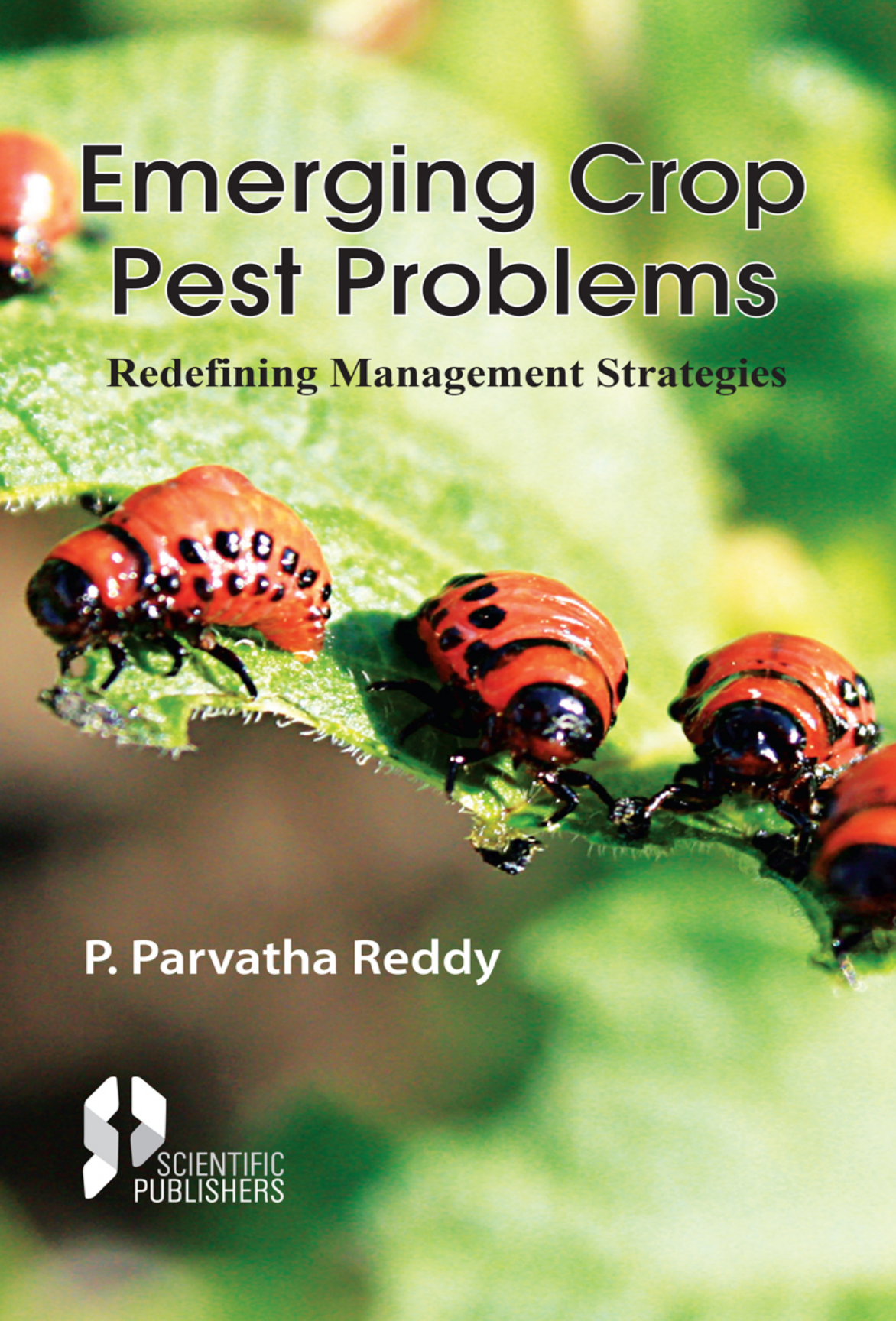

Emerging Crop Pest Problems

Redefining Management Strategies

P. Parvatha Reddy

SCIENTIFIC PUBLISHERS

Emerging Crop Pest Problems: Redefining Management Strategies

By

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Foreword

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To promote agricultural education, research and sustainable development with focus on food and nutrition security

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With the development of agricultural technology as well as biotic and abiotic factors, the crop losses and pest problems are changing continuously. Chronic, emerging and invasive pests are considered as one of the major threat to food security. There is a need to explore certain reformative measures to narrow down these losses. The climate change will affect the pest's distribution and status as well as the pest management practices.

