

猕猴桃研究进展(II)

Advances in *Actinidia* Research (II)

黄宏文 主编

Edited by Huang Hongwen

猕猴桃研究进展 (II)

Advances in *Actinidia* Research (II)

黄宏文 主编

Edited by Huang Hongwen

科学出版社

北京

内 容 简 介

本书系第五届国际猕猴桃研讨会论文集,是继第一本《猕猴桃研究进展》后出版的《猕猴桃研究进展(II)》。本书分为7个专题:①猕猴桃产业化与市场;②遗传与育种;③果园管理;④采前与采后生理;⑤种质资源、分类及系统学;⑥病虫害防治;⑦分子生物学与生物化学,其中比较偏向国内猕猴桃资料的系统和全面反映,国外文献则着重对知名学者的文章进行了翻译,从而保证了本书兼有查询中国系统资料和世界研究前沿的工具书的功能。

本书可供农业院校师生及果树推广和管理工作者参考。

图书在版编目数据

猕猴桃研究进展(II) / 黄宏文主编. —北京: 科学出版社, 2003. 12
ISBN 7-03-012740-4

I. 猕… II. 黄… III. 猕猴桃—国际学术会议—文集 IV. S663.4-53

中国版本图书馆 CIP 数据核字(2003)第 126447 号

责任编辑: 梁淑文 / 责任校对: 王望荣

责任印制: 高 嵘 / 封面设计: 深白广告

科 学 出 版 社 出 版

北京东黄城根北街 16 号

邮政编码: 100717

<http://www.sciencep.com>

武汉大学出版社印刷总厂印刷

科学出版社出版 各地新华书店经销

2003 年 12 月第 一 版 开本: 787×1092 1/16

2003 年 12 月第 一 次印刷 印张: 24 3/4

印数: 1—1 000 字数: 604 000

定价: 60.00 元

(如有印装质量问题, 我社负责调换)

《猕猴桃研究进展（Ⅱ）》编委会

主 编：黄宏文

副主编：王圣梅 姜正旺 龚俊杰

编 委：（按姓氏笔画排列）

王圣梅 王明忠 刘旭峰 李洁维 肖兴国 张忠慧

张 洁 姜正旺 赵淑兰 胡忠荣 黄宏文 龚俊杰

程中平 韩礼星

序

猕猴桃是 20 世纪由野生资源通过人工选择驯化成为大规模商业化栽培生产为数不多最成功的果树之一。猕猴桃产业化历程为人们提供了一个如何有效利用自然资源实现产业化造福人类的典型事例。作为中国人遗憾的是,猕猴桃的产业化却是由新西兰人完成的。虽然我国是猕猴桃属植物的原产地,猕猴桃属 66 种有 62 种自然分布在中国,而且我国古代人民种植猕猴桃的历史可以追溯到 1 200 年前(唐代)。新西兰人 Isabel Fraser 于 1904 在湖北宜昌无意带回到新西兰一小把猕猴桃种子(美味猕猴桃 *Actinidia deliciosa*),孕育了当今栽培面积约 12 万 hm^2 、产量 120 万 t 的世界猕猴桃产业。从小把种子到一个世界范围的水果产业,其间所经历的实验栽培、商业品种研发、苗圃业建立、商业化果园栽培技术、贮藏运输直至市场开拓和营销等产业链网络的形成,新西兰人花了 50 年的时间;从上个世纪 50 年代开始,新西兰将商业生产的猕猴桃改名为新西兰国鸟命名的“基维果”(kiwifruit),开始了独家经营世界猕猴桃市场的局面长达 30 多年之久,直到 20 世纪 80 年代以后,法国、意大利、智利等国形成大规模生产并分享市场份额。

