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重要稻种资源　一般稻种资源

浙江稻种资源图志

稻

ATLAS OF RICE GERMPLASM RESOURCES IN ZHEJIANG

The Chief Editors Zhang Lihua Ying Cunshan

张丽华　应存山　主编

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ATLAS OF RICE GERMPLASM RESOURCES IN ZHEJIANG

The Chief Editor Lihua Zhang Cunshan Ying

Editorial Board

序

浙江是中国主要产稻省份之一，水稻栽培历史悠久，同时由于复杂的生态环境和稻作科学技术的不断发展，经过长期的自然选择和人工选择，形成了丰富多彩的稻种资源。这些稻种资源是选育良种不可缺少的物质基础和进行稻作科学理论研究的重要材料，是我国的宝贵财富和珍贵遗产。

回顾浙江数千年来的稻作生产发展历史，稻种资源从中起了极为重要的作用。在唐代，浙江水稻就普遍有了籼、粳和早、晚之分；到了宋代，籼、粳、糯和早、中、晚已各类俱全。其后，随着栽培技术的改进，稻种资源更趋丰富，如在现存的《宋方志》中记载太湖地区有特性各异的品种 69 个，而明代有 196 个，到清代已增加到 380 个。对于水稻生态类型的多样性，历代文献也早有记载，如在明代黄省曾撰写的《理生玉镜·稻品》、湖州府归安县涟川的沈氏《农书》、嘉兴府桐乡县的张（履祥）氏的《补农书·稻种一则》中都论及了黄稻、白稻、乌稻和青稻的特性及其栽培方法。浙江的浙北平原属太湖地区，该地区历来是稻作高产区，为中国著名的鱼米之乡。

浙江省的水稻育种工作最早由原浙江大学农学院开展，始于 1923 年，当时从日本引进优良稻种，并通过单穗选择，育成了浙大 3 号、曲玉 2 号等品种。1930 年浙江省稻麦改良场成立后，积极从事大规模的单穗选择，先后育成了原种选自萧山的中籼浙场 1 号、原种选自宁波细秆晚青的晚籼浙场 9 号（晚籼 9 号）、原种选自嘉兴地区的 10509 等品种。以上表明，浙江省对稻种资源的研究和利用实际上早在 20 世纪初就已开始。但由于长期处于小农经济自给自足状态，稻种资源的收集、保存、利用都以小农户生产为基础，使稻种资源亦处于自生自灭状态。1949 年中华人民共和国建立后，为了使水稻育种工作适应于现代化农业的发展和人们生活不断提高的需要，浙江稻种资源的研究受到了各级领导的重视，并认识到科学的品种改良必须以搜集、研究稻种资源为起点。为此，从 1952 年起，浙江省陆续进行了地方品种的征集、整理研究工作，并在省内进行了 2 次规模较大的征集活动。首次在 1958 年，由浙江省农业厅组织宁波、金华、嘉兴、台州等 4 个农业专业学校的师生协助各县进行全面的征集和调查工作，先后征集到 4 000 多份品种。60 年代中期至 70 年代中期，由于历史的原因，对已收集到的种质又缺乏妥善保存的设施，致使地方稻种资源大量损失。至 1977 年，浙江省农业科学院仅保存浙江地方稻种资源 700 余份。

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为了弥补以往的资源损失，浙江省农业科学院成立了水稻品种资源研究组，先后向有关省（市）收集原产浙江的稻种资源。1979年，浙江省科学技术委员会根据国家农业部、国家科学技术委员会（79）农业（科）字第13号《关于加强农作物品种资源补充征集的通知》，又开展了第二次全省主要农作物地方品种及其近缘野生植物的补充征集工作，并将该项研究任务下达给浙江省农业科学院，水稻方面由该院水稻研究所承担。该所随即组织专业研究人员深入全省27个山区县和有关地区、县（市）农业科学研究所再次搜集和收回复份保存的稻种资源3 000份，1983年中国水稻研究所成立后，这3 700多份浙江稻种资源转入中国水稻研究所品种资源系保存。在以前研究的基础上，1985～1990年中国水稻研究所又进行了系统而全面的形态农艺性状鉴定、整理，保留了2 182份，并进行了统一编目、繁殖，种子送往中国农业科学院品种资源研究所的国家种质库长期保存，并在中国水稻研究所的现代化种质库复份保存。

