

Identification of Important Diseases of Wheat

Vishal Gandhi^{1*}, Vikas Kumar², Kapil Malik³, Neha Sharma⁴

¹Senior Research Fellow, MHU-132001, Karnal, Haryana, India

^{2,4}Senior Research Fellow, MHU, RMRC, Murthal (Sonipat)-131027, Haryana, India

³Ph.D. Student, CCS Haryana Agricultural University, Hisar-125004, Haryana, India



Open Access

*Corresponding Author

Vishal Gandhi*

E-mail: vishalgandhi1991@gmail.com

Article History

Received: 13.03.2021

Revised: 22.03.2021

Accepted: 28.03.2021

This article is published under the terms of the [Creative Commons Attribution License 4.0](https://creativecommons.org/licenses/by/4.0/).

INTRODUCTION

Wheat is one of the important staple foods worldwide. Significant gains wheat production over the past 40 years has resulted in a steady balance between supply and demand. On the other hand, predict global growth in population rates and dietary changes gives an idea about to increase production in upcoming decades to meet this escalating demand. The essential component to overcome this challenge is better and appropriate management of fungal diseases, which is responsible for 15–20 percent yield reduction per year. The major diseases of wheat that contribute most to these losses are rusts, smut and the bunts. Other recently emerges or unnoticed diseases viz; wheat blast and spot blotch also threaten wheat production. The most important wheat diseases and their symptoms caused by these diseases are present below.

1. Loose Smut (*Ustilago tritici* (Pers.) E. Rostr.)- The normal head tissue of plants infected by this disease is completely replaced with the dark masses of fungal spores and giving the heads a black powdery appearance. It is possible to notice the heads damage by loose smut while much of the head is still inside the boot. Only central stem of the head is left over after the spore's release. Maximum Spores are washing and blown away by wind and rain and at harvest only bare spike remains. It is seed-borne disease of wheat kernel and it can be controlled by treating the wheat seed with various fungicides before planting.



2. Leaf Rust (*Puccinia recondita* f. sp. tritici Eriks. & Henn)- Small, orangish-brown lesions are key features of leaf rust infections. These blister lesions are very common on leaves but can also appear on the leaf sheath. Lesions caused by leaf rust are smaller, more

round in shape, and cause less tearing of the leaf tissues than those caused by stem rust in wheat. It is transmitted to other plant by wind borne fungus spores. Foliar spray of fungicides is effective in controlling this disease.



3. Stripe Rust/ Yellow Rust (*Puccinia striiformis* var. striiformis Westend)-Stripe rust causes yellow, blister-like lesions that are arranged in stripes. The disease is most common on leaves, but head tissue also can

develop symptoms when disease is severe. Outside the United States, this disease is sometimes referred to as yellow rust. Genetic resistance, foliar fungicides are effective in controlling stripe rust.



4. Stem Rust (*Puccinia graminis* f. sp. tritici)- Stem rust causes blister-like lesions on leaves, leaf sheaths, and stems. Infection of glumes and awns is also possible. The reddish-brown spores of the fungus cause considerable tearing

as they burst through the outer layers of the plant tissues. Mature stem rust lesions are more elongated than those of leaf rust. Genetic resistance, foliar fungicides are effective in controlling stem rust.



5. Karnal Bunt (*Neovossia indica*)-Karnal bunt is mainly a disease related to grains. Either in partially or fully infected condition the whole grain is converted into black powder of bunt spores. In highly infected spikelets, bunted grains form a greater angle with the main axis and may fall to the ground. At the beginning, the smut sorus is covered with a membrane (pericarp) which, when it bursts, releases black masses of spores that contribute

to the bunt smell. The fungus produces chemicals with a fishy odor, which sometimes causes this disease to be referred to as “stinking smut.” The spores may disperse with air or may fall to the ground and thus the inoculum is not limited to only fields but can spread to distant places. The measures to control Karnal bunt in the field are Resistant varieties, Seed treatment with fungicides, Crop rotation, Controlled irrigation etc.



6. Blast (*Magnaporthe grisea* (anamorph *Pyricularia grisea*)- Symptoms are visible on all plant parts. A seedling infection can result in plant death. Foliar symptoms on young leaves are elliptical lesions which vary in shape and size on older leaves. The centres are whitish to light brown with reddish-brown to dark grey margins. On the lower side of the leaf the lesions are dark grey due to sporulation. The awns can have brown to whitish discolourations. The spikes are straw-coloured. Depending on the growth stage at

which infection takes place, the kernel formation can be zero to normal. Kernels of diseased plants are smaller, lighter and shrivelled and are of low quality. *Pyricularia grisea* is an air- and seed-borne disease. Seeds, grasses, volunteer plants and plant debris can be sources of inoculum. Fungicides that provide complete control have not been discovered so far. Some strobilurins and triazoles can be applied during heading, but they provide no control in susceptible cultivars.



7. Powdery mildew (*Blumeria graminis* f. sp. *tritici*) - Powdery mildew causes white lesions on leaf sheaths and leaves. When disease is severe, glumes and awns can also be infected. Fungal growth is limited to outer plant

surfaces and easily wiped away by rubbing the finger across the affected areas. Mature lesions may have dark and reproductive structures mixed with the white and cottony growth of the fungus. Disease can be both stubble borne

and carried over on green bridge, so management strategies include controlling

volunteer wheat, crop rotation to avoid stubble borne infection and using foliar fungicides.



8. Flag Smut of Wheat (*Urocystis tritici*)-

This flag smut disease mainly affects the leaf of the wheat. The greyish black linear sori occur on sheath and leaf blades in between the veins. In the early stage, the sori are covered with epidermis and later it ruptures and exposing the black spore mass. The infected

plant of wheat shows stunting growth, leaves twisting and ultimately results in no ear head formation. Grow resistant varieties, use certified seeds, field sanitation, avoid late sowing of crop, rogue out the affected plants and destroy by burning are the best management expertise in controlling it.



CONCLUSION

It is, without question, the case that diseases of wheat provide a significant challenge to maximize the wheat yields, now and into the future. In this article, we have attempted to briefly summarize the identification of some of the most significant wheat diseases with symptoms photos currently threatening production. We acknowledge that there are many other diseases that also threaten

production (e.g. Wheat Streak Mosaic, take-all, bare patch, eyespot, crown rot etc); however, space limitations restricted our selection of diseases to currently considered to have the greatest effect on yield. Although clearly not exhaustive, this article provides a reference point for colleagues, farmers and plant pathology students to appreciate the complexity of these diseases and to consider them in a more holistic manner.