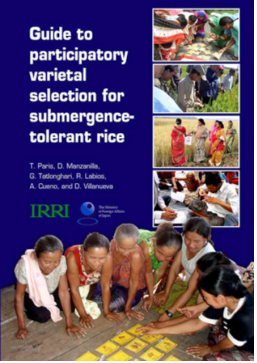

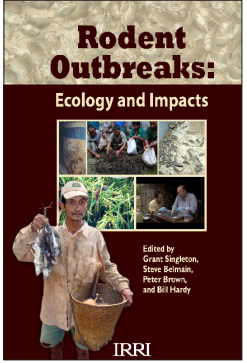

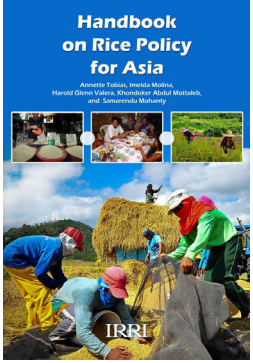

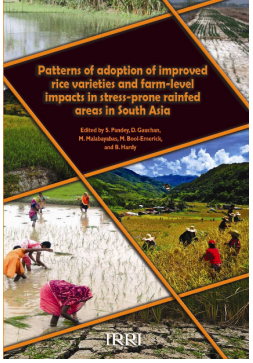

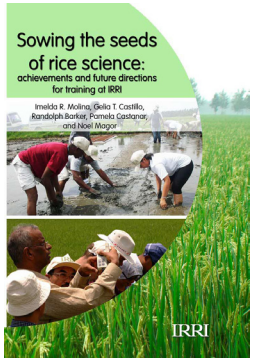

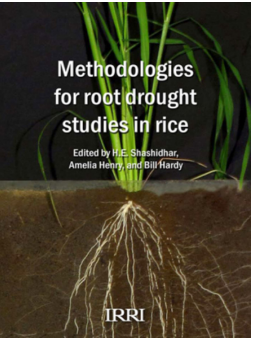

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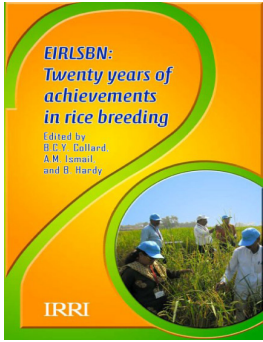

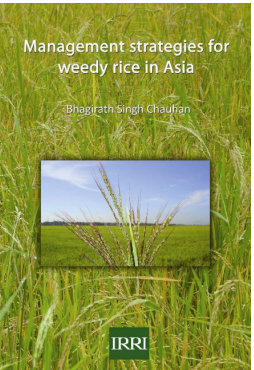

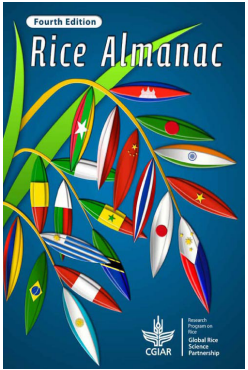

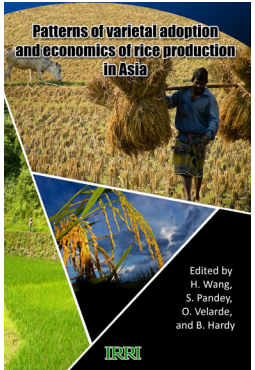

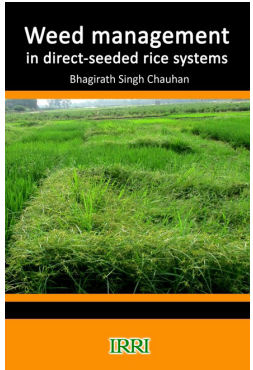

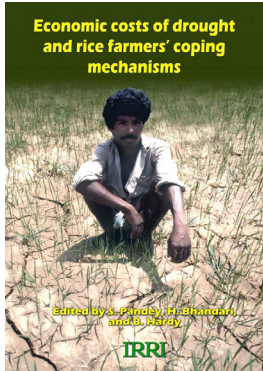

Contents

About IRRI

The International Rice Research Institute (IRRI), is a nonprofit independent organization and a member of the CGIAR Consortium that, through research, aims to

- reduce poverty and hunger,
- improve the health of rice farmers and consumers, and
- ensure that rice production is environmentally sustainable.

IRRI develops new rice varieties and crop management techniques that help farmers improve the yield and quality of their crop while conserving natural resources. Our social and economic research also helps governments formulate policy to develop the rice sector.

Supported by donors worldwide, we work with public and private-sector partners in major rice-growing countries to do research, training, and development activities.

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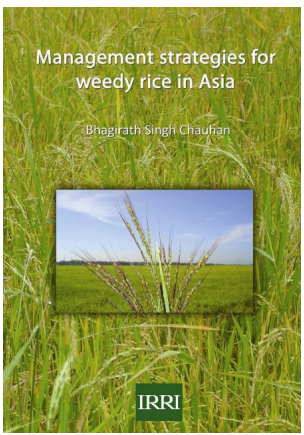
Management strategies for weedy rice in Asia

B.S. Chauhan



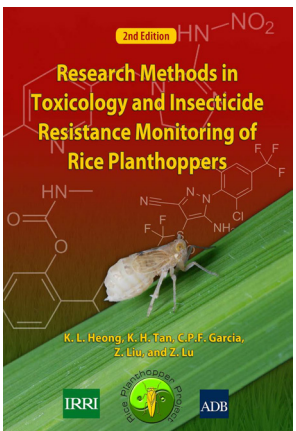
In Asia, the adoption of direct-seeded rice systems makes weedy rice infestation one of the most serious problems that growers encounter. This is mainly because of the morphological and physiological similarities of weedy rice to cultivated rice and the absence of standing water at the time of crop emergence. By infesting rice fields, weedy rice increases production costs and reduces farmers' income by decreasing grain yield and grain quality. Chemical control measures to manage weedy rice in conventional rice cultivars are not an easy option simply because of the similar physiological and morphological traits between weedy rice and cultivated rice. Therefore, managing weedy rice is a challenging and increasing problem for farmers in Asia. In the absence of selective herbicides, cultural weed management strategies may help reduce the problem of weedy rice.

This publication describes various cultural weed management strategies, both preventive and cultural, to reduce the problem of weedy rice in direct-seeded rice systems. This information will help researchers and extension specialists to develop programs to manage weedy rice in rice production systems.

2013. 16 pages.
ISBN 978-971-22-0928-8
Available at: http://books.irri.org/9789712209288_content.pdf

Research methods in toxicology and insecticide resistance monitoring of rice planthoppers, 2nd edition

K.L. Heong, K.H. Tan, C.P.F. Garcia, Z. Liu, and Z. Lu

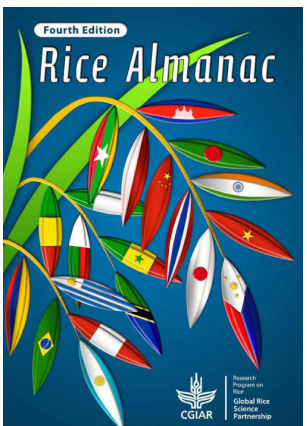


Insecticide resistance in rice planthoppers is developing rapidly, especially to neo-nicotinoids such as imidacloprid. In China where planthoppers have acquired much resistance, the Ministry of Agriculture has removed this active ingredient from the rice market. Resistance reporting has been rather inconsistent, differing in methods, equipment used, insect conditions, stages, and statistical analyses. Since the manuscript of the first edition was completed in 2010, research partners in the ADB-IRRI Rice Planthopper Project have been conducting routine monitoring as well as evaluating repellents, studying reversion of resistance and using molecular techniques. Several workshops were held to compare results and discuss methods, analyses, and interpretation. The second edition of this book contains the modifications made based on the feedback. They replaced authorship with Professor Z. Liu of Nanjing University joining, and added 4 more chapters and references. Although the contents of Chapters 1 to 7 remain similar, the authors have edited and updated them with new information wherever appropriate. As in the first edition, they continue to draw from the works of Busvine (1971), Finney (1977), and Robertson et al (2005), and provide step-by-step procedures for readers to design experiments and use the program for analyses.

2013. 145 pages.
ISBN 978-971-22-0301-5
Available at: http://books.irri.org/9789712203015_content.pdf

Rice Almanac, 4th edition

Edited by: J. Maclean, B. Hardy, and G. Hettel



This fourth edition of the Rice Almanac continues the tradition of the first three editions by showcasing rice as the most important staple food in the world and all that is involved in maintaining rice production. It also breaks new ground in its coverage of issues related to rice production, both environmental--including climate change--and its importance to food security and the global economy. It also further expands coverage of the world's rice production area by featuring 80 rice-producing countries around the world.

The statistics presented are derived primarily from FAO, which includes official country data (FAOSTAT), surveys, reports, and personal communications; IRRI's RICESTAT database, which is based on primary data from requests and questionnaires and secondary data from statistical publications and international organization, including the International Labor Organization and the World Bank; and regional data from AfricaRice and CIAT.

2013. 283 pages.
ISBN 978-971-22-0300-8 Available at: http://books.irri.org/9789712203008_content.pdf

Meta-Impact Assessment of the Irrigated Rice Research Consortium

R.M. Rejesus, A.M. Martin, and P. Gypmantasiri

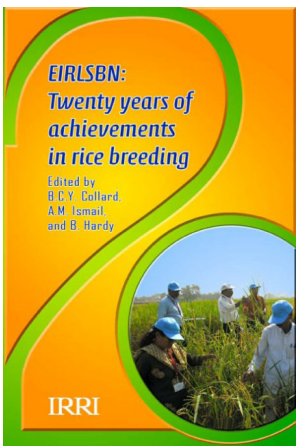
The Irrigated Rice Research Consortium (IRRC) was established in 1997 with the aim of providing a platform to facilitate identification, development, dissemination, and adoption of natural resource management (NRM) technologies suitable for irrigated rice-based ecosystems in several Asian countries. With funding support mainly from the Swiss Agency for Development and Cooperation (SDC) through four project phases (Phases I–IV from 1997 to 2012), the IRRC has provided a mechanism that expedited partnerships between national agricultural research and extension systems (NARES) and scientists from the International Rice Research Institute (IRRI). It is estimated that 1.2 million farmers have been reached by the NRM technologies promoted by the IRRC.

In light of the more than 15-year history of IRRC, there is natural interest in whether IRRC's efforts resulted in meaningful impacts and whether benefits from the outputs of IRRC's research outweigh the research investments. Hence, the objective of this study is to determine the multidimensional impacts (i.e., economic, sociocultural, environmental, policy, scientific, institutional) of the technologies developed and/or disseminated by IRRC, as well as document the pathways and mechanisms that led to successful adoption of these technologies. A "meta" impact assessment approach is used where the analysis of impact evidence mainly relies on existing documents (or studies), easily accessible data sources, and short field visits.

2013. 174 pages.
ISBN 978-971-22-0297-1
Available at: http://books.irri.org/9789712202971_content.pdf

EIRLSBN: Twenty years of achievements in rice breeding

Edited by: B.C.Y. Collard, A.M. Ismail, and B. Hardy



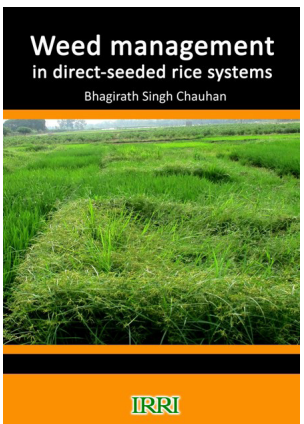
Eastern India is an area with a largely agrarian society and high poverty incidence. Rice is the dominant crop, but yields are low. Most of the rice is grown under rainfed conditions, in which rainfall is highly unpredictable and numerous abiotic and biotic stresses occur in combination during all growing seasons. Farmers have limited access to inputs such as fertilizer and good-quality seed. Despite these challenges, a progressive increase in rice production must be maintained, especially within the vast rainfed areas, if India and other Asian countries are to achieve food security.

Considerable progress has been made in developing new rice varieties for eastern India, although the literature on this topic is limited. Evidence for this is the development and release of many new improved varieties. At least 20 of these varieties have been released within the Eastern India Rainfed Lowland Shuttle Breeding Network (EIRLSBN). In addition to producing new varieties, this network has conducted considerable research on many high-priority traits and has identified new donor parents, key maturity groups for the region, elite lines that can be transplanted at normal or delayed times, and target variety profiles for eastern India. More importantly, the network has been an exemplary model for synergistic rice breeding partnerships. It demonstrates the benefits of regional and international scientific collaboration for working to overcome food insecurity. Indeed, it has influenced the formation and structure of many other breeding networks.

2013. 145 pages.
ISBN 978-971-22-0295-7
Available at: http://books.irri.org/9789712202957_content.pdf

Weed management in direct-seeded rice systems

B.S. Chauhan

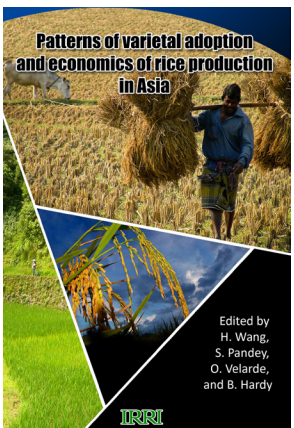


The area under direct-seeded rice systems is expected to increase in the future because of labor and water shortages. Weeds, however, are the major constraints to direct-seeded rice production. To achieve effective, long-term, and sustainable weed control in direct-seeded systems, there is a need to integrate different weed management strategies, such as the stale seedbed practice; rotation of different direct-seeded systems; use of crop residue as mulches; use of weed-competitive cultivars with high yield potential; appropriate flooding depth and duration; appropriate agronomic practices (row spacing, seeding rates, and manual or mechanical weeding); and appropriate herbicide mixtures, timing, and rotation.

2012. 20 pages.
ISBN 978-971-22-0294-0
Available at: http://books.irri.org/9789712202940_content.pdf

Patterns of varietal adoption and economics of rice production in Asia

Edited by: H. Wang, S. Pandey, O. Velarde, and B. Hardy



Improved varieties resulting from scientific research efforts will not have the desired impact unless target farmers ultimately adopt these varieties. Hence, it is important to understand the social and economic contexts of rice production in these countries for efficient targeting. This book aims to provide such socioeconomic context for rice production in key countries in Asia (Sri Lanka, Cambodia, and Pakistan) where the GSR project is being done. The various chapters in this book are based on household-level benchmark data on farmers' resource endowments, their livelihood strategies, rice production practices, technology adoption patterns, constraints to the adoption of existing improved technologies, gendered division of labor, and household income structures.

2012. 130 pages.
ISBN 978-971-22-0293-3
Available at: http://books.irri.org/9789712202933_content.pdf

Reaching resource-poor farmers: innovative partnerships in video-led extension

Edited by: N. Magor, A. Salahuddin, R. Gandhi, and B. Hardy

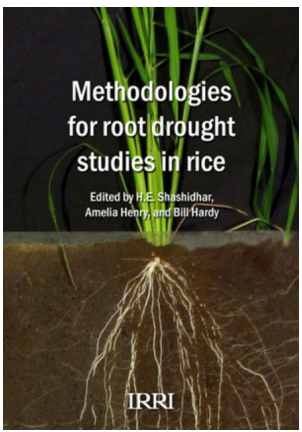
The Cereal Systems Initiative for South Asia (CSISA) seeks to reach large numbers of farmers, so collaborating with digitalGreen was seen as an opportunity to leverage its technology-enabled model and grass-roots-level partnerships with local extension agencies and rural communities to improve the efficiency and efficacy of the approach. An agreement for an initial 6-month pilot in Bihar was signed in September 2011. The pilot essentially aimed to establish a two-way knowledge exchange among CSISA, digitalGreen, an extension system, and the local community. The pilot involved 20 villages in Bihar in which digitalGreen had partnered with an extension system operated by an NGO, Action for Social Advancement (ASA), and linked with CSISA's Bihar hub as a resource for technologies.

This report documents the pilot and its review that culminated in a mini-workshop of the main actors and potential stakeholders in March 2012.

2012. 52 pages.
ISBN 978-971-22-0292-6
Available at: http://books.irri.org/9789712202926_content.pdf

Methodologies for root drought studies in rice

Edited by: H.E. Shashidhar, A. Henry, and B. Hardy



Root biology is at the forefront of progressing fields to improve agricultural productivity in low-input systems. Although there is a strong case for the role of roots in plant performance under drought stress, appropriate methods for evaluating them in relation to performance under drought (particularly in rice) are less clear-cut. There is also a strong need for advances in phenotyping to match the rapid progress in rice breeding and genotyping. Since rice research has historically emphasized irrigated environments, and because of the difficulties associated with studying roots, large gaps exist in our knowledge about root traits for drought-resistant rice. The research community needs a better understanding of the genetic variation in rice for drought response and root trait as well as practical methods for studying them.

