

# RICE BLACK BUGS

Taxonomy, Ecology, and  
Management of Invasive Species



Editors

Ravindra C. Joshi, Alberto T. Barrion, and  
Leocadio S. Sebastian

**PHILRICE**



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**Ravindra C. Joshi, Alberto T. Barrion,  
and Leocadio S. Sebastian**

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**PHILRICE**

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Department of Science and Technology



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Department of Agriculture



Food and Agriculture Organization

The Philippine Rice Research Institute (PhilRice) was created in 1985 by the Government of the Philippines to help develop high-yielding and cost-reducing technologies so farmers can produce enough rice for all Filipinos. Today, PhilRice is considered a model research agency, a center of excellence, and a world-class research institution.

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# Foreword

With increasing population pressure on land and with diminishing per capita availability of arable land and irrigation water, the only pathway available to the Philippines and other developing countries in Asia to meet their growing food needs is improving productivity in perpetuity without ecological harm, a pathway which I have named “Ever-green Revolution.” Pest management is vital to achieving an ever-green revolution. In 1982, when I was the director general of the International Rice Research Institute at Los Baños, I watched with great concern the damage being done to the crop by the rice black bug (RBB) *Scotinophara* species. RBB has become a highly invasive pest in several parts of the Philippines, particularly in Palawan Province. RBB outbreaks have also occurred in Visayas and Mindanao, resulting in 15–23% yield loss.

Management of RBB becomes difficult because of the presence of several alternate hosts such as okra, corn, and taro. The rice granary of the Philippines, Central Luzon, is also threatened by this pest. Therefore, the Philippine Rice Research Institute (PhilRice), in cooperation with IRRI, the University of the Philippines Los Baños, and the Department of Agriculture convened a workshop in February 2006 to identify effective control and management procedures to curb the incidence and spread of this important pest. At this workshop, a strategy for the control of this pest was developed. The RBB management strategy recommended in this book is environment-friendly as well as cost-effective. We owe a deep sense of gratitude to Dr. Ravi Joshi and all his colleagues for bringing out this timely publication. I hope it will be widely used by scientists, policymakers, consumers, and farmers so that the threat of RBB will now be part of history.

M.S. SWAMINATHAN  
President, Pugwash Conferences on Science and World Affairs  
Chairman, M.S. Swaminathan Research Foundation  
Recipient, 1987 World Food Prize

# Foreword

From a little noticed minor pest, the rice black bug (RBB) *Scotinophara* spp., has become one of the most rice-damaging insect pests. Its spread across nations and regions of the world has brought about complex and far-reaching challenges for its management.

RBB has proven to be a challenge to manage, its alternate hosts being grown together with or after rice such as okra, corn, and taro. In the Philippines, RBB infestations or “bug burn” result in 15–23% yield loss. Frequent RBB occurrences lead to economic distress on account of the forgone income from production.

This is further aggravated by the misuse and abuse of broad-spectrum nonselective synthetic pesticides, a practice commonly and inadvertently committed by farmers, as it is often their only known and affordable option of defense against the RBB menace. Hence, persistent RBB infestation triggers environmental degradation in the long run, aside from the immediate economic losses.

The solution for farmers is to learn more about ecological and sustainable management options for RBB, to prevent crop losses, as well as to diminish environmental damage. Furthermore, knowledge about RBB and timely access to information on pest population dynamics are critical elements to achieve effective and ecologically sound management of other pest species in the rice system.

I am personally delighted with this publication as no other book thus far carries such an extensive literature on the taxonomy, ecology, and sustainable management of RBB. Its relevant scientific content makes it a very useful reference manual for entomologists, pest management practitioners, and information officers in developing locally specific RBB management approaches. The availability of such management options will also help ensure the reduction of crop losses due to RBB infestation and prevent environmental harm by suggesting biological control methods as alternative to synthetic pesticides.

The contributions of various authors are highly appreciated. They have graciously shared the extensive knowledge and experience they gained from working at international and national agricultural research centers. Many have dedicated their lives to making sure that invasive RBB species do not deprive farmers of their already precarious livelihood and income.

By publishing this important book, PhilRice gives scientists, pest management specialists, and rice farmers worldwide access to the contributors' knowledge and information in support of its strategy of exploring and deriving benefits from research, while focusing on areas of special interest to the Philippines.

With the editors' painstaking efforts, this book on RBB should be a very useful resource to researchers, students, and rice farmers who want to learn more about RBB and how to mitigate its devastating effects on the economy and the environment.

I believe that this unique book will also benefit other RBB-invaded countries, the same way that it has fulfilled PhilRice's quest for RBB knowledge, thus making a difference in the lives of Filipino farmers.