我国在上世纪 70 年代末开始进行猕猴桃资源利用和商业化生产,至今我们已经形成了世界栽培面积第一,产量仅次于意大利的第二大生产国。我们虽然用了 20 年的时间完成了猕猴桃产业化,但是我们必须清醒地看到中国生产的猕猴桃无论从单位面积产量和品质远远落后于新西兰和意大利。目前我国猕猴桃出口几乎在国际市场可以忽略不计。我国于 20 世纪 90 年代初期商业规模生产的猕猴桃开始进入国内鲜果市场,但是短短的 5 年以后,由于果园管理粗放,品质差,加之贮藏运输不当和化学调节剂滥用,我们生产的商品猕猴桃就出现了“地摊贱卖”和农民卖果难的局面;与新西兰生产的猕猴桃在国际市场上高档水果货价上持续了 30 年的局面形成了鲜明的对比。显然,一个健康可持续性水果产业的形成和发展,有其不同于工业制造业的特殊性,但是,正如新西兰猕猴桃产业所经历的艰难过程一样,它凝聚了众多科学工作者、种植者、企业家、市场营销经理甚至政策决策者共同的创造思维和实践,并依赖于良好的合作和团结奋斗。

我国有着得天独厚的资源优势,自 20 世纪 70 年代以来,我国的猕猴桃科研工作者和广大的农民种植业主以及国家和地方政府的共同努力,我国在资源深入开发和规模产业化方面取得了举世瞩目的成就;特别是在新品种研发方面,近 20 年来中国选育的新品种已经完全改变了世界猕猴桃产业的品种构成。中国成功地将猕猴桃属的另一物种——中华猕猴桃(*Actinidia chinensis*)实现了规模化商业栽培,并成为包括新西兰、意大利等主要生产国的更新换代品种,如我国选育的“金桃”已经在欧洲作为主要栽培品种得以推广;新西兰继中国之后也推出了中华猕猴桃新品种“Hort16A”(Zespri 金果)来替代传统的美味猕猴桃品种“Hayward”。我国在武汉、昆明、北京和桂林建立的猕猴桃种质资源圃也将成为支撑世界猕猴桃产业可持续健康发展的重要资源基础平台。

2002 年 9 月在中国武汉召开的“第五届国际猕猴桃研讨会”是世界各猕猴桃生产国科研工作者面向新世纪的猕猴桃科研和产业发展的一次非常重要的会议。也体现了中国在猕猴桃科研和产业化方面在国际上正在发挥越来越重要的作用。同时,中国园艺学会猕猴桃分会的成

立也将进一步推动我国猕猴桃的科研和产业的发展。《猕猴桃研究进展(II)》的编撰主要搜集了近年来我国猕猴桃科研和产业实践进展的论文,并选择性地收录了“第五届国际猕猴桃会议”上国外主要猕猴桃生产国的科研和产业发展趋势方面的论文,旨在为我国猕猴桃科研和种植业主提供参考。

我相信中国会在不远的将来真正成为猕猴桃方面名副其实的资源大国、生产大国和优质产品的出口大国。使世界各国市场货架上的猕猴桃产品成为来自原始故乡中国的猕猴桃。

黄宏文

中国园艺学会猕猴桃分会理事长

2003年6月于武汉

前 言

我国对猕猴桃的研究当追索到上世纪 70 年代末至 80 年代初,20 多年来已形成了相当规模的产业和一定的研究积累。我们用了国外五分之一的时间正在追赶猕猴桃 100 年的发展进程,这其中包含了多少我国老一辈和青年学者和建设者们坚持不懈的追求!也正是为了这个追求,我们于 1998 年和 2002 年分别举办了“中国猕猴桃学术研讨会”和“第五届国际猕猴桃研讨会”,并对这两次会议的论文收集、翻译、编写成册,旨在为中外研究人员提供世界猕猴桃研究进展和市场、生产最新信息。本书是继第一本《猕猴桃研究进展》出版后的《猕猴桃研究进展(II)》。受中国园艺学会委托和全国猕猴桃联以及广大猕猴桃工作者的支持,中国科学院武汉植物园被推选为“中国园艺学会猕猴桃分会”挂靠单位,我们将一如既往定期或不定期地组织学术会议等多种形式的交流活动,并继续保持全球猕猴桃研究进展的信息畅通,以很好地履行猕猴桃分会的职责和义务。