浙江稻种资源在浙江稻作生产的各个重大改革时期都起了重要的作用，如在1960年前后生产上利用的主要优良品种早三倍、503、太湖青、老来青等，以及从外省引入的优良高秆品种南特号、莲塘早、南特16、陆财号等。特别值得提出的是1959年引入的早籼品种矮脚南特和1961年引进的晚粳农垦58，经试种表现矮秆、高产，从而迅速在全省推广，在生产上应用的时间达19年和21年之久，累计种植面积分别达200多万公顷和233万公顷。同时还利用矮脚南特、农垦58和矮仔占4号的后裔品种等作杂交育种亲本，促进了浙江矮化育种的蓬勃发展，育成了一大批不同熟期的矮秆优良新品种，使矮秆品种逐渐代替了原有的高秆品种。据1988年统计，在早籼选育品种中，矮脚南特的衍生品种占21%，源自矮仔占4号的衍生品种占58%，从国际稻系统中选育出的品种占17%，其中如矮南早1号、二九青、圭陆矮、青秆黄、原丰早、二九丰、浙辐802等均先后成为代表不同熟期早籼类型的主要良种。农垦58衍生的品种约占晚粳选育品种的80%，其中农虎6号、矮粳23、秀水48等曾是浙江的晚粳主栽品种。浙江稻种资源还被利用于杂交水稻不育系的选育，如以珍汕97转育成的不育系珍汕97A，先后配制成不少优良组合，其中如汕优6号、汕优10号等在浙江水稻生产上广泛利用，获得了显著的增产效果。

为了充分发挥浙江稻种资源的作用，有助于育种家们选育出更高产、优质、多抗的新品种，以满足人们对稻米的需求，同时也为了传之后代，浙江省科学技术委员会除重视和支持浙江稻种资源研究外，还将编写《浙江稻种资源图志》列为“八五”浙江省科学技术研究计划，并由中国水稻研究所和浙江省农业科学院承担这项任务。

《浙江稻种资源图志》一书的编写出版是浙江广大稻作科学研究人员多年辛勤劳动的结晶，她对稻作工作者正确利用和妥善保存浙江省珍贵的稻种资源，以造福于人类，具有重要的现实意义和深远的历史意义。

浙江省科学技术
委员会副主任 陈存斌

1993年4月

Preface

Zhejiang is one of the major provinces in rice production in China with a long history of rice cultivation. The formation of rich and colorful rice germplasm resources was brought by the complicated ecological environment, continuous progress on the sciences and technology of rice cropping, and long process in natural and artificial selection. These germplasms are of the indispensable substantial foundation for developing elite cultivars, the important materials for theoretical research on rice sciences, and also the precious wealth and valuable heritage of the country.

Rice germplasm resources had played an extremely important role when reviewed the developmental history of rice production over thousands of years in Zhejiang. There had been popularly existed the distinction between *indica* and *japonica* rice, and early—and late—season variety in Tang dynasty in Zhejiang. Till Song dynasty, the complete rice types had become with *indica*, *japonica* and glutinous rice; and early—, middle—and late—season variety. Rice germplasm resources had been enriched subsequently along with the reform on cropping system. For instance, there were 69 varieties with different special properties in Taihu Lake region in Song dynasty according to the record in the existing "Songfang Annals". It was documented that such rice varieties increased upto 196 in Ming dynasty and 380 in Qing dynasty. The diversity of rice ecotypes was also described long ago. The characteristics and cultivation techniques of yellow, white, black and green rice had been described in "Jade Mirror for managing life rice" written by Huang Shengzeng in Ming dynasty, in "Book of Agriculture" by Shen at Lianchuang of Gui'an county in Huzhou city, and in "A supplementation to book of agriculture: Rices" by Zhang (Luxiang) of Tongxiang county in Jiaxing city. The northern Zhejiang plain belongs to Taihu Lake region. It has ever since been the high—yielding region of rice and well known in the country as a land of fish and rice.

Rice breeding in Zhejiang started at the former Agricultural College of Zhejiang University in 1923. Elite rice varieties were introduced from Japan and the varieties such as Zheda 3 and Quyu 2 were bred through the selection of a single—panicle plant. The single—panicle plants were selected in a large scale after the establishment of Zhejiang Provincial Rice and Wheat Improvement Station in 1930. Varieties were earlier or latter bred like the medium—season *indica* variety Zhechang 1 whose seed was originated from Xiaoshan, the late—season *indica* variety Zhechang 9 (Wanxian 9) originated from variety Xiganwanqing of Ningbo, the late—season *japonica* variety 10509 originated from Jiaxing. This indicates that the research and utilization of rice germplasm resources in Zhejiang in fact started in the early 20th century. Under the condition of self—sufficient and small—scale peasant economy for a long time, rice germplasm resources were however existing at a run—its—course condition because their collection,

