

Emerging Crop Pest Problems

Redefining Management Strategies

P. Parvatha Reddy



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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 during 1996. 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

Foreword	iii
Preface	v

Section I. INTRODUCTION

1. Emerging Crop Pest Problems – An Overview	1
1.1. Introduction	1
1.2. Crop Losses Due to Pests	1
1.3. Emerging Pest Problems	4
1.3.1. What is an Emerging Pest?	4
1.3.2. Insect Pests	5
1.3.3. Disease Pathogens	6
1.3.4. Nematode Pathogens	8
1.4. Invasive Pests	9
1.5. Impact of Climate Change on Emergence of Pests	11
1.5.1. Expansion of Geographic Ranges	12
1.5.2. Increased Overwintering Survival	13
1.5.3. Increase in Number of Generations	13
1.5.4. Physiological and Ecological Impact	13
1.5.5. Loss of Ecological Biodiversity	14
1.5.6. Changes in Insect Feeding	14
1.5.7. Breakdown of Host Plant Resistance	14
1.5.8. Introduction of Transgenic Crops	14
1.5.9. Changes in Tillage Technology	14
1.5.10. Other Effects	14
1.6. Drivers of Pest Emergence	15
1.6.1. Insect Pests	16
1.6.2. Disease Pathogens	16
1.7. Impacts of Emerging Pests	18
1.7.1. Food Security	18
1.7.2. Human Health and Welfare	19
1.7.3. Biodiversity	19
1.8. Management of Emerging Pests	20
1.8.1. Insect Pests	20
1.8.2. Disease Pathogens	22
1.9. Conclusions	22

Section II. INSECT AND MITE PESTS

2. Emerging Insect Pest Problems in Field Crops	25
2.1. Introduction	25
2.2. Cotton, <i>Gossypium</i> spp.	25
2.2.1. Mealy Bug, <i>Phenacoccus solenopsis</i> (Hemiptera: Pseudococcidae)	27
2.2.2. Tobacco Caterpillar, <i>Spodoptera litura</i> (Lepidoptera: Noctuidae)	31
2.2.3. Mirid Bug, <i>Creontiades biseratense</i> (Miridae: Hemiptera)	32
2.2.4. Stink Bugs, <i>Acrosternum hilare</i> , <i>Nezara viridula</i> , <i>Euschistus servus</i>	34
2.2.5. False Chinch Bug, <i>Nysius raphanus</i> (Hemiptera: Lygaeidae)	35
2.2.6. Sugarcane Beetle, <i>Euethoeola rugiceps</i>	35
2.2.7. Three-Cornered Alfalfa Hopper, <i>Spissistilus festinus</i>	35
2.2.8. Tea Mosquito Bug, <i>Helopeltis bryadi</i> (Hemiptera: Miridae)	36
2.2.9. Flower Bud Maggot/Gall Midge, <i>Dasineura gossypii</i> (Cecidomyiidae: Diptera)	36
2.3. Soybean, <i>Glycine max</i>	38
2.3.1. Tobacco Caterpillar, <i>Spodoptera litura</i>	38
2.4. Sunflower, <i>Helianthus annuus</i>	39
2.4.1. Tobacco Caterpillar, <i>Spodoptera litura</i>	39
2.5. Sugarcane, <i>Saccharum officinarum</i>	39
2.5.1. Woolly Aphid, <i>Ceratovacuna lanigera</i> (Aphididae: Hemiptera)	39
2.6. Rice, <i>Oryza sativa</i>	41
2.6.1. Brown Plant Hopper, <i>Nilaparvata lugens</i> (Hemiptera: Delphacidae)	41
2.6.2. Swarming Caterpillar, <i>Spodoptera mauritia</i> (Lepidoptera: Noctuidae)	43
2.7. Sorghum, <i>Sorghum bicolor</i> and Pearl Millet, <i>Pennisetum glaucum</i>	46
2.7.1. Grey Weevil, <i>Myloccerus</i> spp.	46
2.7.2. Leaf Hopper, <i>Pyrilla perpusilla</i>	46
2.7.3. Leaf Roller, <i>Cnaphalocrosis trapezalis</i> (Lepidoptera: Crambidae)	47
2.8. Pulse Crops	48
2.8.1. Changing Pest Scenario	48
2.8.2. Gram Caterpillar, <i>Helicoverpa armigera</i>	48
2.8.3. Spotted Pod Borer, <i>Maruca vitrata</i> (Pyralidae: Lepidoptera)	49
2.8.4. Pod Wasp, <i>Tanaostigmodes cajaninae</i>	50
2.9. Jute, <i>Corchorus</i> spp.	51