根据本届国际园艺学会猕猴桃工作委员会主席黄宏文博士和与会中外学者对所掌握信息和情况的分析,我们清醒地认识到中国猕猴桃的研究和产业化与国际接轨还存在很大的距离,我们没有理由坐视远在太平洋和欧洲的国家千里迢迢来占领眼皮底下的东南亚市场甚至于猕猴桃的老家,我们不能按部就班,除了寻找跨越式的发展别无选择。猕猴桃事业是个系统工程,需要各个领域的通力合作,猕猴桃分会愿提供力所能及的服务,希望得到各位有识之士及时主动的信息和建议,以便形成我国猕猴桃信息、分析甚至远景规划的互动平台,在中国园艺学会的领导下,为中国猕猴桃的发展尽到绵薄之力。

由于能力和水平所限,书中难免出现错误,恳请大家反馈宝贵意见,以得到及时矫正。借此机会再次向为本书提供文献的作者和对分会和本书给予支持的领导和同仁们表示衷心的感谢,并希望继续得到你们更多的指导和支持!

中国科学院武汉植物园
中国园艺学会猕猴桃分会
2003 年 5 月于武汉

目 录

(CONTENTS)

序	(i)
前言	(iii)

(一) 猕猴桃产业化与市场

新西兰猕猴桃产业与市场现状 (The Production and Marketing of New Zealand Kiwifruit)	R.A. Martin (3)
中国猕猴桃资源开发利用与产业化发展战略 (Exploration of <i>Actinidia</i> Genetic Resources and Development of Kiwifruit Industry in China)	黄宏文等 (7)
法国猕猴桃的经济策略: 利润率对销售环节的影响 (Economic Aspects of the French Kiwifruit Sector: Impact of Profit Margin Policy on Channel Operation)	J.M. Fournier 等 (22)
新西兰猕猴桃产业创新的研究途径 (A Research Approach to Enhance Innovation in the New Zealand Kiwifruit Industry)	K.N. Buxton 等 (30)
湖南猕猴桃研究与商业化开发现状 (Kiwifruit Research and Commercial Development in Hunan Province, China)	王中炎等 (38)
十二个猕猴桃品种引种栽培果实品质评价研究 (Fruit Quality Evaluation of Twelve Introduced Kiwifruit Cultivars in Hunan Province)	赵思东等 (41)
江山市猕猴桃市场前景分析及应对措施 (Development Prospect and Strategy for Kiwifruit Industry in Jiangshan City, Zhejiang Province)	柴茂林等 (47)
我国加入 WTO 后猕猴桃产业的发展策略 (Strategy of Chinese Kiwifruit Industry Development after Accession to WTO)	韩礼星等 (51)

(二) 遗传与育种

植物育种的挑战——将猕猴桃变为世界主流水果 (The Plant Breeding Challenges to Making Kiwifruit a Worldwide Mainstream Fresh Fruit)	A.G.Seal (63)
软枣猕猴桃“Baby Kiwi”的开发和商业化栽培 (Development and Commercialization of ‘Baby Kiwi’ (<i>Actinidia arguta</i> Planch.))	M.H. Williams 等 (70)
猕猴桃属植物核-质基因组综合遗传信息与保育策略的制定 (Integrating Both Nuclear and Cytoplasmic Genetic Information into a High Genomic Coverage Conservation Approach for <i>Actinidia</i>)	黄宏文 (78)
“沁香”猕猴桃的选育与栽培技术 (The Selection and Cultivation Techniques of New Cultivar ‘Qinxiang’)	王仁才等 (86)
红肉猕猴桃新品种——“红阳”猕猴桃 (‘Hongyang’ Kiwifruit—A New Red-fleshed Cultivar)	王明忠等 (90)

美味猕猴桃新品系“实美”的选育 (A New Kiwifruit Cultivar ‘Shimei’ from <i>Actinidia deliciosa</i>)	李洁维等(93)
优质猕猴桃新品种“丰悦”与“翠玉” (Two Superior New Kiwifruit Cultivars ‘Fengyue’ and ‘Cuiyu’)	钟彩虹等(100)
美味猕猴桃新品种“皖翠”生物学特性研究 (Evaluation of the New Cultivar ‘Wancui’ from <i>Actinidia deliciosa</i> cv. Hayward)	朱立武等(104)
“G3”——早熟美味猕猴桃新品系 (‘G3’—An Early Maturing Selection of <i>Actinidia deliciosa</i>)	刘旭峰等(107)
雌雄同株猕猴桃花性育性初探 (Preliminary Study on the Flower Characteristics of Hermaphrodite Plant of Kiwifruit)	杜元林等(110)
中华猕猴桃特优新品系——黄肉红心猕猴桃 (A New Cultivar with Yellow Flesh, Red Core Selected from <i>Actinidia Chinensis</i>)	李军德(112)

