



وزارة التعليم العالي والبحث العلمي

جامعة الانبار / كلية الزراعة

قسم وقاية النبات

(امراض خضر - Vegetable diseases)



Fourth stage

المرحلة الرابعة

Plant Protection Dept.

قسم وقاية النبات

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Diseases Caused by Basidiomycetes Fungi

Basidiomycetes are fungi that produce their sexual spores, called basidiospores, on a club-shaped sporeproducing structure called a basidium. Most Basidiomycetes are fleshy fungi, such as the common mushrooms, the puffballs, , and are either saprophytes or cause wood decay, including root and stem rots of trees. Basidiomycetes, however, also include two very common and very destructive groups of plant pathogenic fungi that cause the rust and the smut diseases of plants.

RUSTS

Plant rusts, caused by Basidiomycetes of the order **Uredinales**, are among the most destructive plant diseases. They have caused famines and ruined the economies of large areas, including entire countries, especially wheat, oats, and barley, but they also attack vegetables such as bean and field crops such as cotton and soybeans, and ornamentals such as

Rust fungi attack mostly leaves and stems. Rust infections usually appear rusty, orange, yellow, or even white-colored spots that rupture the epidermis. Some form swellings and even galls. Most rust infections are strictly local spots, but some may become systemic. There are about 5,000 species of rust fungi.

First: *Puccinia*, causing severe and hosts such as

1-The stem rust of wheat and all other small grains (*P. graminis*).

2-yellow or stripe rust of wheat, barley, and rye (*P. striiformis*).

3- leaf rust of barley (*P. hordei*).

4- Crown rust of oats (*P. coronata*).

5-corn rust (*P. sorghi*).

Second:

Gymnosporangium:

1- causing cedar-apple rust (*G. juniperi-virginianae*)

Third:

Hemileia, causing coffee leaf rust (*H. vastatrix*)

Fourth:

Uromyces, causing the rusts of legumes (*U. appendiculatus*)

and of carnation (*U. caryophyllinus*).

Most rust fungi are very specialized parasites and attack only certain genera or only certain varieties of plants. Rust fungi that are morphologically identical but attack different host genera are regarded as special forms (*formae specialis*), e.g., *Puccinia graminis* f. sp. *tritici* on wheat and *P. graminis* f. sp. *hordei* on barley. Within each special form of a rust there are many so called pathogenic (physiological) races. These can attack only certain varieties within the species and can be detected and identified only by the set of differential varieties they can infect. Where sexual reproduction of the rust fungus is rare, the races are more stable over fairly long periods of time, but even so some of these fungi have as many races as those in which sexual reproduction is common.

Rust fungi are obligate parasites in nature, but some of them have now been grown on special culture media in the laboratory. Most rust fungi

produce five distinct fruiting structures with five different spore forms that appear in a definite sequence.

produce teliospores and basidiospores. Rusts caused by fungi that produce only teliospores and basidiospores are called **microcylic** or **short cycled**. Other rust fungi produce, in addition to teliospores and basidiospores, spermatia (formerly known as pycniospores), aeciospores, and uredospores (also known as urediospores or urediniospores) in that order. These are called **macrocylic** or **long-cycled** rusts.

Basidiospores, aeciospores, and uredospores can attack and infect host plants. **Teliospores** serve only as the sexual, overwintering stage, which on germination produce the basidium. The basidium, following meiosis, produces four haploid basidiospores. **Basidiospores**, on infection, produce haploid mycelium that forms **spermagonia** (formerly known as pycnia), containing haploid spermatia and receptive hyphae. **Spermatia** act as male gametes and are unable to infect plants.

Stem Rust of Wheat and other Cereals

Stem rust of wheat occurs worldwide and affects wheat wherever it is grown. Similar rusts affect other cultivated cereals. The stem rust fungus attacks all the aboveground parts of the wheat plant. Infected plants usually set fewer seeds per head, and the kernels are smaller in size, generally shriveled, and of poor milling quality and food.

The Pathogen.

Puccinia graminis.

Puccinia graminis is a macrocyclic, heteroecious rust fungus producing

spermagonia and aecia on barberry and uredia and telia on wheat and other cereals and grasses.

Development of Disease.

In cooler regions the fungus overwinters as teliospores on infected wheat.

Teliospores germinate in the spring and produce a basidium on which form four basidiospores. The basidiospores are ejected forcefully into the air and are carried by air currents for a few hundred meters. Basidiospores landing on young barberry leaves germinate and penetrate the epidermal cells. After that, the mycelium grows mostly intercellularly. Within 3 or 4 days the mycelium develops into a spermagonium.

References

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