Preface

The International Conference on "Rice Planthoppers—Ecology, Management, Socio Economics and Policy" was held in Zhejiang university's new campus in Zhijinggang, Hangzhou, November 21–23, 2012. The conference brought together researchers from Australia, Cambodia, China, Indonesia, Japan, Myanmar, Philippines, South Korea, Thailand, the FAO, and IRRI. This conference came about as a result of numerous outbreaks of planthoppers in China, Philippines, Thailand, Indonesia, Bangladesh, India, and Myanmar from 2005 to 2012. Planthoppers are generally not pests as they are well controlled by natural biological control services that are abundant in rice ecosystems. However, when such services are compromised, their populations grow exponentially into outbreaks destroying crops, causing a symptom called 'hopper burn'. In addition, planthoppers are also vectors of several virus diseases that will destroy newly planted crops in the seasons following the outbreaks.

In the 1970s and 1980s, the early days of the Green Revolution, planthoppers became major threats to rice production following high use of subsidized fertilizer and pesticides and when the subsidies were removed the pest subsided. These same pests have returned with a vengeance, causing even more destruction and misery to farmers throughout East and Southeast Asia. Today, rice planthoppers have become rice's most serious pest problems. In the last few years they have caused crop losses of more than 10 million tons.

The most seriously affected country was Thailand. From 2008, Thailand's rice bowl in the central Plains has suffered continuous outbreaks for 14 consecutive seasons. In January 2010 the government of Thailand announced a 16 % reduction in their export forecasts. Thousands of farmers had lost their crops and in February 2010 the government announced a release of US $60 million to compensate farmers' losses. Economists quantified the 2010 dry season crop loss due to planthopper attacks to be more than US $50 million at farm gate price. In addition, the government spent more than US $1 million to launch 28 control campaigns in 14 provinces and released emergency funds of about US $16 million to purchase insecticides for distribution which contributed to the sustained outbreaks. In June 2011, the Rice Department in collaboration with the Thai Agro Business

Association (TABA) and IRRI launched a campaign to "stop the use of abamectin and cypermethrin" in rice. These two types of insecticides were major culprits to pest resurgences. The campaign reduced on-farm use of these insecticides but applications remain high as retailers very quickly introduced other products into the market.

Similarly, Indonesian farmers suffered the same threats and Java alone lost about a million tons in 2011. Losses in other years were however not quantified. Smaller patches of outbreaks had occurred in Malaysia, India, Myanmar, Bangladesh, Philippines, and India while China continues to lose about one million ton a year. In 2012, the southern provinces of China suffered the worst planthopper outbreaks in the last 20 years. Besides economic losses, thousands of farmers have suffered crop failures, pesticide poisoning, and severe debt problems, which have forced them into poverty and hunger and even suicide.

Planthoppers are secondary pests that are normally under natural control. Outbreaks are symptoms of unsustainable practices that destroy vital biodiversity and ecosystem services triggering exponential population growth resulting in outbreaks. Although abnormal weather like droughts and floods can also trigger outbreaks, the most consistent factor in Asia is insecticide misuse. Insecticide misuse in Asia is due to weak marketing regulations that permit pesticides to be sold as fast moving consumer goods (FMCGs), like toothpaste and soap. In addition, insecticide active ingredients are marketed in hundreds of trade names in plastic sachets packaging, like instant coffee and shampoo, and retailed by village general stores. To promote sales aggressive marketing campaigns are often used with numerous sales incentives, like gifts, free trips, lottery tickets, and even a trip to Mecca. At the grass-root level farmers rely on pesticide retailers for advice, recommendations, and supply of pesticides and this inevitably result in rampant misuse.

At the 2008 Planthopper Conference held at IRRI, scientists in attendance developed a consensus that planthopper problems are induced by insecticide misuse. Technologies such as resistant varieties alone are unable to solve the problem. At the 2012 Planthopper Conference, scientists further confirmed that planthopper problems are insecticide-induced and developed consensus that strategies to solve such problems would need intervention through the social sciences and policy reforms. Eleven papers from the conference that addressed ecology, management, socioeconomics, and policy were selected for this book. The first chapter describes the planthopper problems in China in the last half century by Prof. Jiaan Cheng who has been working on these problems since the 1960s. In Chap. 2, another veteran who has been working on planthoppers since the 1970s, Dr. K. Sogawa, describes how this man-made problem is occurring in all rice ecosystems in Asia. Chapter 3 is another synthesis paper prepared as a Working Paper for the Asia Development Bank (ADB) that summarizes the general findings from the Regional Research and Development Technical Assistance project that supported a lot of the work. The chapter extends discussions into the realm of policy weaknesses in pesticide control and calls for reforms and the 'professionalizing' of plant protection services similar to that of medical services. Dr. T. Wada, another planthopper veteran researcher, discusses the

differences in the biology of rice planthoppers in tropical and temperature regions. This is followed in Chap. 5 by Prof. Yonggen Lou et al. discussing herbivore-induced defenses in rice that can be useful in avoiding pesticide use. The huge amounts of insecticide used in rice, especially in China, has resulted in rapid developments in resistance. Professor Zewen Liu et al. outline the mechanisms of insecticide resistance development in planthoppers in Chap. 6. Technologies alone are unable to manage planthopper problems and more ecologically based approaches are needed. Professor Geoff Gurr et al. in Chap. 7 explores the potential of ecological engineering methods for delivering ecosystem services that will render protection to rice crops. The pioneering work to introduce ecological engineering methods to manage planthoppers was carried out in Jin Hua, China by Zhongxian Lu and colleagues and this is described in Chap. 8. Farmers' insecticide applications are less than perfect and a large proportion of their sprays is unnecessary. In Chap. 9, K.L. Heong and colleagues examined insecticide use and yield data from more than 5,000 farms and found that there were very little productivity gains from farmers insecticide use. Planthopper outbreaks are unpleasant experiences that rice farmers are constantly fearful of. In Chap. 10, Monina Escalada et al. examine the social impacts of planthopper outbreaks on farmers in Central Thailand. Finally in Chap. 11, Geoff Norton et al. use a resilience model to encapsulate the ecological, social, and policy aspects surrounding the rice planthopper problem and suggest a conceptual framework for future use in tackling such a complex problem as the rice planthopper.

The last book on rice planthoppers published by IRRI in 2009 outlines new paradigms to chart sustainable ways to manage these secondary pests. We hope that this book will provide further thoughts on the new paradigms, especially in the application of ecological engineering methods and in 'fixing' the problem through policy interventions and reforms. The website http://ricehoppers.net/ will continue to update on issues related to rice planthopper management and ecological engineering methods.

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