(三) 果园管理

猕猴桃真的对你有益吗? (Are Kiwifruit Really Good for You?)	A. R. Ferguson 等(115)
反光地膜对猕猴桃产量和品质的影响 (Use of Light Reflective Mulch to Affect Yield and Fruit Quality)	G. Costa 等(124)
结果枝长度和果实位置对“海沃德”猕猴桃果重的影响 (Shoot Size and Fruit Position along the Shoot Influences Fruit Weight of ‘Hayward’ Kiwifruit (<i>Actinidia deliciosa</i>))	Matias Kulczewski B.(130)
川西“海沃德”猕猴桃优质栽培技术 (Cultivation Technique for Producing Good-quality ‘Hayward’ in Western Sichuan)	蒲仕华等(133)
猕猴桃贵在保根 (Root Protection is Important to Kiwifruit Growing)	王新义等(137)
高效栽培猕猴桃应注意的几个问题 (Some Key Factors of Kiwifruit High-benefit Cultivation)	杨声谋等(140)
高山区“海沃德”栽培技术研究 (A Study on the Cultivation of ‘Hayward’ Kiwifruit in the High Mountainous Areas)	杨应龙(142)
陕西省“秦美”猕猴桃果园叶和土壤的营养状况 (Leaf and Soil Nutritional Status of the ‘Qinmei’ Kiwifruit Orchards in Shaanxi Province)	张林森等(144)
美味猕猴桃新品种“沪美1号”引种栽培 (Introduction of A New Cultivar ‘Humei -1’ from <i>Actinidia deliciosa</i>)	敖礼林等(147)
猕猴桃果实套袋试验研究初报 (Preliminary Study on Kiwifruit Bagging)	王世家(149)
“红阳”猕猴桃无公害关键栽培技术 (Cultivation Practice for Producing Healthy ‘Hongyang’ Kiwifruit)	杜毅刚等(151)

(四) 采前与采后生理

猕猴桃果实品质的无损检测方法 (Non-destructive Assessment Methods of Kiwifruit Quality)	G. Costa 等(157)
影响“海沃德”猕猴桃贮藏期间乙烯产生的因素 (Factors Affecting Ethylene Production of ‘Hayward’ Kiwifruit)	冯锦泉等(168)

利用猕猴桃果肉匀浆调节果实风味 (The Use of Fruit Pulps to Explore Flavour in Kiwifruit)	K. Marsh 等(174)
“早金”猕猴桃的产业化发展概况 (‘Hort16A’ Kiwifruit: Progress and Issues with Commercialization)	K. Patterson 等(182)
猕猴桃采后贮藏及货架期间品质评估的系统方法 (A Systems Approach for Quality Assessment of Kiwifruit During the Postharvest Handling, Storage and Shelf Life)	E. Sfakiotakis 等(190)
采前螯合钙处理对猕猴桃贮藏品质的影响 (Effect of Preharvest Ca-Chelate Treatment on the Storage Quality of Kiwifruit)	谢鸣等(201)
猕猴桃采后生理在中国的研究进展 (Progress of Research on Postharvest Physiology of Kiwifruit in China)	韩涛等(207)
猕猴桃便携式微型保鲜冷库研究 (Research of Portable Mini Cold Storage Room for Kiwifruit)	李喜宏等(212)
美味猕猴桃果实冷藏过程中生理生化变化 (Fruit Physio-Biochemical Changes During Cold Storage in <i>Actinidia deliciosa</i>)	陈金印等(217)

