Rice Diseases and Insects



Tatsushi TSUBOI
Rice Technical Advisor
Promotion of Rice Development (PRiDe) Project,
NaCRRI, NARO, Uganda

CONTENTS

DISEASES

1. Rice Yellow Motel Virus (RYMV) 1
2. Rice Blast Magnaporthe grisea *(pyricularia oryzae)* 3
3. Brown spot *Cochliobolus miyabeanus* 5
4. Sheath Blight *Thanatephorus cucumeris* 6
5. Sheath rot *Acrocylindrium Oryzae* 7
6. Leaf scald *Metasphaeria albescens* 8
7. False smut *Claviceps virens* 9
8. Kernel smut *Tilletia barclayana* 10
9. Grain rot *Burkholderia glumae* 11
10. Disease like symptoms on rice 12

INSECTS

1. Stalked-eyed flies *(Diopsis thoracica)* 14
2. African Rice Gall Midge *(Oreolia oryzivora)* 15
3. Caseworm *(Paraponynx stagnalis Zelle)* 16
4. Rice hispa 16
5. Froghopper or Spittlebugs *(Cercopidae)* 17
6. Stem borers *(Pyralidae)* 17
7. Rice leaffolder *(Lepidoptera, Pyralidae)* 18
8. Rice mealybug 18
9. Stink bug and Rice bug 19
10. Termite 19

DISEASES

1. Rice Yellow Mottle Virus (RYMV)

RYMV is known only in Africa and one of the most damaging diseases of rice in Africa.



Symptoms:

- Stunting of rice plants if infected at early stage.
- Reduced tiller number.
- Yellowing and mottling of leaves.
- Infected plants are easily attacked by other diseases such as brown spot.



Transmission of RYMV

- RYMV is transmitted by a vector and also mechanically.
- Five chrysomelids are known as vector insects.
- RYMV is not transmitted by the rice seed.

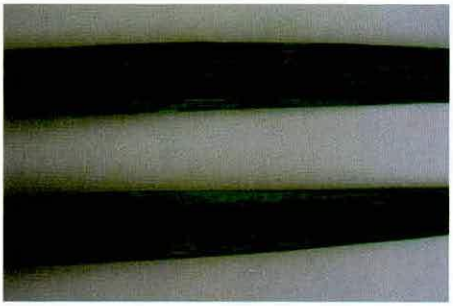
Vector: *Dicladispa viridicyanae*

Hosts of the virus

- Rice plant, wild rice and ratooning stubble are the hosts of the virus.

Damage of the RYMV

- Plants infected at early stages are more severely damaged than those that are infected later.
- Plants infected before maximum tillering stage show incomplete panicle emergence and have unfilled grains.
- Plants infected at later stage (older than 70 days) show no significant yield loss.





Control of RYMV

- There are no practical ways (no chemicals) of curing a plant after it becomes infected.
- The only way to control RYMV is to prevent the rice plant from becoming infected.

Control Methods

- Resistant varieties: Planting resistant varieties is the cheapest and the most effective way of controlling RYMV. Resistant varieties: NERICA 4, NERICA 6 and WITA 9
- Control of vectors: It is difficult to control virus vectors with insecticides. Even low vector populations can cause RYMV infection.
- Eliminating sources of virus: Rogue (remove) infected rice plants from the rice field. Roguing is successful when only a low percentage of plants are infected. Prevent ratoon growth, which is the main source of RYMV.

2. Rice Blast *Magnaporthe grisea (Pyricularia oryzae)*

It is one of the most destructive diseases of rice.

Symptoms:

The fungus produces spots or lesions on leaves, nodes, and panicles and grains. The spots are elongated and pointed at each end.





Neck blast



Leaf blast



Node blast

Disease cycle:

Airborne spores called conidia land on leaves.

↓

The spores germinate and the fungus penetrates the leaf surface.

↓

The fungus grows and produces leaf spots after 4-5 days.

↓

The spores are released by dew or rain and are carried in the air to other plants.

Damage of blast:

In severe infections, yields may be reduced by 50 %.

Upland rice is more severely damaged than lowland rice.



Neck blast → Empty grains



Control:

Planting resistant varieties is the most economical way of controlling this disease. Avoid excess nitrogen fertilizer.

There are several fungicides that effectively control blast but for economic reason, these are not used in the tropics.

3. Brown spot *Cochliobolus miyabeanus*

The disease is common in soils that are poorly drained or deficient in nutrients.

Symptoms:

- The symptoms are brown spots on the leaf and grain.
- Seedling blight may occur in seedling grown from infected seeds.





Seedling stage

Disease cycle:

The disease is transmitted by the infected seeds.

Damage of brown spot:

It lowers grain quality and weight.

Brown spot may kill up to 50 % of seedlings.

Control:

- The most effective way of controlling brown spot is to grow plants in good soil and provide adequate fertilizer.
- Planting a resistant variety is the most practical way of controlling.
- Treating the seeds with fungicide or hot water help control the disease.

4. Sheath Blight *Thanatephorus cucumeris*

Severity of the disease depends on cultivation, land preparation, varieties, crop management, etc.





Symptoms:

- Sheath blight causes spots on the leaf sheath.
- High temperature and humidity increase the severity.

Disease cycle:

Sclerotia develop on lesions and drop to the soil ↓

The fungus survives in sclerotia in the soil.

↓

The sclerotia float on the water surface during land preparation.

↓

The sclerotia germinate and fungus penetrates the plant.

↓

The fungus grows on the plant.

Damage of sheath blight:

Many of the leaves are killed during severe infections and yields may be reduced by 20-25 %.

Control:

- No variety has a high level of resistance to the disease.
- Do not apply too much nitrogen fertilizer.
- There are effective fungicides controlling the disease, but are economically not recommendable.

