“十五”国家重点图书

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Culture and Utilization of Chinese Non-wood Product Forest Trees

胡芳名　谭晓风　刘惠民　　主编

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序

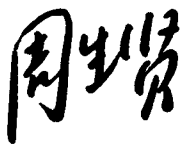
中共中央 国务院《关于加快林业发展的决定》指出："林业是一项重要的公益事业和基础产业，承担着生态建设和林产品供给的重要任务"。要"突出发展名特优新经济林、生态旅游、竹藤花卉、森林食品、珍贵树种和药材培植以及野生动物驯养繁殖等新兴产品产业，培育新的林业经济增长点。"

近年来，在党和政府的高度重视和全社会的大力支持下，我国林业工作坚持以生态建设为主的发展道路，通过认真组织实施六大林业重点工程，正确处理各种重要关系，不断优化林业发展的体制和政策，大力推进科教兴林和人才强林，取得了令人瞩目的成就。生态建设已由"治理小于破坏"阶段进入"治理与破坏相持"的关键阶段，森林资源的数量和质量不断提高，野生动植物种群和栖息地环境明显改善，荒漠化防治和水土流失治理取得显著成效，林业产业迅猛发展、结构不断优化，全国林业建设呈现出盛世兴林的喜人局面。

经济林作为五大林种之一和林业产业的重要组成部分，在整个林业发展的大局中占有十分重要的地位，是做好"相持阶段"林业工作的重要载体和内容。特别是由于经济林"一年栽植、多年收益及经济和生态效益兼顾"的特点，已成为调整农村经济结构、促进农民增收的重要途径和社会投资林业的热点。据统计，目前我国经济林面积已经接近3 000 万 hm^2，占全国森林面积的 17%，年产值近2 000亿元，约占林业总产值的1/3，以经济林产品保鲜、贮藏、加工为主的产业链正在加速形成，经济林已成为促进我国农村经济发展的一项新型主导产业。

经济林发展的新形势、新任务，对广大林业科技工作者提出了新的要求。广大林业科技工作者必须适应这种新形势、新要求，认真总结以往的经验和做法，自觉遵循自然规律和市场规律，勇于探索、大胆创新，进一步搞好适地适树和品种区域化问题，大力加强名、特、优、新经济林果品和产品发展，不断提高精深加工水平，促进经济林产业的持续快速健康发展。

由中南林学院胡芳名教授、谭晓风教授和西南林学院刘惠民教授主持，国内 19 所大学和 20 多个科研院所及相关单位经济林专家共同编著的《中国主要经济树种栽培与利用》，在充分吸收国内外经济林研究最新成果的基础上，比较系统地介绍了 10 大类共 113 个经济林树种的主要物种、品种及其栽培和加工利用技术，是一部集学术性、系统性、实用性于一体的大型经济林专著，被列为"十五"国家重点图书。我相信，该书的出版发行对从事经济林科研、生产和管理工作者具有重要的参考价值，对进一步促进我国经济林产业的快速持续健康发展，做好"相持阶段"的林业工作，具有重要的指导作用和实际意义。



国家林业局局长

2005 年 7 月

前　言

经济林是指以生产果品、食用油料、饮料、调料、工业原料和药材等为主要目的的林木。我国地域辽阔，气候、土壤类型多样，经济林种类资源繁多，分布范围广泛，产品类型丰富。新中国成立以来，我国经济林生产发展迅速，特别是近20年来，经济林栽培面积不断扩大，在国家经济建设中的地位越来越高，现已形成独立规模的经济林产业。经济林科学研究也开始进入一个从单学科研究到多学科联合研究、从宏观到微观、从传统的田间试验到现代生物技术操作的纵深、宽广方向发展的新阶段，研究手段和研究方法也有实质性的提高。经济林学科体系在我国首先形成。随着经济林生产、科研的发展，近20年来，一些主要经济树种的栽培技术体系和产品加工利用体系相继建立，并出版了一些分树种的栽培利用技术图书。但到目前为止，我国尚无一部全面、系统、实用、权威的经济树种栽培利用的大型专著。为此，1999年中南林学院经济林学科有关教授经多次酝酿，并征求国内有关高等林业院校和科研院所经济林专家的意见，达成邀请国内同行专家共同编著出版《中国主要经济树种栽培与利用》大型专著的共识。各位专家一致认为，很有必要而且应尽快出版该著作，以适应我国经济林生产科研及学科发展的形势，满足广大科技工作者的迫切需求。

鉴于国内外尚无统一的经济树种分类系统，经过有关专家的反复讨论，达成了比较一致的意见。本着以植物原料类别和经济用途的基本分类原则，适当考虑类别名称的简单、通俗和实用性，本书首次将我国经济树种共分为果木类（含干果和水果）、油料类（含食用油和工业油料）、药用类、淀粉与糖类、芳香油料类、饮料类、调料类、工业原料类（含树脂、树胶、鞣料、染料、纤维类等）、竹类和其他类（木本蔬菜、饲料、土农药）共10大类。