Increased movement of people, plants and products in the globalized economy on the one hand, and the concentration and intensification of production systems on the other, have accelerated and enlarged redistribution of plant pests with a clear tendency to expand to all regions of the globe. In addition, climate change is creating new ecological niches for the (re)emergence and spread of pests and diseases. As a result, the impact of crop pests has considerably increased.

The truly scary possibility is that a new or re-emerging crop pest could decimate one of the few crops — rice, wheat, corn — that the global diet is based on. We have already had a few close calls. Wheat rust, which is caused by a fungus, devastated wheat crops in Africa, and is poised to spread to other major wheat-producing countries. It does not help that over the years farmers have narrowed the genetic diversity of commodity crops, which limits our ability to respond if a new pest or disease takes hold. That is why we need to support seed banks, which store a variety of strains within a crop, to ensure that farmers have weapons to respond to a new plant plague. They will need those bullets in a warmer world.

Emerging pests have increased in incidence, geographical or host range; have changed damage potential; have been discovered or newly recognized. Interest in emerging pests has focused on those affecting humans, livestock and wildlife. Emerging crop pests impact negatively on human wellbeing through agricultural and economic loss, and also have consequences for biodiversity conservation.

Thus, emerging pests have themselves become new drivers of global environmental change. Emerging pests can cause extinction of endangered species; alter the ratios of predators, prey, competitors, and recyclers necessary for healthy, well-functioning ecosystems; and alter habitat already threatened by fragmentation and global climate change.

Hence, there is an urgent need to modify crop protection measures with changed climate in order to attain the goal of food security.

In this context, the book written by **Dr. P. Parvatha Reddy** is very timely and comprehensively deals with changing pest scenario with respect to insects, mites, diseases and nematodes affecting field, fruit, vegetable, ornamental, medicinal, plantation, tuber, and forest crops. The management strategies for the emerging pests have been discussed in detail and the practical recommendations have been outlined. The pests which are likely to become serious threats in future due to changes in the ecosystems and habitats are discussed. The possible technical and policy responses, and policy considerations to solve the problems of emerging pest problems have also been outlined.

I compliment Dr. Reddy for his meticulous contribution on a very potential topic of emerging crop pest problems and redefining their management strategies. This book will be of immense value to scientific community in agriculture as a whole and who are involved in crop protection in particular. The material can also be used for teaching post-graduate courses. The book can also serve as a very useful reference to policy makers and practicing farmers.

(Dr. PREM NATH)

Date: May 1, 2017
Place: Bangalore

Preface

Crop pest introduction, establishment, re-emergence and outbreaks have resulted in major food problems either directly through yield reductions of food crops, or indirectly through the reduction of yields of cash crops and loss of consumer confidence, e.g. potato late blight and locusts.

In recent years, with changes in the cropping systems and climate, and introduction of highly input intensive high yielding varieties/hybrids, a shift in pest status has been observed. In light of national concerns for crop biosecurity, new, emerging, and threatening plant pests have received more attention from all the interested parties. Thus, emerging pests have themselves become new drivers of global environmental change. They are responsible for causing extinction of endangered species; altering the ratios of predators, prey, competitors, and recyclers necessary for healthy, well-functioning ecosystems; and altering habitat already threatened by fragmentation and global climate change. New and re-emerging plant pests have raised fear of their potential impact on livelihoods, food security and global markets.

The incidences of several insect pests like mealy bugs, particularly *Phenacoccus solenopsis* on cotton; sugarcane woolly aphid, *Ceratovacuna lanigera* on sugarcane; *Pieris brassicae* on crucifers; and tobacco caterpillar, *Spodoptera litura* on several crops; have shown an increasing trend. There was a decline in the pest status of bollworm (*Helicoverpa armigera)* in cotton, whereas the sap feeders, *viz*. aphids, jassids, mirids and mealy bugs are emerging as serious pests. Recently, the occurrence of resistance in *Bt* cotton to *Helicoverpa zea* in different regions had been reported.

