



现代农业产业技术体系建设专项资金资助
华中农业大学国家重点学科农业经济管理建设经费资助

柑橘产业 经济与发展研究 2012

ANNUAL REPORT ON ECONOMY AND
DEVELOPMENT IN CITRUS INDUSTRY 2012

国家柑橘产业技术体系产业经济研究室 著
祁春节 等



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前 言

我国在世界上具有竞争优势的农产品并不多，柑橘产业是我国为数不多的具有国际竞争力的优势产业，但目前也面临着产业转型升级。2012年2月6日，温家宝总理给果农袁守根的回信中指出，“赣南脐橙发展有很大潜力，只要坚持科学种养、提高品质、搞活流通，就大有可为”。这为柑橘产业的发展指明了方向。

2012年度，我国柑橘产业经济显现如下特点：由于部分产区低温阴雨天过多，受此影响，柑橘总产量同2011年度相比有小幅度的下降；生产扩张迅速，呈现出一定的盲目性；基础设施落后，建园标准低，部分果园管理水平落后；主产区柑橘品牌、营销等工作得到大力重视，新兴营销模式发展迅速；柑橘产业组织化程度低，营销主体散乱，产业化合作机制没有建立起来；预计柑橘鲜果出口形势向好，但柑橘罐头出口不太乐观。值得注意的问题：由于劳动力和农资价格飞涨，柑橘生产成本不断增大，但终端销售价格涨幅不大，挤占了果农及中间商的利益；受2011年贮果企业亏损严重的影响，部分企业资金缺口较大，收贮积极性下降，给2012柑橘销售带来新的问题。

国家柑橘产业技术体系建设既面临一些科学技术问题，也存在诸多经济、管理问题。柑橘产业经济研究岗位在国家柑橘产业技术体系建设中具有重要的地位。其主要目标任务是：立足于农业家庭经营这一基础，对我国柑橘产业发展过程中产前、产中和产后三个领域面临的突出问题进行经济学、管理学研究，探索柑橘产业发展规律，建立起较为完整的经济、政策研究体系和经济信息服务体系，为相关行业管理部门、地方政府部门提供决策咨询服务，为产业发展提供经济、技术咨询和信息服务，为相关产业中各用户（农户、企业、专业合作社、行业协会等）提供经营管理咨询和信息服务。

《柑橘产业经济与发展研究 2012》是国家柑橘产业技术体系产业经济研究室的学术论文和报告研究的选集,从一个侧面反映了国家柑橘产业技术体系产业经济研究室在 2012 年度的调研成果。该选集分为五个研究领域:生产与产业技术经济研究,市场、流通与消费研究,对外贸易与国际贸易,信息化与标准化管理研究领域,产业宏观发展与政策。共收录了 26 篇相关论文及研究报告。将它们结集出版,呈现在产业界、学术界同行面前,期望能够引起大家的进一步讨论和深入研究,对我国柑橘产业可持续发展起到积极的推动作用。

特别感谢国家柑橘产业技术体系首席科学家、华中农业大学校长邓秀新院士给予的长期关怀与指导!感谢产业技术体系内执行专家组、功能研究室主任、岗位科学家、综合试验站站长对产业经济研究室的支持和帮助!

感谢农业部科技司刘艳副司长,产业技术处张国良处长、徐利群副处长,农业部办公厅王小兵副主任,种植业管理司叶贞琴司长,种子管理局马淑萍副局长,种植业管理司周普国副司长,农业部机关团委蔡派书记,经作处王戈处长、龙熹副处长,全国农技推广中心经作处李莉处长等给予的指导和支持!感谢现代农业产业技术体系产业经济协调领导小组韩军、秦富和王慧军研究员给予的指导和支持!

感谢柑橘主产区农业厅、局的相关领导和技术人员的支持和帮助!感谢华中农业大学科技处、经济管理—土地管理学院领导和同事给予的关心和支持!

