



# សៀវភៅណែនាំអំពី

## ការគ្រប់គ្រងសមាសភាពចង្រៃ

### Guide Book for Pest Management

គម្រោងពង្រឹងសមត្ថភាពសម្រាប់ការត្រួតពិនិត្យ

បច្ចេកវិទ្យាគុណភាពសម្ភារកសិកម្ម

(ជីគីមី និងថ្នាំកសិកម្ម)

Project of Capacity Building of  
Quality Standard Control of Agricultural Materials  
(chemical fertilizers and pesticides)

## Preface

This document has been developed by the Project of Capacity Building for Quality Standard Control of Agricultural Materials (Chemical Fertilizers and Pesticides), shortly called “QCAM Project”, of Japan International Cooperation Agency (JICA) and the Ministry of Agriculture, Forestry and Fisheries (MAFF) of Cambodia.

One of the main objectives for the QCAM Project is to raise awareness of Cambodian people on proper use and qualities of pesticides. Since most of pesticides are illegally brought from the neighboring countries and sold in local markets without the Khmer labels, most end-users have no means to know how to use them properly.

Under such situations, the QCAM Project and the MAFF have decided to develop this document and provide it to retailers and end-users. This document includes necessary information about how to properly identify and tackle major pests in Rice and Chinese cabbage which are commonly produced in Cambodia, by following the Integrated Pest Management (IPM) concept, that the Cambodian government is enhancing and the QCAM Project values highly.

It must be noted that the QCAM Project and the MAFF recommend that end-users of the pesticides firstly consider using IPM approaches than the use of any pesticides. The chemical control measures should be applied only when they are absolutely necessary as the last measure. It should be also noted that wrong chemical control may worsen the situation and cause further damages. In case that you need more detailed information about the IPM, please contact the National Integrated Pest Management Programme.

Finally, on behalf of the QCAM Project and the MAFF, we express our sincere appreciation for all of the support in the development of agricultural sector and this document.

August, 2011

So Khan Rithykun  
Director General of  
General Directorate of Agriculture, MAFF  
Co-project manager of the QCAM Project

Ouk Syphan  
Director, Department of  
Agricultural Legislation, MAFF  
Co-project manager of the QCAM Project

# IMPORTANT INFORMATION

This guide book is compiled information obtained and collected from different sources such as agricultural documents and internet.

Some of the photos in this book are not taken locally in Cambodia. As in the case of active ingredients mentioned here, they need to be updated in line with the new research and studies, as well as technological advancement. This being the case, we would appreciate if any efforts are made by various institutions and organizations to keep updating the contents.

The book does not provide any warranties on its contents expressed or implied, as to the accuracy or adequacy of any of the information presented.

The book has been developed to provide information only, and no endorsement is intended for products listed, nor criticism meant for products not mentioned. In the case of agro-chemicals, always consult the product labels and the accompanying instructions before purchasing and using any products.

# Contents

## Part I. Identification of Pests

### A. Rice

#### A.1. Symptoms and Damages

A.1.1.	Leaf .....	04
A.1.2.	Stem .....	11
A.1.3.	Panicle .....	13
A.1.4.	General Views .....	15
A.1.5.	Others .....	20

#### A.2. Identification of Insects

A.2.1.	Rice Army Worm ( <i>Mythimna separata</i> ) .....	22
A.2.2.	Black Bug ( <i>Scotinophara coarctata</i> ) .....	23
A.2.3.	Brown Planthopper ( <i>Nilaparvata lugens</i> ) .....	24
A.2.4.	Golden Apple Snail ( <i>Pomacea canaliculata</i> ) .....	25
A.2.5.	Green Leafhopper ( <i>Nephotettix virescens</i> ) .....	26
A.2.6.	Leaf Folder ( <i>Cnaphalocrocis medinalis</i> ).....	27
A.2.7.	Rice Bug ( <i>Leptocorisa oratorius</i> ) .....	28
A.2.8.	Rice Case Worm ( <i>Nymphula depunctalis</i> ) .....	29
A.2.9.	Rice Thrip ( <i>Stenchaetothrips biformis</i> ) .....	30
A.2.10.	Yellow Stem Borer ( <i>Scirpophaga incertulas</i> ) .....	31

#### A.3. Diseases

A.3.1.	Blast ( <i>Pyricularia grisea</i> ) .....	33
A.3.2.	Leaf Blight ( <i>Xanthomonas oryzae pv. oryzae</i> ).....	34
A.3.3.	Leaf Streak ( <i>Xanthomonas oryzae pv. oryzicola</i> ) .....	35
A.3.4.	Tungro .....	36
A.3.5.	Rice Grassy Stunt Virus .....	37
A.3.6.	Rice Ragged Stunt Virus .....	38
A.3.7.	Sheath Rot ( <i>Sarocladium oryzae</i> ) .....	39
A.3.8.	Sheath Blight ( <i>Rhizoctonia solani</i> ) .....	40