(五) 种质资源、分类及系统学

叶绿体、线粒体和核 DNA 测序对猕猴桃科植物的分类研究 (Screening Chloroplast, Mitochondrial, and Nuclear DNA Sequences Suitable for Taxonomic Studies in Actinidiaceae)	G. Cipriani 等(225)
RAPD 技术对引进和日本原产猕猴桃属植物的系统关系及鉴别种间杂种的研究 (Phylogenetic Classification of Introduced and Indigenous <i>Actinidia</i> in Japan and Identification of Interspecific Hybrids Using RAPD Analysis)	K. Kokudo 等(232)
SSR 标记筛选以及它们对猕猴桃品种鉴定作用的分析 (Screening Microsatellites for Their Effectiveness to Identify and Differentiate among <i>Actinidia</i> Genotypes)	A. E. Korkovelos 等(238)
基于 RAPD 及 mtDNA PCR-RFLP 标记的猕猴桃属的核质遗传多样性与系统学研究 (Genetic Diversity and Specific Relationships in the Genus <i>Actinidia</i> Based on RAPDs and PCR-RFLPs of mtDNA)	李作洲等(245)
微卫星标记对我国猕猴桃品种的遗传多样性分析和鉴定 (Genetic Diversity and Identification of Chinese Kiwifruit Cultivars Based on Microsatellites)	郑轶琦等(262)
猕猴桃属植物种质资源保存及其利用 (The Conservation and Utilization of the Genetic Resources of the Genus <i>Actinidia</i>)	王圣梅等(270)
云南野生猕猴桃资源及分布概况 (Germplasm Resources and Main Distribution of Wild Chinese Gooseberry in Yunnan Province)	胡忠荣等(275)
神农架主峰南坡猕猴桃种质资源调查及保护策略 (Germplasm Investigation and Protective Strategy of the Genus <i>Actinidia</i> in South Foot of the Peak of Shennongjia Mountains)	张忠慧等(280)
福建梅花山国家级自然保护区猕猴桃种质资源及其分布 (Investigation of <i>Actinidia</i> Resources and Distribution in Meihua Mt., a Natural Reserve in Fujian Province)	陈兆凤(285)

(六) 病虫害防治

- 新西兰猕猴桃核盘霉病的模型建立 (Modelling of Sclerotinia Disease in New Zealand Kiwifruit (*Actinidia deliciosa*))S.M. Hoyte 等(291)
- 韩国目前猕猴桃的主要病害及其防治措施 (Current Status of Occurrence of Major Diseases on Kiwifruits and Their Control in Korea)Y.J. Koh 等(301)
- 抗根线虫的猕猴桃遗传资源研究 (Research on Kiwifruit Source of Genetic Resistance to Root-knot and Lesion Nematodes)A. Nicotra 等(308)
- 安徽岳西猕猴桃溃疡病发生规律及防治措施研究 (Studies on the Kiwifruit Canker Disease and the Control Measures in Yuexi, Anhui Province)张力田等(313)
- 柿广翅蜡蝉和西藏疏广蜡蝉为害猕猴桃及其防治 (Two New Pest Species of Kiwifruit Vines, *Ricania sublimbata*, *Euricania xizangensis* and Their Control)陈庆红(318)
- 湖北省猕猴桃花腐病发生规律研究 (Preliminary Studies on the Occurrence Regularity of Flower rot Disease on Kiwifruit and its Controls in Hubei)张胜菊(321)
- 猕猴桃黄化病防治研究初报 (A Study on Prevention and Cure of Kiwifruit Chlorosis Disease)王西锐等(326)