2.9.1. Mealy Bug, <i>Phenacoccus solenopsis</i>	51
2.10. Subabul, <i>Leucaena leucocephala</i>	51
2.10.1. <i>Leucaena psyllid</i> , <i>Hereopsylla cubana</i> (Order: Homoptera, Family: Psyllidae)	51
2.11. Conclusions	52
3. Emerging Insect Pest Problems in Fruit Crops	53
3.1. Introduction	53
3.2. Gauva, <i>Psidium guajava</i>	54
3.2.1. Spiraling Whitefly, <i>Aleurodicus dispersus</i> (Homoptera: Aleyrodidae)	54
3.3. Papaya, <i>Carica papaya</i>	55
3.3.1. Mealy Bug, <i>Paracoccus marginatus</i>	55
3.4. Sapota, <i>Manilkara zapota</i>	58
3.4.1. Seed Borer, <i>Trymalitis margarias</i> (Lepidoptera: Tortricidae)	58
3.5. Banana, <i>Musa</i> spp.	60
3.5.1. Root Mealy Bug, <i>Geococcus citrinus</i>	60
3.6. Mango, <i>Mangifera indica</i>	61
3.6.1. Fruitfly, <i>Bactrocera caryeae</i>	61
3.6.2. Red Banded Fruit Borer, <i>Deanolis sublimalis</i> (Lepidoptera: Pyralidae)	62
3.6.3. Leaf Weevil, <i>Rhynchaenus mangiferae</i> (Coleoptera: Curculionide)	63
3.7. Amla, <i>Embelica officinalis</i>	64
3.7.1. Anar butterfly, <i>Dendrorix isocrates</i> (Lepidoptera: Lycaenidae)	64
3.8. Litchi, <i>Litchi chinensis</i>	65
3.8.1. Key Facts	65
3.8.2. Red Weevil, <i>Apoderous blandus</i> (Coleoptera: Curculionidae)	65
3.8.3. Fruit Borer, <i>Conopomorpha cramerella</i> (Lepidoptera: Gracillariidae)	66
3.9. Conclusions	67
4. Emerging Insect Pest Problems in Vegetable Crops	68
4.1. Introduction	68
4.2. Recent Changes in the Pest Scenario	69
4.3. Emerging Vegetable Pests	70
4.3.1. Solenopsis Mealy Bug, <i>Phenacoccus solenopsis</i> (Pseudococcidae: Homoptera)	70
4.3.2. Serpentine Leaf Miner, <i>Liriomyza trifolii</i> (Agromyzidae: Lepidoptera)	71

4.3.3.	Phytophagous Mites, <i>Tetranychus</i> spp., <i>Polyphagotarsonemus latus</i>	72
4.3.4.	Fruit Flies, <i>Bactrocera</i> spp.	73
4.3.5.	Whiteflies, <i>Bemisia tabaci</i>	74
4.3.6.	Giant African Snail, <i>Achatina (Lissachatina) fulica</i>	75
4.4.	Tomato, <i>Solanum lycopersicum</i>	76
4.4.1.	Silver Leaf Whitefly, <i>Bemisia argentifolii</i>	76
4.4.2.	Pinworm, <i>Tuta absoluta</i> (Lepidoptera: Gelechiidae)	77
4.4.3.	Western Flower Thrips, <i>Frankliniella occidentalis</i> (Thripidae: Thysanoptera)	79
4.4.4.	Serpentine Leaf Miner, <i>Liriomyza trifolii</i> (Agromyzidae: Lepidoptera)	80
4.5.	Brinjal/Egg Plant	81
4.5.1.	Mealy Bug, <i>Phenacoccus solenopsis</i> (Pseudococcidae: Hemiptera)	81
4.5.2.	Gall Midge, <i>Asphondylia capparidis</i>	82
4.6.	Chilli, <i>Capsicum annuum</i>	82
4.6.1.	Gall Midge, <i>Asphondylia capparidis</i>	82
4.7.	Potato, <i>Solanum tuberosum</i>	83
4.7.1.	Changing Pest Complex	83
4.7.2.	Aphid, <i>Myzus persicae</i>	83
4.8.	Cauliflower, <i>Brassica oleracea</i> var. <i>botrytis</i>	84
4.8.1.	Diamondback Moth, <i>Plutella maculipennis</i>	85
4.9.	Cowpea, <i>Vigna unguiculata</i>	86
4.9.1.	Spotted Pod Borer, <i>Maruca vitrata</i> (Pyralidae: Lepidoptera)	86
4.9.2.	Hadda beetles, <i>Henosepilachna vigintioctopunctata</i> and <i>Epilachna dodecastigma</i> (Curculionidae: Coleoptera)	87
4.10.	Field Bean, <i>Lab lab purpureus</i> var. <i>lignosus</i>	88
4.11.	Conclusions	89
5.	Emerging Insect Pest Problems in Plantation and Tuber Crops	90
5.1.	Introduction	90
5.2.	Plantation Crops	90
5.2.1.	Coffee, <i>Coffea canephora</i> / <i>Coffea arabica</i>	90
5.2.2.	Coconut, <i>Cocos nucifera</i>	93
5.2.3.	Oil Palm, <i>Elaeis guineensis</i>	97
5.2.4.	Cashew, <i>Anacardium occidentale</i>	97
5.3.	Tuber Crops	99
5.3.1.	Taro, <i>Colocasia esculenta</i>	99
5.4.	Conclusions	100