### B. Chinese Cabbage

#### B.1. Symptoms and Damages

B.1.1.	Leaf.....	43
B.1.2.	Stem .....	49
B.1.3.	Others.....	50

<b>B.2.</b>	<b>Identification of Insects</b>	
B.2.1.	Beet Army Worm ( <i>Spodoptera exigua</i> ) .....	52
B.2.2.	Black Cut Worm ( <i>Agrotis ipsilon</i> ).....	53
B.2.3.	Cabbage Head Caterpillar ( <i>Crocidolomia binotalis</i> ).....	54
B.2.4.	Cabbage Looper ( <i>Trichoplusia ni</i> ) .....	55
B.2.5.	Cabbage Webworm ( <i>Hellula undalis</i> ) .....	56
B.2.6.	Diamond Back Moth ( <i>Plutella xylostella</i> ) .....	57
B.2.7.	Striped Flea Beetle ( <i>phyllotreta striolata</i> ) .....	58

<b>B.3.</b>	<b>Diseases</b>	
B.3.1.	Turnip Mosaic Virus .....	60
B.3.2.	Bacterial Soft Rot ( <i>Erwinia carotovora</i> ) .....	61
B.3.3.	Alternaria Leaf Spot ( <i>Alternaria spp.</i> ).....	62
B.3.4.	Clubbed Root ( <i>Plasmodiophora brassicae</i> ).....	63
B.3.5.	Downy Mildew ( <i>Peronospora brassicae</i> ).....	64

**Part II. Integrated Pest Management (IPM) ..... 66**

**Part III. Pest Control by Using Pesticides**

A.	Warning on Use of Pesticides .....	74
B.	How to Read Labels of Pesticides .....	80
C.	Insect/Disease of Rice and Applicable Active Ingredients.....	83
D.	Insect/Disease of Chinese Cabbage and Applicable Active Ingredients.....	83

**Annex**

1.	List of Pictures .....	87
2.	List of Insects/Diseases and their Host Plants.....	94
3.	References	

# **Part I. Identification of Pests**

# A. Rice

# A.1.Symptoms and Damages



### A.1.1. Leaf



Picture 1 : Leaves of small seedling are chewed. → Rice Army Worm (page 22)



Picture 2: Leaf tips, leaf margins and leaves are cut off. → Rice Army Worm (page 22)



Picture 3: Larva is chewing the leaf. → Rice Army Worm (page 22)



Picture 4: Ladder-like appearance of skeletonized leaf tissues. → Rice Case Worm (page 29)



Picture 5: The cut portions are turned into cylindrical tubes, are either attached to the plant or seen floating on the water surface.

➡ Rice Case Worm (page 29)



Picture 6: Longitudinal white and transparent streaks on the blade.

➡ Leaf Folder (page 27)



Picture 7: Leaf blade folded together and glued with silk strands.

➡ Leaf Folder (page 27)



Picture 8: Leaf blade folded together and glued with silk strands.

➡ Leaf Folder (page 27)





Picture 9: Dead heart.  
➡ Yellow Stem Borer (page 31)



Picture 10: Dead heart.  
➡ Yellow Stem Borer (page 31)



Picture 11: Silvery streak on leaf blade.  
➡ Rice Thrip (page 30)



Picture 12: Yellowing leaves.  
➡ Green Leafhopper (page 26)





Picture 13: Dried leaves with presence of small brown insects.

➡ Brown Planthopper (page 24)



Picture 14: Lesion on leaf with diamond-shaped or elliptical or spindle-shaped spots with gray or white centers and brown margins.

➡ Blast (page 33)



Picture 15: Lesion with diamond-shaped or elliptical or spindle-shaped spots with gray or white centers and brown margins. ➡ Blast (page 33)





Picture 16: Bleached lesion with irregular yellowish brown to brown border.

➡ Sheath Blight (page 40)



Picture 17: Yellow and dried leaf appears along the leaf and the edge.

➡ Leaf Blight (page 34)