(七) 分子生物学与生物化学

- 猕猴桃的连锁作图: 作图群体的选择 (Linkage Map in Kiwifruit: The Choice of Mapping Populations)R. Testolon 等(329)
- 多基因拷贝与猕猴桃生化和分子生物学的研究 (Multiple Gene Copies: Carrying out Biochemical and Molecular Studies in Kiwifruit)E. MacRae 等(336)
- 猕猴桃整株植物气体交换和碳水化合物代谢 (Whole-Plant Gas Exchanges and Carbohydrate Metabolism in Kiwifruit)G. Vizzotto 等(345)
- 猕猴桃早期性别鉴定的分子标记研究 (Molecular Markers for Early Sex Determination in *Actinidia*)张潞生等(351)
- 美味猕猴桃采后软熟果实香气成分的 GC/MS 分析 (GC/MS Analysis of Fruit Aroma Components in Ripened Kiwifruit)涂正顺等(362)
- 猕猴桃种间体细胞杂种叶绿体 DNA 遗传 (Chloroplast DNA Heredity of Interspecific Somatic Hybrids in the Genus *Actinidia*)肖尊安(363)
- 超临界 CO₂ 从猕猴桃果仁中萃取亚麻酸油的工艺研究 (The Technical Studies on the Supercritical CO₂ Extraction of Linolenic Acid Oil from Kiwifruit Seeds)张永康等(366)
- 美味猕猴桃“金魁”胚乳培养的形态建成 (Endosperm Culture of 'Jinkui', a Cultivar from *Actinidia deliciosa*)闵伟等(369)
- 现代生物技术在猕猴桃上的应用 (Application of Modern Biotechnology on Kiwifruit (*Actinidia*))徐小彪等(373)

后 记

- 回到起点: 第五届国际猕猴桃会议概述 (Back to the Beginning: an Overview of the 5th International Symposium on Kiwifruit)Dr.A.R. Ferguson(380)

（一）猕猴桃产业化与市场

新西兰猕猴桃产业与市场现状

R.A. Martin

(新西兰 Zespri 国际有限公司, Maunganui 山南麓, 4043 邮箱)

摘 要 猕猴桃在新西兰商业化种植从上个世纪 30 年代开始, 已有 70 多年的历史, 并于 1952 年首次将猕猴桃出口到英国。猕猴桃的种植技术需得到发展, 果实要让消费者接受, 在上个世纪开发的 3 种果树中, 仅猕猴桃这一种成功地在全球得以推广。为了促进生产和国际市场开发, 新西兰在 1977 年至 1988 年间由“新西兰猕猴桃专营部门”进行市场与出口经营猕猴桃, 并制定了相应的质量标准、促销产品和对研究开发的投入。1988 年之后, 该机构又改为“新西兰猕猴桃市场委员会”; 到 1997 年, 成立了一家拥有 2 506 个股东、价值 4 亿美元的大企业——“Zespri™ 国际有限公司”。

Hayward Wright 在 20 世纪 20 年代从中国鹅莓(猕猴桃在新西兰最早的称谓)选出了“Hayward”品种, 20 世纪 50 年代才在普伦梯(Plenty)湾开始大规模种植。该地区土壤是深厚的火山灰, 并具有优良的气候条件, 年光照大于 2 000 h, 降水量达 1 300 mm, 且分布均匀, 夏天一般在 23~25℃, 春秋基本无霜冻, 但又有足够的低温量来满足休眠和萌芽的需要。目前该品种的总产占新西兰猕猴桃的 81%。

20 世纪 70 年代后, 南半球及北半球其他国家开始种植和生产猕猴桃鲜果, 使全年的 12 个月份均有猕猴桃销售, 但猕猴桃仅占世界果品的 1%。自 Zespri 公司成立后, “Hayward”又注册成“Zespri 绿果”, 以及后来发展的“Zespri 有机果”。近年来, 黄色果肉的 ZespriGold (Zespri 金果, 新西兰猕猴桃商标, 即原来称为“Hort16A”或“早金”)品种果实全球销售, 目前已在好几个国家实行许可种植。猕猴桃是新西兰主要的园艺出口产品, 至 2001 年 11 月止的前一年中, 猕猴桃出口占所有果品出口的 35.4%。

“Hayward”品种不太适合加工, 目前发展的黄肉品种“Hort16A”有一定潜力, 不光是其鲜艳色泽, 更重要的是其营养价值, 如 Vc 和矿物质等。

新西兰在世界猕猴桃产业化和发展中起了重要作用, 依靠单一品种形成了其支柱产业。为了保持在该领域的领头羊地位, 每年仍需投入大量资金进行果实品质改良、果园可持续性管理措施、更科学合理地采收和包装技术以及拓宽猕猴桃的应用如开发功能性食品等方面的研究, 并不断进行引种和新品种开发, 以科技创新带动猕猴桃产业的持续性发展。