The focus of this manual is the description of relatively high-throughput, low-cost, and precise root phenotyping techniques adopted by researchers across the world that have been developed for drought studies on rice. Field phenotyping protocols for root studies in precise drought-stress treatments, as well as a range of root phenotyping systems, are described. Protocols to associate root traits with other plant traits and productivity are also included.

2012. 65 pages.
ISBN 978-971-22-0290-2
Available at: http://books.irri.org/9789712202902_content.pdf

Advances in temperate rice research

Edited by: K.K. Jena and B. Hardy

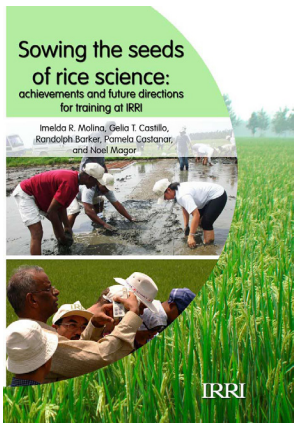
Several constraints limit rice production and productivity in temperate rice-growing countries and high-altitude regions in the tropics. Several million hectares of rice area in Africa, Asia, Australia, Europe, and North and South America are affected by low temperature every year, resulting in annual yield losses of 1–3.9 t/ha. Low temperature at the seedling stage damages boro rice production in Bangladesh and in high-altitude regions of Bhutan, Cambodia, Indonesia, and Nepal. The temperate rice germplasm accessions in some temperate countries such as Kazakhstan, North Korea, and Uzbekistan have narrow genetic diversity with low yield potential (2–3 t/ha). Biotic stresses such as blast and bacterial blight diseases affect rice production because of the disease-conducive environment in temperate as well as high-altitude regions.

Collaborative research related to increasing production in temperate and high-altitude regions is important for rice improvement. In the areas of higher latitude, the rice-growing season is characterized by long days, greater solar radiation than in the tropics, a greater diurnal temperature range with lower night temperature limiting respiration losses, and lower disease pressure. Under these conditions, yield potential is considerably higher than in the tropics. Research and sharing of information can therefore play a pivotal role in understanding how yield potential can be increased.

2012. 105 pages.
ISBN 978-971-22-0289-6
Available at: http://books.irri.org/9789712202896_content.pdf

Sowing the seeds of rice science: achievements and future directions for training at IRRI

I. Molina, G. Castillo, R. Barker, P. Castanar, and N. Magor



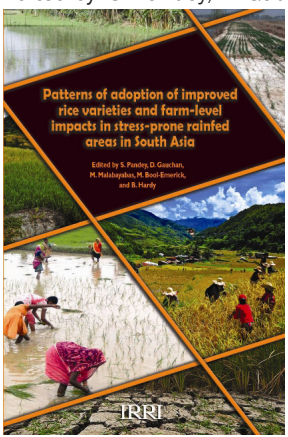
Human capacity building is the heart and soul of IRRI's past and future. For more than 50 years, IRRI has provided training to a total of 11,599 national scientists around the world, 22% of whom were female. More than 10,000 personnel benefited from nondegree training and about 1,600 were supported in their MS/PhD programs. No other center in the CGIAR has trained as many professionals. The result is that, in every corner of the rice-growing world, one can find personnel who have been to Los Baños.

IRRI management has from the very beginning recognized the need for training in both research and extension activities in order to achieve a sustained increase in rice production. Yet, until now, there has been no close examination of the training program. Our objective in this report has been to reconstruct the database, examine the trends and changes over time in training activities, and raise issues regarding the future of the training program.

2012. 66 pages.
ISBN 978-971-22-0288-9
Available at: http://books.irri.org/9789712202889_content.pdf

Patterns of adoption of improved rice varieties and farm-level impacts in stress-prone rainfed areas in South Asia

Edited by: S. Pandey, D. Gauchan, M. Malabayabas, M. Bool-Emerick, and B. Hardy

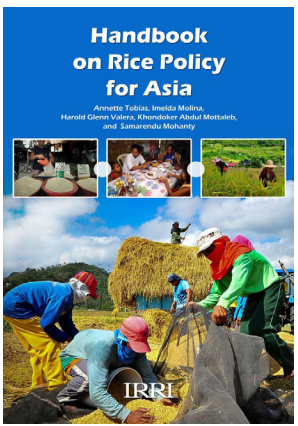


Rice is the main staple food and a major source of livelihood for more than 400 million people in South Asia (IRRI 2010). It accounts for 73% of the caloric intake in Bangladesh, 40% in Nepal, and 30% in India (FAOSTAT 2010). South Asia has about 37% of the world's total rice area, and approximately 50% of the rice-growing area in South Asia is rainfed (Dawe et al 2010). Rice is the only crop that grows well in large areas of wetlands in monsoon Asia. Most of these rainfed rice areas regularly suffer from various abiotic stresses such as droughts, floods, and salinity. The productivity of rice in these stress-prone rainfed environments is less than 3.0 t/ha (Pandey et al 2010). Historical rice productivity trends in three countries of South Asia (India, Bangladesh, and Nepal) show that growth in yield has been sluggish and unstable in rainfed areas because of the regular occurrence of abiotic and biotic stresses. Therefore, improving the productivity of rice through stress-tolerant technologies is a key entry point to enhance the income and livelihood of resource-poor farmers in these stress-prone environments.

2012. 318 pages.
ISBN 978-971-22-0287-2
Available at: http://books.irri.org/9789712202872_content.pdf

Handbook on rice policy for Asia

A. Tobias, I. Molina, H.G. Valera, K.A. Mottaleb, and S. Mohanty



Asian countries have similarities as well as dissimilarities as far as policy implementation is concerned. In general, food security is a main concern in all the countries. As a result, trade and domestic policies are largely the same; they all aim at providing high income to rice farmers while making prices reasonable to the public. Among the Asian countries, India has the most trade policies implemented. Measures can be categorized under trade support through import and export controls, stock policy, production subsidy through price support and input subsidy, direct income payments, and consumption subsidies.

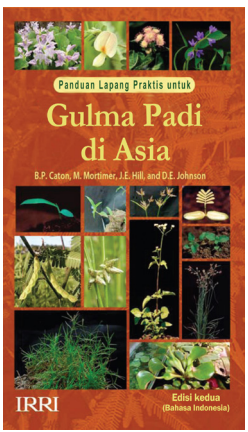
A majority of the Asian economies procure through state-owned enterprises (SOEs), particularly India, Pakistan, Nepal, China, Japan, South Korea, Vietnam, Cambodia, Indonesia, Lao PDR, Malaysia, and the Philippines. Generally, the SOEs have substantial control in procurement in order to stabilize domestic prices and control foreign trade.

Among all regions in Asia, India has been providing the most subsidies to rice farmers. These subsidies not only provide an incentive for farmers to produce more but also help in raising farmers' income. Subsidies also make rice prices cheaper through expanded production, mainly through the expansion of area.

2012. 47 pages.
ISBN 978-971-22-0285-8
Available at: http://books.irri.org/9789712202858_content.pdf

Panduan Lapang Praktis - Gulma Padi di Asia (A practical guide to weeds of rice in Asia)
Bahasa Indonesia version

B.P. Caton, M. Mortimer, J.E. Hill, and D.E. Johnson



Weed infestations are a concern of every farmer. Depending on the type of rice production system, farmers across Asia often contend with the same or similar weed species. This group of species is relatively small, but of great importance, and includes many of the "world's worst weeds."

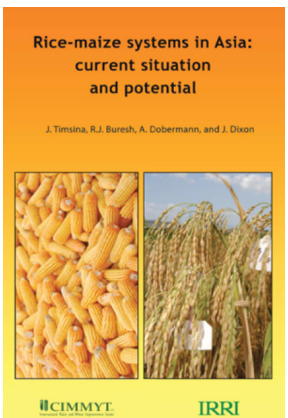
This guide tried to collect practical information about some of the most common weeds of rice in Asia. The guide contains information about the botany, ecology, herbicide resistance, and cultural control of these species in a short text that should be easy to use in the field. It also includes pictures to aid in early and accurate species identification.

The goal is to give farmers, extension agents, researchers, and others a practical in-field means of assessing weed control problems and, when possible, to provide strategies for improving integrated weed management in rice systems. This guide will help farmers better understand the relationships among land preparation, rice establishment methods, and early-season water management practices that often strongly influence the weed species that infest their rice fields.

2010. 118 pages.
ISBN 978-971-22-0284-1
Available at: http://books.irri.org/9789712202841_content.pdf

Rice-maize systems in Asia: current situation and potential

J. Timsina, R.J. Buresh, A. Dobermann, and J. Dixon



Recognizing the importance of diversifying cropping systems in Asia and the need for system-level research to support new opportunities for agricultural development, IRRI and CIMMYT scientists, in collaboration with NARES partners, have begun work on R-M (rice-maize) systems in many Asian countries. This report contains information on a strategic assessment of R-M systems for 29 selected sites representing diverse soils, climate, and agroecosystems across nine countries in Asia (Bangladesh, China, India, Indonesia, Nepal, Pakistan, the Philippines, Thailand, and Vietnam). Conducted jointly by IRRI and CIMMYT, the process involves regional and site-level biophysical assessment, supported by socioeconomic evaluation using economic data at the regional level and some microeconomic data. Biophysical assessment includes agroecosystem characterization of R-M systems, analysis of historical daily climatic data, and regional-level prediction of yield potential for the 29 sites. The study then provides a detailed analysis of 10 selected sites to understand existing cropping systems, identify alternative potential systems, and explore measures to optimize these.

2011. 232 pages.
ISBN 978-971-22-0263-6
Available at: http://books.irri.org/9789712202636_content.pdf

Guide to participatory varietal selection for submergence-tolerant rice

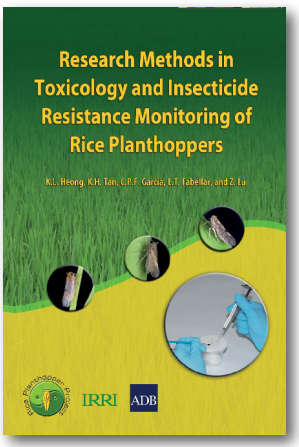
T. Paris, D. Manzanilla, G. Tatlonghari, R. Labios, A. Cueno, and D. Villanueva

Participatory varietal selection (PVS) is a simple way for breeders and agronomists to learn which varieties perform well on-station and on-farm and to obtain feedback from potential end users in the early phases of the breeding cycle. It is a means for social scientists to identify the varieties that most men and women farmers prefer, including the reasons for their preference and constraints to adoption. Based on IRRI's experience in collaboration with national agricultural research and extension system partners and farmers, PVS, which includes "researcher-managed" and "farmer-managed" trials, is an effective strategy for accelerating the dissemination of stress-tolerant varieties. PVS has also been instrumental in the fast release of stress-tolerant varieties through the formal varietal release system. This guide on PVS will complement the various training programs given by IRRI for plant breeders, agronomists, and extension workers engaged in rice varietal development and dissemination.

2011. 111 pages.
ISBN 978-971-22-0262-9
Available at: http://books.irri.org/9789712202629_content.pdf

Research methods in toxicology and insecticide resistance monitoring of rice planthoppers

K.L. Heong, K.H. Tan, C.P.F. Garcia, L.T. Fabellar, and Z. Lu



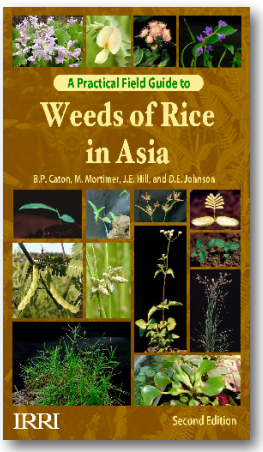
Developing a common standardized methodology and national training program for partners to conduct appropriate and meaningful in situ toxicological tests were adopted. Collaborators in a resistance monitoring network meet at least once a year to review methods, data, and interpretations. In addition to collecting standardized data sets that can be compared, this approach also develops local capacity and the skills of national scientists in insecticide toxicology.

This book describes the standardized methodology developed with step-by-step illustrations wherever appropriate. The first two chapters provide readers with an introduction to insect toxicology involving insect biochemistry, genetics, and physiology related to insecticide mode of action and resistance. Chapter 3 discusses quantal response data and toxicological statistics. Here, we draw heavily from the works of Finney (1977), Busvine (1971), and Robertson et al (2005) to provide readers with some basics in quantal response data and toxicological statistics. Chapter 4 describes the whole process involved in collecting specimens from the field, rearing them in an insectary, and preparing standardized test insects. In Chapter 5, preparation of a stock solution from technical-grade insecticide based on active ingredient and the test solutions used for insecticide application are discussed. Also discussed are tropical application, the use of recovery cages, and posttreatment conditions for test insects.

2011. 101 pages.
ISBN 978-971-22-0260-5
Available at: http://books.irri.org/9789712202605_content.pdf

A practical field guide to weeds of rice in Asia

B.P. Caton, M. Mortimer, J.E. Hill, and D.E. Johnson



Weed infestations are a concern of every farmer. Depending on the type of rice production system, farmers across Asia often contend with the same or similar weed species. This group of species is relatively small, but of great importance, and includes many of the "world's worst weeds."

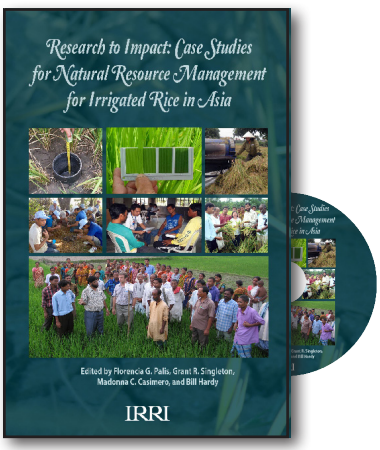
This guide tried to collect practical information about some of the most common weeds of rice in Asia. The guide contains information about the botany, ecology, herbicide resistance, and cultural control of these species in a short text that should be easy to use in the field. It also includes pictures to aid in early and accurate species identification.

The goal is to give farmers, extension agents, researchers, and others a practical in-field means of assessing weed control problems and, when possible, to provide strategies for improving integrated weed management in rice systems. This guide will help farmers better understand the relationships among land preparation, rice establishment methods, and early-season water management practices that often strongly influence the weed species that infest their rice fields.

2010. 118 pages.
ISBN 978-971-22-0256-8
Available at: http://books.irri.org/9789712202568_content.pdf

Research to impact: case studies for natural resource management for irrigated rice in Asia

Edited by F.G. Palis, G.R. Singleton, M.C. Casimero, and B. Hardy



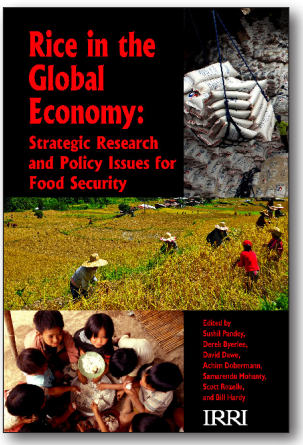
The lives of resource-poor farmers who grow irrigated rice in Asia can no doubt improve if innovative agricultural technologies are tailored to their needs and carried out collectively. Establishing synergy among various rice stakeholders, including scientists and farmers, is a key to helping resource-poor farmers increase food security, profitability, and environmental sustainability.

To facilitate the journey from research to outcome to impact, the third phase (2005-08) of the Irrigated Rice Research Consortium (IRRC) of the International Rice Research Institute (IRRI) provided an international partnership platform for adaptive research for impact in 11 countries in Asia. The IRRC, with funding support from the Swiss Agency for Development and Cooperation, has the role as IRRI's facilitator of working with various rice stakeholders in the intensive irrigated lowlands to foster multistakeholder partnerships, bridge the gap between research and extension, and together address the regional and country-specific needs and problems in irrigated rice production. In September 2008, the IRRC organized a regional workshop at the Philippine Rice Research Institute in Nueva Ecija to synthesize field experiences and distill the lessons learned from Phase III. This workshop provided a dynamic sharing of experiences that are rarely well captured in literature. Presentations of this workshop have been documented in this book.