本书包含我国主要经济树种113个，物种500余个。为保证本书的科学技术体系和编写质量，在编著过程中统一了各树种的编写体例，要求作者在充分吸收各树种国内外最新研究成果的基础上，简要地介绍各树种的栽培重要性、主要物种、主要品种（品种群）和生物学特性，重点介绍各树种的栽培技术和加工利用技术。尤其是增加加工利用技术内容是本书一大特色，有利于扩展读者的知识面及进一步开发各经济树种的潜在利用价值。绝大多数树种附有必要的彩色照片，有利于增加读者的感性认识。本书是一部集科学性、系统性、实用性于一体的图文并茂的大型经济林专著。

本书由挂靠中南林学院的经济林育种与栽培国家林业局重点实验室负责牵头，由国内19所大学20家科研院所及其他相关单位的经济林专家共同编著，最后由胡芳名教授和谭晓风教授负责统稿。本书在编著和出版过程中得到了中南林学院、西南林学院、中国林业科学研究院、湖南省林业厅、中国林业出版社等单位及全国广大经济林专家的大力支持和帮助，并得到湖南省林业厅、中南林学院森林培育国家重点学科的部分资助，使本书的编著和出版工作得以圆满完成。为此我们对各单位和各位专家的大力支持和辛勤工作表示衷心的感谢！

本书虽然历时数年，但仍成稿仓促，一定还存在许多不足和谬误之处，敬请广大专家和读者提出宝贵意见，以便再版时修改完善。

胡芳名　谭晓风　刘惠民

2004年8月28日

Preface

In the *Decision on Speeding up the Development of Forestry*, released by the Central Committee of the Communist Party of China and the State Council, forestry is explicitly defined as an important public welfare undertaking and a basic industry that bears the dual tasks of ecological reconstruction and provision of forest products, where to establish a relatively complete forest ecosystem and an advanced forest industrial system has been assigned as the long-term objective of forestry development. The *Decision* has also pointed out that, to foster new growth areas in the forest economy, efforts should be focused on such new products and industries as the famous and specialized non-wood forest products, ecotourism, bamboo and rattan, floriculture, forest foodstuff, culture of valuable trees and ingredients of traditional Chinese medicine, and wildlife domestication and reproduction.

In the recent years, our government has attached great importance to the development of forestry that puts ecological reconstruction as the priority. We have made marked progress through implementation of the six national key forest projects, coordination of the various basic relations, optimization of the forest system and policy, and advancement of the strategy of invigorating forestry through science and technical expertise. As a result, our forestry rehabilitation has entered, from the past "more damage but less control" stage, the "balanced control and damage" stage, where the forest resource has gained a continuous increase in quantity and quality, wild plants and animals have noticeably improved in community conditions and habitats, desertification and soil erosion has been remarkably checked, forest industries have boomed and the industry structure optimized, and nation-wide aspect of forestry revitalization has come into existence.

Non-wood product forest crops as a forest category belongs to the five major forest categories of our country, and it is an important component of our macro forest industry, playing a very significant role in the forestry development as a whole. It is the indispensable medium and ingredient in mediating ecological conservation and forest production. In particular, non-wood product forest trees and shrubs are characterized by their "one year planting but multi year harvest" and "a merger of economic and ecological benefit" advantages; therefore, they have long been the hot investment items in economic restructuring and optimization in the rural areas. Statistics show that we have approximately 30 million hectares of non-wood forest crops, taking 17 per cent of our total forested area and making an annual output value of 200 billion RMB yuan which accounts for 1/3 of the total value of forest output. The industrial chain is in rapid progress, comprising the production, freshness retention, storage, and processing of the non-wood forest products. In a word, non-wood forest production has become a new leading industry in promoting our rural socio-economic development.

The new task and development prospects of non-wood product forest crops have generated new requirements for all those working as forest scientists and technicians. To adapt ourselves to this change, we should conscientiously sum up our experience, follow the natural law and the market rules, and renovate old ideas and explore new orientations. We should keep solving the problem of cultivar regionalization to grow the right cultivars on the right site. In addition, we should actively develop famous, specialized, and new products, and raise the level of deep processing, so as to foster the sustained, rapid, and sound development of the non-wood product forest industry.

The large monograph *Culture and utilization of Chinese Non-wood Product Forest Trees*, compiled by Professors Hu Fangming and Tan Xiaofeng of South Central Forestry University and Professor Liu Huimin of Southwest Forestry College, and co-authored by professionals from 19 Chinese colleges and universities and more than

20 research institutes and academies, is a joint work well collaborated with all the domestic and overseas achievements pertinent to non-wood product forest crops. This book systematically introduces according to 10 product kind 113 non-wood product trees and/or shrubs that are grown in our country in terms of each tree's major species, cultivars, and cultivation and processing utilization techniques and technology. It is a book of academics, systematics, and practicability, doubtlessly worthy of the honor of having been listed as the national key publication in the "tenth five-year period". It is my belief that publication and circulation of this book will be of great reference value to the large number of people engaging in non-wood product forest research, production, and management. It will also underline a guiding role and practical significance in further promoting the sustained, rapid, and sound development of the non-wood product forest industry in our country's stage of "balanced control and damage" in forestry development.

