PADDY DISEASES IN SARAWAK

by

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Traditionally, paddy planting is carried out once a year in Sarawak. With the recent introduction of hybrid rice and short term varieties, double cropping can be done annually. This will increase rice production in Sarawak. Due to the relatively low intensity of planting, coupled with either a fallow period or off-season crops of maize or watermelon, paddy diseases in Sarawak are not very severe. The more common diseases are blast, neck rot, sheath blight, brown spot and sheath rot. Bacterial leaf blight, leaf scald and false smut are minor diseases. Rice tungro disease, caused by a complex of two viruses, is not present in Sarawak. With the current focus on increasing paddy planting in Sarawak, there is a need for farmers and growers to arm themselves with knowledge on how to recognise the diseases, their level of risks and how to carry out an integrated disease management. Some of the paddy diseases in Sarawak are discussed here.

Blast and neck rot

Blast symptoms on leaves

Neck rot

Blast is the most common of all paddy diseases in Sarawak. The blast fungus, *Pyricularia oryzae*, attacks the rice plants at all stages of growth, producing spindle-shaped lesions on the leaves and causing neck rot at the culm of the panicle. The smaller leaf lesions are brown in colour, whereas the larger ones have grey centres with yellowish-brown margins. When neck rot develops, the culm breaks. Infection of the panicle produces brown spots at the base of the panicle. If severe infection occurs at the early stage of flowering, no grains will be formed. Then fungicide treatment becomes necessary.

Sheath blight

Sheath blight

The sheath blight fungus, *Rhizoctonia solani*, produces greenish grey lesions on the leaf sheaths near the water/soil surface. These lesions which can be elliptical or oval, enlarge to 2-3cm long and coalesce to form large greyish white to brownish white patches with brown margins. On older lesions, white and brown sclerotia can sometimes be seen. Infection can spread to leaf blades or adjacent sheaths. In cases of severe infection, poor grain filling occurs. MADA (Malaysian Agricultural Development Authority) estimated the economic threshold level to be 10%, i.e. it is only economical to control the disease, if infection is more than 10%. However, the economic threshold level depends not only on the percentage of plants infected, but the stage of the disease infection. The cost of the pesticide treatment and the price of rice are also important factors to be considered. Studies by some Japanese researchers showed that when the disease reached the flag leaves, the yield loss was estimated at 25%.

Brown spot

Brown spot disease

Brown spot disease is caused by the fungus, *Helminthosporium oryzae* (with synonyms, *Drechslera oryzae/ Cochliobolus miyabeanus*). Symptoms range from small circular lesions to larger oval lesions with brown margins and greyish to white centres on the leaves and glumes. Since this disease is often associated with poor soil fertility, improving the soil conditions and fertility can reduce the disease incidence. Unless it is very severe, fungicide treatment for this disease has been reported to be not economical, as yield is not significantly increased after application.

Bacterial leaf blight

Bacterial leaf blight

This disease is caused by the bacterium, *Xanthomonas oryzae* pv *oryzae* (syn. *Xanthomonas campestris* pv *oryzae*). Symptoms range from yellowish white lesions on the edge of the leaves to yellowish white stripes with a yellowish margin. When the bacterial infection becomes systemic, the leaves or the whole plant will wilt. The bacterial cells enter the vascular system of the plant through injuries on the roots or leaves. The bacterial cells ooze out of the leaf lesions in the morning and spread through contact with neighbouring wounded leaves, and through wind and irrigation water. If infected debris from the previous crop is not removed, infection can occur in the next crop. If the infection is localized, the yield loss will only be confined to the infected plants. There is no chemical control for this disease. Apart from carrying out integrated disease management as listed at the end of this article, avoid planting susceptible varieties, like MR84, in areas known to have the disease.

Sheath rot

Sheath rot

The sheath rot fungus, *Sarocladium oryzae* (syn. *Acrocylindrium oryzae*), attacks the upper sheath that encloses the young panicle. Oblong or irregular spots with a brown margin and grey or greyish brown centre will form on most parts of the sheath. The infected young panicles remain within the sheath or only emerge partially. This disease is often associated with stem borers or other causes of injury to the lower portion of the stem. Controlling stem borers or avoiding injury to the lower stem during cultivation practices can reduce the disease incidence.

Leaf scald

Leaf scald starting from the tip of leaf

Leaf scald starting from edge of leaf

Leaf scald is caused by the fungus, *Rhynchosporium oryzae*. Symptoms include the presence of lesions with light to dark brown zonation pattern developing from either the leaf tip, or from the edge of the leaf. When the lesions become old, the zonation pattern fades and the dried lesion appears scalded. Leaf tips of severely infected leaves may split in the middle.

False smut

False smut

The false smut fungus, *Ustilaginoidea virens*, transforms individual grains of the panicle into orangey to black spore balls of about 1 cm in diameter. Infection can take place at the booting stage or when the grains are mature. Usually only a few grains in a panicle are infected. The highly humid environment amongst the plants in high density planted areas favours the growth of the fungus. Normally, this disease is not serious in the field. Smut also attacks other hosts like *Panicum* spp., *Digitaria* spp., maize and other *Oryza* spp.

Integrated Management of Paddy Diseases

Planting tolerant or less susceptible varieties is the mainstay of good disease management. The use of healthy seeds from good sources is critical to the success of the crop. In areas with a history of disease incidence, seed treatment with fungicides like captan or benomyl, before sowing, will reduce the disease severity. Optimal planting distance (depending on the tillering characteristic of the paddy variety) to avoid overcrowding of tillers is important to reduce the microclimate humidity amongst the leaves. Judicious use of nitrogen fertiliser is also important as excessive nitrogen fertiliser increases disease incidence and severity. Good water management in rain-fed areas must be ensured to prevent plant stress, which can increase disease incidence. Removal of crop debris after a harvest will reduce the disease incidence for the next crop. This is especially in areas where the disease incidences are high. Removal of graminaceous weeds will reduce the number of infection sources for the pathogens, both during cropping and off-season periods. If land use is not an issue, fallowing the land after a few cropping seasons can reduce the disease inoculum in the soil.

Where pesticides are deemed necessary, practising judicious use of alternate pesticides will reduce the build-up of resistance by the pathogens. All pesticides used must be registered with the Malaysian Pesticide Board, and the application conditions on the label of the pesticide packaging adhered to. Some of the pesticides registered for use on paddy for the following diseases are:

Disease	Active ingredients of some of the recommended pesticides
Blast and neck rot	Isoprothiolane, tricyclazole, azoxystrobin + difenoconazole, trifloxystrobin + difenoconazole
Sheath blight	Pencycuron, azoxystrobin + difenoconazole, propineb, propiconazole
Brown spot	Iprodione, trifloxystrobin + difenoconazole, azoxystrobin + difenoconazole, mancozeb + carbendazim
Sheath rot	Mancozeb, benomyl
Leaf scald	Difenoconazole + propiconazole, thiophanate methyl, carbendazim, benomyl, mancozeb
False smut	Carbendazim, benomyl