2010. 370 pages.
ISBN 978-971-22-0259-9.
Available at: http://books.irri.org/9789712202599_content.pdf
(available CD)

Rice in the global economy: strategic research and policy issues for food security

Edited by S. Pandey, D. Byerlee, D. Dawe, A. Dobermann, S. Mohanty, S. Rozelle, and B. Hardy



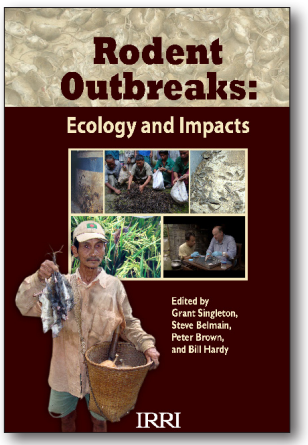
This book presents a new vision for the future of rice farming. The book is forward-looking and addresses the key strategic questions in the context of major developments in the global economy. Some of the strategic questions follow: (1) How does the role of rice change with economic growth? (2) Will rice be produced mainly on small or large farms; in irrigated or rainfed ares? (3) How will the increasing scarcity of labor affect the organization of rice production? (4) Can the poor depend on rice trade for stable food security? (5) Will Africa become the new growth center for rice? (6) What impact will climate change have on the way rice will be grown in the future? and (7) What are the key global and regional priorities for rice research and policy reforms? The various contributions in this book examine these questions in the context of major global trends.

The book consists of 18 chapters organized into four thematic sections: (1) rice in the global food economy, (2) organization of rice production and postharvest operations and input efficiency, (3) evolving rice market structure, and (4) technological opportunities and the role of R&D policies.

2010. 477 pages. 15.3 x 22.9 cm.
ISBN 978-971-22-0258-2.
Available at: http://books.irri.org/9789712202582_content.pdf

Rodent outbreaks: ecology and impacts

Edited by G.R. Singleton, S.R. Belmain, P.R. Brown, and B. Hardy

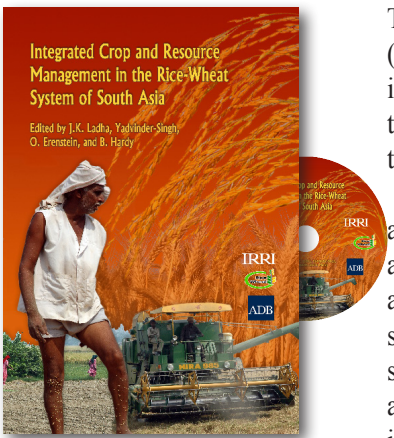


Population outbreaks of rodents in the rice-cropping systems of Asia have escalated. There has been precious little formal documentation of the factors that lead to rodent population outbreaks, their impacts, and the successes and failures of management actions, particularly in developing countries. The authors bing together in this publication a more complete picture of rodent outbreaks and their implications. The book examines case studies of the recent rodent outbreaks in Asia with a view to drawing generalities. However, an added strength of the book is that it goes beyond the rice ecosystems of Asia and ventures into other ecosystems in Australia, New Zealand, East Africa, Europe, and North America, to allow readers to compare the factors that generate outbreaks of rodent populations in five continents.

2010. 289 pages.
ISBN 978-971-22-0257-5.
Available at: http://books.irri.org/9789712202575_content.pdf

Integrated crop and resource management in the rice-wheat system of South Asia

Edited By J.K. Ladha, Yadvinder-Singh, O. Erenstein, and B. Hardy



This publication review and document the history and impact of the Asian Development Bank (ADB) in the initiation and subsequent support for the Rice-Wheat Consortium (RWC). This includes assessing the qualitative importance of ADB contributions in shaping and maintaining the RWC and the quantitative importance of ADB's contributions in absolute and relative terms.

The origin of the rice-wheat systems research in the Indo-Gangetic Plains are discussed, along with early efforts to introduce wheat zero-tillage after rice. Then, a description of how an institutional structure for rice-wheat research was formed, how this structure evolved into an Ecoregional Program (the RWC), and the role played in this process by ADB. Also, the successful launched of the zero-tillage, and the role of the RWC in making this happen. The story continues on how the RWC used the model of zero-tillage as a means of introducing a wider range of resource-conserving technologies (RCTs). In each stage of the history, the influence of successive ADB projects on RWC priorities is explored, the level and timing of ADB support are analyzed, and the extent to which Consortium success can be attributed to ADB is discussed. Concluding sections summarizes the financial underpinnings of the RWC and the special contribution of ADB.

2009. 395 pages.
ISBN 978-971-22--0247-6.
Available at: http://books.irri.org/9789712202476_content.pdf
(available CD)

Planthoppers: new threats to the sustainability of intensive rice production systems in Asia

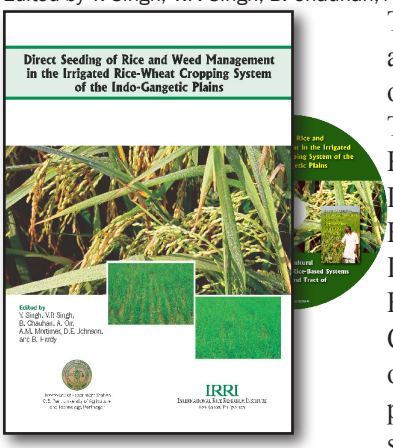
Edited by K.L. Heong and B. Hardy

This book provides summaries and analyses of key works and issues related to development in research on the biology and ecology of planthoppers and provides details on management approaches. It has 19 chapters. Of these, 17 are from papers presented at the International Conference on Planthoppers – new threats to the sustainability of intensive rice production systems in Asia held at the International Rice Research Institute (IRRI), Los Baños, Philippines, in June 2008. The aim of this book is to help shift paradigms in planthopper management and chart new sustainable approaches that will reduce the vulnerability of farmers' rice fields to hopper burn, virus infections, and economic losses.

2009. 460 pages.
ISBN 978-971-22-0251-3.
Available at: http://books.irri.org/9789712202513_content.pdf
(available CD)

Direct seeding of rice and weed management in the irrigated rice-wheat cropping system of the Indo-Gangetic Plains

Edited by Y. Singh, V.P. Singh, B. Chauhan, A. Orr, A. M. Mortimer, D.E. Johnson, and B. Hardy



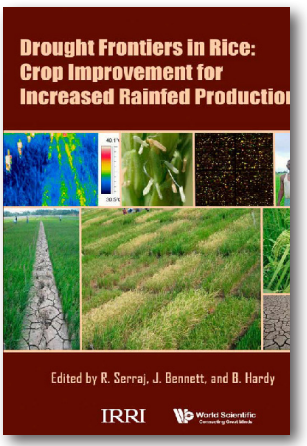
This publication is a compilation of papers presented in a workshop by scientists from agricultural state universities located in the Indo-Gangetic Plains (G.B. Pant University of Agriculture and Technology, Pantnagar; Narendra Deva University of Agriculture and Technology, Faizabad; Chandra Shekhar Azad University of Agriculture and Technology, Kanpur; Rajendra Agricultural University, Bihar), national research institutes (Project Directorate for Cropping Systems Research, Modipuram; Directorate of Rice Research, Hyderabad; Directorate of Wheat Research, Karnal; WTC, Indian Agricultural Research Institute, New Delhi; NRC Weed Control, Jabalpur), International Rice Research Institute, Los Baños, Philippines; Natural Resources Institute, UK; University of Liverpool, UK; Rice-Wheat Consortium, New Delhi; non-government organizations; herbicide companies; and farmers of Uttaranchal, Uttar Pradesh, and Bihar. The workshop covered the major aspects of rice production—methods of rice establishment, weeds and weed management in different cropping systems, water management, varieties suited to direct seeding, rice quality, and socioeconomic issues.

The book will be of great help to all stakeholders of direct-seeded rice in the irrigated rice-wheat system and will help promote these technologies, which are cost-effective, save labor and water, and increase farmers' profit.

2008. 272 pages.
ISBN 978-971-22-0236-0.
Available at: http://books.irri.org/9789712202360_content.pdf
(available CD)

Drought frontiers in rice: crop improvement for increased rainfed production

Edited by R. Serraj, J. Bennett, and B. Hardy



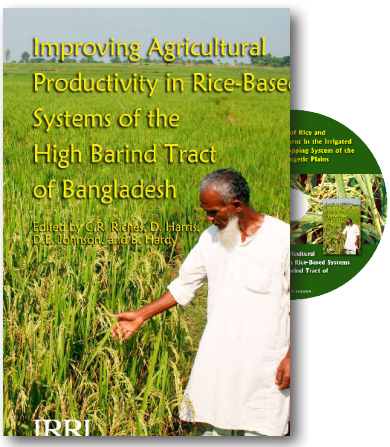
Drought is the major constraint to rice production in rainfed areas across Asia and sub-Saharan Africa. At least 23 million hectares (20% of rice area) are potentially affected in Asia alone. Frequent droughts result in enormous economic losses and have long-term destabilizing socioeconomic effects on resource-poor farmers and communities.

In this publication, the appropriate research agenda for the Drought Frontier Project was to discuss scaling-up of gene detection and delivery for use in marker-aided breeding. The International Rice Research Institute established a planning workshop for this project. This workshop aims to (1) assess the current status and future challenges facing rice cultivation in drought-prone environments; (2) review the recent progress, breakthroughs, and potential impact of drought research in rice and other tropical crops; (3) identify priority research areas and state-of-the-art methodologies and approaches to tackle drought challenges; and (4) establish a research consortium and an integrated research strategy on drought resistance in rice.

2008. 400 pages.
ISBN 978-971-22-0237-7.
Available at: http://books.irri.org/9789712202377_content.pdf

Improving agricultural productivity in rice-based systems of the High Barind Tract of Bangladesh

Edited by C.R. Riches, D. Harris, D.E. Johnson, and B. Hardy



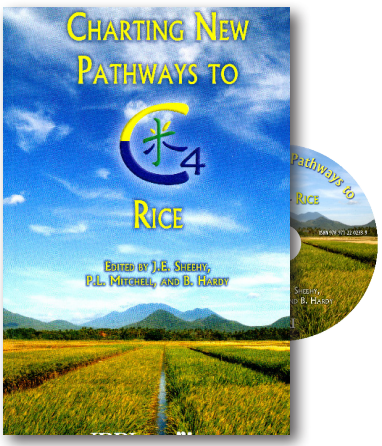
The High Barind Tract of northwest Bangladesh is an area of low and erratic rainfall with limited irrigation potential. Cost-effective ways of increasing the productivity of both rice and rabi crops have been developed. The challenge now is to disseminate that information to farmers in the Barind to increase the reliability and productivity of agriculture in this marginal cropping area and to ensure food security and income from agriculture. A workshop was organized for this purpose. It discussed the application of validated technologies to the High Barind Tract and identified opportunities and requirements for enhancing the scaling-up of these technologies in extension programs.

This book provides information on the application of validated technologies. It discussed opportunities for improving rice and rabi crop production in the High Barind Tract. The last two chapters discuss the experiences of technology development for this highly variable rainfed environment.

2008. 215 pages.
ISBN 978-971-22-0229-2.
Available at: http://books.irri.org/9789712202292_content.pdf
(available CD)

Charting new pathways to C4 rice

Edited by J.E. Sheehy, P.L. Mitchell, and B. Hardy

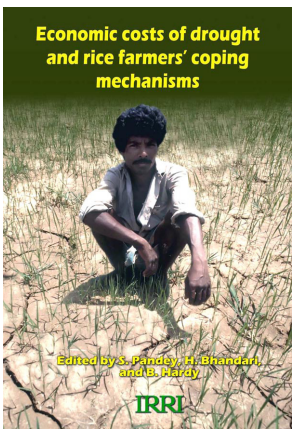


World-renowned experts offer special insights into the various forms of C4 photosynthesis, and how they might be introduced to rice. There are differences of opinion (contrasting hypotheses) between scientists as to which form of C4 photosynthesis (single-cell and dual-cell systems) can be achieved most rapidly in rice and the ultimate effectiveness of the different forms in delivering significant yield. This book explores those differences. It begins with a broad perspective of the economic problems surrounding rice and the potential impact of failing to contain upward pressure on food prices on the poor. This book also provides critical discussion and evaluation of the new pathways to C4 rice. As a result, IRRI has formed a C4 Rice Consortium to stimulate and conduct the research needed to invent C4 rice.

2007. 422 pages.
ISBN 978-971-22-0216-2.
Available at: http://books.irri.org/9789712202162_content.pdf
(available CD)

Economic costs of drought and farmers' coping mechanisms

Edited by S. Pandey, H. Bhandari, and B. Hardy

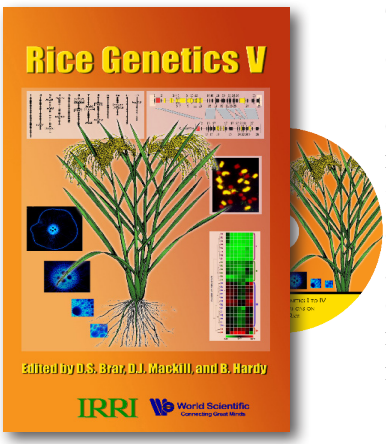


The nature and frequency of drought in subhumid regions, its impact on farmers' livelihoods, farmers' drought-coping strategies, and the welfare implications of drought have not been adequately studied. Analyses of drought characteristics, drought impacts, and household coping mechanisms are important for understanding the nature of risk and vulnerability associated with drought and for formulating various interventions for effective drought mitigation. This book examine these issues through a cross-country comparative study of the impact of drought and farmers' coping mechanisms. The countries included in the study are China, Thailand, and India. These countries vary in climatic conditions, level of economic development, rice yield, and institutional and policy contexts of rice farming. Comparative analyses of the impact of drought and responses from these varying conditions can provide better insights than studies of individual countries conducted separately.

2007. 203 pages.
ISBN 978-971-22-0212-4.
Available at: http://books.irri.org/9789712202124_content.pdf

Rice Genetics V

Edited by D.S. Brar, D.J. Mackill, and B. Hardy

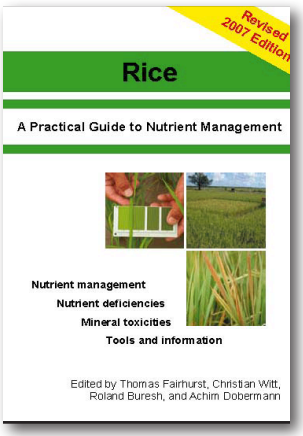


The Fifth International Rice Genetics Symposium held in 19-23 November 2005, which was attended by 710 registered participants from 38 countries and featured 26 plenary lectures in six sessions, 54 contributory papers in eight concurrent sessions, and 431 poster presentations on different aspects of rice genetics. Various sessions provided an important forum for reviewing the latest advances in rice research and for in-depth discussion and exchange of information on classical genetics, genetic diversity, molecular mapping of gene/QTLs for biotic and abiotic stresses, single nucleotide polymorphisms and novel molecular markers, applied genetics, transformation, genome organization, gene isolation, regulation of gene expression, and functional genomics. The symposium also featured four workshops: on temperate rice, reproductive biology, Oryza map alignment and alien introgression, and genetics of insect resistance.

2007. 355 pages.
ISBN 978-971-22-0213-1
Available at: http://books.irri.org/9789712202131_content.pdf
(available CD)

Rice: a practical guide to nutrient management

Edited by T. Fairhurst, C. Witt, R. Buresh, and A. Dobermann



In the last five years, site-specific nutrient management (SSNM) for rice has become an integral part of initiatives on improving nutrient management in many Asian countries. Nutrient recommendations were tailored to location-specific needs, evaluated together with rice farmers, and promoted through public and private partnerships on a wide-scale.

Over the years, SSNM has been continually refined through research and evaluation as part of the Irrigated Rice Research Consortium. Conceptual improvements and simplifications were made particularly in nitrogen management. A standardized 4-panel leaf color chart (LCC) was produced and the promotion of the new LCC continues with more than 250,000 units distributed until the end of 2006. The revised edition of the practical guide thus became necessary to be consistent with newer information and local training materials. We are pleased that this 2nd edition is about to be translated into a number of languages including Bangla, Chinese, Hindi, Indonesian, and Vietnamese.

This pocket-sized guide introduces the concept of yield gaps and the underlying constraints. The functions of each nutrient are explained in detail, with a description of the deficiency symptoms and recommended strategies for improved nutrient management. The 47-page color annex provides a pictorial guide to the identification of nutrient deficiencies in rice.