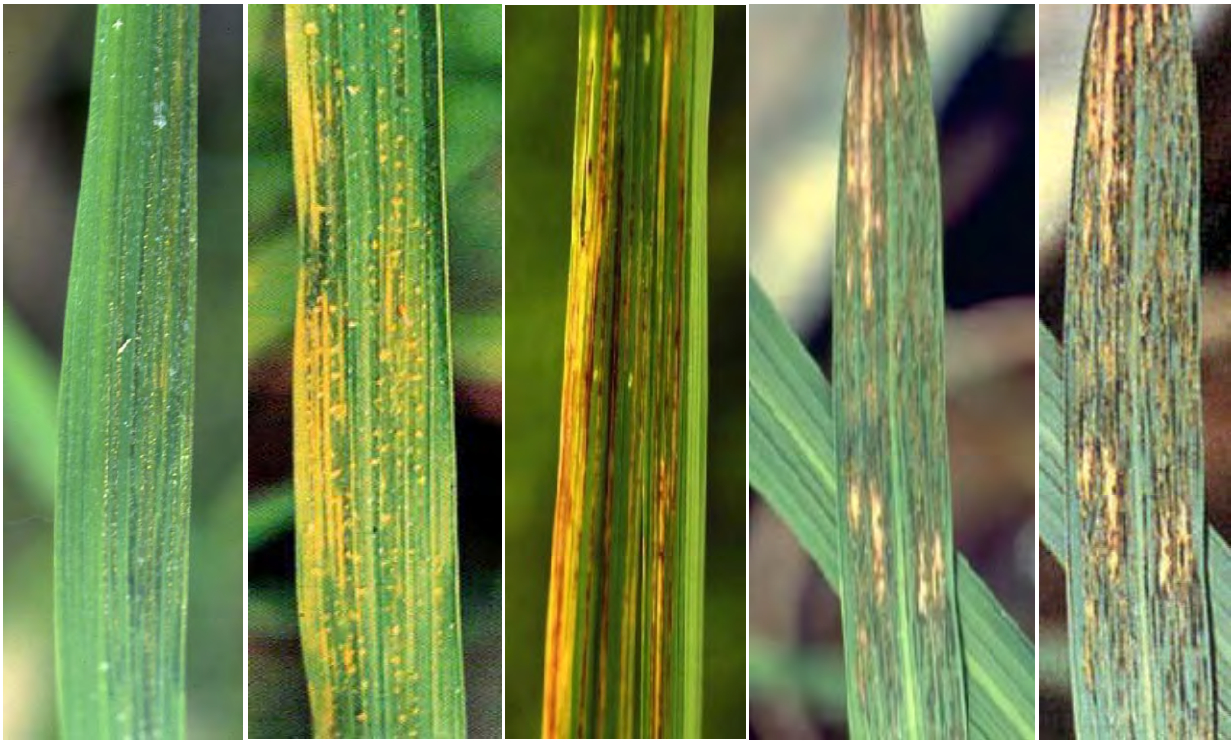
Picture 18: Yellowish droplets on young lesions observed during early morning with high dew formation.

➡ Leaf Blight (page 34)



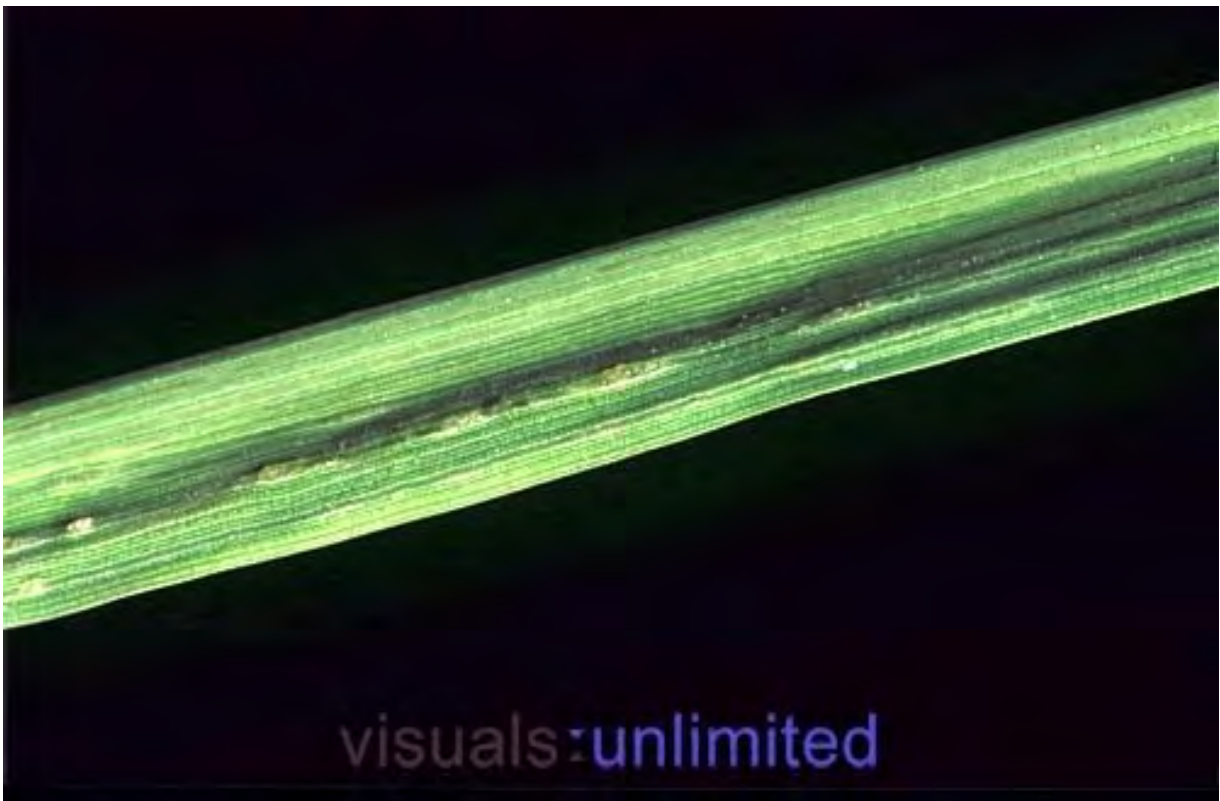
Picture 19: Yellowish to grayish streak along the leaf blade.

