

A.3. Diseases

ជំងឺឆ្កាស

A.3.1.

Blast (*Pyricularia grisea*)



Picture 100 : Leaf blast.

Description: The disease caused by fungal infection.

Leaf blast: An infected leaf has diamond-shaped or elliptical or spindle-shaped spots with gray or white centers and brown margins. The spots may merge leading to a complete drying of the infected leaf.

Collar blast: Lesion is located at the junction of the leaf blade and leaf sheath and can kill the entire leaf .

Node blast: The infected node rots causing all above parts to die.

Panicle blast: The infected panicle turns white and dies before being filled with grain.

Neck blast: Symptoms appear at the base of the panicle . Infected panicles appear white and are partly or completely unfilled . The whitehead symptoms can easily be confused with a stem borer attack which also results in a white and dead panicle.



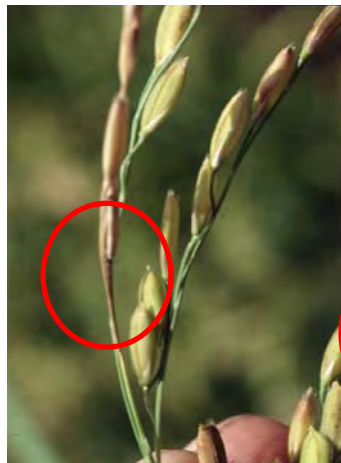
Picture 101 : Collar blast.

Factor favoring disease development :

- Infested or diseased seeds.
- Excessive use of nitrogen.
- Poor air flow and poor sunlight penetration.
- Rainy days with high humidity.
- Cloudy skies, frequent rain, and drizzles.



Picture 102 : Node blast.



Picture 103 : Panicle blast.



Picture 104 : Neck blast.

Host plant: Specific to rice.

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A.3.2. Leaf Blight (*Xanthomonas oryzae* pv. *oryzae*)



Picture 105 : Appearance of bacterial that looks like a milky or opaque dewdrop on young lesions early in the morning.



Picture 106 : Dried leaf edges.

Description:

The disease is caused by the bacterial pathogen. An infected leaf has yellow water soaked lesions at the margin of its leaf blade. The lesions run parallel along the leaf and when they join together may cover the whole leaf. Bacterial discharge appears on young lesion early in the morning that looks like a milky dewdrop. As the disease progresses, the leaf dries-up with white lesions and the leaf blade has wavy margins.



Picture 107 : Leaves wilt and roll up and become grayish green to yellow.



Picture 108 : Seedling wilt completely.

Damage: Yellowing and drying of leaves.

Factor favoring disease development:

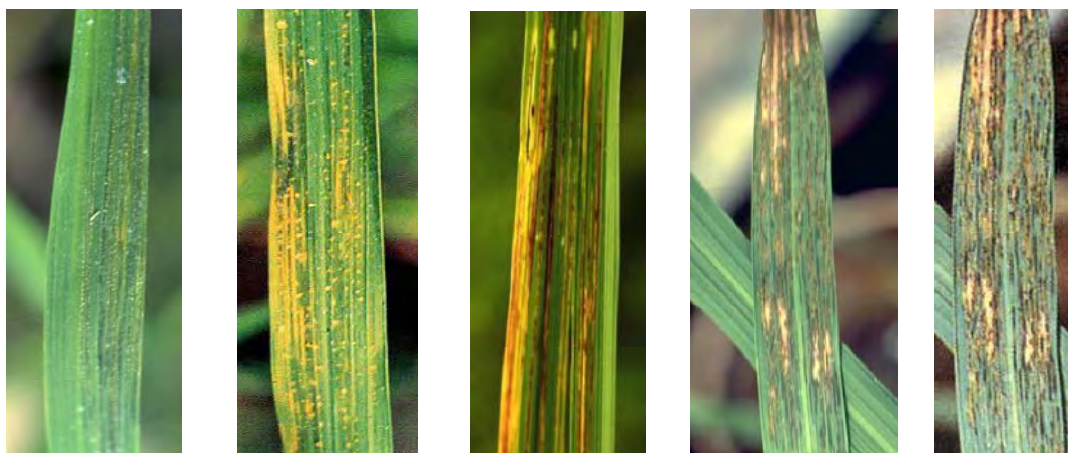
- Presence of weeds.
- Presence of rice stubbles of infected plants.
- Presence of bacteria in the rice paddy and irrigation canals.
- Warm temperature, high humidity, rain and deep water.
- Over fertilization.