感谢现代农业产业技术体系建设专项资金资助以及华中农业大学国家重点学科农业经济管理建设经费资助。

我们选编的论文或研究报告只代表了作者的观点和结论,由于知识视野和研究水平有限,书中难免存在疏漏,恳切同行专家、学者以及广大读者不吝赐教,提出批评与建议。

国家柑橘产业技术体系产业经济研究室主任
华中农业大学园艺经济研究所所长

祁春节

2013 年 5 月于南湖狮子山

Preface

Having a competitive advantage in the world, China's citrus industry is also confronted with the economic transforming and upgrading. Premier Wen Jiabao replied to a fruit grower named Yuan Shougen and said that Gannan navel orange will have a brilliant future as long as it adheres to the scientific management, improve quality and invigorate the circulation. It points out the direction for the development of citrus industry.

The characteristics of China's citrus industry economy in 2012 are as follows: there were modest decline in citrus production of some areas than those of the last year because of too much cold wet weather; the rapid expansion of production showed a certain blindness; infrastructure, orchards construction standards and some of the orchard management were not satisfying; citrus brand and new marketing modes developed rapidly; cooperation mechanism of industrialization had not been established; the export of citrus fruit was expected to improve, but that of canned citrus petals was not optimistic. Notable problems are: as labor and agricultural property prices soaring, the costs of citrus production continued to increase, but the terminal sales price rose slightly, diverting the interests of farmers and middlemen; influenced by the serious losses of fruit storage enterprises in 2011, the enthusiasm of some enterprises declined, bringing new problems of citrus sales in 2012.

The construction of National Citrus Industry Technology Research System is facing some problems of science and technology as well as economic and management issues. The citrus industrial eco-

economic research position plays an important role in the construction of National Citrus Industry Technology Research System, with main tasks are as follows: based on agricultural household operation, to carry on economic and management studies on the prominent problems in the former, middle and latter periods of our country citrus fruits industrial development process; to establish a relatively complete economic and policy research system and information services structure; to provide decision-making consultation service for the related industry management departments and local government departments, economic and technical consultation and information service for the industrial development, and management consultation and information service for various users (peasants, enterprises, professional cooperation, industrial association) in the industry.

Annual Report on Economy and Development in Citrus Industry 2012 is the academic selections of 26 articles and reports written in 2012 by researchers of Research Center of Citrus Industrial Economics, National Citrus Industry Technology Research System, which is expected to be published annually since 2009. Five topics are included, namely, production and industry technical and economic research; market, circulation and consumption research; foreign trade and international trade; informationization and standardization management research field; industrial macroeconomics and policy. The 26 articles and reports are selected to be published to serve for the primary purpose of attracting the attention of industrial and academic peers and deepen these researches, which will positively maintain the sustainable development of China's citrus industry.

I would like to express my warmest gratitude to those who give instruction, support and assistance to the publication of this book. Namely, Liu Yan, deputy director of Department of Science and Technology Education, Ministry of Agriculture; Zhang Guoliang, section chief of Industrial Technology Department; Xu Liqun, vice

director of Industrial Technology Department; Wang Xiaobing, associate director of General Office of Ministry of Agriculture; Ye Zhenqin, director of Management Division of Plant Industry; Ma Shuping, deputy director of Seed Management Bureau; Zhou Puguang, deputy director of Planting Management Division; Cai Pai, secretary of Organization Committee of Ministry of Agriculture; Wang Ge, section chief of Economic Co-operation Office; Long Xi, vice director of Economic Co-operation Office; Li Li, vice director of Economic Co-operation Office of National Agricultural Technology Extension Center. Thanks also goes to researchers Han Jun, Qin Fu and Wang Huijun, members of economic coordination leading group of modern agricultural technology system industry for the guidance and support!

Besides, we should especially appreciate the help and support from Deng Xiuxin, the academican of Chinese Academy of Engineering, chief scientist of National Citrus Industry Technology Research System and the President of Huazhong Agricultural University. Special appreciation also goes to executive expert groups, the functional research directors, post scientists and heads of comprehensive experimental station of the system.

