GAP), standard operating procedure (SOP), traditional Chinese medicine (TCM)

Abstract

The Good Agriculture Practice (GAP) program, being established in China, is an optimal way for the sustainable utilization of the medicinal plant and animal resources. Most frequently used Chinese materia medica will be mainly produced from the GAP bases in the future. To assure the successful operation of GAP program, standard operating procedure (SOP) should be implemented for specific plants or animals. Both GAP and SOP include the requirements in many aspects from the ecological environment of cultivation place, germ-plasm and varieties, seedling and transplant, fertilization, irrigation, and field care, to harvest and process, package, transport and storage. As a complex system, GAP demands strong commitment from the pharmaceutical industry, local administrative involvement, long-term R&D support, and years of time of development before a satisfactory result can be achieved.

Introduction

Chinese material medica enjoy an inherent and prominent role in the general health service. It presently

accounts for an average of 40% of the total consumption of medicaments in China. The sustainable utilization of CMM resource will be able to guarantee the sustainable supply of the raw material; to preserve the biodiversity of CMM; and to maintain biosphere equilibrium and environmental integrity.

Used in China for thousands of years, traditional Chinese medicine (TCM) has strongly influenced the regional traditional medicine in Asia, such as Japan, Korea, and Singapore. Along with the process that China joins WTO, TCM became recognized by more and more people in the developed countries. An example is that acupuncture has become very popular in the United Kingdom, and other European countries, Australia, etc. CMM is exported to the international market at a high growth rate as TCM is being adopted by more and more people in the world. For instance, Korea imports a large quantity of CMM from China every year, and as a result, about half of the dry material medica in Seoul market came from China. Medicinal plant is the main source of Chinese materia medica (CMM). The wild resources of medicinal plants in China could hardly meet the demand of the market need in terms of quantity. Consequently the over-harvest of wild medicinal plants has been frequently observed, which will lead to the eventual loss of biodiversity of the wild resources. Hence, Good Agricultural Practice (GAP) is the only way to solve this problem.

* Corresponding author, E-mail: biochemgao@hotmail.com
Received Jul. 18, 2002; accepted Aug. 20, 2002.

The Medicinal Plant Resources in China

Around 11% of the world plant species can be found in China, including 240 peculiar genera. A national survey for 30 years indicated that China totally has 12,807 species of medicinal materials (Table 1) (Huang et al., 2002a, b). Among them, 11,146 species (9933 taxonomic species and 1,213 taxonomic units under species) are medicinal plants including 10687 species of seed plant, bryophyte, or pteridophyte and 459 species of alga, bacteria, fungi, or lichen (Table 2).

Due to the over-exploitation happening, the reserves and output of wild medicinal plant are decreased generally. For example, *Radix Glycyrrhiza uralensis* was originally produced in Inner Mongolia province, but its reserve and output has been decreasing very quickly. Recently, the total yield of *Radix Glycyrrhiza* reduced by 40% comparing with 1950s and the main harvest place of this plant changes to Xinjiang Province from Inner Mongolia province (Yuan et al., 2000). In case of *Radix Astragalus membranaceus* and *Radix Astragalus mongolicus*, the wild plant output was more than 2,000 tons in 1960s, however,

the output decreased to less than 100 tons recently (Wang and Xiao, 2000). The other medicinal plant species whose reserve and output has decreased are listed as follows:

Acanthopanax senticosus;
Atractylodes lancea;
Anemarrhena asphodeloides;
Asarum sieboldii;
Cistanche salsa;
Cynomorium songaricum;
Dichroa febrifuga;
Ephedra sinica;
Gastrodia elata;
Gentiana macrophylla;
Gentiana scabra;
Glycyrrhiza uralensis;
Lithospermum erythrorhizon;
Notopterygium incisum;
Paris polyphylla;
Phellodendron amurense;
Pinellia ternate;
Rheum officinale;
Saposhnikovia divaricata;
Scutellaria baicalensis;
Stellaria gypsophiloides;
Tripterygium wilfordii;
Uncaria rhynchophylla;
Vitex trifolia;
Ziziphus jujuba.

Table 1. The resource of Chinese material medica

Resource	Family	Genus	Species	Percentage (%)
Medicinal plant	383	2,309	11,146	87.03
Medicinal animal	395	862	1,581	12.34
Medicinal mine	-	-	80	0.63
Total			12,807	

Table 2. The medicinal plant resource in China

Resource	Family	Genus	Species
Alga	42	56	115
Bacteria and fungi	40	117	292
Lichen	9	15	52
Bryophyte	21	33	43
Pteridophyte	49	116	456
Seed plant	222	1,972	10,188
Total	382	2,309	11,146

Table 3. The higher plant species in imminent danger in China

Higher plant	Total species	Endangered species	Percentage (%) of endangered species
Bryophyte	2,200	28	1.3
Pteridophyte	2,600	80	3.1
Gymnogen	200	75	37.5
Angiosperm	25,000	826	3.3
Total	30,000	1009	3.4

In its narrow sense, to protect the medicinal plant resource means merely to maintain the enough medicinal materials; but in the broader and more accepted sense, it means to conserve the biodiversity. China is one of the countries that have rich bio diversity. Chinese biodiversity lists No. 8 in the world and No. 1 in the Northern Hemisphere. Meanwhile, China is also one of the countries whose biodiversity is threatened (Yuan et al., 2000; Zou, 2001). As shown in Table 3, around 1000 plant species in China are in imminent danger and around 200 species have become extinct. Thus, it is an extremely urgent work to protect the wild plant resources and we have to try our best to conduct this great project. We are happy to see that the Chinese government has recognized the serious situation and began to save the wild resources. Good Agriculture Practice (GAP) should be one of the best ways to protect the medicinal plant resource for sustainable development.