关键词 品种 产业 市场 新西兰

The Production and Marketing of New Zealand Kiwifruit

INTRODUCTION

As background, ZESPRI International Ltd is the single biggest marketer of kiwifruit and is the sole marketer of ZESPRI™ New Zealand kiwifruit. It is 100% grower owned with 2 506 shareholders and is a NZ \$800 (US\$400) million business. ZESPRI International and the ZESPRI brand were created in 1997. Prior to this date, it was known as the New Zealand Kiwifruit Marketing Board from

1988. Between 1977 and 1988, the New Zealand Kiwifruit Authority licensed exporters to market kiwifruit, setting quality standards, undertaking promotion of the fruit and funding research and development projects.

COMMERCIAL VARIETIES

The New Zealand nurseryman Hayward Wright cultivated and developed the original Hayward commercial kiwifruit variety from the Chinese Gooseberry. The first commercial plantings were in the late 1920's and was widely planted in the sunny Bay of Plenty region of New Zealand in the early 1950's. The first exports were to the United Kingdom. However, the kiwifruit was stowed on board the ship with other vegetables and fruit so did not arrive in good condition. The Chinese Gooseberry name was changed to kiwifruit in 1959, kiwi being the name for New Zealand's national bird which is known for its brown furry skin.

The Hayward variety is the most widely grown kiwifruit variety. It is green-fleshed and has a refreshing sweet/sour taste being one of only three new fruits successfully launched globally in the 21st century. With the development of the ZESPRI brand, the Hayward variety is marketed as ZESPRI Green. There is also an organically grown product, ZESPRI Organic.

In 1998, ZESPRI Gold kiwifruit was introduced — a new product to stimulate the kiwifruit category. With its bright yellow flesh and tropical (mango or papaya type) flavour, it has been very widely accepted by consumers and commercial plantings were first developed in the northern hemisphere in 1999 to provide a year round supply to consumers.

There are limited plantings of the small grape sized or cocktail variety arguta in New Zealand.

PRODUCTION OF KIWIFRUIT

Kiwifruit is a relatively recently grown fruit with significant volumes only being produced from the 1980's with fairly static production levels since 1992 and representing only about 1% of total fruit production (Fig. 1).

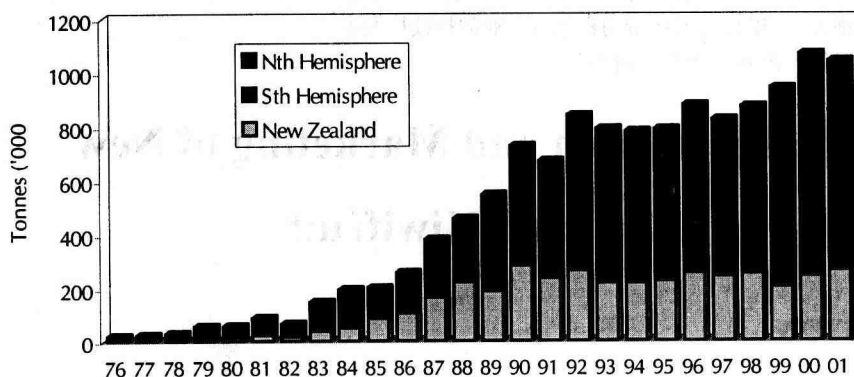


图 1 Global kiwifruit production 1975~2001

There have been significant commercial plantings in China during the late 1990's. Increasing production levels from 1999 onwards will largely be a result of these plantings.

In New Zealand, kiwifruit is the single most important horticultural export, representing 35.4% of horticultural exports in the 12 months to November 2001. The production level in New Zealand declined in the early 1990's following the collapse of the fresh fruit market in 1992 but has increased over the later 1990's, apart from 1999. This was due to the conversion of many vines from Green to Gold. The volume will increase further as the Gold plantings mature plus some new Green plantings.

Kiwifruit production has consolidated into the Bay of Plenty region, currently representing 81% of the volume, due to good volcanic soils. These are free draining but moisture retentive, allied to a climate with good sunshine hours (>2 000 hours) and even rainfall throughout the year (1 300 mm). Excessive temperatures do not occur, with typically warm summer days of 23°C~25°C, most areas being frost free over spring and autumn and with usually adequate winter chill for good flower bud initiation.

