A conversation with LUQI HUANG, President, China Academy of Chinese Medical Sciences

CHINESE MEDICINAL MATERIALS ARE FUNDAMENTAL TO THE DEVELOPMENT OF THE TRADITIONAL CHINESE MEDICINE (TCM) industry, and its sustainable utilization is central to government policies. From 2011 to 2020, China implemented its Fourth National Survey of Chinese Materia Medica (CMC) Resources in a bid to establish a comprehensive database on CMM resources to improve their management, protection, development, and utilization. The survey results will bolster large-scale planting of medicinal plants, TCM industry growth and regional economic development. Molecular pharmacognosist, Luqi Huang, President of the China Academy of Chinese Medical Sciences (CAUCMS), shares his insights on the survey and its implications for the investigation, conservation, and dissemination of CMM knowledge.

What is the background of the survey?
TCM and related industries are booming in China due to growing demands by the healthcare system and a medical paradigm shift. Thanks to the increasing demand and technical know-how surrounding CMM resources, the status quo is drastically different from that of the last survey conducted almost 30 years ago. A new survey was urgently required to update our perception on CMM resources, provide scientific evidence to facilitate policy-making on CMM resources protection and the development of TCM-related industries. Pilot work on the Fourth National Survey of Chinese Materia Medica Resources started in 2011. Given the complexity, breadth and volume of the work, the survey was implemented by multiple government sectors, while the technical aspects were primarily led by National Research Center for Chinese Materia Medica of CACMS, and carried out by TCM-related universities, research institutes, hospitals, etc.

What are the survey's goals?
We intend to build a database based on the survey results to foster information sharing, deliver suggestions for CMM resources management, protection, development and utilization; and construct a CMM resources monitoring and service system. We have implemented a bottom-up approach to enrich local knowledge and provide data to empower indigenous resource protection and utilization. We have developed a long-term monitoring system capable of trend forecasts of herbal medicine output volume, price and quality, to promote healthy development of TCM industry. We have built multiple Chinese herbal medicine seed and seedling resource databases to maintain quality and protect rare, endangered and indigenous regional CMM resources.

What is your approach for talent training?
To charter the survey team, professionals including students and senior experts were recruited from more than 10 fields ranging from medicine, health to forestry. The survey involved more than 400 academic institutions, 79 new species and 563 medicinal species listed in the Pharmacopoeia of the People’s Republic of China. We have recently initiated collaboration with the International Regulatory Cooperation for Herbal Medicines (IRC-CH) on IHP, and several countries, including Laos, on herbal medicine, which has already led to the compilation of the Virtual Pharmacopoeia of Laos by collaborating with experts in the country.

What is the global significance of this survey?
Our survey provided much valuable data for TCM and traditional medicine research, enriching the field with new insights and directions. For instance, a Gaoping Gyci Fructus berry variety with a bitter taste was discovered on the Tibetan Plateau, which is different from the common strains. The finding brings evidence for the potential medicinal value. Moreover, our survey form of CMM resources could be served as valuable reference for similar surveys and studies in other countries. We have adopted spatial and temporal output volume, price and quality, to guide the artificial acquisition of new species and new strains. Our survey also generated a congener of the artificial cultivation of cultivated Lycii Fructus berry, which could serve as a valuable reference for similar surveys and studies in other countries.

How do you encourage interdisciplinary collaboration in the survey?
We aim to promote an interdisciplinary collaboration and have tried to get the most out of available technologies. We have developed spatial monitoring system capable of trend forecasts of herbal medicine output volume, price and quality, to promote healthy development of TCM industry. We have built multiple Chinese herbal medicine seed and seedling resource databases to maintain quality and protect rare, endangered and indigenous regional CMM resources.

How do you picture the transformation and application of the collected CMM data?
We are compiling a volume on CMM resources in China based on the survey, as well as building a CMM resources archive to preserve all the original specimens collected from the survey with the aim of supporting effective and sustainable uses of CMM resources. In terms of applications, we believe that our data could provide the essential puzzle pieces for making policy and supervising plans to develop CMM resources, formulating programmes to alleviate poverty by standardizing production chains for CMM products, and developing and enhancing TCM industry.

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THREE previous surveys between 1960-1962, 1969-1973 and 1983-1987 made notable contributions on CMM resources and paved the way for the sustainable development of TCM

REVAMPING CMM INDUSTRY:
- A decade of data (2011—2020) has seen a CMM resources archive to preserve all the original specimens collected from the survey with the aim of supporting effective and sustainable uses of CMM resources. In terms of applications, we believe that our data could provide the essential puzzle pieces for making policy and supervising plans to develop CMM resources, formulating programmes to alleviate poverty by standardizing production chains for CMM products, and developing and enhancing TCM industry.

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PROVIDING BIODIVERSITY:
- Based on the survey data of more than 1 million samples, National Resource Center for Chinese Materia Medica of the China Academy of Chinese Medical Sciences estimated the available amount of 563 medicinal species listed in the Pharmacopoeia of the People’s Republic of China. More than 1,000,000 CMM samples, were specimens, and germplasm resources will contribute to the largest archive of CMM resources.

BUILDING INFRASTRUCTURE:
- A multi-layered national network, combining 29 technical centres and 66 monitoring stations, at provincial and county levels, provides valuable information on CMM resources and related services on a centralised platform. In total, 29 CMM bases and 180 sub-bases spread across 20 provinces, currently targeting more than 120 key species to maximize economic values.

GIVING BACK TO THE LOCAL COMMUNITIES:
- National Resource Center for Chinese Materia Medica of CACMS shares the diverse technical know-hows from site selection, breeding and cultivation, to pest control. Comprehensive sample has helped evaluate the total volume and geographic breakdown of CMM resources, along with detailed comparison against space, time and other primary data. Digitization and synchronization of CMM big data increase efficiency of data management, collection and knowledge transformation. Dedicated geographical data points refine CMM resources distribution accuracy right down to specific location. The combination of GPS and GIS technologies corrects each node into meaningful paths for further consolidation on CMM resources representative of individual region.

DELIVERING UNIFORM STANDARDS AND INDUSTRY PUBLICATIONS:
- Defining statistical methods for national CMM resources survey: pilot effort to fill the gap in TCM industry by setting up related technical specifications and industry standards.
- Software copyright: Information management system for survey on CMM resources (No. 0660877). Dynamic monitoring system for CMM resources (No. 1838676). Space information and grid data collection platform for CMM resources (No. 299504). Producing a Dictionary of Chinese Materia Medica Resources: 85 volumes by province and county are compiled and enriched.
- Publicizing TCM knowledge through specialist volumes on CMM geographic distribution, TCM functions and technologies, and TCM knowledge of ethnic groups, such as the Dai and Naxi people.

Email: huanglq@cacms.cn