



现代中国

农业科学专著集

The Modern Monographs
on Agricultural Science of China

两系法 杂交水稻 的理论与技术

陈立云等 编著

THE PRINCIPLES
AND TECHNIQUES OF
TWO-LINE
HYBRID RICE

by

Chen Liyun et al.

上海科学技术出版社

Shanghai Scientific & Technical Publishers

责任编辑→周星锦

→叶平

封面设计→房惠平



www.sstp.com.cn

ISBN 7-5323-5889-5



9 787532 358892 >

定价：43.00元

• 现代中国农业科学专著集 •

两系法杂交水稻 的理论与技术

陈立云等 编著

上海科学技术出版社

• The Modern Monographs on Agricultural Science of China

**The Principles and Techniques of
Two-line Hybrid Rice**

by

Chen Liyun et al.

Shanghai Scientific & Technical Publishers

图书在版编目(CIP)数据

两系法杂交水稻的理论与技术/陈立云等编著. —上海:
上海科学技术出版社, 2001. 4

(中国农业科学专著集)

ISBN 7-5323-5889-5

I. 两... II. 陈... III. 水稻-杂交育种
IV. S511.035.1

中国版本图书馆 CIP 数据核字(2001)第 04060 号

上海科学技术出版社出版、发行

(上海瑞金二路 450 号 邮政编号 200020)

上海新华印刷厂印刷 新华书店上海发行所经销

开本 787 × 1092 小 1/16 印张 22.25 插页 4 字数 336 000

2001 年 4 月第 1 版 2001 年 4 月第 1 次印刷

印数 1 - 1 200

定价: 43.00 元

本书如有缺页、错装或坏损等严重质量问题,
请向本社出版科联系调换

出版说明

科学技术是第一生产力。21 世纪，科学技术和生产力必将发生新的革命性突破。

为贯彻落实“科教兴国”和“科教兴市”战略，上海市科学技术委员会和上海市新闻出版局于2000年设立“上海科技专著出版资金”，资助优秀科技著作在上海出版。

本书出版受“上海科技专著出版资金”资助。

上海科技专著出版资金管理委员会

推动科技出版事业
提高学术水平

為「上海科技書出版資金」題

徐匡迪

二〇〇〇年十月十一日

内 容 提 要

全书共分七章,分别阐述了两系法杂交水稻的基础理论,两系法品种间杂交组合的选育、亚种间两系法杂交稻组合的选育,新技术与两系杂交水稻育种,两系法杂交水稻制种原理与技术,两用核不育系高产保纯繁殖原理与技术、两系杂交稻的生物学基础与栽培技术等内容。

本书理论与实践紧密结合,对水稻专业研究人员和高等农业院校有关专业师生均有参考价值。

主 编 陈立云

主要撰写人员 (以姓氏笔画为序)

严钦泉 肖应辉 肖层林

邹应斌 陈立云 陈光辉

徐庆国 温圣贤

Editor-in-Chief: Chen Liyun

Contributors: Yan Qinquan Xiao Yinghui Xiao Cenglin
Zhou Yingbin Chen Liyun Chen Guanghui
Xu Qingguo Wen Shengxian

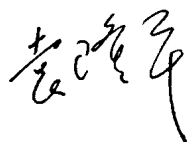
序

21 世纪人类将面临人口增长、环境资源退化和粮食短缺的三重挑战。据预测,到 2050 年,世界人口将达到 100 亿。要满足 100 亿人口对粮食的需求,粮食生产必须在目前的基础上增加一倍以上。中国的耕地面积只占全世界的 7%,却要承担养活全世界 22%的人口重负。21 世纪的中国所面临的挑战比任何国家都要严峻。三系杂交水稻的育成和推广,是我国农业科研工作中一项具有世界先进水平的成就,是我国现阶段粮食产量上台阶的关键之一。两系杂交水稻的培育成功,是我国农业科学研究工作中又一项具有世界领先水平的成就,它的推广应用对我国乃至世界的粮食生产将产生极为深远的影响。

湖南农业大学水稻科学研究所的科研工作者们,在总结前人研究成果的基础上,结合自己的研究体会,合作撰写了《两系法杂交水稻的理论与技术》,该书较系统地阐述了两系法杂交水稻的理论与技术,并且着重强调了技术的实用性和可操作性,具有较高的学术水平和参考价值。

该书出版之际,正值我国两系法杂交水稻进入快速发展阶段。这对两系法杂交水稻的进一步深入研究和促进该项成果快

速转化为现实生产力具有重要作用。我祝贺该书的出版,并高兴地把它推荐给读者。

A handwritten signature in black ink, appearing to read '张洪宾' (Zhang Hongbin), written in a cursive style.