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conservation and utilization was fully based on the production of small farm households. After the foundation of the People's Republic of China in 1949, the studies on rice germplasm resources in Zhejiang had been paid special attention by the leaders at different levels in order to enable the adaptation of rice breeding research to the development of modern agriculture, and to meet the requirements of the continuous improvement of people's living standard. It had been rea lized that improving rice variety scientifically should be relied upon the collection and study of rice germplasms. Therefore, the collection and sorting of tranditional rice varieties have been undertaken gradually since 1952. The collection activities were launched twice in a relatively large scale within the province. Under the organization of Zhejiang Agricultural Bureau, the first collection and investigation of rice germplasms was conducted entirely in the counties of Zhejiang in 1958 with the help of the teachers and students of specialized agricultural schools in Ningbo, Jinhua, Jiaxing and Taizhou. More than 4 000 accessions of varieties were collected early or later. From mid 60s to mid 70s, a number of elite rice germplasms had been lost because of some historical reasons and a lack of the facilities for proper conservation of the collected germplasms. In 1977, only approximately 700 accessions of rice germplasm resources in Zhejiang were conserved at Zhejiang Academy of Agricultural Sciences (ZAAS). A special research group for rice germplasm resources has been set up in order to conserve the lost germplasms. Rice germplasms originated from Zhejiang were collected back from related provinces (cities). In 1979, Zhejiang Science and Technology Commission organized the second supplementary collection of tranditional varieties of major crops and related wild species based upon the "Notice concerning the supplementary collection with the emphasis on crop germplasm resources" issued by the Ministry of Agriculture and the National Science and Technology Commission. The task was designated to ZAAS and the collection of rice germplasms was undertaken by the rice research institute, ZAAS. Afterwards, research workers were organized and went to 27 mountain counties, and to regional or county (city) institutes of agricultural sciences, collecting 3 000 rice germplasm resources. After the establishment of China National Rice Research Institute (CNRRI) in 1983, all of Zhejiang rice germplasm resources (>3 700 accessions) was transferred to Department of Germplasm Resources, CNRRI for conservation. On the basis of previous research, the morphological and agronomic characters of rice germplasms were identified and sorted systematically and comprehensively during 1985—1990; 2 182 accessions were maintained, numbered and reproduced. Their seeds have been sent to the National Bank of Crop Germplasm Resources at the Institute of Crop Germplasm Resources, Chinese Academy of Agricultural Sciences for long—term conservation. The duplicated seeds have been conserved in a modernized bank of rice germplasm resources, CNRRI.

Zhejiang rice germplasm resources have played important role in rice production at different reform stages. Around 1960, the elite varieties utilized in practice were mainly Zaosanbei, 503, Taihuqing and Laolaiqing, and the introduced tall elite varieties such as Nantehao, Liantangzao, Nante 16 and Lucaihao. It must be particularly mentioned that the early—season *indica* variety Aijiaonante introduced in 1959 and the late—season *japonica* variety Nongkeng 58 introduced in 1961 showed the properties of semi—dwarf and high yielding after planted on a trial basis. They were therefore spread rapidly within the province and had been used practically as long as for 19 years and 21 years in rice production, respectively. The accumulative planting areas had been reached to 2 and 2. 3 million hectares, respectively. At the same time, the offsprings of Aijiaonante, Nongkeng 58 and Aizizhan 4 were used as parents for hybrid breeding, flourishing the development of dwarfication in plant breeding of Zhejiang. A large number of elite semi—dwarf varieties with different maturities had been developed and gradually repla-

ced the tall varieties used before. According to the statistics in 1988, the varieties originated from Aijianante, Aizizhan 4 and IR series accounted for 21%, 58% and 17% in the early—season *indica* varieties, respectively. Of them, Ainanzao 1, Erjiuqing, Guiluai, Qingganhuang, Yuanfengzao, Erjiufeng and Zhefu 802 have earlier or later become the main eary—season *indica* varieties with different maturities. Among the late—season *japonica* varieties, the varieties originated from Nongkeng 58 accounted for 80%. Of them, Nonghu 6, Aijing 23 and Xiushui 48 were the major cultivars in the late—season plantation of rice in Zhejiang. Zhejiang rice germplasms were also used to breed male sterile lines in hybrid rice. The male sterile line Zhenshan 97A from Zhenshan 97 has been utilizable and developed a number of the elite combinations such as Shanyou 6 and Shanyou 10. The significant increase of rice yield had been achieved by using these hybrids in practice.