Host plan:

Rice and others.

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A.3.3. Leaf Streak (*Xanthomonas oryzae* pv. *oryzicola*)



Picture 109 : From early to severe infection (from left to right).

Description:

The disease is caused by bacterial pathogen.

Initial symptoms are dark-green and water-soaked streaks on interveins from tillering to booting stage. Streaks later enlarge to become yellowish gray and translucent.

Bacterial exudates on surface of lesions. Lesions turn brown to grayish white then dry.

Damage:

- Browning and drying of leaves.
- Reducing yield under severe condition.



Picture 110 : Rice leaves infected by leaf streak.

Factors favoring disease development:

- Presence of the bacteria on leaves and in the water or those surviving in the debris left after harvest.
- High temperature and high humidity.

Host plant: Species of *Oryza*.

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A.3.4.

Tungro



Picture 111 : Discolored leaves.

Description: Tungro virus disease is transmitted by leafhoppers, wherein the most efficient vector is the green leafhopper.

- Discoloration begins from leaf tip and extends down to the blade or the lower leaf portion.
- Infected leaves may also show mottled or striped appearance – stunting.
- Reduced tillering.
- Delayed flowering, which may delay maturity.
- Panicles are small and not completely exerted.
- Most panicles are sterile or partially filled with grains and covered with dark brown blotches.

Damage:

- Reduce tillering.
- Delay flowering and maturity.



Picture 112 : Appearance of plant infected by tungro.

Factor favoring disease development:

- Presence of the virus sources.
- Presence of the vector.
- Age and susceptibility of host plants.

Host plants: Rice and others.

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A.3.5.

Rice Grassy Stunt Virus

Description: Transmitted by Brown Planthopper. The symptom develops in 10-20 days after infection. The main symptoms of infected plant are :

- Stunting.
- Excessive tillering.
- Very upright growth habit.
- Leaves which are short, narrow, and yellowish green.
- Small rusty spots or patches.
- Infected plants usually survive until maturity.



Picture 113 : Infected plant.

Damage: No panicles have been produced by infected plants.

Factor favoring disease development:

Presence of brown planthopper.

Host plants: The disease found only on rice crop.

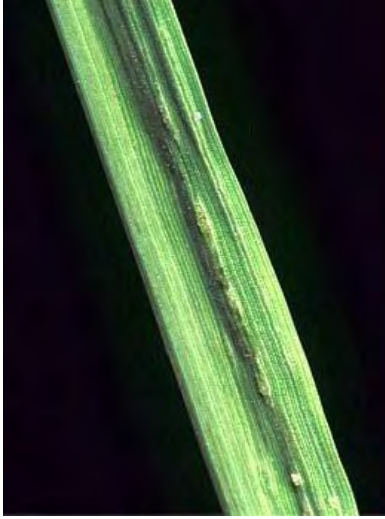


Picture 114 : Infected and healthy plants.

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A.3.6.

Rice Ragged Stunt Virus



Picture 115 : Galls caused by swollen phloem cell.



Picture 116 : Leaf blades twist.



Picture 117 : Flag leaves twist and enclose panicle.

Description: The disease is transmitted only by Brown Planthopper. The infected plants are:

- Stunting during early growth stages of the crop.
- Leaves which are short and dark green with serrated edges.
- Leaf blades are twisted at the apex or base.
- Galls are caused by swollen phloem cells and developed on the leaf blades and sheaths.
- Leaf edges are uneven and the twisting gives the leaves a ragged appearance.
- Ragged portions of the leaves are yellow to yellow-brown.
- Flag leaves are twisted, malformed, and shortened at booting stage.
- Flowering is delayed.
- Incomplete panicle emergence.