Thanks give to relative leaders and technicians in agricultural department in main citrus producing areas. Meanwhile, I am also grateful to Huazhong Agricultural University, leaders and colleagues in Science and Technology Department and School of Economic and Land Administration of Huazhong Agricultural University for their concern and support.

Thanks to earmarked fund of Modern Agro-industry Technology Research System construction and construction fund of national key discipline-Management of Agricultural Economy of Huazhong Agriculture University.

Finally, thanks to the help from editors of Chinese Agricultural

Press, such as Yan Jingchen, Xiao bang and so on. The selected articles and reports in the book only represent personal views. The knowledge and studies could be limited, so if there would be any error in this book, do not hesitate to give us your comment and suggestions.

Qi Chunjie

Director of Reasearch Center of Citrus Industrial Economics, National Citrus Industry Technology Research System and Director of Institute of Horticultural Economics, Huazhong Agricultural University

May 2013

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湖北省柑橘产业生产效率的 DEA 分析

DEA Analysis Based on Citrus Production Efficiency in Hubei

熊 巍 祁春节

Xiong Wei Qi Chunjie

摘 要 本文采用数据包络分析法 (Data Envelopment Analysis, DEA) 结合我国 2005—2010 年柑橘生产成本和收益数据, 对湖北省柑橘生产效率与其他 3 大主产区 and 全国平均生产效率进行了分析。结果表明, 湖北、湖南、广东、福建四大主产区柑和橘全要素生产率呈现出明显的周期性波动; 湖北柑生产的全要素生产率变化主要源于综合技术效率变动和技术进步的共同作用, 湖北橘生产的全要素生产率变化主要源于综合技术效率的变动; 湖北柑和橘生产的规模效率变动决定了综合技术效率的变动, 全国柑和橘生产的规模效率和纯技术效率变动共同影响了综合技术效率的变动。

关键词 柑橘; 全要素生产率; 效率变化; 技术进步; DEA

Abstract In this paper, we adopted the DEA method to analyze the citrus production efficiency in Hubei province and other three main producing areas and the national average productivity based on citrus production cost and revenue data of 2005 - 2010. The results show that, the TFP in four main areas experienced obvious periodic fluctuation; TFP of citrus reticulate in Hubei depends on the combined action of comprehensive technical efficiency variation and technical advances, TFP of tangerine in Hubei depends on comprehensive technical efficiency variation; the comprehensive technical efficiency variation of citrus reticulate and tangerine in Hubei depends on scale efficiency variation. The efficiency variation of citrus reticulate and tangerine in China depends on scale efficiency and pure technical efficiency.

Key words citrus; total factor productivity; efficiency variation; technical ad-

vances; Data Envelopment Analysis (DEA)

柑橘是世界第一大果树品种,在所有水果中种植面积、产量均居首位。近年来,作为世界柑橘生产大国,我国柑橘的生产保持稳定增长,面积和产量均居世界首位。湖北省是我国柑橘九大主产区之一,近年来柑橘产业迅猛发展,2010年柑橘种植面积为22.92万 hm^2 ,产量为301.04万t,分别居全国第4位和第5位。以柑橘为主的水果产业已经成为湖北农村经济的一大支柱产业,为促进农民增收、扩大城乡居民就业和改善生态环境作出了积极贡献。目前传统的生产要素投入增长模式已经对湖北柑橘产业的进一步发展形成制约,柑橘生产能力的提升主要取决于全要素生产率的提高,客观地分析和评价湖北省柑橘产业生产效率的变动及构成具有十分重要的现实意义。纵观国内外,对于生产效率的研究和评价广泛采用DEA分析。如张冬平对我国小麦生产效率进行了DEA分析^[1];李道和等对中国茶叶产业的全要素生产率进行了DEA分析^[2];石会娟等对河北省苹果产业的生产效率进行了基于Malmquist指数的DEA分析^[3];李翠霞等选用DEA方法的CCR产出导向模型,对黑龙江省乳制品加工业生产效率进行评价^[4];吕超等运用DEA的Malmquist指数方法,探究1994—2007我国和各省份蔬菜生产率变动^[5];司伟等借助随机前沿生产函数模型,分析了中国大豆生产全要素生产率、技术效率和技术进步的变动趋势及其空间分布特征^[6]。本文将采用数据包络分析法及我国2005—2010年柑橘生产成本和收益数据,对湖北柑橘全要素生产率的变动及其构成进行分析,探讨提高湖北柑橘生产效率的有效途径。