Zhou Shengxian
Administrator of the State Forestry Administration
July 2005

Foreword

Non-wood product forest (NWPF) Crops include those forest trees and shrubs that mainly produce fruit, edible oil, beverage, condiment, industrial, and medicinal raw material, *etc.* China is vast in territory, and diversified in climate and soil types. There is a rich variety of NWPF resource, whose distribution is extensive and product kinds are numerous. Since the founding of the People's Republic of China, NWPF production has achieved great development. Especially in the last two decades, the planting area of NWPF has been enlarged continuously, giving rise to a more important role in the national economic construction, and now the specialized NWPF industry has already been formed. The research on NWPF has also begun to enter a new stage when scientists and technicians have directed their attention from single disciplines to multidisciplinary cooperation. The scope of research has not only included macro programs and conventional field tests and trials, it has also covered micro programs that make use of modern biological technology in good depth and width. In addition, the means and techniques of research have also been advanced substantially. China is the first country to establish the NWPF disciplinary system. Along with the development of the NWPF production and research in the last 20 years, the product processing system as well as the technical horticultural system of some major NWPF trees have been formed in succession, and many books on culture and utilization by individual trees have been published. However, so far, there isn't a comprehensive, systematic, practical, authoritative, and large - scale monograph on cultivating and using of NWFP trees in our country yet. Therefore, in 1999, NWPF scientists and technicians across the country reached general agreement, which had been initiated by NWPF professors with South Central Forestry University, that the expertise of all those concerned should be sought to compile and publish the large book named *Culture and utilization of Chinese Non-wood Product Forest Trees.* The editors and contributors believed that it is of great necessity to publish this monograph and the plan ought to be enacted as quickly and effectively as possible, in order to keep pace with the situation of NWPF production, research and discipline development in our country and meet the urgent demand of the broad ranks of scientists and technicians.

In view of the fact that the unified classification system of NWFP trees has not yet been set up in China or overseas, so the editors decided after repeated discussions to compile the book by the guideline of classifying the NWPF plants by the product kind and its economic utility, and at the same time consider simplicity, popularity and applicability of the class names. Thus, the NWFP trees included in this book are divided into 10 classes, including Fruit and Nut Trees covering fresh and dry fruit; Oil Trees consisting of edible and industrial oil crops; Raw Material for Traditional Chinese Medicine; Starch and Sugar Crops; Essential Oil Crops, Beverage Crops; Spice & Condiment Crops; Raw Material for Industrial Use including resin, gum, tan, dyestuff, fiber, *etc.*; Bamboo; and Other Tree Crops comprising woody vegetables, feedstuff, plant pesticide, *etc.*

This book contains the major 113 NWFP trees that grow in our country, covering nearly 500 species. In order to guarantee the system of science and technology and compilation quality, in the course of compilation, the format of all trees was unified, and every contributing author was asked, on the basis of consulting the newest achievements of his or her assigned trees, to introduce briefly the cultivation significance, major species, major cultivars or cultivar groups, and biological characteristics, and to pay particular attention to the cultivation and processing utilization techniques and technology. It is worthwhile to mention that the added content relating to processing and utilization is a great feature of the book, and is helpful to extend the reader's knowledge and further develop the latent value in use of each kind. The color photographs are provided for each tree, which

is instrumental in enhancing the readers perceptual knowledge. This book is a scientific, systematic, practical and large scale NWPF monograph with rich illustration and depiction.

Through the leading effort of the State Forestry Administration Key Lab of NWPF Breeding & Culture affiliated with South Central Forestry University, the NWPF experts were drawn together from 19 colleges and universities, and more than 20 research academies and institutes and other related units. Professors Hu Fangming and Tan Xiaofeng took the responsibility of arranging and reading through the final manuscript. We are extremely grateful to those institutions that are supportive and helpful in the course of compiling and publishing this book: South Central Forestry University, Southwest Forest College, Chinese Academy of Forestry, Forestry Department of Hunan Province, China Forestry Publishing House, *etc.* We owe special thanks to the large number of nationwide NWPF professionals, whose unselfish sharing of information and whose contribution of manuscripts has made the book successfully come out. We appreciate each institution and every contributor for their vigorous support and industrious work. Although the book is an effort of several years, but we still feel the incompletion. Therefore, we warmly welcome experts and readers to make valuable comments on it, so that improvements can be made in the next edition.

Hu Fangming, Tan Xiaofeng, Liu Huimin

August 28, 2004

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