Picture 118 : Panicle can not emerge completely.

Damage: Partially exerted panicles and unfilled grains.

Factor favoring disease development: Presence of the vector and the host.

Host plants: Rice and others.

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A.3.7. Sheath Rot (*Sarocladium oryzae*)



Picture 119 : Close view of sheath rot lesion (interveinal discoloration).



Picture 120 : Rice sheath rot infection.



Picture 121 : Lesions and necrosis on rice flag leaf.

Description:

The disease is caused by fungus pathogen and presents:

- Irregular spots or lesions, with dark reddish brown margins and gray center.
- Discoloration in the sheath.
- Lesions enlarge and often coalesce and may cover the entire leaf sheath.
- Severe infection causes entire or parts of young panicles to remain within the sheath.
- Unemerged panicles rot and florets turn red-brown to dark brown.
- Whitish powdery growth inside the affected sheaths and young panicles.
- Infected panicles that are sterile, shriveled, or partially filled with grains.



Picture 122 : Head does not completely exert from the leaf sheath.



Picture 123 : Grain discoloration.

Factors favoring disease development:

- Associated with insect injury.
- High amount of nitrogen.
- High relative humidity.
- Dense crop growth.
- Temperature from 20 to 28° C.

Host plants: Rice, maize and others.

Damage:

- Development of spots or lesions.
- Unfilled and discolored panicles.

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A.3.8. Sheath Blight (*Rhizoctonia solani*)



Picture 124 : Lesion development from left to right.



Picture 125 : Lesion on the sheath leaves.

Description:

The disease is caused by the fungal pathogen. The initial symptoms usually develop as lesion on sheath leaf, just below the leaf collar as oval-to-elliptical, green-gray, water-soaked spots. The lesions expand and the center of the lesions may become bleached with an irregular tan-to-brown border. The infection spreads to upper part of plant, including leaf blade, causing extensive, tan, irregularly shaped lesions with brown borders. The lesion will turn dark brown at maturity.



Picture 126 : Mature lesion on leaf blades.

Damage:

- Formation of lesions.
- Production of empty grains.

Factors favoring disease development:

- Presence of the disease in the soil.
- High humidity .
- Temperature from 28-32 ° C.
- High levels of nitrogen fertilizer.
- Presence of irrigation water.

Host plants:

Citrus, chili, groundnut, crucifers, soybean, cotton, rice, lettuce, maize, potatoes and others.

B. Chinese Cabbage

B.1.Symptoms and Damages

B.1.1. Leaf



Picture 127: Damage caused by beetle army worm.
➡ Beet Army Worm (page 52)



Picture 128: Damage caused by beetle army worm.
➡ Beet Army Worm (page 52)



Picture 129: Damage caused by beetle army worm.
➡ Beet Army Worm (page 52)



Picture 130: Damage caused by diamond back moth.
➡ Diamond Back Moth (page 57)



Picture 131: Young larvae of diamond back moth chewing the leaf tissue.
➡ Diamond Back Moth (page 57)



Picture 132: Damage caused by diamond back moth (Cauliflower leaf).
➡ Diamond Back Moth (page 57)



Picture 133: Damage caused by cabbage looper.

➡ Cabbage Looper (page 55)



Picture 134: Leaf damaged by cabbage looper.

➡ Cabbage Looper (page 55)



Picture 135: Cabbage head caterpillar larva chewing the leaf tissue at the underside of leaf with its silk net and frass.

➡ Cabbage Head Caterpillar (page 54)



Picture 136: Young larvae of cabbage head caterpillar chewing the leaf tissue.

➡ Cabbage Head Caterpillar (page 54)



Picture 137: Tiny strip back insect and irregular holes.

