



Rice yellow mottle disease

Rice yellow mottle sobemovirus



Photo: Noah Phiri.

Rice growing in northern Zambia showing symptoms of yellow mottle disease.

SUMMARY: Rice yellow mottle disease causes major epidemics and yield loss in lowland irrigated rice throughout sub-Saharan Africa. Leaves turn yellow or orange with green streaks, plants are stunted, tiller number is reduced and panicles produce unfilled or sterile grain. There are many ways it is spread: beetles and grasshoppers and perhaps also other insects and mites; leaf-to-leaf and root-to-root contact; and on harvest implements. Management depends on use of tolerant varieties – crosses between African and Asian rice – supported by cultural techniques, e.g. removal of grasses and sedges that are alternative hosts of both virus and insects before planting, and destruction of crop residues after harvest.

KEY SIGNS

Symptoms vary due to differences in variety, environmental factors (temperature, light, humidity) and the growth stage of the crop. The newly emerged leaves show yellow (or orange) and green stripes of different width, sometimes continuous for up to 10 cm. If seedlings are infected early, plants become stunted, the number of tillers is less than on healthy plants, panicles fail to emerge completely and the grain is unfilled or sterile. The virus kills susceptible varieties.

MANAGEMENT

Prevention – what to do before signs are seen

Cultural approaches: The use of tolerant varieties is the best way to manage rice yellow mottle disease. Traditional upland varieties of African rice, *Oryza glaberrima*, are moderately resistant or tolerant. One variety from Mozambique is highly resistant: the gene that provides this resistance has been transferred to several of the lowland NERICA varieties by backcrossing. These lines have been tested in Burkina Faso, Cote d'Ivoire, Gambia, Ghana, Guinea, Liberia, Mali, Niger, Nigeria and Sierra Leone. However, there are isolates of the virus in 'hot spots', where disease pressure is high, that can overcome the resistance provided by the *O. glaberrima* gene, so a second gene is being added. Check to see if these resistant and tolerant varieties are available from suppliers in the local area.

An integrated pest management approach incorporating a number of cultural techniques is also recommended. These include: cleaning weeds from irrigation canals and around rice fields to remove reservoirs of virus and insects, especially in the off-season; early planting; direct sowing to reduce transfer of disease and/or insects from contaminated nurseries; and burning straw and stubble after harvest.

In addition, synchronous planting, i.e. planting fields at the same time in an area so that insects do not spread the virus from older to younger crops, and a rice-free period between crops are also recommended.

Control – what to do after signs are seen

Cultural approaches: Remove infected plants from the field as soon as signs of the disease are seen.

CAUSE

Rice yellow mottle virus causes this disease, which is of great economic importance. The host range is narrow; apart from Asian rice (*Oryza sativa*) and African rice (*Oryza glaberrima*) the virus is found in some wild *Oryza* species and a few grasses, for instance, members of the genera *Eleusine*, *Eragrostis*, *Echinochloa* and *Cyperus*.

Chewing insects – beetles and grasshoppers – and possibly also some sucking bugs spread the disease, and there is also evidence of involvement by mites. Evidence suggests that the virus is non-persistent in chewing insects, meaning it is picked up when the insects feed on diseased plants and transferred straightaway when they feed again on healthy plants; there is no multiplication of the virus in insects.

Other methods of spread are leaf and root contact between infected and healthy plants, and on sickles used to harvest crops, in which case there is potential for ratooned crops (new crops sprouting after harvest) to become infected. Transplanted rice is more vulnerable to infection than that direct-seeded.

The disease does not spread through the soil or via seed.

IMPACT

Rice yellow mottle disease is a major problem on lowland irrigated rice, causing losses of between 25 and 100% depending on the variety. By 1990, only 25 years after it was first reported, it had spread throughout West and Central Africa, Tanzania and Madagascar, and had become a major problem in Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal and Sierra Leone. The epidemics of the disease that occurred at this time were the result of intensive rice cultivation – irrigation, monoculture and use of high-yielding, but highly susceptible, Asian varieties. Presently, this disease is a threat to some 3 million hectares of rice in sub-Saharan Africa.

Traditional African upland varieties are relatively more tolerant to the disease than introduced lowland varieties.

DISTRIBUTION

The virus is widely distributed throughout East and West Africa since it was first reported in Kenya in the mid-1960s. It is not found in other parts of the world.

FURTHER READING

Rice yellow mottle virus. CABI Crop Protection Compendium. (<http://www.cabi.org.ezproxy.library.uq.edu.au/cpc/datasheet/47658>)

The genes that could beat the AIDs of rice. Global Rice Science Partnership. Annual Report 2011. CGIAR. (<http://bit.ly/1PoM6jG>)