The truly scary possibility is that a new or re-emerging disease pathogen could decimate one of the few crops — rice, wheat, corn — that the global diet is based on. For example, wheat rust fungus, *Puccinia graminis* devastated wheat crops in Africa and is poised to spread to other major wheat-producing countries. Cassava mosaic virus transmitted by white flies, has caused enormous losses in cassava in sub-Saharan Africa, where it is a staple in the diet of millions. As new strains of *Phytophthora infestans* evolve, new outbreaks of the disease emerge, causing devastating epidemics globally; such as the virulent fungicide-resistant strain US-8, which emerged during 1992. In 1972, Karnal bunt fungus, *Tilletia indica* became globally important following its discovery in Mexico and in USA during1996. Recent interest in the disease has surrounded the potential for its use as a biological weapon and exports of wheat from many regions with Karnal bunt have been banned, leading to severe economic loss for affected countries.

There has been an outbreak of serious root-knot nematode problems in the recent years in vegetable crops grown under protected cultivation systems and fruit crops such as pomegranate and guava through dissemination of nematodes with

infected planting materials. Rice root-knot nematode has also emerged as a national problem, and the problem is getting accentuated. The detection of potato cyst nematodes in northern India is a serious concern with ramifications on export and quarantine issues.

A focused attention by experts like plant pathologists, entomologists, nematologists, horticulturists, policy makers, pesticide industries, and farmers is the need of the hour for in-depth discussion at one platform in order to develop a broad strategy for tackling these problems.

The present book on "**Emerging Crop Pest Problems: Redefining Management Strategies**" comprehensively deals with the rapid and accurate detection, diagnosis, and development of management recommendations for the emerging crop pests. The book is divided into five sections. The first section deals with an overview of emerging crop pest scenario including drivers of pest emergence, impacts of emerging pests, and management of emerging pests. The emerging insect and mite pests on field, fruit, vegetable, plantation, tuber, and forest crops; and strategies for their management are dealt in section two. The third section deals with emerging bacterial, fungal and viral diseases of field, fruit, vegetable, ornamental, spice, and tuber crops and their management. The emerging nematode scenario on field, fruit, vegetable, ornamental, medicinal, spice, and tuber crops and strategies for their management are dealt in section four. The final section deals with pests likely to become serious threats in future, and potential impact and anticipated effect of climate change on emerging pests. The possible technical and policy responses, policy considerations and the road map ahead are also discussed in this section. The book is extensively illustrated with excellent quality photographs enhancing the quality of publication. The book is written in lucid style, easy to understand language along with adoptable management recommendations involving eco-friendly practices.

This book will be of immense value to scientific community involved in teaching, research and extension activities related to emerging crop pest problems and their management strategies. The material can be used for teaching post-graduate courses. The book can also serve as a very useful reference to policy makers and practicing farmers. Suggestions to improve the contents of the book are most welcome (E-mail: reddy_parvatha@yahoo.com). I am very much thankful to Dr. Prem Nath for kindly writing Foreword to my book.

The publisher, Scientific Publishers, Jodhpur, India, deserves commendation for their professional contribution.

P. Parvatha Reddy

Bangalore
May 5, 2017

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Contents

Section II. INSECT AND MITE PESTS

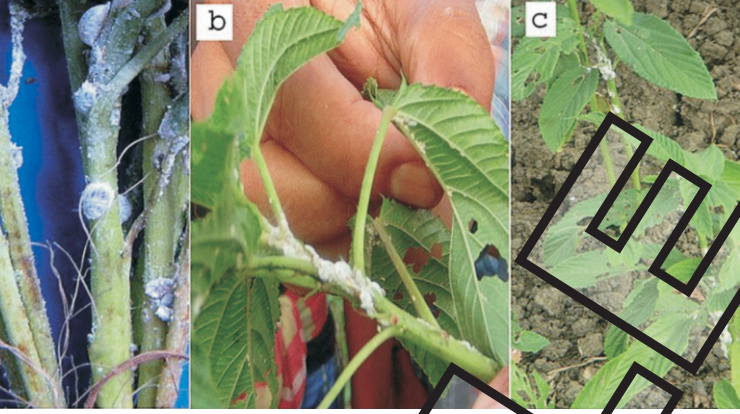

Plate 2.19. Jute field, severely infested with mealy bug a) basal part, b) terminal part, and c) infested plant in field