➡ Striped Flea Beetle (page 58)

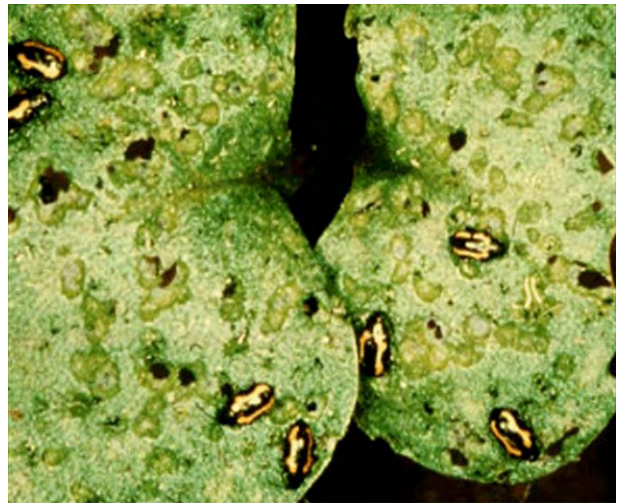


Picture 138: Cabbage web worm damage leaf tissue.

➡ Cabbage Web Worm (page 56)



Picture 139: Leaves damaged by flea beetle.
 ➡ Strip Flea Beetle (page 58)



Picture 140: Small strip back shiny insects with irregular holes on cotyledons.
 ➡ Striped Flea Beetle (page 58)



Picture 141: Mottle leaf.
 ➡ Turnip Mosaic Virus (page 60)



Picture 142: Decayed and Collapsed plant.
 ➡ Bacterial Soft Rot (page 61)



Picture 143: Water soaked on leaf of cabbage.
 ➡ Bacterial Soft Rot (page 61)



Picture 144: Small dark brown or black ring spots on the leaves.
 ➡ Alternaria Leaf Spot (page 62)



Picture 145: Dried brown ring lesions.
➡ Alternaria Leaf Spot (page 62)



Picture 146: Brown ring spots on leaf.
➡ Alternaria Leaf Spot (page 62)



Picture 147: Brown ring spots on leaf.
➡ Alternaria Leaf Spot (page 62)



Picture 148: Yellow to light brown patch lesions.
➡ Downey Mildew (page 64)



Picture 149: Irregular yellow patch caused by downy mildew.
➡ Downy Mildew (page 64)



Picture 150: Yellow to orange necrotic patches on cabbage seedling leaf.

➡ Downy Mildew (page 64)



Picture 151: Yellow patched lesions turn tan to light-brown on cabbage seedling.

➡ Downy Mildew (page 64)



Picture 152: White mold on the underside of cabbage seedling leaf. ➡ Downy Mildew (page 64)



Picture 153: White mold on the underside of cabbage seedling dried leaf. ➡ Downy Mildew (page 64)



Picture 154: Yellow patches on leaf caused by downy mildew.

➡ Downy Mildew (page 64)



Picture 155: Light brown patches on the underside of leaf caused by downy mildew.

➡ Downy Mildew (page 64)



Picture 156: Leaves damaged by downy mildew. ➡ Downy Mildew (page 64)

B.1.2. Stem

Picture 158: Growing point and stalk are damaged by cabbage webworm.

➡ Cabbage Webworm (page 56)



Picture 157: Bud is destroyed and stalk is bored (Kale).

➡ Cabbage Webworm (page 56)



Picture 159: Young seedling is cut down at the ground.

➡ Black Cut Worm (page 53)



Picture 160: Black cut worm with cut seedling.

➡ Black Cut Worm (page 53)

B.1.3. Others



Picture 161: Water soak on cauliflower.

➡ Bacterial Soft Rot (page 61)



Picture 162: Water soak on broccoli.

➡ Bacterial Soft Rot (page 61)



Picture 163: Deformed root.

➡ Clubbed Root (page 63)



Picture 164: Seedling wilt during day time

➡ Clubbed Root (page 63)