6. Emerging Insect Pest Problems of Forest Crops	101
6.1. Introduction	101
6.2. Coral Tree, <i>Erythrina</i> spp.	101
6.2.1. Gall Wasp, <i>Quadrastichus erythrinae</i> (Hymenoptera: Eulophidae)	101
6.3. Eucalyptus, <i>Eucalyptus teriticornis</i>	103
6.3.1. Gall wasp, <i>Leptocybe invasa</i> (Hymenoptera: Eulophidae)	103
6.4. Oak, <i>Quercus</i> spp.	105
6.4.1. Processionary Moth, <i>Thaumetopoea processionea</i>	105
6.5. Pine, <i>Pinus</i> spp.	105
6.5.1. Processionary Moth, <i>Thaumetopoea pityocampa</i>	105
6.5.2. Mountain Pine Beetle, <i>Dendroctonus ponderosae</i>	105
6.5.3. Southern Pine Beetle, <i>Dendroctonus frontalis</i>	105
6.6. Conclusions	106

Section III. DISEASE PATHOGENS

7. Emerging Disease Problems in Field Crops	108
7.1. Introduction	108
7.2. Groundnut, <i>Arachis hypogea</i>	109
7.2.1. Peanut Bud Necrosis Virus	109
7.2.2. Peanut Yellow Spot Tosspovirus (Tospovirus: Bunyaviridae)	112
7.3. Wheat, <i>Triticum</i> spp.	113
7.3.1. Karnal Bunt, <i>Tilletia indica</i>	113
7.3.2. Blast, <i>Magnaporthe oryzae</i>	116
7.4. Conclusions	120
8. Emerging Disease Problems in Fruit Crops	121
8.1. Introduction	121
8.2. Pomegranate, <i>Punica granatum</i>	121
8.2.1. Bacterial Blight, <i>Xanthomonas axanopodis</i> pv. <i>punicae</i>	121
8.2.2. Disease Complex, <i>Fusarium</i> spp., <i>Rhizoctonia bataticola</i>	124
8.3. Guava, <i>Psidium guajava</i>	125
8.3.1. Fusarium Wilt, <i>Fusarium oxysporum</i> f. sp. <i>psidii</i>	125
8.4. Papaya, <i>Carica papaya</i>	130
8.4.1. Papaya Ringspot Virus (PRSV)	130
8.5. Conclusions	133
9. Emerging Disease Problems in Vegetable Crops	134
9.1. Introduction	134
9.2. Potato, <i>Solanum tuberosum</i>	134
9.2.1. Late Blight, <i>Phytophthora infestans</i>	134