2001 年 1 月

Foreword

Man is to face three challenges—population growth, degeneration of environmental resources and grain shortage in the twenty-first century. It's predicted that by 2050 the world's population will have increased to ten billion. To satisfy the ten billion people's need for food, the grain yield must be doubled on the present basis. China only occupies seven per cent of the world's cultivated area, whereas it has to support twenty-two per cent of its population, which is really a heavy burden. So the challenge China is to face in the twenty-first century is more severe than other countries are. The successful breeding and popularization of three-line hybrid rice is an achievement that is up to the world's advanced level in our country's agricultural scientific research and it is the crux of the increase of the present grain yield in our country. Another achievement among our country's agricultural researches which is up to the world's leading level is the successful breeding of two-line hybrid rice and its popularization and application will have a far-reaching influence on China's and even the world's grain yield.

The research workers of the Rice Scientific Research Institute of Hunan Agricultural University contribute *The Principles and Techniques of Two-line Hybrid Rice* cooperatively based on the summary of the achievements of the former research workers and their own experience. This book elaborates the theories and techniques of two-line hybrid rice systematically and emphasizes its practicability and operability. Hence, it is of comparatively high academic standard and reference val-

ue.

The publication of this book witnesses the fast development of two-line hybrid rice in our country. It will play an important role in the further research of two-line hybrid rice and hasten the transformation of the achievements acquired into productive forces. Congratulations on its publication and with pleasure, I recommend it to the readers.

Yuan Longping

January, 2001

前 言

从 1973 年湖北石明松在晚粳品种农垦 58 大田中发现长日高温不育、短日低温可育的突变株,到今天两系法杂交水稻培育成功,已经历了 27 个春秋。它的育成与推广,是我国农业科学研究工作中又一项值得骄傲的重大成果。

“九五”期间,我们有幸承担了国家“863”生物领域两系杂交水稻研究与开发的中试项目和重大关键技术项目,使我们在拥有众多一流杂交水稻育种专家的国家队伍中有了很多的学习、交流的机会;我们也有幸与国家杂交水稻工程技术中心相邻,使我们时时刻刻体会到近水楼台的好处,尤其是袁隆平院士的学术思想和具体指导,更使我们受益匪浅。我们庆幸短短几年能配制出培两优 288 和培两优余红二个两系法杂交水稻组合,并通过湖南省农作物品种审定委员会审定,其中“两系法杂交水稻培两优 288 的选育”1998 年获湖南省科技进步一等奖。我们确信在今后两系杂交水稻研究中还会取得新的更大的成绩,因为我们在水稻两用核不育系、广亲和系和亚种间杂交稻组合选育方面已取得新进展。

为了总结他人和自己的研究工作,促进两系杂交稻的深入发展,我们合作撰写了《两系法杂交水稻的理论与技术》一书。该书较系统地总结了两系杂交水稻基础理论、育种技术与方法、杂

交水稻制种与繁殖技术、高产栽培技术,同时作者提出了一些新的观点与见解,对从事两系杂交水稻工作的科研教学人员、农业基层干部、农业技术人员、综合性大学生物系和农业院校的学生,都可用作参考。

本书由陈立云主编。全书共分七章。第一章两系法杂交水稻基础理论由徐庆国撰写;第二章两系法品种间杂交组合选育由陈立云、温圣贤、严钦泉撰写;第三章亚种间两系法杂交稻组合选育由陈立云、肖应辉撰写;第四章新技术与两系杂交水稻育种由陈光辉撰写;第五章两系法杂交水稻制种原理与技术和第六章两用核不育系高产保纯繁殖原理与技术由肖层林撰写;第七章两系杂交稻的生物学基础与栽培技术由邹应斌撰写。

在本书出版之际,我们要感谢国家“863”联办、中国生物工程中心、湖南省科学技术委员会、湖南省农业厅、湖南省教育委员会、湖南省计划委员会、湖南省农村工作部和湖南省长沙市科学技术委员会的有关领导对我们科研工作的关心、支持和帮助;感谢袁隆平院士为本书作序;感谢李宗道教授、康春林教授在该书编写过程中的鼓励和具体指导。

由于编者水平有限,书中错误在所难免,望读者不吝指教。

陈立云

2001年1月

Preface

Twenty-seven years has passed since the discovery of mutant which fertilize in short day-length and low temperature condition and sterilize in long day-length and high temperature condition in late Japonica rice Nongkeng58 field by Shi Mingsong in Hubei province. Today's successful breeding of two-line hybrid rice and its popularization is another great achievement that we all take pride in of our country's agricultural scientific research.

During the "Ninth Five-Year-Plan", fortunately we take up the middle-test item and the key techniques of the research and exploitation of two-line hybrid rice item in biological field in the national "863" project. This grants us many chances to lean from the national team of the first-rate experts in the breeding of hybrid rice and to exchange experience with them. More fortunately, we are adjacent to the National Hybrid Rice Engineering Technique Center and are always aware of the benefits of being in such a favorable position. Furthermore, we owe a lot to the theories and specific guide of Yuan Longping, the academician. We are rejoiced that we have succeeded in breeding Peiliangyou 288 and Peiliangyouyuhong these two two-line hybrid rice and they both have been examined and approved by the Examining and Approving Committee of Cultivar of Hunan. The selection and breeding of two-line hybrid rice Peiliangyou 288 win the first prize in the scientific progress of Hunan province in 1998. We are sure that more achievements will be acquired in the future research in two-line hybrid rice because new