2007. 136 pages.
ISBN 978-981-05-7949-4
Available at: http://books.irri.org/9789810579494_content.pdf

Technologies for improving rural livelihoods in rainfed systems in South Asia

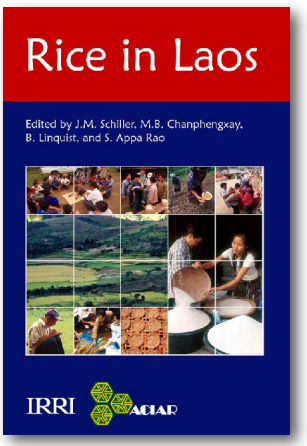
Edited by Z. Islam, M. Hossain, T. Paris, B. Hardy, and J. Gorsuch

The project "Accelerating Technology Adoption to Improve Rural Livelihoods in the Rainfed Eastern Gangetic Plains" jointly administered by CGIAR centers (IRRI, CIMMYT, and ICRAF), led to the production of this document. It contains three major sections (A) *project implementation*, which briefly describes how the project was implemented and the benefits of adopting the technologies selected for scaling up; (B) *case stories*, which recounts successful cases; and (C) *Technical Advisory Notes* (TANs), which covers diverse categories of technologies such as cropping systems, improved varieties, crop establishment methods, and nutrient management and technologies that provide supplementary income for landless and marginal farmers. This document will be useful in improving the livelihoods of the rural poor of South Asia.

2007. 124 pages.
ISBN 978-971-22-0217-9
Available at: http://books.irri.org/9789712202179_content.pdf

Rice in Laos

Edited by J.M. Schiller, M.B. Chanphengxay, B. Linguist, and S. Appa Rao

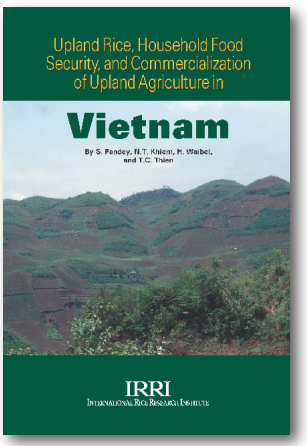


Rice has long been the most important food crop cultivated in Laos. This book helps document the long association of Laos and its people with rice in historical, cultural, and agricultural contexts and provides a summary of some of the more salient recent advances in rice-related research undertaken since 1990. It is the result of a collaborative effort among international scientists and scholars, and researchers within Laos, with the support of the Australian Centre for International Agricultural Research (ACIAR) and IRRI.

2006. 457 pages.
ISBN 971-22-0211-9
Available at: http://books.irri.org/9712202119_content.pdf

Upland rice, household food security, and commercialization of upland agriculture in Vietnam

S. Pandey, N.T. Khiem, H. Waibel, and T.C. Thien



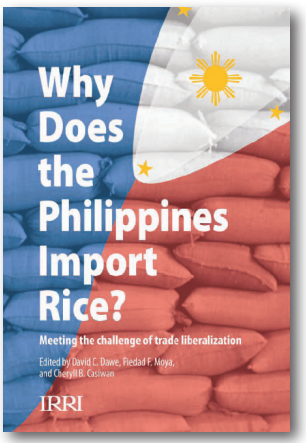
Large parts of the Asian uplands are characterized by high incidence of poverty, poor physical access to markets, ill-functioning marketing institutions, and subsistence-oriented agriculture with low productivity. Given the importance of rice as a staple crop, interventions that increase rice productivity can serve as a critical entry point in initiating and reinforcing the process of agricultural growth and income generation in uplands.

This research monograph, based on a detailed microeconomic study of rice farmers in the uplands of northern Vietnam, throws light on the role of upland rice in farmers' livelihood systems in this remote area that is still lagging behind in development. The findings of this study will be helpful in both guiding rice research for productivity enhancement and formulating policy interventions for encouraging an inclusive and pro-poor growth process.

2006. 106 pages.
ISBN 978-971-22-0210-0
Available at: http://books.irri.org/9789712202100_content.pdf

Why does the Philippines import rice? Meeting the challenge of trade liberalization

Edited by D.C. Dawe, P.F. Moya, and C.B. Casiwan



A perpetual question on the minds of many Filipinos is "Why do we import rice?" This book points to geography—the Philippines imports rice because it is a nation of islands without any major river deltas like those in Thailand and Vietnam, the world's top two rice exporters.

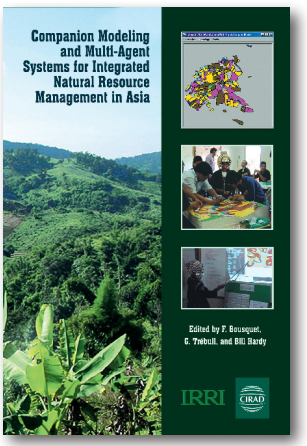
The authors also point out that trade liberalization does not necessarily translate into more imports. Rather, it means that the price for a specific commodity inside a country (the domestic price) becomes the same as the price for that same commodity outside the country (the world price), after taking account of the exchange rate and transportation costs.

This book promises to be an enlightening read to those interested in the effects of trade liberalization on the poor. Although written by experts on the rice economy, it is a must-read for the general public.

2006. 166 pages.
ISBN 978-971-22-0209-4.
Available at: http://books.irri.org/9789712202094_content.pdf

Companion modeling and multi-agent systems for integrated natural resource management in Asia

Edited by F. Bousquet, G. Trebuil, and B. Hardy

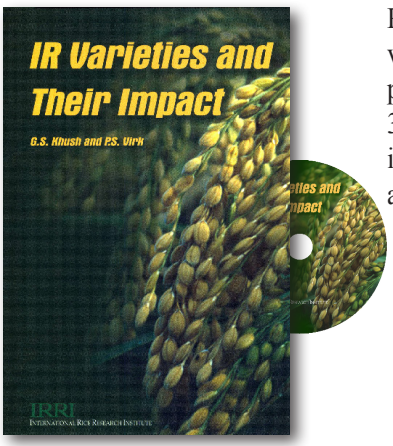


The International Rice Research Institute, the Center for International Cooperation in Agricultural Research for Development (CIRAD), and other CGIAR centers are working constantly to develop innovative methodologies based on new approaches and paradigm shifts. This publication presents breakthroughs in research on integrated natural resource management (INRM) —spatial modeling and adaptive management of renewable resources are key findings—based on a 2001-2004 companion modeling project in Thailand. It recommends that INRM projects are defined in a collaborative and equitable manner with all relevant stakeholders and partners. It generates new knowledge as international/regional public goods based on both indigenous knowledge and modern science. The INRM projects also effectively communicate and disseminate results and conclusions to all stakeholders and reform and strengthen institutions from local to policy levels.

2005. 360 pages.
ISBN 9799712202086.
Available at: http://books.irri.org/9712202089_content.pdf

IR varieties and their impact

G.S. Khush and P.S. Virk



Rice scientists, journalists, and historians often search for information on Green Revolution varieties of rice. In this sourcebook, World Food Prize Laureate, Dr. Gurdev S. Khush, and premier IRRI plant breeder, Dr. Parminder S. Virk, summarize the available information on 34 IR varieties. The book lists 328 IR breeding lines released as 643 varieties in 75 countries, irrespective of geographic location or ideology. It is estimated that 60 percent of the world rice area today is planted to IRRI-bred varieties or their progenies.

2005. 163 pages.
ISBN 971-22-0206-2.
Available at: http://books.irri.org/9712202062_content.pdf
(available CD)

New approaches to gall midge resistance in rice: proceedings of the international workshop

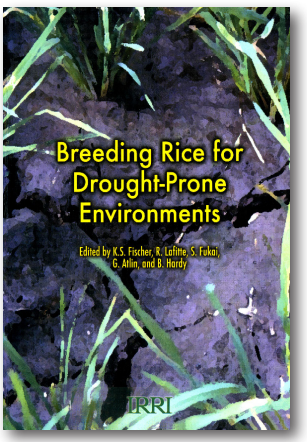
Edited by J. Bennett, J.S. Bentur, I.C. Pasalu, and K. Krishnaiah

This book represents the proceedings of a workshop titled "New Approaches to Gall Midge Resistance" jointly organized by the Directorate of Rice Research, in Hyderabad, India and IRRI. The papers in the volume provide an excellent opportunity for scientists to read about the many years of research experience on a significant and continuing problem that is the gall midge. The Asian rice gall midge and the African rice gall midge are the major dipteran pests of rice. The proceedings covers the status of gall midge research in various countries, including the biology and ecology of the pest, genetics and breeding for resistance using DNA-based marker-aided selection, use of DNA fingerprinting for determining relatedness and diversity of gall midge and the mechanism of sex determination, and other important related research aspects.

2005. 195 pages.
ISBN 971-22-0198-8.
Available at: http://books.irri.org/9712201988_content.pdf
(available CD)

Breeding rice for drought-prone environments

Edited by K.S. Fischer, R. Lafitte, S. Fukai, G. Atlin, and B. Hardy

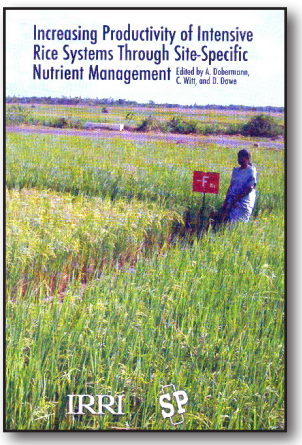


This is a manual that aims to help plant breeders develop rice varieties for drought-prone environments. Many of the world's poorest farmers work in rainfed areas where water supplies are unpredictable and droughts are common. In Asia, about half of all the rice land is rainfed. While rice yields in irrigated systems have doubled and tripled over the past 30 years, only modest gains have occurred in rainfed rice because of the complexity of improving rice varieties for changeable environments and the small investment made so far in breeding rice for drought tolerance. Drought tolerance must be integrated with mainstream breeding programs addressing agronomic adaptation, grain quality, and pest and disease resistance. This manual, prepared in collaboration with the University of Queensland, amplifies and updates the section on drought tolerance in the IRRI book Rainfed lowland rice improvement (Mackill et al 1996).

2004. 98 pages.
ISBN 971-22-0189-9.
Available at: http://books.irri.org/9712201899_content.pdf

Increasing productivity of intensive rice systems through site-specific nutrient management

Edited by A. Dobermann, C. Witt, and D. Dawe

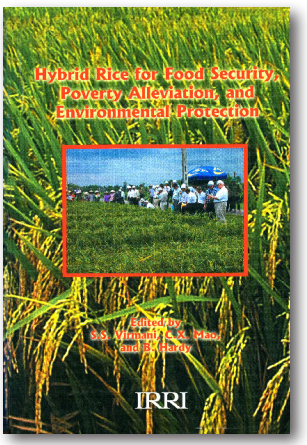


Yield gains have slowed in recent years, particularly among early adopters of Green Revolution technologies. Although scientists are developing new germplasm to raise existing yield ceilings, future yield increases are likely to be smaller than in the past and will require more knowledge-intensive forms of soil and crop management that improve input efficiency and, at the same time, protect the environment. The integrated and efficient use of nutrients is one of the key issues for sustainable resource management in intensive rice systems. After reviewing the economics of rice production and productivity trends in Asia, most of the book presents the principles of site-specific nutrient management SSNM and the results of the first phase of field-testing at numerous sites in Asia. This book demonstrates how long-term commitment to interdisciplinary on-farm research forges promising generic solutions for resource management. As new tools such as a nutrient decision support system and a Practical guide for nutrient management (Fairhurst and Witt 2002) have been developed, the theoretical development of new nutrient management concepts continues.

2004. 410 pages.
ISBN 971-22-0187-2.
Available at: http://books.irri.org/9712201872_content.pdf

Hybrid rice for food security, poverty alleviation, and environmental protection

Edited by S.S. Virmani, C.X. Mao, and B. Hardy

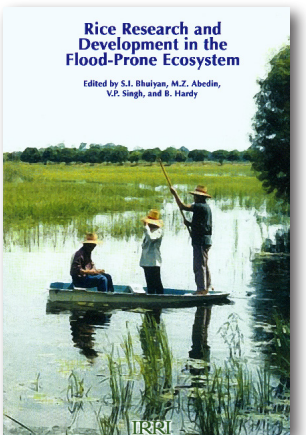


This publication offers papers covering progress made since 1996 in hybrid rice breeding methodologies, biotechnological applications, seed production, agronomic management, and technology dissemination. Hybrid rice technology was successfully developed in China during 1964-75, where it is grown on half of the country's 30 million ha of rice area. It is now under development in some 20 other countries, with 800,000 ha currently under rice hybrids in Vietnam, India, Philippines, Bangladesh, Indonesia, Myanmar, and the United States. This technology enables farmers to produce more rice per hectare and hour of labor, and so contributes to improved grain yields and farmers' income while creating rural employment in hybrid seed production. Having contributed significantly toward improved food security and environmental protection in China, hybrid rice also has good prospects in other countries. The papers in this book were presented at the 4th International Symposium on Hybrid Rice held in Hanoi, Vietnam, 14-17 May 2002, which was attended by 187 participants from 19 countries and three international agencies (IRRI, the Food and Agriculture Organization, and the Asia-Pacific Seed Association).

2004. 401 pages.
ISBN 971-22-0188-0
Available at: http://books.irri.org/9712201880_content.pdf

Rice research and development in the flood-prone ecosystem

Edited by S.I. Bhuiyan, M.Z. Abedin, V.P. Singh, and B. Hardy

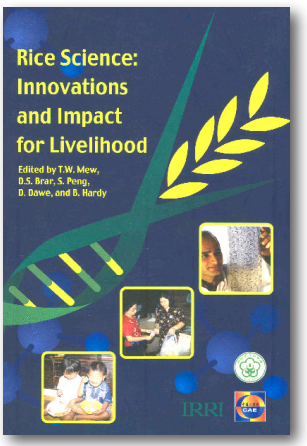


This publication presents papers and major recommendations from an international workshop on Rice Research and Development in the Flood-Prone Rice Lands of South and Southeast Asia in Gazipur, Bangladesh. Participants discussed the hydrological, biological, agronomic, and socioeconomic perspectives of flood-prone rice environments; the challenges, possibilities and strategies for improving the productivity of rice lands in flood-prone environments; and issues and strategies for action. The flood-prone ecosystem consists of basins and lowland areas adjacent to rivers in the humid and subhumid tropics and in coastal areas subject to tide-induced flooding. This ecosystem is important for many rice-producing countries in South and Southeast Asia, where more than 11 million ha are prone to uncontrolled flooding. Globally, the flood-prone ecosystem accounts for 9% of total rice lands, but in India, Bangladesh, Myanmar, Vietnam, and Thailand, it can represent more than a quarter of total rice lands.

2004. 284 pages.
ISBN 971220197X
Available at: http://books.irri.org/971220197X_content.pdf

Rice science: innovations and impact for livelihood

Edited by T.W. Mew, D.S. Brar, S. Peng, D. Dawe, and B. Hardy

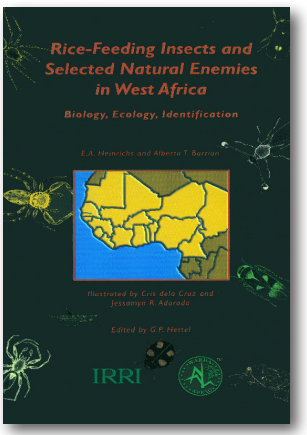


This is the proceedings of the 24th International Rice Research Conference, held as part of the 1st International Rice Congress in Beijing, 16-20 September 2002. Dedicated to Gurdev Khush, whose work with many collaborators has provided more rice for millions, the volume contains selected papers presented at the conference, along with Chinese President Jiang Zemin's opening address and some keynote speeches. The papers report on the latest in cutting-edge rice research conducted by some of the world's most distinguished agricultural scientists.

2004. 1022 pages.
ISBN 971-22-0184-8
Available at: http://books.irri.org/9712201848_content.pdf

Rice-feeding insects and selected natural enemies in West Africa: biology, ecology, identification

E.A. Heinrichs and A.T. Barrion

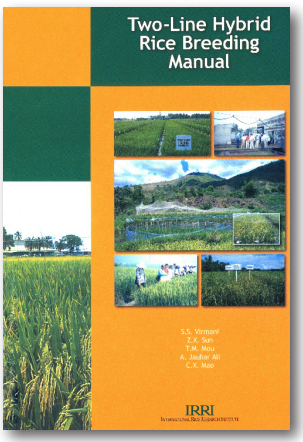


This book provides the first comprehensive taxonomic keys to West African rice-feeding insects and their natural enemies. West African rice farmers face many constraints in their quest to increase rice production. As cropping intensity and cultural practices change to meet production needs in the region, it will be important to avoid the problem of increased pest pressure. With 600 hand-drawn illustrations, the book describes the presence and abundance of important insects and spiders in the various climatic zones and rice ecosystems of West Africa. This collaborative work, highly recommended for researchers, extension workers, academics, and trainers, combines the unique knowledge and expertise of two sister CGIAR centers, IRRI and WARDA.