THE DEVELOPMENT AND MARKETING OF A NEW VARIETY

To find a new variety with commercial potential take a long time. Seeds of *Actinidia chinensis* were introduced from China in the 1970's. Seedlings were propagated and crosses made between many different seedlings before a single plant was found in 1992 that produced a fruit with a truly unique flavour.

That one vine had to be multiplied to provide more plants and fruit for further evaluation in the orchard, to determine its post harvest requirements and to undertake consumer research. For it is from all these differing factors that a decision has to be taken on whether to release that new variety.

Once the decision is taken to release a variety, it must be protected under Plant Variety Rights (PVR) international convention. ZESPRI International has handled the release of 'Hort16A', the PVR name for the fruit marketed as ZESPRI™ Gold, differently. Traditionally, a royalty is collected on each plant or tree of a new variety that is paid to the breeder. For this variety, a new approach was used. Nurserymen and growers are licensed to grow the variety but all the fruit produced has to be marketed by ZESPRI. This is because a new variety represents a very significant investment, not only in finding the new variety and releasing it but also in successfully launching that variety. Retailers have to be persuaded to provide shelf space, consumers have to be persuaded to taste the new fruit and finally the product requires a full marketing and promotional package in each market – very expensive if it is to be successful.

We also believed that it was important that any new variety should be distinctively different to the existing Hayward or ZESPRI™ Green variety. This is to grow the kiwifruit category by finding new consumers, rather than having existing kiwifruit eaters substituting the new variety for the old.

KIWIFRUIT PROCESSING

The traditional Hayward variety is not an easy fruit to process successfully. Although it is early in the development stage of the ZESPRI™ Gold variety, successful products are starting to appear which capture its unique characteristics, not only its colour but also its functional properties, for example vitamins and minerals for health benefits.

THE ZESPRI™ INTEGRATED DELIVERY SYSTEM

Control of the supply chain is essential to provide customers and consumers with confidence that the way their food is produced is safe and respects environmental considerations. Traceability and tracking of products is now an essential requirement, not only from the customer's perspective but also from a regulatory perspective following an increasing level of food safety scares globally.

The ZESPRI™ System is a Supply Chain relationship that works. New Zealand growers are very experienced and knowledgeable, totally committed to producing export quality kiwifruit. The 113 packhouses and coolstores have accredited quality systems whose systems and processes are audited to ensure that ZESPRI™ standards are maintained. These systems flow through the transport, shipping and delivery system with the majority of the products passing through ZESPRI's own facilities in key markets.

Records are maintained throughout the System, allied to the track and trace system which means that if there is a concern about a particular tray of fruit, it can be identified right through the system to the orchard on which it was produced. Improvements to the system are constantly being implemented.

TRENDS IN MARKETS

There is consolidation of retailers around the world who want a supplier to manage a category, for example kiwifruit, for 12 months of the year. Not only does this mean supplying kiwifruit all year round but also supporting the retailer with promotional programmes to ensure retailer, and therefore producer, profitability. The competition is not merely from other kiwifruit producers but also from other fruit and other fast moving consumer goods such as noodles, potato chips and chocolate bars.

Consumers are changing as well. They are very aware of food safety, requiring assurances on how their food is produced, such as EUREPGAP. Convenience is very important, ready to eat, quality and taste allied with nutrition and health.

INNOVATION

New Zealand is a respected leader in research and development. ZESPRI International invests significant funds in improving quality, taste and flavour, sustainable orchard management systems, better handling logistics and packaging, not to mention new variety development. Such investment is essential to maintain a leading position to grow the business.

It is ZESPRI's commitment to enhance our products, services and systems to continually bring to customers and consumers the best kiwifruit in the world.

CONCLUSIONS

Kiwifruit is a very minor product in the fruit category, having survived for many years with a single variety. The introduction of a distinctively different variety will help to grow the kiwifruit category but launching a new variety successfully is expensive. Identifying health benefits for kiwifruit will also grow the category.