HANS RUDOLF HERREN  
President, Millennium Institute  
Recipient, 1995 World Food Prize

# Preface

After its first outbreak in the Philippines in 1982, rice black bug (RBB) *Scotinophara* spp. has remained as a highly invasive pest of rice in some regions of the country. In fact, the idea of establishing a national rice institute in the Philippines came up when Palawan Province was being affected by RBB. This incidence amplified the need to have an organization fighting the country's local battles, despite the local presence of the International Rice Research Institute (IRRI) whose concerns are global.

Time and again, RBB outbreaks occurred in various rice-growing provinces in the Visayas and Mindanao, resulting in 15–23% yield loss. Thriving primarily in rice, RBB is one of the most difficult pests to manage because its alternate hosts are crops grown together with or after rice such as okra, corn, and taro.

Being able to fully identify its ecology and management would further help scientists and researchers to contain this pest in areas already affected and prevent its spread in other rice-growing areas, especially in Central Luzon, one of the Philippines' "rice bowls." Its reported occurrence in Sorsogon Province in late 2005 raised alarms about the pest migrating and wreaking havoc in the greater Luzon area, where rice and alternate host crops of RBB are planted in wider contiguous areas.

The Philippine Rice Research Institute (PhilRice), in cooperation with IRRI, the University of the Philippines Los Baños (UPLB), and the Department of Agriculture (DA), convened a workshop in February 2006 to determine currently available and effective tools and management alternatives to arrest the potential spread of RBB in Central Luzon. Accordingly, the DA-Regional Field Unit 5 (RFU 5) reported RBB occurrence in three towns—Bulan, Gubat, and Matnog of Sorsogon—between November and December 2005, attesting to the fact that RBB has become an ominous threat to rice cultivation in the Bicol region.

The Philippines' efforts to mitigate RBB infestation have been limited to its management. Less is known about its migration pattern, behavior, taxonomy, and ecology. Moreover, although a wealth of RBB information is internationally accessible through the World Wide Web, these are not thorough. Extensive literature searches have yielded no single comprehensive book on the identification, ecology, and management of RBB.

As one of its R&D strategies to explore and derive benefits from research activities around the world and to concentrate on areas of special interest to the Philippines, PhilRice, through this book, presents the current knowledge of leading researchers from other countries where rice production has been affected by RBB. Consisting of four sections, each part addresses the following: Section

1: clarifications on the confusing taxonomy using traditional and modern taxonomic tools; Section 2: state-of-the-art technologies of the different approaches to the management of RBB pest species; Section 3: country reports and current available information; and Section 4: database of selected world bibliography on RBB and a stand-alone compact disc (DVD-ROM) containing PDF of published scientific information on RBB.

Our book chapters reinterpret old problems and address new techniques for RBB management. The lessons, information, and knowledge available in one country or region could be sources of helpful management approaches for RBB toward preventing its spread from one area to the next.

With the wealth of information compiled herein, this book will hopefully provide guidance and direction to RBB research on ecological management in the next few years. However, the taxonomy of the African RBB species should be further reviewed and revised in the near future.

On a personal note, we, the editors, find this book project challenging. Our subject matter may be minute to the naked eye, but its damaging effect on rice and alternate host crops results in economic loss, mostly afflicting marginal rice farmers. And we never could have gone this far, were it not for the help of individuals who made this book possible. We especially thank Tess Rola and George Reyes who patiently escorted us through the web of the editorial process and commercial production of this book. We also thank Henry Mamucod who designed the attractive book cover. We are grateful to Elaine Joshi for preparing the index.

We are most grateful to all contributors for sharing their personal knowledge and experiences without presenting the views of their own institutions. We also commend them for their responsiveness to our invitation, perseverance in rectifying errors and shedding light on our reviews, while minding the tight production schedule. Thank you for your help in making this work into a reality. At this juncture, any errors committed, may they be beyond our control, are our responsibility.

We are also indebted to the co-publishers of this book: the Department of Science and Technology (DOST), the Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development (DOST-PCARRD), the Department of Agriculture-Bureau of Agricultural Research (DA-BAR), and the United Nations Food and Agriculture Organization (FAO). Thank you for helping PhilRice with the much needed resources for book printing.

Finally, we dedicate this book to the Filipino rice farmers. They may have been burned by the occurrence of RBB, but this disheartening experience has been the driving force behind the establishment of PhilRice and now, our motivation in coming up with this book. The mounting problems on RBB, among other local concerns, have indeed prompted agriculture leaders and researchers in the Philippines to create an institution dedicated to helping Filipino farmers produce enough rice.

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