9.3.	Tomato, <i>Solanum lycopersicum</i>	138
9.3.1.	Tomato Yellow Leaf Curl Virus (TYLCV)	138
9.3.2.	Tomato Spotted Wilt Virus (TSWV)	142
9.4.	Onion, <i>Allium cepa</i>	145
9.4.1.	Iris Yellow Spot Virus (Iris Yellow Spot Disease)	145
9.5.	Watermelon, <i>Citrullus lanatus</i> var. <i>lanatus</i>	149
9.5.1.	Watermelon Bud Necrosis Virus (WBNV)	149
9.6.	Conclusions	151
10.	Emerging Disease Problems in Ornamental, Spice and Tuber Crops	152
10.1.	Introduction	152
10.2.	Ornamental Crops	152
10.2.1.	Ornamental Plants	152
10.2.2.	Rose, <i>Rosa</i> spp.	154
10.3.	Spice Crops	157
10.3.1.	Ginger, <i>Zingiber officinale</i>	157
10.4.	Tuber Crops	159
10.4.1.	Cassava, <i>Manihot esculenta</i>	159
10.4.2.	Taro, <i>Colocasia esculenta</i>	162
10.4.3.	Elephant Foot Yam, <i>Amorphophallus poeniifolius</i>	168
10.5.	Conclusions	172
Section IV. NEMATODE PATHOGENS		
11.	Emerging Nematode Problems in Field Crops	174
11.1.	Introduction	174
11.2.	Rice, <i>Oryza sativa</i>	174
11.2.1.	Root-Knot Nematode, <i>Meloidogyne graminicola</i>	174
11.2.2.	White Tip Nematode, <i>Aphelenchoides besseyi</i>	183
11.3.	Wheat, <i>Triticum</i> spp. and Barley, <i>Hordeum vulgare</i>	186
11.3.1.	Cereal Cyst Nematode, <i>Heterodera avenae</i> (Molya Disease)	186
11.4.	Pigeon Pea, <i>Cajanus cajan</i>	188
11.4.1.	Cyst Nematode, <i>Heterodera cajani</i>	188
11.5.	Groundnut, <i>Arachis hypogaea</i>	191
11.5.1.	Root-knot Nematodes, <i>Meloidogyne arenaria</i> , <i>M. javanica</i>	191
11.6.	Conclusions	195
12.	Emerging Nematode Problems in Fruit Crops	196
12.1.	Introduction	196
12.2.	Guava, <i>Psidium guajava</i>	196
12.2.1.	Root-Knot Nematode, <i>Meloidogyne enterolobii</i> (= <i>M. mayaguensis</i>)	196

12.2.2. Guava Decline Disease Complex, <i>Meloidogyne enterolobii</i> , <i>Fusarium solani</i>	203
12.3. Pomegranate, <i>Punica granatum</i>	205
12.3.1. Root-Knot Nematode, <i>Meloidogyne incognita</i>	205
12.3.2. Wilt Disease Complex (Fungi, Nematodes and Insect pests)	208
12.4. Mulberry, <i>Morus</i> spp.	212
12.4.1. Root-knot Nematodes, <i>Meloidogyne incognita</i>	212
12.4.2. Root-knot Nematode, <i>Meloidogyne incognita</i> and Root Rot, <i>Macrophammina phaseolina</i> Disease Complex	214
12.5. Citrus, <i>Citrus</i> spp.	215
12.5.1. Root-knot Nematode, <i>Meloidogyne indica</i>	215
12.6. Conclusions and Recommendations	216
13. Emerging Nematode Problems in Vegetable Crops	218
13.1. Introduction	218
13.2. Potato, <i>Solanum tuberosum</i>	218
13.2.1. Cyst Nematodes, <i>Globodera rostochiensis</i> , <i>G. pallida</i>	218
13.3. Nematode Problems on Polyhouse Vegetables	229
13.3.1. Main Causes	230
13.3.2. Management	230
13.3.3. Cropping Sequences	231
13.3.4. Recommendations	231
13.4. Tomato, <i>Solanum lycopersicum</i>	232
13.4.1. Root-knot Nematodes, <i>Meloidogyne incognita</i> , <i>M. javanica</i>	232
13.4.2. Root-knot Nematode, <i>Meloidogyne incognita</i> and Wilt, <i>Fusarium oxysporum</i> f. sp. <i>lycopersici</i> / <i>F. solani</i> Disease Complex	233
13.5. Bell Pepper, <i>Capsicum annuum</i>	234
13.5.1. Root-knot Nematode, <i>Meloidogyne incognita</i>	234
13.5.2. Root-knot Nematode, <i>Meloidogyne incognita</i> and Bacterial Wilt, <i>Ralstonia solanacearum</i> Disease Complex	236
13.6. Cucumber, <i>Cucumis sativus</i>	238
13.6.1. Root-knot Nematodes, <i>Meloidogyne incognita</i>	238
13.7. Conclusions	239
14. Emerging Nematode Problems in Ornamental and Medicinal Crops	240
14.1. Introduction	240
14.2. Ornamental Crops	240
14.2.1. Tuberose, <i>Polyanthbes tuberosa</i>	240
14.3. Polyhouse Flower Crops	243
14.3.1. Preparation of Beds	244