➡ Leaf Blight (page 34)



Picture 20: Leaves are dark-green and water-soaked streaks on interveins. Streaks later enlarge to become yellowish gray and translucent. Lesions turn brown to grayish white then dry. Browning and drying of entire leaves.

➡ Leaf Streak (page 35)



Picture 21: Galls caused by swollen phloem cell.

➡ Rice Ragged Stunt Virus (page 38)





Picture 22: Flag leaves are short and curly.  
➡ Rice Ragged Stunt Virus (page 38)



Picture 23: Leaves are short and curly.  
➡ Rice Ragged Stunt Virus (page 38)



Picture 24: Leaves are yellowing.  
➡ Tungro (page 36)

## A.1.2. Stem



Picture 25: Small brown-black insects accumulate. Picture 26: Browning leaves and stem or bug burn.  
➡ Black Bug (page 23) ➡ Black Bug (page 23)



Picture 27: Presence of a mass of brown black insects on the stems. Picture 28: Small insects on the base of stem near the water.  
➡ Brown Planthopper (page 24) ➡ Brown Planthopper (page 24)





Picture 29: Dark lesion shrivels collar.  
➡ Blast (page 33)



Picture 30: Dark lesion shrivels node.  
➡ Blast (page 33)



Picture 31: Bleached lesion with irregular yellowish brown to brown border.  
➡ Sheath Blight (page 40)

### A.1.3. Panicle



Picture 32: Rice panicles are cut off.  
➡ Rice Army Worm (page 22)



Picture 33: Panicle twisted and enclosed by flag leaf, can not emerge completely.  
➡ Rice Ragged Stunt Virus (page 38)



Picture 34: White head.  
➡ Yellow Stem Borer (page 31)



Picture 35: Panicle broken down as a result of dried neck lesion. ➡ Blast (page 33)



Picture 36: Dried panicle.  
➡ Blast (page 33)



Picture 37: Dried neck of panicle.  
➡ Blast (page 33)



## A.1.4. General Views



Picture 38: Stunted plant, dead heart.

➡ Black Bug (page 23)



Picture 39: This rice field is infested by Brown Planthoppers.

➡ Brown Planthopper (page 24)



Picture 40: Dried rice field infested by Brown Planthoppers.

➡ Brown Planthopper (page 24)



Picture 41: Hopper burned leaves are dried.

➡ Brown Planthopper (page 24)



Picture 42: Dried rice field.

➡ Brown Planthopper (page 24)



Picture 43: Leaf tips are yellowing.

➡ Green Leafhopper (page 26)





Picture 44: Leaves of seedlings are cut down. → Rice Army Worm (page 22)



Picture 45: Leave tips are browning.  
→ Black Bug (page 23)



Picture 46: Presence of shells in the field and missing hill.  
→ Golden Apple Snail (page 25)



Picture 47: Leaves wilt and roll up, turning grayish-green to yellow, and whole seedlings die.  
→ Leaf Blight (page 34)



Picture 48: Leaf rolling.  
➡ Rice Thrip (page 30)



Picture 49: Dried bleached lesion.  
➡ Sheath Blight (page 40)



Picture 50: Leaves wilt and roll up, turning grayish-green to yellow, whole seedlings die. Survived plants are stunted and yellowish. ➡ Leaf Blight (page 34)







Picture 51: Dried leaf edges.

➡ Leaf Blight (page 34)



Picture 52: Dried streaked leaf.

➡ Leaf Streak (page 35)



Picture 53: Hills are severely stunted with excessive tillering and very upright growth habit.

➡ Rice Grassy Stunt Virus (page 37)



## A.1.5. Others



Picture 54: Pink eggs.  
➡ Golden Apple Snail (page 25)



Picture 55: Brown spotty, deformed and small grains .  
➡ Rice Bug (page 28)



Picture 56: Brown spot on the grain.  
➡ Rice Bug (page 28)