5. Sheath rot *Acrocylindrium Oryzae*

Symptoms:

- Spots develop on the uppermost leaf sheaths enclosing panicles.
- The young panicles remain in the leaf sheath or emerge partially.
- Grains remain unfilled or are discoloured.





Disease cycle:

- Little is known about the life cycle of the fungus.
- The disease is usually found in plants injured by insect or diseases, particularly stem borer and virus (RYMV).
- Hot humid weather favours sheath rot development.

Damage of sheath rot:

Little is known about crop losses caused by sheath rot.

Control:

Little is known about control of this disease.

6. Leaf scald *Metasphaeria albescens*

Symptoms:

The symptoms are lesions starting from leaf tip.







Disease cycle:

The fungus survives on the rice straw.

↓

The fungus penetrates lower leaves.

↓

Flooding of rice induce sever occurrence of this disease.

Damage of leaf scald:

It lowers the filled grain ratio and grain quality.

Control:

- Avoid excess nitrogen fertilizer.
- Nitrogen top dressing should be done at the right time.

7. False smut *Claviceps virens*

The occurrence of the disease is believed to indicate a good yield because weather favourable to the development of false smut also favours good crop production.

Symptoms:

- The fungus changes single grain of the panicle into velvety balls, which may grow to a diameter of 1 cm.
- Usually, only a few grains on the panicle are infected and the rest remain normal.





Disease cycle:

Small infection bodies are produced on the surface of the smut ball.

↓

The spores are blown in the air and infect the panicle of other plants.

↓

The spores either infect the developing spikelets at the flowering stage or the mature grain.

↓

Eventually the grain is replaced by a smut ball.

Damage of false smut:

- Usually, damage of this disease is minimal.

Control:

- Usually, no control measures are necessary.

8. Kernel smut *Tilletia barclayana*

This disease appears only on grains.

Symptoms:

- Grain surface is stained black. Inside of the grain is full of black powder.



Disease cycle:

Little is known about the life cycle of the fungus

Damage of kernel smut:

Usually, damage of this disease is minimal.

Control:

Usually, no control measures are necessary.

9. Grain rot *Burkholderia glumae*

Symptoms:

- Usually, two days after heading, spikelets loose green colour and become whitish then finally turn to brown.





Disease cycle:

Seed transmitted disease.
Hot humid weather favours grain rot development.
This disease is also transmitted by wind and rain from infected panicle to near by panicles.



Damage of grain rot:

It lower grain quality and weight.

Control:

- There is no resistant variety for this disease.
- There are several fungicides which effectively control grain rot but for economic reason, these are not used in the tropics.

10. Disease like symptoms on rice

Herbicide injury (phytotoxicity)





Iron toxicity



Saline soil







Deep Transplanting





INSECTS

1. Stalked-eyed flies *(Diopsis thoracica)*

The larvae bore and feed on plant tissue inside the rice stem causing dead heart.



Adult



Damage (dead heart)



Larva

2. African Rice Gall Midge (*Oreolia oryzivora*)

The larvae attack the growing point of the apical bud at a node and cause the leaf sheath tissues to form a tube-like structure called a 'silver shoot gall' or 'onion shoot'.

Rice fields planted early are less damaged than those planted late.

There are some resistant varieties.









(WARDA)

3. Caseworm (*Paraponynx stagnalis Zelle*)

- The larva may eat the leaf tissue.
- The insect attacks from seedling to tillering stage.
- Larvae make their cases from leaf.
- The damage is not uniform because the larvae floating in their cases are carried to one side of the field by wind or water currents.
- Draining the field for 4-6 days kill larvae.





4. Rice hispa

- The larva is a leafminor starting to eat the internal tissue from the tip to the basal part of a leaf and makes the leaf empty as a white gallery.
- The adults are known as the vector of Rice Yellow Mottle Virus (RYMV).
- Application of Furadan 5 G can control this insect.







5. Froghopper or Spittlebugs (*Cercopidae*)

Watafukimushi (Jap. name)







6. Stem borers (*Pyralidae*)

The larvae bore through the stem and eat up the plant tissue resulting in a condition called dead heart and / or white head.

Damage(white head)→







Adult



Larva

7. **Rice leaffolder** (Lepidoptera, Pyralidae)

The larva scrapes the leaves and folds the leaf together and scrapes inside.



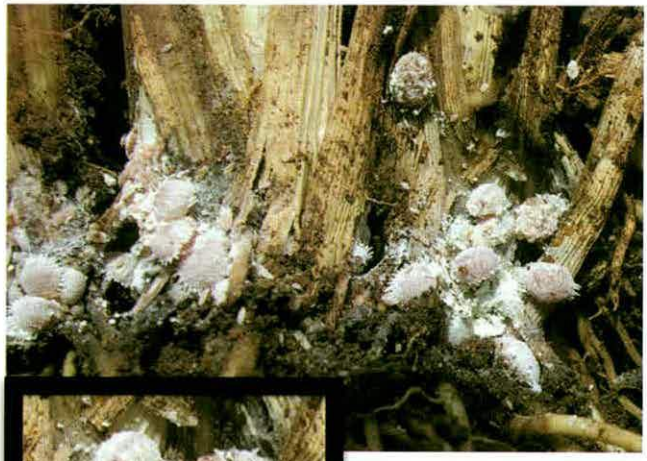




Damage

Larva

8. **Rice mealybug** (rice root mealybug, *Dysmicoccus boninsis*)







9. Stink bug and Rice bug

The bugs stay on the panicle and suck the milky juice in young panicles causing staining of the grains hence lowering grain quality.





Stink bug **Rice bug**




Damaged rice

10. Termite






Ants (Formicidae)



Satyrid butterfly (larva)



Aphid



Scale insect



Rice Weevil