2004. 242 pages.
ISBN 971-22-0190-2.
Available at: http://books.irri.org/9712201902_content.pdf

Two-line hybrid rice breeding manual

S.S. Virmani, Z.X. Sun, T.M. Mou, A. Jauhar Ali, C.X. Mao

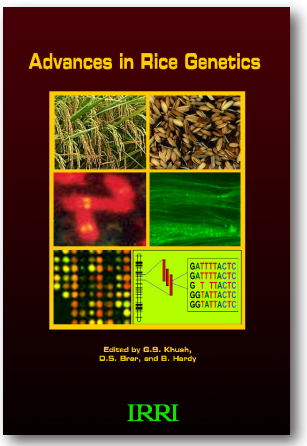


This manual describes concepts and procedures in a stepwise manner for easy learning of the two-line hybrid rice breeding technique. Breeding hybrid rice requires several concepts, skills, and procedures that are strikingly different from those used in breeding inbred rice. The availability of adequately trained technicians is an essential prerequisite for developing and using this technology. Experienced hybrid rice scientists from China and IRRI prepared this manual, which is expanded from IRRI's earlier Hybrid Rice Breeding Manual (Virmani 1997).

2004. 88 pages.
ISBN 971-22-0185-6.
Available at: http://books.irri.org/9712201856_content.pdf

Advances in rice genetics

Edited by G.S. Khush, D.S. Brar, and B. Hardy



In order to meet the growing food need and overcome malnutrition, rice varieties with higher yield potential and multiple resistance to biotic and abiotic stresses with improved nutritional quality are needed. Recent advances in genetics offer new opportunities to achieve these objectives.

The advances covered in this book open new avenues to apply new tools of genomics and reverse genetics to understand the function of rice genes. Manipulation of such genes would be a breakthrough in rice genetics and breeding.

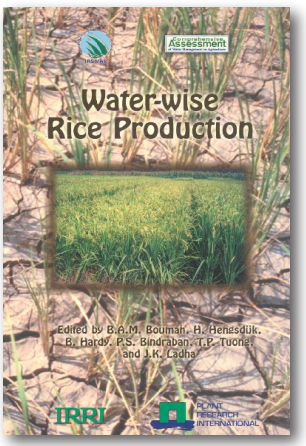
This book is the supplementary volume of Rice Genetics IV and it contains 241 research papers presented at the 4th International Rice Genetics Symposium held in 2000 at IRRI. The book has been divided into seven sections: (1) genetics and breeding of agronomic traits; (2) genetic diversity, evolution, and alien introgression; (3) molecular markers, QTL mapping, and marker-assisted selection; (4) genomics; (5) gene isolation and function; (6) tissue culture and transformation; and (7) genetics of rice pathogens.

This book serves as reference for the scientific community engaged in genetics and breeding of rice, with emphasis on both forward and reverse genetics, and to apply new tools of genomics in rice improvement.

2003. 642 pages.
ISBN 971-22-0199-6.
Available at: http://books.irri.org/9712201996_content.pdf

Water-wise rice production

Edited by B.A.M. Bouman, H. Hengsdijk, B. Hardy, P.S. Bindraban, T.P. Tuong, and J.K. Ladha



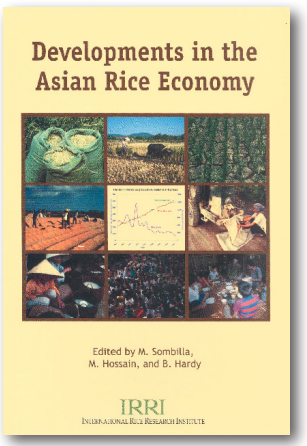
IRRI, together with Plant Research International of Wageningen University and Research Centre (WUR-PRI; the Netherlands), organized a thematic workshop on water-wise rice production on 8-11 April 2002 at the IRRI headquarter, Los Baños, Philippines. The objectives were to present and discuss the development, dissemination, and adoption of water-saving technologies at spatial scales ranging from the field to the irrigation system. The workshop brought together scientists and irrigation system managers from several consortia and projects examining water scarcity in rice production—the Water Workgroup of the Irrigated Rice Research Consortium, the Rice-Wheat Consortium, and the projects Water-Less Rice, Growing more rice with less water, and Ground Cover Rice Production Systems. Participants created the International Platform for Saving Water in Rice (IPSWAR). The platform's purpose is to be a mechanism to increase the efficiency and enhance the coherence of research on water savings in rice-based cropping systems in Asia.

This book contains 28 papers presented at the workshop on topics of intermittent irrigation, System of Rice Intensification (SRI), aerobic rice, rice-wheat, physiology and breeding, and irrigation systems.

2003. 356 pages.
ISBN 978-971-22-0182-1.
Available at: http://books.irri.org/9712201821_content.pdf

Developments in the Asian rice economy

Edited by M. Sombilla, M. Hossain, and B. Hardy

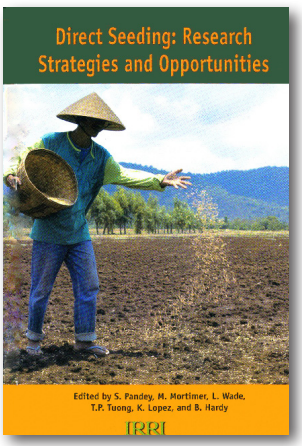


This book includes papers tied to a collaborative project to undertake policy analysis and projection studies on supply, demand, and trade of rice in some of the major rice-producing countries. The papers were presented at a workshop on Medium- and Long-Term Prospects of Rice Supply and Demand in the 21st Century held at IRRI headquarters on 3-4 December 2001. Medium- and long-term projections of rice supply, demand, and prices are key information needed to guide national policy decisions and investment plans. In close collaboration with researchers and scientists from the NARES, IRRI, and IFPRI embarked on the collaborative research project to make an in-depth analysis of the changing structure and dynamics of rice supply and demand and to institutionalize the research and policy analysis capacity and projection work as a core research activity in selected NARES. With financial support from the Japanese government and from core funds of IRRI and IFPRI, the project started with the following countries selected to participate: Thailand, Vietnam, Indonesia, Philippines, Malaysia, Myanmar, Japan, South Korea, Taiwan (China), Bangladesh, India, Nepal, and Pakistan.

2002. 436 pages.
ISBN 971-22-0181-3.
Available at: http://books.irri.org/9712201813_content.pdf

Direct seeding: research strategies and opportunities

Edited by S. Pandey, M. Mortimer, L. Wade. T.P. Tuong, K. Lopez, and B. Hardy

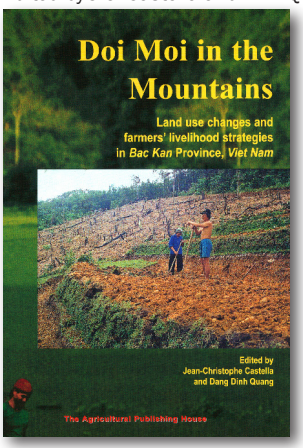


Asian rice systems are undergoing various types of change in response to economic factors and technological opportunities in farming. One such change has been a shift from transplanting to direct-seeding methods for rice establishment. While the rising cost of labor has provided economic incentives for direct seeding, the availability of short-duration rice varieties and chemical weed control methods has made such a shift economically profitable. Direct-seeding methods have also played a critical role in the intensification of Asian rice systems. In the future, in addition to the rising cost of labor, rice farmers of Asia will have to deal with an anticipated increasing scarcity of irrigation water as the demand for water from the urban and industrial sectors expands. Direct-seeding methods, especially dry seeding, may help in achieving higher water-use efficiency. IRRI, together with the Rice Research Institute, Thailand, organized an international workshop on Direct Seeding in Asian Rice Systems: Strategic Issues and Opportunities, held on 25-28 January 2000 in Bangkok, Thailand. The objectives of this workshop were to review past patterns of changes in crop establishment and factors explaining such patterns, assess the likely future patterns of change in crop establishment in various ecosystems and regions, and identify strategic research issues for improving rice productivity by manipulating crop establishment methods and related factors.

2002. 383 pages.
ISBN 971-22-0173-2.
Available at: http://books.irri.org/9712201732_content.pdf

Doi Moi in the mountains: land use changes and farmers' livelihood strategies in Bac Kan Province, Vietnam

Edited by J.C. Castella and D.D. Quang



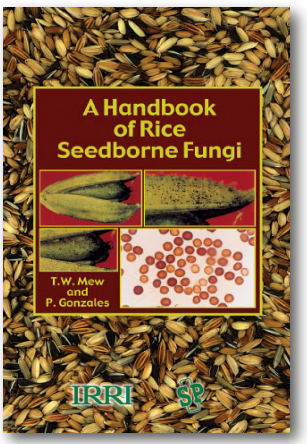
Under the socialist system of collectivized agriculture, Vietnam was a nation of chronic food shortages. Now, thanks to the dramatic Doi Moi economic reforms, Vietnam has transformed itself into one of the world's leading exporters of rice, coffee, rubber, tea, and other agricultural products. This remarkable economic success has been concentrated in the lowland "rice bowl" regions, where farmers had the means to take advantage of the new Doi Moi policies. But in the northern mountains, poverty levels remain high and environmental degradation threatens the continued livelihoods of farmers.

This volume presents a series of monographic and analytical studies vital to understanding the heterogeneity and potential of the mountains of northern Vietnam. The Mountain Agrarian Systems Program (SAM) used an interdisciplinary approach to analyze the needs and possibilities of farmers in the mountainous province of Bac Kan. The multiple-scale analysis showed that we need to create not only a spirit of "thinking globally and acting locally", but just as importantly, a spirit of "thinking locally and acting globally". The research provides a foundation for development practitioners and policy makers to identify the successes and failures of past policies and projects, and to target the groups that need development assistance the most.

2002. 283 pages.
No ISBN
Available at: http://books.irri.org/DoiMoi_content.pdf

A handbook of rice seedborne fungi

T.W. Mew and P. Gonzales



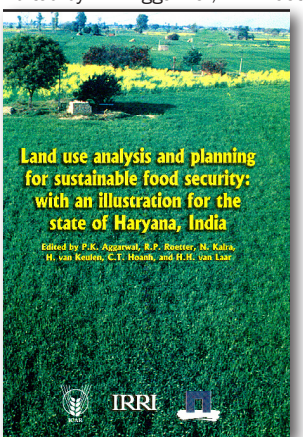
Seed health testing has become an important activity of international centers and national programs when they are involved in germplasm exchange. It assures safe movement of the seed that can be a carrier of pathogens, insect pests, and contaminants such as weed seed. Rice seed, like the seed of other crops, often carries significant amounts of harmful microorganisms, such as fungi, bacteria, and nematodes.

This handbook focuses on the important seedborne fungi that cause diseases of the foliage, stem, leaf sheath, root, grain, and inflorescence in rice. It provides information on more than 50 species that have been detected in the rice seed during routine testing and analysis. The information, which can be used for teaching and as a reference when conducting seed health testing in different laboratories, should be used in conjunction with available information on local rice-growing conditions.

2002. 83 pages.
ISBN 971-22-0174-0
Available at: http://books.irri.org/9712201740_content.pdf

Land use analysis and planning for sustainable food security: with an illustration for the state of Haryana, India

Edited by P.K. Aggarwal, R.P. Roetter, N. Kalra, H. van Keulen, C.T. Hoanh, and H.H. van Laar



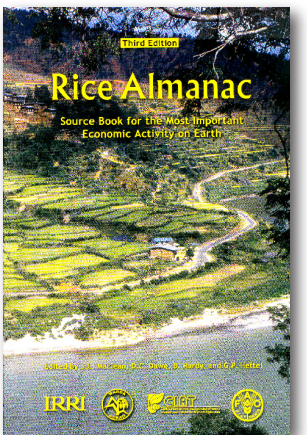
For more than 40 years, IRRI has been both a major player and a platform for leveraging partnerships. One partnership established in 1985 with the Indian Agricultural Research Institute (ICAR) and the Wageningen University and Research Centre (WUR) were able to forge the Systems Analysis for Rice Production (SARP) project to develop and implement systems approaches in rice research. This effort led to greater understanding of weather, crop, soil, and pest interactions in rice and applications of rice models in estimating potential yields, yield gaps, optimal strategies for water and nitrogen management and agroecological zoning. It also resulted in collaboration among scientists of different disciplines using the systems approach as a common way of thinking. Building on the experiences with the systems research in SARP, IRRI, ICAR, and WUR decided in 1996 to continue their partnership to develop tools for land use analysis and planning.

This 167-page joint publication of IRRI, ICAR, and WUR reports on various tools developed in these projects to help stakeholders explore options and opportunities for food production to meet the increasing demand, labor, capital, and other resources required for such production levels and their environmental impact. The illustration of the use of a decision support system for Haryana amply demonstrates that considerable progress has been made in developing new tools for ecoregional research.

2002. 167 pages.
ISBN 971-22-0168-6
Available at: http://books.irri.org/9712201686_content.pdf

Rice Almanac: source book for the most important economic activity on earth (3rd edition)

Edited by J.L. Maclean, D.C. Dawe, B. Hardy, and G.P. Hettel

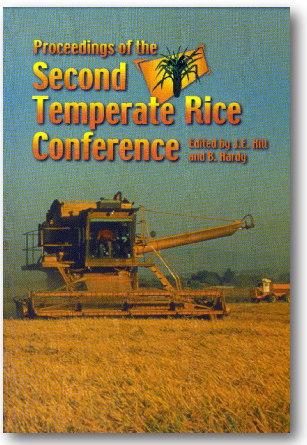


As a result of editions published in 1993 and 1997, the Rice Almanac has become a standard source book for the most important economic activity on earth. It brings together general information about rice and data about rice production worldwide. The third edition has been fully updated and expanded to now include 64 countries—from Afghanistan to Venezuela. There are also discussions on international issues important to the crop such as the looming water crisis, global climate change, and biotechnology. The compiled information is the result of collaboration among IRRI, the West Africa Rice Development Association (WARDA), the International Center for Tropical Agriculture (CIAT), and the Food and Agriculture Organization (FAO).

2002. 253 pages.
ISBN 0-85199-636-1.
Available at: http://books.irri.org/0851996361_content.pdf

Proceedings of the Second Temperate Rice Conference

Edited by J.E. Hill and B. Hardy

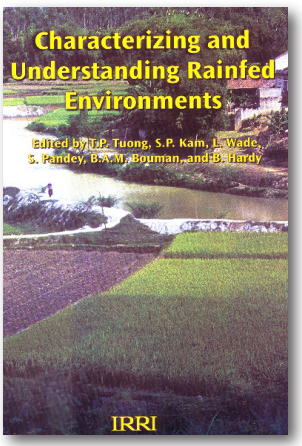


These proceedings cover the Second Temperate Rice Conference which was held in Sacramento, California, 13-17 June 1999. More than 250 scientists from 19 countries representing Asia, Australia, Africa, Europe, North America, and South America attended these Second TRC. More than 140 presentations were given in plenary, volunteer, and poster sessions. Authors were encouraged to provide full papers from either oral or poster presentations and these proceedings contain 80 papers and 61 abstracts. Full papers from the poster sessions are included in their respective disciplines: agronomy, disease, entomology, genetics, quality, or weed science. Where only abstracts were submitted, they are included in a separate section titled Abstracts.

2002. 714 pages.
ISBN 971-22-0180-5
Available at: http://books.irri.org/9712201805_content.pdf

Characterizing and understanding rainfed environments

Edited by T.P. Tuong, S.P. Kam, L. Wade, S. Pandey, B.A.M. Bouman, and B. Hardy

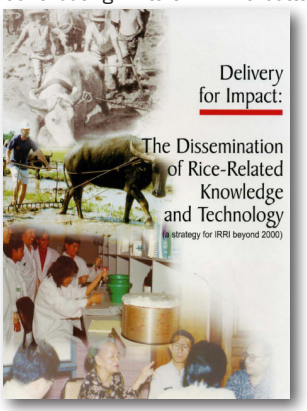


This publication is proceedings held in Bali, Indonesia, to review progress on research related to characterizing and understanding rainfed lowland rice environments and considering future research issues and opportunities for collaboration. Seventy scientists from 15 countries attended. Over the years, IRRI, in partnership with national agricultural research systems of Asian countries, has been carrying out studies to understand rainfed environments and cropping practices so that research results can be applied to use appropriate technology to improve production in these fragile ecosystems. Papers report on studies carried out in different geographical areas by a variety of national institutions using different methodologies. This workshop was partially supported by the Australian Centre for International Agricultural Research.