14.3.2. Enrichment of Organic Amendments (FYM/ Neem/ Pongamia/ Mahua Cake/ Vermicompost)	244
14.3.3. Application of Enriched Organic Amendments	244
14.3.4. Recommendations	245
14.4. Carnation, <i>Dianthus caryophyllus</i>	245
14.4.1. Root-Knot Nematode, <i>Meloidogyne incognita</i>	245
14.4.2. Root-knot Nematode, <i>Meloidogyne incognita</i> and Wilt, <i>Fusarium oxysporum</i> f. sp. <i>dianthi</i> Disease Complex	247
14.5. Gerbera, <i>Gerbera</i> spp.	248
14.5.1. Root-knot Nematode, <i>Meloidogyne incognita</i>	248
14.5.2. Root-knot Nematode, <i>Meloidogyne incognita</i> and Foot Rot, <i>Phytophthora parasitica</i> Disease Complex	249
14.6. Medicinal Crops	249
14.6.1. Coleus, <i>Coleus forskohlii</i>	249
14.6.2. Aswagandha, <i>Withania somnifera</i>	255
14.7. Conclusions	259

Section V. FUTURE THRUSTS

15. Pests likely to become Serious Threats in Future	261
15.1. Introduction	261
15.2. Potential Impact of Climate Change on Emerging Pests in Future	262
15.2.1. Increased CO ₂ Concentration	262
15.2.2. Rising Temperature	262
15.2.3. Precipitation	263
15.3. Anticipated effect of Climate Change on Pests	263
15.3.1. Insect Pests	263
15.3.2. Disease Pathogens	269
15.3.3. Weeds	271
15.3.4. Nematodes	272
15.4. Conclusions	272
16. The Way Forward	274
16.1. Introduction	274
16.2. Possible Technical and Policy Responses	275
16.2.1. Data for Projecting Risk	275
16.2.2. Early Warning and Prevention Strategies	276
16.2.3. Eradication, Containment, and Impact Reduction	276
16.2.4. Information Options	276
16.2.5. Food Trade Industry	277
16.2.6. Government Constraints	277
16.2.7. Government Priorities	277
16.2.8. Ecosystem Processes	278
16.2.9. Global Frameworks	278

16.3. Policy Considerations	278
16.3.1. Disaster Prevention	279
16.3.2. Capacity Development	279
16.3.3. Protecting Livelihoods	279
16.4. Roadmap Ahead	280
16.5. Conclusions	280
References	282
Acronyms	329
Subject index	330

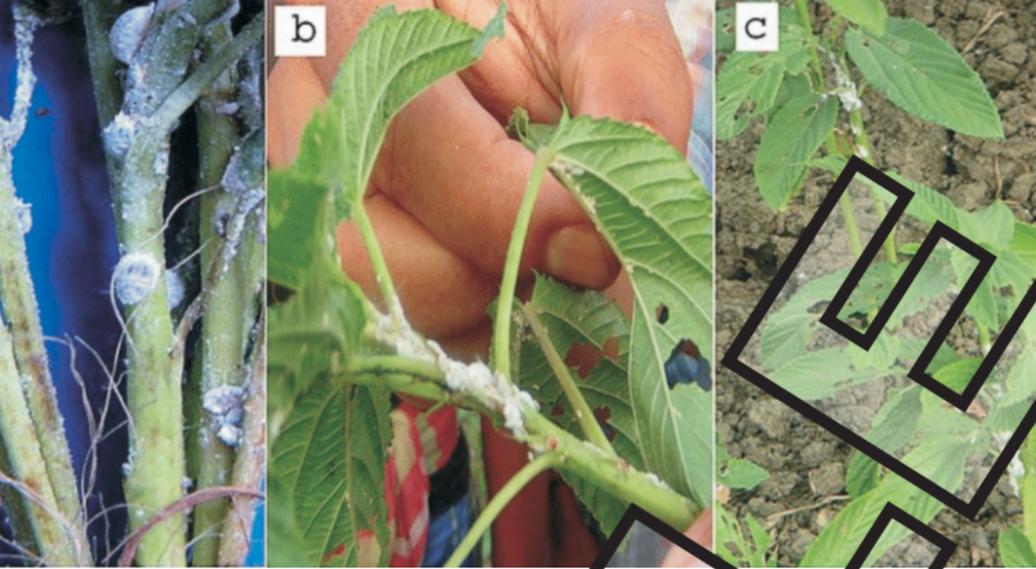


Plate 2.19. Jute field, severely infested with mealy bug
a) basal part, b) terminal part, and c) infested plant in field