In order to utilize Zhejiang rice germplasms fully, to enable rice breeders to develop new varieties with a higher yield, good grain quality and multiple resistances, to satisfy the people's need for rice grains, and to make these germplasms utilized by our young generations as well, the research of rice germplasm resources has been paid attention and supported by Zhejiang Science and Technology Commission. The compilation of "Atlas of Rice Germplasm Resources in Zhejiang" has been listed as one of science and technology programs in the 8th "Five—year Plan" period (1991—1995) and undertaken by CNRRI and ZAAS.

The compilation and publication of "Atlas of Rice Germplasm Resources in Zhejiang" is a crystallization of hard work by a great number of rice scientists and technicians in many years. The Atlas has an important realistic and far—reaching historical significance for the correct utilization and proper conservation of the precious rice germplasm resources in Zhejiang by rice scientists and for bringing benefits to the mankind.

Chen Chuanqun
Deputy Director
Zhejiang Science and Technology Commission

April 1993

前　言

浙江气候温和湿润，属亚热带季风气候，季风交替规律明显，雨量充沛，年平均气温16℃左右，日照充足，无霜期长达245天左右，适于水稻生长。据宁绍平原的河姆渡和杭嘉湖平原的罗家角、钱山漾的出土文物考证，水稻在浙江至少已有7 000多年栽培历史。在这漫长的自然演化和人们有意识择优汰劣的过程中逐渐形成了类型丰富、品种繁多的稻种资源，这是几千年来劳动人民创造的宝贵财富。这些资源在过去和现在对浙江和全国的稻作生产和科学研究都起着重要的作用。

早在20世纪初期，浙江就已开始对稻种资源的研究和利用。当时的浙江大学农学院和浙江省稻麦改良场，采用单穗选择，先后育成了一批新品种。新中国建立后，浙江稻种资源的研究受到了各级领导的重视，从1952年起，浙江省陆续进行了地方品种的征集、整理研究工作，并在1958年和1979年组织了两次省内规模较大的征集活动。至1982年，浙江农业科学院收集、保存的浙江稻种资源已达3 700多份。1983年中国水稻研究所成立后，这3 700多份浙江稻种资源，转入该所品种资源系保存。

在以前的研究基础上，中国水稻研究所等单位于1985年开始组织了多学科的协作研究，对这3 700多份浙江稻种资源进行了系统的农艺性状、抗病虫、耐逆性鉴定及米质测定，经归并整理为2 182份，并对每份品种73项的植物学形态特征和生物学特性的详细鉴定资料作了认真分析、总结。为了使这些稻种资源能进一步发挥作用，并造福于子孙后代，在浙江省科学技术委员会的大力支持下，我们编写了这本《浙江稻种资源图志》。

本书主要内容包括浙江稻种资源概况、稻种资源图志和附录三个部分。第一部分主要介绍浙江稻种资源概况，为中、英文对照。第二部分是本书的主体部分，包括了地方品种、选育品种、外省和外国引进的优良品种、特异类型品种，分重要稻种资源和一般稻种资源两大类介绍。所谓重要稻种资源，系指在历史上起过重要作用或通过多学科鉴定确定为具有某方面优良特性的地方品种，计289份；选育品种系指在浙江省或其他省份种植6 700公顷以上，并通

前言

过省、市品种审定委员会审定（认定）的品种，计105份；外省和外国引进的资源对浙江的稻作生产和育种事业也起了很大作用，共选择了14份列入本书。3类合计共有408份，每个品种都列有植株、穗、谷粒（含糙米、精米）3幅彩图和文字说明。彩图均以大田种植的活体拍摄的彩色照片，共1 224幅。一般稻种资源中，地方品种1 610份，选育品种164份，以表格形式表示，列有品种编号、品种名称、来源地（原产地）和品种类型等4项内容。有些品种曾在浙江省推广面积较大，有很多优点，但因目前无种子保留，故未列入本书内。全书编入稻种资源共2 182份。第三部分附录包括稻种资源的特征、特性鉴定方法与标准、重要选育品种系谱和重要稻种资源名称索引等。

在本书的编写和出版过程中，浙江省科学技术委员会给予了全面、直接的指导，同时得到省内各级领导及有关育种、植物保护、生理、米质研究等方面的科学家和其他学者、工作人员的大力支持，在此一并表示衷心的感谢。

本书可供稻种资源研究者、水稻生产技术人员和其他水稻科技工作者参考，也可作为交换、利用和保存品种及其种子的工具书。书中不妥之处，敬请有关专家、学者和广大读者不吝指正。

编者

1993年4月

Foreword

The climate in Zhejiang province belongs to the type of sub—tropical belt monsoon with a clear pattern of monsoon alternation. Annual temperature averages at 16℃. There is adequate rainfall and sufficient sun light with a frost—free period of as long as 245 days. Hence, the climate in the province is suitable for the growth of rice plants.