2001. 488 pages.
ISBN 971-22-0152-X.
Available at: http://books.irri.org/971220152X_content.pdf

Delivery for impact: the dissemination of rice-related knowledge and technology (a strategy for IRRI beyond 2000)

Contributing Writers: P.L. Marcotte, M.A. Bell, M.B. Quiamco, G.T. Castillo, S.R. Main; Editor: B. Hardy



IRRI was established in 1960 in recognition of the importance of rice and the people who depend on it. In the early 1960s, there was fear of widespread famine in Asia and the subsequent instability of the sovereignty of nation-states in the area. In an attempt to alleviate poverty, hunger, and potential instability, IRRI has worked toward the goal of improving the well-being of present and future generations of rice farmers and consumers, particularly those with low income.

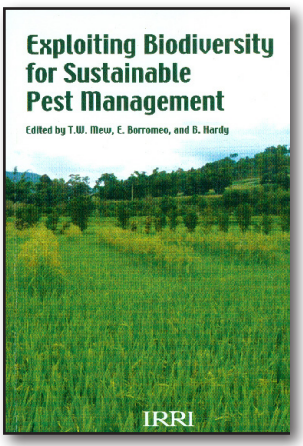
Literally from the inception of IRRI, training was a key component in its dissemination of information from research and in the development of national research systems. The first IRRI training course was a 12-month rice production course. The scientists/trainees then assisted in the replication of the course for another group of Filipino scientists. Thus began the model of training, train-the-trainer, and devolution of information and technical knowledge and process into national systems.

Since then, IRRI's training effort has been consistent with the goals and objectives of the Institute. Despite changes in the organization, in its goals and objectives, and in the alignment of training within the organization, IRRI training has remained true to its original mandate.

2001. 22 pages.
ISBN 971-22-0228-3
Available at: http://books.irri.org/9712202283_content.pdf

Exploiting biodiversity for sustainable pest management

Edited by T.W. Mew, E. Borromeo, and B. Hardy



Exploiting Biodiversity for Sustainable Rice Pest Management is the proceedings of a symposium held in Yunnan, China. The book's chapters are grouped into four sections—habitat diversity, microbial diversity, genetic diversity, and technology diffusion—corresponding to the four main topics of the symposium. It also features chapters from several internationally known experts who were invited to share their insights on certain topics.

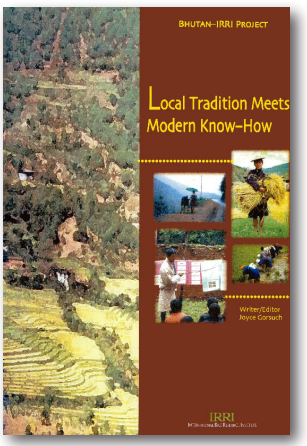
The implementable outputs reported in this proceedings vary in stages of development. The most advanced, which can be considered a mature technology, is genetic diversification by interplanting susceptible glutinous varieties with resistant hybrid indica rice to control rice blast. This has passed the transition from experimental plots to widespread farmers' practice.

Microbial diversity, on the other hand, illustrates the complexity of how biodiversity operates in pest management; habitat diversity section describes how certain mixes of a rice and nonrice habitat favor the proliferation of beneficial insects that can control the population of insect pests; and technology diffusion complete the from-concept-to-practice story of applying biodiversity in pest management.

2001. 241 pages.
ISBN 971-22-0156-2.
Available at:http://books.irri.org/9712201562_content.pdf

Local tradition meets modern know-how: Bhutan-IRRI Project

Writer/editor J. Gorsuch



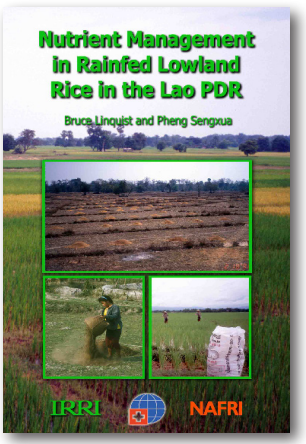
IRRI's involvement with national agricultural research and extension systems (NARES) varied, depending on the country's specific needs and level of development. For the last 16 years, IRRI has been proud of its fruitful partnership with Bhutan, which has led to the development of a functional research and development system in Bhutan. Our collaborative partnership is an excellent example of building a small but effective research system. Bhutan is now widely considered to be a model research system for a small country.

It is worth documenting the history and the many achievements associated with the development of the Bhutan national program. Others can appreciate what has been achieved through partnership with the other stakeholders, particularly the main donors, the International Development Research Centre, and lately, the Swiss Agency for Development and Cooperation. Through effective collaboration, a strong foundation has been laid for developing a national research program on rice, oilseeds, wheat, and vegetables. In addition, a small farm research station (CARD - Wangduephodrang) has been transformed into an effective national agricultural research center that serves not only the wetland production system but also the national research and development program for field crops. Project efforts have contributed positively to enhancing research-extension linkages and have generated farm-level impact through the adoption of new varieties and production technologies in many parts of the country.

2001. 44 pages.
ISBN 971-22-0158-9.
Available at:http://books.irri.org

Nutrient management in rainfed lowland rice in the Lao PDR

B. Linguist and P. Sengxua

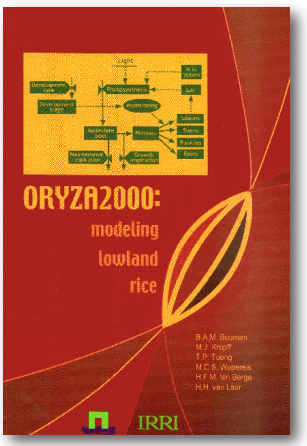


The International Rice Research Institute (Lao-IRRI Project) and the Lao National Rice Research Program have been collaborating on rice research since 1991. Soil fertility research has been conducted in all provinces of Laos through this effort. The objective of this book is to review the research that has been conducted on nutrient management of lowland rice in Laos from 1991 to 2000 and to present an integrated and sustainable nutrient management approach that is relevant to Lao farmers. We focus on the rainfed lowland rice system as opposed to the irrigated rice system, although references will be made to both. In the first section, an overview of lowland rice trends and practices in Laos will be given. This will be followed by a discussion of the production environment, with emphasis on climate and soils. This will be followed by a presentation of research aimed at identifying nutrient deficiencies and nutrient management strategies to overcome these deficiencies. Finally, the last section provides an overall summary and recommendation for different soils. In the appendixes at the end, we have provided (1) a list of Lao-IRRI publications relating to rainfed lowland rice, which are available from IRRI, and (2) a list of soil fertility experiments that have been conducted from 1991 to 2000. It is from these experiments that the results of this book have been derived.

2001. 88 pages.
ISBN 971-22-0167-8
Available at: http://books.irri.org/9712201678_content.pdf

ORYZA 2000: modeling lowland rice

B.A.M. Bouman, M.J. Kropff, T.P. Tuong, M.C.S. Wopereis, H.F.M. ten Berge, H.H. van Laar

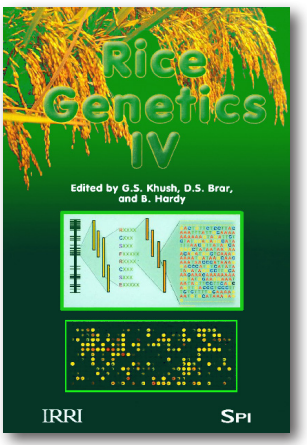


ORYZA2000: modeling lowland rice is the next in a series of (lowland) rice growth simulation models developed by IRRI and Wageningen University and Research Centre (WUR) in the early to mid-1990s in the project "Simulation and Systems Analysis for Rice Production (SARP)." It is an update and integration of the models ORYZA1 for potential production, ORYZA_W for water-limited situations, and ORYZA-N for nitrogen-limited production. Since the release of these models, new insights into crop growth and water-balance processes have been gained, new scientific subroutines developed, and programming standards and tools improved. These developments warranted a new release in the ORYZA series. Besides the scientific and programming updates, ORYZA2000 contains new features that allow a more explicit simulation of crop management options, such as irrigation and nitrogen fertilizer management. It can also be used in application-oriented research such as the design of crop ideotypes and the analysis of yield gaps to the optimization of crop management, the ex ante analysis of the effects of climate change on crop growth, and agroecological zonation.

2001. 235 pages.
ISBN 971-22-0171-6.
Available at http://books.irri.org/9712201716_content.pdf
(available CD)

Rice Genetics IV

Edited by G.S. Khush, D.S. Brar, and B. Hardy

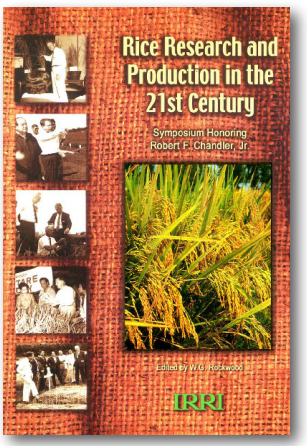


In these proceedings of the Fourth International Rice Genetics Symposium held in October 2000 at the International Rice Research Institute, renowned geneticists have contributed to a wide range of topics—from the most advanced research on sequencing of the rice genome to functional genomics. This volume reviews the latest advances in rice research and provides in-depth discussion and exchange of information on classical genetics, biosystematics and evolution, molecular markers, tranformation, genome organization, gene isolation, regulation of gene expression, sequencing of the rice genome, and bioinformatics.

2001. 488 pages.
ISBN 157808167X
Available at: http://books.irri.org/157808167X_content.pdf

Rice research and production in the 21st century

Edited by W.G. Rockwood



M.S. Swaminathan, IRRI's fourth director general, noted in a frontispiece to the Chandler book An Adventure in Applied Science: A History of the International Rice Research Institute that Chandler was "obviously modest when referring to his own contributions. It is therefore the duty of others who are aware of the history of agricultural progress…to chronicle the seminal role of Dr. Chandler." These proceedings do that.

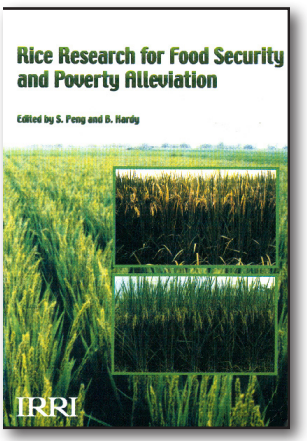
Readers who are most interested in Bob Chandler the man will find Part I rewarding. A long-time colleague and friend chronicles Chandler's humble beginnings in rural Maine and his early years as a member of a somewhat itinerant family. Professional colleagues give readers of these proceedings a close-up personal look at the life and management styles that Chandler brought to the two international institutions he founded, and the respect and love engendered among their teams of scientists. Other colleagues remember how Chandler touched their lives throughout his long and distinguished career from university professor to his post-retirement activities in other international institutions.

Those readers most interested in rice, rice science, and innovations in both research methodologies and institutions will find enrichment in Parts II-IV.

2001. 224 pages.
ISBN 971-22-0163-5
Available at: http://books.irri.org/9712201635_content.pdf

Rice research for food security and poverty alleviation

Edited by S. Peng and B. Hardy

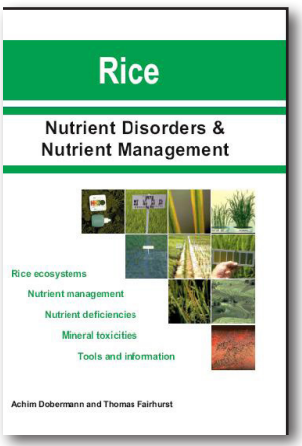


Rice research for food security and poverty alleviation is the proceedings of the 23rd International Rice Research Conference (IRRC). More than 250 participants from 33 countries attended. Presentations covered the following topics: (1) increasing yield potential in irrigated rice: breaking the barrier, (2) exploiting and using heterosis in rice, (3) breeding for abiotic stress tolerance, (4) durable hop-plant resistance, (5) integrated nutrient and pest management, (6) water and weed management in direct-seeded rice, and (7) impact of technologies on food security and poverty alleviation.

2001. 692 pages.
ISBN 971-22-0157-0.
Available at: http://books.irri.org/9712201570_content.pdf

Rice: nutrient disorders and nutrient management

A. Dobermann and T. Fairhurst



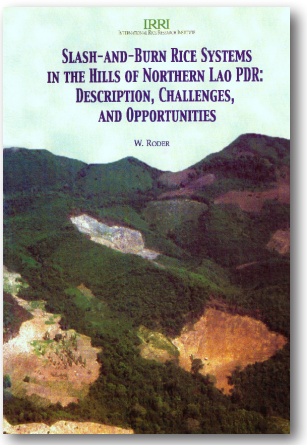
Rice: Nutrient Disorders and Nutrient Management is a handbook that provides a guide for detecting nutrient deficiency and toxicity symptoms and managing nutrients in rice grown in tropical and subtropical regions. Some background information is included on the function of nutrients in the rice plant and possible causes of nutrient deficiencies, together with a description of nutrient deficiency symptoms, the effect of nutrient deficiency on plant growth, and the effect of flooding on nutrient availability. Estimates of nutrient removal in grain and straw have been included to help researchers and extension workers calculate the amount of nutrients removed from the field under different management systems. Strategies for preventing and treating nutrient deficiencies are described.

The main targets of the handbook are the irrigated and rainfed lowland rice systems because these systems account for about 80% of the total harvested area of rice and 92% of global rice production. Where appropriate, additional information has been included for upland rice or rice grown in flood-prone conditions. This publication and the accompanying CD will help increase the impact of new approaches to nutrient management at the farm level.

2001. 191 pages.
ISBN 981-04-2742-5
Available at: http://books.irri.org/9810427425_content.pdf
(available CD)

Slash-and-burn rice systems in the hills of northern Lao PDR: description, challenges, and opportunities

W. Roder



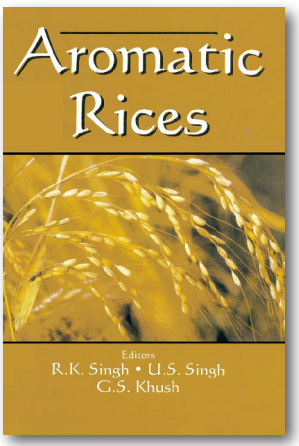
Over the past decade, the Lao-IRRI Rice Research and Training Project (LIRRTP) has been the principal source of capacity building and technological developments in the rice sector in Lao PDR. From a very low base in 1990, the project has helped develop a functional national rice research system involving more than 120 government officials and technicians.

Research has been conducted in irrigated, rainfed lowland, and upland ecosystems. This publication focuses on efforts in the uplands. Despite significant progress in the uplands, several challenges remain. For example, research has to build on previous component technology research and identify technologies that move away from slash-and-burn shifting cultivation to more stable and more sustainable integrated production systems. Thus, whole-system considerations (e.g., markets and infrastructure) and agroforestry will be important elements. This document brings together much of the previous upland work completed in the LIRRTP.

2001. 201 pages.
ISBN 971-22-0153-8.
Available at: http://books.irri.org/9712201538_content.pdf

Aromatic rices

Editors R.K. Singh, U.S. Singh, G.S. Khush



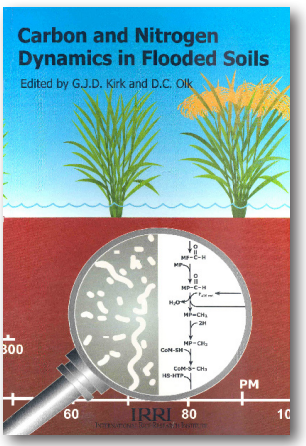
Aromatic rices constitute a small but an important sub-group of rice. These are rated best in quality and fetch a much higher price than high quality non-aromatic rice in the international market. In spite of their importance the improvement of this group of rice has been rather slow. In addition to other problems related with their cross-compatibility with high-yielding non-aromatic rices and high dependence of expression of quality traits on environmental factors, the lack of information on various aspects of these rices have also contributed toward their slow improvement. Considering these facts, the current publication is intended to present in depth the critical information available on various aspects of aromatic rices such as taxonomy and origin, methods for estimation of quality traits, breeding for quality traits, factors affecting aroma and other quality traits, plant protection, and trade. A few chapters have also been devoted to review the current status of cultivation and improvement of aromatic rice in important aromatic rice-growing countries.

Chapters in the book have been contributed by eminent scientists who are actively involved in research on aromatic rice. The publication is intended to serve not only rice scientists but also traders, advanced students, and teachers of botany and agriculture.