一、模型简介与数据来源

(一) 模型简介

DEA是由著名运筹学家查恩斯、库伯和罗兹于1978年提出,用于评价相同部门间相对有效性,主要是采用数学规划方法,利用观察到的有效样本数据,对决策单元进行生产有效性评价。DEA现已发展成为管理科学、系统工程、决策分析和评价技术等领域的一种行之有效的分析工具^[7]。由于在处理多项投入产出生产方式方面具有一定的优越性,既不涉及各种要素的价格,又允许无效率的行为存在,同时还不需要事先设定函数形式,因而在国内也被广泛应用于农业生产效率和各种农产品生产效率的测算。

DEA主要包括CCR模型和BCC模型两种形式。CCR模型是由Charnes等提出的DEA基础模型,模型假定:决策单位都处于最佳生产规模,有固定规模效率,此时所测量的效率值包含规模效率和技术效率。但实际中各决策单

位有可能存在规模递增和规模递减的情形,如果规模效率发生变动,所测效率值中就会有规模效应的影响。Charnes 等于 1985 年提出了 BCC 模型,即在规模报酬可变的假设下,对 CCR 模型进行了更为符合实际的修正。它将综合技术效率分解为纯技术效率与规模效率的乘积。纯技术效率指能否有效利用生产要素,使产出最大化,该效率值表示投入要素在使用上的效率。规模效率则指产出与投入的比例是否匹配,使产出最大化。该效率值越大表示规模越适合,生产力也越高。

Malmquist 指数是 Malmquist 在 1953 年提出的一种统计指数,1978 年后与 DEA 理论结合,广泛用于测量全要素生产率 (Total Factor Productivity, TFP)。Fare 将基于 BCC 模型引入 Malmquist 生产效率指数的计算,进一步将综合技术效率分解为技术变化 (Tch) 和效率变化 (Ech),表明全要素生产率变动 (TFPch) 是技术进步与效率提高综合作用的结果,而综合技术效率则包含技术效率 (Tech) 与规模效率 (Sech),技术效率反映在生产领域中技术更新速度的快慢和技术推广的有效程度,规模效率的变化则反映要素投入增长对全要素生产率变化的影响。具体表达式如下:

$$M_0(X_s, Y_s, X_t, Y_t) = TFPch = Tch \times Sech \times Tech$$

(二) 数据来源与指标选择

由于 DEA 模型在处理时只适合于截面数据或面板数据,不适用于时间序列,因此并不能单独估算出某一主体的全要素生产率随时间的变动趋势,加之柑橘九大主产区中成本收益资料数据的获取连续性有一定限制,因此选取湖北、福建、湖南、广东和全国平均值为研究样本,采用 2006—2011《全国农产品成本收益资料汇编》中柑和橘生产成本与收益的相关数据,选择柑、橘的每亩*主产品产值作为产出指标,选择每亩的物质与服务费用、人工成本和土地成本作为投入指标来测算生产效率。其中,物质与服务费用是指在直接生产过程中消耗的各种农业生产资料的费用、购买各项服务的支出以及与生产相关的其他实物或现金支出,包括直接费用和间接费用两部分;人工成本是指生产过程中直接使用的劳动力的成本,包括家庭用工折价和雇工费用两部分,土地成本即地租,指土地作为一种生产要素投入到生产中的成本,包括流转地租金和自营地折租。

* 1 亩=667 米²。