Zhejiang has a long history of more than 7 000 years in rice plantation based upon the textual research of the unearthed archaeological articles from Hemudu on Ningbo—Shaoxing plain, and Luojiajiao and Qianshanyang on Hangzhou—Jiaxing—Huzhou plain. In the long process of natural evolution as well as the people's conscious selection of the good and deletion of the poor, the diversified germplasms of rice with different types and varieties have been shaped gradually. This is the valuable wealth created by laboring people over thousands of years. These germplasm resources had played in the past and are playing at present the important roles in rice production and research in Zhejiang and the whole country as well.

The study and utilization of rice germplasm resources started in Zhejiang from the early 20th century. A number of new varieties had been bred through the single—panicle selection by the former Agricultural College of Zhejiang University and Zhejiang Provincial Rice and Wheat Improvement Research Station. After the foundation of the People's Republic of China in 1949, the leaders at different levels in Zhejiang had been paid special attention to the research of rice germplasm resources . The collection and sorting of traditional rice varieties has been undertaken gradually since 1952. The collection activities were organized in 1958 and 1979 in a relatively large scale within the province. Till 1982, More than 3 700 accessions of rice germplasm resources in Zhejiang had been collected and conserved by Zhejiang Academy of Agricultural Sciences (ZAAS). After the establishment of China National Rice Research Institute (CNRRI) in 1983, all of these germplasms was transferred to Department of Germplasm Resources, CNRRI for conservation.

On the basis of previons research, CNRRI and other institutions organized a multi—disciplinary collaboration program in 1985. The morphological and agronomic characters, resistance to insect pests and plant diseases, tolerance to environmental stresses, and grain quality analysis of Zhejiang rice germplasms (>3 700 accessions) were identified, evaluated and sorted systematically and comprehensively; 2 182 accessions were maintained and numbered. After sorted and categorized, 2 182 accessions have presently been conserved. The detailed evaluation documents including 73 items of morphological and biological characteristics of each accession have been seriously analyzed and summarized. In order to enable these germplasms to continue playing their role and to benefit our younger generations, and under the greatest

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support by Zhejiang Science and Technology Commission, we compile and publish this "Atlas of Rice Germplasm Resources in Zhejiang".

The Atlas includes mainly three parts of (1) the general information of rice germplasm resources in Zhejiang, (2) plates of rice germplasm resources and (3) appendices. Part one introduces mainly the general information of rice germplasm resources in Zhejiang, coming with both Chinese and English version. Part two, further classified into two groups of important and general germplasms, is the main body of the Atlas including the traditional varieties, the improved varieties, the varieties introduced from other provinces and countries, and special varieties. The important rice germplasms are regarded as (1) the varieties which were played important roles historically and traditional varieties (289) with elite properties in certain aspects determined by multi—disciplinary evaluation; (2) the improved varieties (105) which were planted over 6 700 ha in Zhejiang or other provinces and admitted by provincial (city) variety assessment commission; (3) the germplasms (14) which were introduced from other provinces or foreign countries and played the significant roles for rice production and breeding in Zhejiang. Thus, the germplasms in this portion comes with 408 accessions in total. Each variety appears in three photos of a whole plant, panicles and grains (both brown and milled rice) and with literary description. The color pictures in a total of 1 224 were taken in the paddy field. General germplasms including 1 610 traditional varieties and 164 improved varieties were tabulated in accession number of variety, name of variety, origin and type of variety. Some varieties with many advantages were planted popularly in Zhejiang in relatively large areas. However, they have not been included in the Atlas since the seeds have not been conserved at CNRRI. Therefore, the Atlas compiles 2 182 rice germplasms. Part three contains the characteristics of rice germplasms, and the evaluation methods and standards for the germplasms' characteristics; the gencalogy of the important improved varieties and the index for names of important rice germplasms by the strokes of Chinese characters.

The compilation and publication of the Atlas has been supported entirely and directly by Zhejiang Science and Technology Commission. Our heartful and greatest thanks are expressed to the concerning leaders and rice scientists in plant breeding, crop protection, plant physiology, grain quality analysis; other researchers and technicians in Zhejiang for their help.

The Atlas could be used as a reference book for researchers on rice germplasm resources, extension workers on rice production and other rice scientists as well as for the exchange, utilization and conservation of rice varieties and their seeds. We earnestly hope that experts, researchers and readers will not hesitate to make comments and suggestions if there is any inappropriateness in the Atlas.

The Editors

April 1993

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