2000. 293 pages.
ISBN 81-204-1420-9.
Available at: http://books.irri.org/8120414209_content.pdf

Carbon and nitrogen dynamics in flooded soils

Edited by G.J.D. Kirk and D.C. Olk



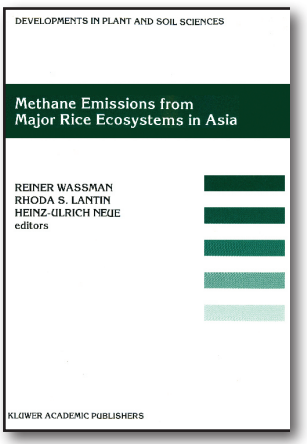
Most of our understanding of soil carbon and nitrogen dynamics are from research on aerobic soils, predominantly under temperate conditions. Relatively little research has been done on flooded anaerobic soils and tropical conditions. These conditions are essential to rice production systems and are also important in natural wetlands. Recent interest in carbon and nitrogen dynamics in flooded rice soils has been stimulated by trends of declining productivity in intensive rice systems and evidence that this was linked to long-term changes in soil organic matter and the supply of nutrients. In addition, we are concerned about the relations between organic matter and the release of greenhouse gases; crop residue management; the fate of pollutants; water relations and crop establishment; and soil physical conditions in rice-nonrice systems. Rice soils range from those that are almost permanently flooded and wholly aerobic upland conditions.

With this background, the Fifth External Program and Management Review of IRRI in February 1998 identified soil carbon and nitrogen dynamics as a key area for future research, and recommended that a program of strategic research be mounted in collaboration with centers of excellence worldwide. In response to that recommendation, IRRI organized an international workshop on carbon and nitrogen dynamics in flooded soils, which was held at IRRI on 19-22 April 1999. This book features the papers presented at the workshop.

2000. 188 pages.
ISBN 971-22-0140-6
Available at: http://books.irri.org/9712201406_content.pdf

Methane emissions from major rice ecosystems in Asia

R. Wassman, R.S. Lantin, H.U. Neue

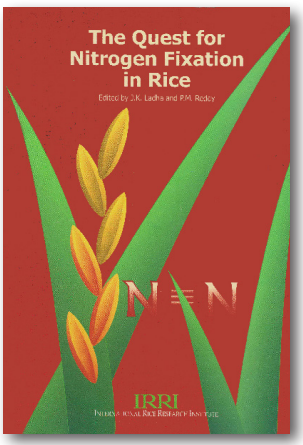


Given the expected doubling in rice production in Asia, conducting research that will help developing countries grow more rice on limited land, in ways that do not harm the environment and that benefit both farmers and consumers, will be critical. The papers presented in this book, generated through the interregional program or through other research initiatives, provide a comprehensive overview on the progress made in studying methane fluxes from rice fields for global-scale and location-specific syntheses. This book aims to document baseline emissions for major rice ecosystems (that may be used for national inventories) and to devise feasible mitigation options under a broad range of environmental and socioeconomic settings.

2000. 395 pages.
Not an IRRI publication
ISBN 07-923-6765-0
Available at: http://books.irri.org/0792367650_content.pdf

The quest for nitrogen fixation in rice

Edited by J.K. Ladha and P.M. Reddy

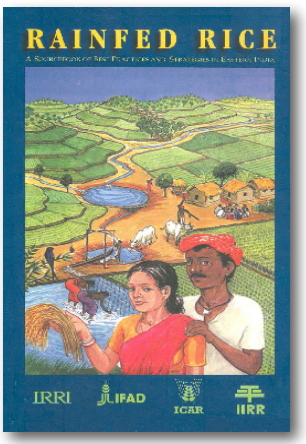


To achieve food security through sustainable agriculture, the requirement for fixed nitrogen must be increasingly satisfied by biological nitrogen fixation (BNF) rather than by industrial nitrogen fixation. In view of the importance of BNF to sustainable agriculture, it is imperative to improve existing BNF systems and develop nitrogen-fixing nonlegume crops, particularly important cereal crops such as rice. To meet this challenge, IRRI organized a think-tank workshop in 1992 to assess the feasibility of nitrogen fixation in rice. Based on the research strategies recommended, IRRI launched a global collaborative initiative in 1993, the Frontier Project on Nitrogen Fixation in Rice. The long-term goal of this project is to enable rice plants to fix their own nitrogen. The Frontier Project involves a committed group of scientists from several research institutes around the world. The project also has a working group, through which IRRI facilitates communication among scientists worldwide with active research interests in nitrogen fixation in rice and other cereals. The working group periodically reviews the progress to evaluate how such new knowledge has furthered the probability of success in meeting this long-term goal. The third BNF working group meeting at IRRI on 9-12 August 1999 presented several significant results emanating from the Frontier Project. This book features the proceedings of the meeting, encompassing the latest research advances made in developing nitrogen-fixing rice.

2000. 354 pages.
ISBN 971-22-0112-0
Available at: http://books.irri.org/9712201120_content.pdf

Rainfed rice: a sourcebook of best practices and strategies in Eastern India

V.P. Singh, and R.K. Singh

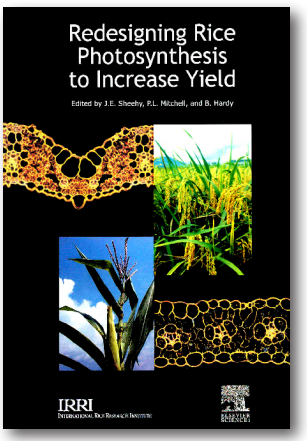


This publication features some of the exemplary practices drawn from on-farm research undertaken as part of this project. A workshop was organized by IRRI with the assistance of the Internationa Institute of Rural Reconstruction (IIRR). The workshop, which was held at the Central Soil and Water Conservation Research and Training Institute (CSWCRTI), Dehradun, India on 5-18 April 1999, brought all the participating scientists together primarily for the purpose of documenting best practices and strategies. Artists, editors, and desktop publishing staff provided support during the workshop. Papers were intensively reviewed and critiqued by participants representing a wide range of disciplines. Often, scientific assumptions were challenged. The practical relevance of the topics was continuously emphasized. Papers were revised and small teams were set up to further deliberate and improve the papers. At the end of two weeks, a near-final draft was prepared for review and finalization. The result is this publication, a user-friendly compilation of findings and practices of relevance to governments, NGOs, universities, district administrators, authors, and researchers within the region and in other countries with similar ecologies.

2000. 292 pages.
ISBN 81-86789-02-2.
Available at: http://books.irri.org/8186789022_content.pdf

Redesigning rice photosynthesis to increase yield

Edited by J.E. Sheehy, P.L. Mitchell, and B. Hardy



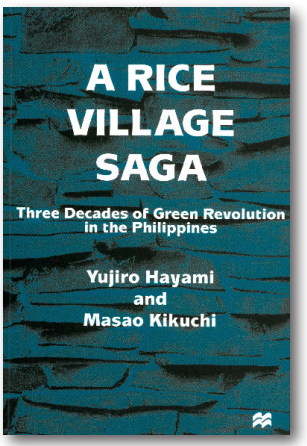
The principal objective of this workshop was to explore the possibilities of increasing yield in rice to keep up with population growth by redesigning the rice plant's photosynthetic pathway. We wanted to establish at what level we at IRRI should work on this problem, what the key areas into which we should channel our energies are and crucially, what partnerships could be constructed to further our aims. We discussed whether the inefficiencies in current photosynthetic systems could be eliminated and if it would be possible to imitate nature and produce a rice plant with the superior photosynthetic capacity of maize. The difficulties in producing such novel plants and the advantages they would offer in terms of yield and use of natural resources were the subject of much discussion. It was concluded that such a plant could revolutionize rice farming, but producing it will not be an easy task.

We are grateful to the internationally renowned scientists who came to IRRI to participate in the workshop. They all shared their expertise with us and contributed to a fascinating and stimulating debate. The chapters in this book cover various subjects, such as the economic consequences of yield improvements for poverty, the molecular genetics of photosynthesis, and the ecophysiological and evolutionary perspectives of photosynthesis in wetlands. IRRI continues to face the challenge of using basic science in the quest to reduce hunger and a workshop such as this one helps us set the agenda.

2000. 293 pages.
ISBN 971-22-0146-5.
Available at: http://books.irri.org/9712201465_content.pdf

A rice village Saga: three decades of Green Revolution in the Philippines

Y. Hayami and M. Kikuchi

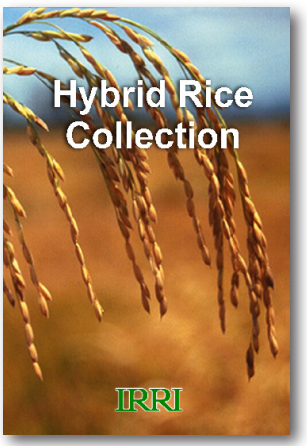


This study aims to give a microscopic view of the process by which agricultural production systems, village community institutions, and rural people's economic well-being change under the pressure of those modernizing forces. The study is based on recurrent surveys of one village in the Province of Laguna, Philippines, since the 1960s.

The data and statistics referred to in this book (tables and figures as well as text) are collected by the authors mainly based on eleven-round surveys. In addition to those in-village surveys, they also conducted several other surveys extending beyond the border of East Laguna Village, such as about rice harvesting (Chapter 7), rice marketing (Chapter 8), and rural manufacturing (Chapter 9), which shall be specified where their outcomes will be analyzed.

2000. 293 pages.
ISBN 971-22-0129-5.
Available at: http://books.irri.org/9712201295_content.pdf

Hybrid rice collection

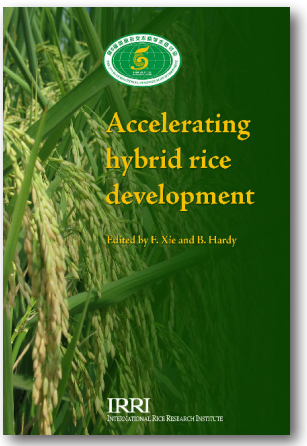


This collection contains the proceedings of four previous International Hybrid Rice Symposia (more than 1,400 pages of material), plus the Two-Line Hybrid Rice Breeding Manual and the terminal report of the IRRI-Asian Development Bank project, Sustaining Food Security Through the Development of Hybrid Rice Technology.

2010
ISBN 978-971-22-0253-7.

Accelerating hybrid rice development

Edited by F. Xie and B. Hardy



Hybrid rice is a proven and successful technology for rice production, having significantly contributed toward improving food security, raising rice productivity and farmers' income, and providing more employment opportunities over the past three decades. Remarkable progress continues as hybrid rice technology makes its way across Asia and to other countries. Since the 4th International Hybrid Rice Symposium held in Hanoi, Vietnam, in 2002, the area grown to hybrid rice worldwide increased to an estimated 19.8 million hectares in 2007, including about 2.8 million hectares outside China. All major rice-producing countries in the world have been investing in applying hybrid rice technology, and, in recent years, the seed industry has also been involved in hybrid rice research and development. The advance of new technologies, such as marker-assisted selection, has provided new approaches to enable scientists to develop hybrid rice varieties with increased yield potential, improved grain quality, and multiple resistance to or tolerance of various biological and environmental stresses. However, with the remaining challenge of increasing food demand with fewer resources, and new challenges from climate change, it is even more important for hybrid rice to receive high priority for increasing rice productivity. Many problems constrain the further development of hybrid rice in the areas of higher yield heterosis, seed production, grain quality, seed cost, field management, and public-private partnership.

2009/ 698 pages.
Included in Hybrid Rice collection
ISBN 978-971-22-0252-0
Available at: http://books.irri.org/9789712202520_content.pdf

Rice Genetics collection

This Rice Genetics Collection of past symposia and other selected literature contains nearly 4,400 pages of searchable information on rice genetics and cytogenetics published by IRRI and its partners since 1964. In addition to the five rice genetics symposia held at five-year intervals since 1985 (Rice Genetics I-V), the Collection contains classic publications that truly kicked off significant reporting on these subjects in the early 1960s:

- The Proceedings of the Symposium on Rice Genetics and Cytogenetics, held at IRRI on 4-8 February 1963 and published in 1964—the first-ever international conference solely devoted to rice genetics, cytogenetics, and taxonomy.
- A technical bulletin on the Present Knowledge of Rice Genetics and Cytogenetics, written in August 1964 by renowned geneticist T.T. Chang, provided the first effort to bring together in one medium the voluminous multilanguage literature on these important subjects.

Also included are 23 issues of the Rice Genetics Newsletter, published under the Rice Genetics Cooperative, beginning in 1984 and going through 2006.

Also featured is a 642-page supplement to Rice Genetics IV, Advances in Rice Genetics, published in 2003.

2008.

Science and technology and trade for peace and prosperity

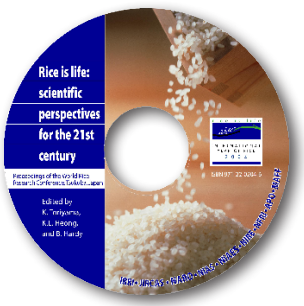
P.K. Aggarwal, J.K. Ladha, R.K. Singh, C. Devakumar, B. Hardy

The 2nd International Rice Congress, IRC2006, was organized to discuss these developments and to provide a common platform for sharing knowledge and expertise on research extension, production, processing, trade, consumption, and related activities with all stakeholders of rice. The Congress was organized by the Indian Council of Agricultural Research and the National Academy of Agricultural Sciences (India) and sponsored by the International Rice Research Institute, Philippines, and the Government of India. A comprehensive event for the world's most important crop, this Rice Congress had simultaneous conferences, symposia, workshops, and exhibitions based on the theme "Science, technology, and trade for peace and prosperity." The main events of the Congress were the 26th International Rice Research Conference, 2nd International Rice Commerce Conference, 2nd International Rice Technology and Cultural Exhibition, and 2nd International Ministerial Round-Table Meeting. The deliberations of the Asian Ministers led to a Delhi Declaration that highlighted the need to establish a comprehensive partnership among the participants through strengthened dialogue on a regular basis for the development of rice research and trade with greater emphasis on the social, cultural, and human dimension.

2007. 782pages.

Rice is life: scientific perspectives for the 21st century
(Proceedings of the World Rice Research Conference, Tsukuba, Japan)

Edited by K. Toriyama, K.L. Heong, and B. Hardy



This CD contains the pdf files of the proceedings of the "Rice is life: scientific perspectives for the 21st century" edited by K.Toriyama, K.L. Heong, and B. Hardy, published in 2005; and recent issues of IRRI serials: International Rice Research Notes (IRRN)- a semi-annual journal about rice research and development, and Rice Today, a popular magazine.

2005.
ISBN 971-22-0204-6

Mountain agrarian systems program (SAM)

Vietnam Agricultural Sciences Institute (VASI), Institut de Recerche pour la Developpement (IRD), Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement (CIRAD), International Rice Research Institute (IRRI)

The Mountain Agrarian Systems Program (SAM) started in 1998 with the main objective of improving agricultural productivity, a natural resources management, and the living standards of ethnic highland minority groups. The SAM Program is made of two sub-programs. Based on a preliminary agronomic diagnosis characterizing and explaining intra- and interfield heterogeneity, and ranking production-limiting factors, the “Cropping Systems” component identifies, adapts, tests, and extends improved cropping systems from field to small watershed levels. The “Regional” component aims at achieving a good understanding of the processes of land-use changes and their main driving forces from farm to provincial levels prior to the introduction of technical and organizational innovations. This component is complementary to the “Cropping Systems” component as it identifies extrapolation keys to large geographic areas of locally obtained research results, and offers new tools to facilitate decision making in the field of rural development and sustainable natural resource management in the uplands.

2003.

The IRRI pioneer interviews (Part 1 and 2)

Luck is the Residue of Design

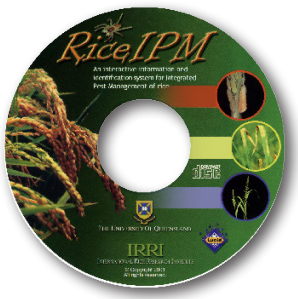
G. Hettel

Peter Jennings - IRRI's first Plant Breeder (1961-67)

Peter Jennings, the International Rice Research Institute's first rice breeder (1961-67), with a long career in Latin America after his work in Asia, kicks off this historic series with a singular wit. He played a major role in the development of IR8, the rice variety that would ultimately change the face of agriculture across Asia. He reminisced on a warm, muggy day (20 July 2007) at his home in Gainesville, Florida. The full interview on two DVDs.

Rice IPM

University of Queensland, International Rice Research Institute (IRRI)



Rice IPM is an interactive training and resource package for researchers, advisors, and students. Focusing on tropical rice, this CD provides a comprehensive source of information and training material for improving the management of rice pests, including insect pests, diseases, and weeds.

A major feature of this interactive knowledge management tool is that users can navigate through the content in any way they want to meet their own, specific information and learning needs. The combination of video, images, hypertext links, and interactive keys provides a unique way of accessing the wealth of material contained on the CD.

The content of the CD, structured according to the competency standards required for proficient integrated pest management, has been researched and developed by an international team of IPM specialists from various countries in Southeast Asia and IRRI.

Rice IPM contains sections on pest ecology; crop checking; fact sheets on major insect pests, rats, diseases, weeds, nutrient deficiency, and toxicity; crop growth and pest damage; pest management options and decisionmaking; and economics.

2001.

Growth stages of the rice plant

Rice Production Training Modules

This module discusses the growth stages of the rice plant. The information presented is based on the data and characteristics of IR64, a modern, high-yielding, semidwarf variety, but applies generally to other rice varieties.

It will enable you to (1) recognize the 3 basic growth phases of the rice plant and the stages of development in each phase; (2) identify the growth stages of a rice plant according to a 0-9 numerical scale, each number in the scale corresponding to a specific growth stage; and (3) explain the specific physical changes in a growing rice plant.

2000.
RP11-02

Strategic plan 2007-2015

IRRI bringing hope, improving lives

IRRI's previous strategic plan, entitled IRRI Toward 2020, ambitiously sought to carry the Institute over a 25-year period. The present plan endeavors to take the Institute over a more modest 9 years, joining the world in seeking to reach the Millenium Development Goals (MDGs) by 2015. Nonetheless, much of the work outlined here will extend beyond 2015.

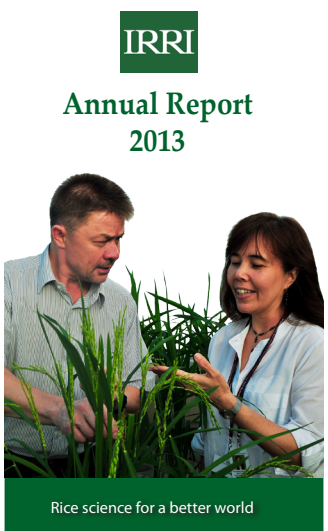
We describe herein the changing world that has rendered the previous plan out-of-date because the changes are happening so fast and have by no means stopped; the world of rice in particular is in a rapid demographic, technological, and social transition (Chapter 1). We then describe the broad foundation of successful collaboration in which IRRI has continued to work with many institutions across disciplines, localities, and ecosystems (Chapter 2). This has positioned the Institute to respond with substantial optimism to both the known and as yet unknown new challenges implied by these ongoing changes toward helping achieve the MDGs, especially the three related to hunger and poverty, environmental sustainability, and nutrition and health.

2006. 61 pages.
Not for sale.

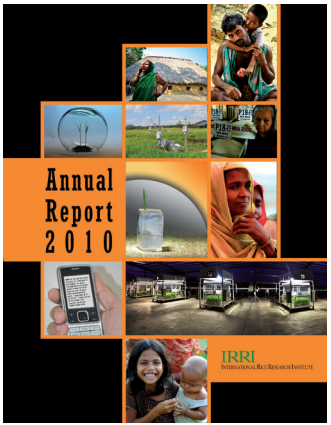
Annual Reports

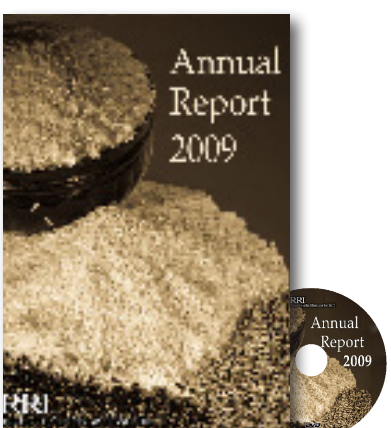
IRRI Annual Reports 2013, 2012, 2011, 2010, 2009, 2008, 2007, 2006-07, 2005-06, 2004-05, 2003-04, 2002-03, 2001-02, 2000-01

The IRRI Annual Report is intended to address current information to the world's rice producers and consumers plus the brief summaries of research undertaken by the Institute during a given year.

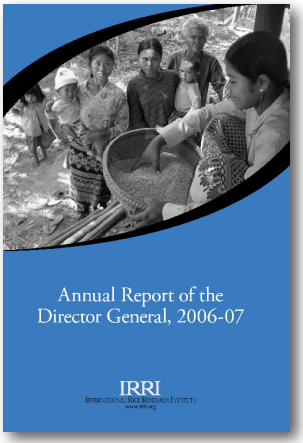


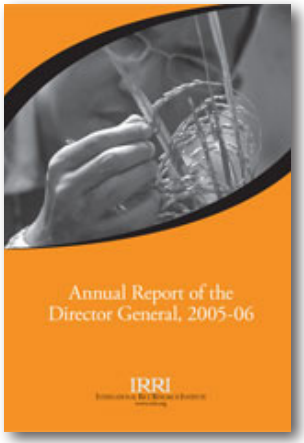
Annual Reports

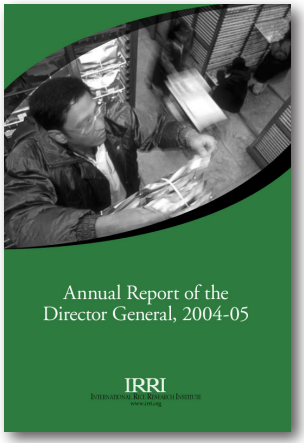


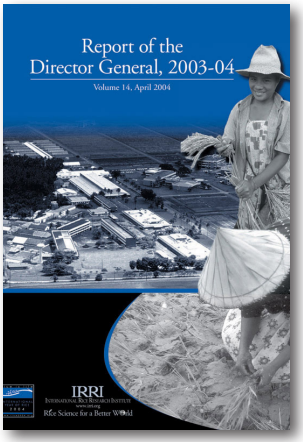


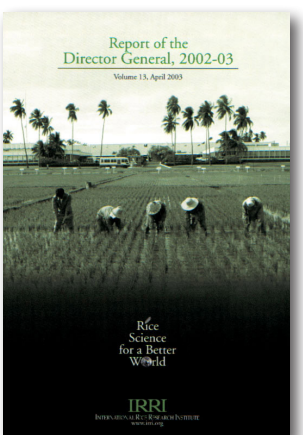
Annual Reports

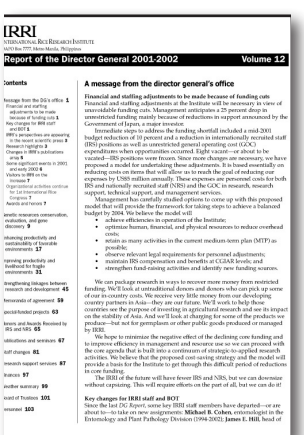


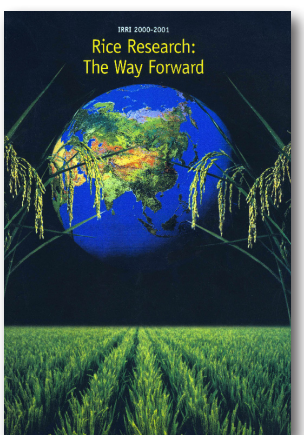


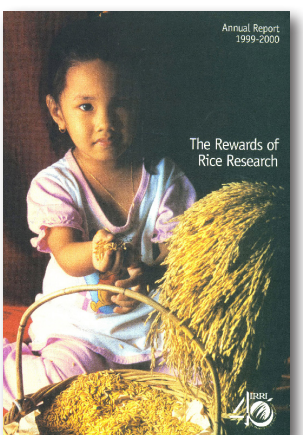












The IRRI Paper Series

Discussion Paper Series

The IRRI Discussion Paper Series is a flexible means for IRRI scientists to share information with specialized institutions and individuals. It is intended to be a fast means of presenting plans for new research or preliminary results of research still in progress, but which could be of immediate use for others. The series also contains special project reports, consortia and network reports, reports of meetings or workshops (short of the actual proceedings), workshop recommendations, and others.

The Discussion Paper Series are as follows:

1. Current status and future directions of rice-related group training programs in Asia
2. Microenterprise development small-scale farm equipment manufacturing: entrepreneurship and employment
3. Farmers as customers: a service management approach to designing an agricultural research and development institution
4. Rice and problem soils in South and Southeast Asia
5. A weather factor-searching program for plant pathological studies
6. Crop-animal interaction
7. Characteristics and classifications of wetland rice soils in India, Indonesia, and Thailand
8. Enhancing incomes of rural women through suitably engineered systems
9. Rice research and production in the commonwealth of independent states (CIS)
10. Constraints, opportunities, and innovations for wet-seeded rice
11. Competition and conflict in Asian agricultural resources management: issues, options, and analytical paradigms
12. PCR-based marker-assisted selection in rice breeding

Discussion Paper Series

13. What IRRI personnel say about the Matrix Management Systems 5 years after its adoption
14. WinBoot: a program for performing bootstrap analysis of binary data to determine the confidence limits of UPGMA-based dendograms
15. Impact of farming systems
16. Upland rice research in partnership
18. A survey portfolio for the characterization of rice pest constraints
19. Rice tungro disease epidemiology and vector ecology
21. New approach to quantify crop losses due to rice pests in varying production situations
22. Screening rice for salinity tolerance
23. On-farm management of applied inputs in native soil fertility
24. Evaluating two mass screening methods for tungro resistance
25. The IRRI upland rice research program
26. The IRRI rainfed lowland rice research program
27. Research on natural resources management strategic: research issues and IRRI's approaches to addressing them
28. A systems approach to analyzing land use options for sustainable rural development in South and Southeast Asia
29. Producing more rice with less water from irrigated systems
30. Increasing the impact of engineering in agricultural and rural development
31. China and IRRI: improving China's rice productivity
32. Potential yields and the efficiency of radiation use in rice

Discussion Paper Series

33. Defining productivity and yield
34. Simulation of yield losses caused by rice diseases insects and weeds in tropical Asia
35. Evaluation, evaluators and evaluation culture
36. Adoption of contour hedgerows by upland farmers in the Philippines: an economic analysis
37. The universe, the evolution of the perverse, and a rice problem
38. Methods for evaluating resistance to rice tungro diseases
39. Economic cost of drought and farmers' coping mechanisms: a study of rainfed rice systems in Eastern India
40. Improving the productivity and sustainability of rice-wheat systems of the Indo-Gangetic Plains: a synthesis of NARS-IRRI partnership research
41. Research for development IRRI's in country roles
42. The quest for connections: developing a research agenda for integrated pest and nutrient management
43. Moral confidence in agriculture
44. A proposal for IRRI to establish grain quality and nutrition research
45. Impacts of rodents on rice production in Asia
46. Classifying rice germplasm by isozyme polymophism and origin of cultivated rice
47. Natural resource endowments, subsistence agriculture, and poverty in the Chhotanagpur Plateau
48. Designing rice for the 21st century: the three laws of maximum yield
49. Rice and climate change: significance for food security and vulnerability

Limited Proceedings

These series allows IRRI scientists and partners to quickly share information with specialized institutions and individuals. It consists of proceedings from conferences, meetings, and workshops. To permit rapid publication, review and editing may not be as rigorous as with formal proceedings.

The LP are as follows:

1. Scaling methodologies in ecoregional approaches for natural resources management
2. Wild and weedy rice in rice ecosystems in Asia: a review
3. Plant variety protection for rice in developing countries: impacts on research and development
4. Philippine rice post production systems (PPS): moving to a brighter future
5. Risk analysis and management in rainfed rice systems
6. Seed health and seed-associated microorganisms for rice disease management
7. Natural resource management issues in the Korat Basin of northeast Thailand: an overview
8. Planning workshop on red stripe
9. Partnerships for modernizing the grain postproduction sector
10. Blessings from nature and science for the future
11. Integrated crop-animal systems in Southeast Asia: current status and prospects
12. Policy support needs of yybrid rice technology in Asia
13. Seed health improvement for pest management and crop production
14. Progress in crop improvement research
15. Natural resource management for poverty reduction and environmental sustainability in fragile rice-based systems
16. Advanced technologies of rice production for coping with climate change: ‘no regret’ options for adaptation and mitigation and their potential uptake
17. Responding to changing climate in unfavorable rice environments

Technical Bulletin

The IRRI Technical Bulletin is a rapid means of presenting research output and delivering new technology on a specialized technical subject such as the development of experimental methods, specialized software, or other solutions to complex research problems.
Publications on this page will also occasionally feature the annual technical reports of some IRRI research divisions, technical advisory notes, and technical manuals.

The TB are as follows:

1. Present knowledge of rice genetics and cytogenetics (1964);
   IRRI biodiversity software series. I. LUMP, LINk, and JOIN: utility programs for biodiversity research (1999)
2. Biological control of rice stem borers: a feasibility study (1964);
   IRRI biodiversity software series. II.COLLECT1 and COLLECT2: programs for calculating statistics of collectors' xurves (1999)
3. Growth habit of the rice plant in the tropics and its effect on nitrogen response (1964);
   IRRI biodiversity software series. III. BOUNDARY: a program for detecting boundaries in ecological landscapes (1999)
4. The morphology and varietal characteristics of the rice plant (1965);
   IRRI biodiversity software series. IV. EXTSPP1 and EXTSPP2: programs for comparing and performance-testing eight extrapolation-based estimators of total taxonomic richness (1999);
5. Evaluation of partial sterility in Indica x Japonica rice hybrids (1966);
   IRRI biodiversity software series. V. RARE, SPPDISS, and SPPRANK: programs of detecting between-sample differences in community structure (1999)

6. Physicochemical data on the rice grain (1966);
   SysNet Tools: The multiple goal linear programming (MGLP) model and maplink (1999)
7. Photosynthesis, respiration, and plant type of the tropical rice plant (1966);
   Upland: a simulation model for water balance in upland soils (2001)
8. The flowering response of the rice plant to photoperiod (1969);
   SysNet Tools II: the MGLP user interface for interactive land use scenario analysis (2001)
9. Production and market relationship for rice and corn in the Philippines (1965)
10. Nutritional disorders of the rice plant in Asia (1966)
11. Resistance of rice varieties to striped rice borers (1971)
12. Listening to farmers: qualitative impact assessments in unfavorable rice environments (2008)
13. Improving productivity and livelihood for fragile environments (2008)
14. Hybrid rice adoption in India: farm-level impacts and challenges (2010)
15. Opportunities for global rice research in a changing world (2011)
16. Rice in Odisha (2012)
17. Alternated wetting and drying in Philippine rice production: feasibility study for a clean development mechanism (2013)

Subject Index

Biotechnology

Biotic Stresses

Breeding

Communication of Information (Training)

Conferences

Countries (Regions)

Crop Nutrition

Cropping systems

Economics

Environment

Farm level & Extension

Hybrid rice

Insect pests

Irrigated rice

Maps

Models

Plant nutrition

Plant Physiology

Charting new pathways to C4 rice 27
Drought frontiers in rice: crop improvement for increased rainfed production 25
Growth stages of the rice plant 84
Redesigning rice photosynthesis to increase yield 72
Water-wise rice production 47

Plant Protection

Aromatic rices 67
Direct seeding of rice and weed management in the irrigated rice-wheat cropping system of the Indo-Gangetic Plains 24
Exploiting biodiversity for sustainable pest management 57
New approaches to gall midge resistance in rice: proceedings of the international workshop 37
Planthoppers: new threats to the sustainability of intensive rice production systems in Asia 23
Practical field guide to weeds of rice in Asia (English) 18
Practical field guide to weeds of rice in Asia (Bahasa Indonesia) 14
Research methods in toxicology and insecticide resistance monitoring of rice planthoppers, 1st edition 17
Research methods in toxicology and insecticide resistance monitoring of rice planthoppers, 2nd edition 2
Rice-feeding insects and selected natural enemies in West Africa: biology, ecology, identification 44
Rice IPM 83
Rice is life: scientific perspectives for the 21st century 80
Rice research for food security and poverty alleviation 64
Rodent outbreaks: ecology and impacts 21

Policy

Production

Rainfed lowland rice

Research

Resource management

Rice Ecosystems

Rodents

Scientists

Sociology

Soil

Statistics

Sustainability

Technology Transfer

Upland Rice

Water Management

Weeds

Title index

E

G

H

I

L

M

N

O

P

R

S

T

U

W

Author/Editor index