Benha University.

Exam(4th Botany&che).

Time:-2 hours. **Faculty of Science.**

Jan 2017 **Botany Department.**

Phytopathogenic fungi

Answer the following questions:-

1- Major characteristic of Biotrophic and Necrotrophic pathogens?

2- Mechanisms of vascular wilts in Fusarium **?**

3- Symptoms and Disease Cycle of Stem rust (black rust)*?*

4- Symptoms and Disease Cycle of Powdery mildews **?**

5- ***Write briefly on :-***

a – **Polycyclic Pathogens** b- **avirulence (*avr*) gene**

With best wishes.

1- Major characteristic of Biotrophs andNecrotrophs pathogens

Biotrophs	Necrotrophs
Host cell not rapidly killed	Host cell rapidly killed
Few or no toxins or enzymes produced	toxins and enzymes produced
Special hostoria formed	No Special hostoria formed
Penetration direct or via natural opening	Penetration via wound/ natural opening
Narrow host range	Wide host range
Unable to grow away from the host	Able to grow away from the host
Attack healthy host at all stage	Attack juvenile or senescing tissues

2- **Mechanisms of vascular wilts in Fusarium**

Wilts - Wilts are characterized by a general loss of turgidity of leaves or possibly entire plants due to the loss of water. The loss is most often caused by a blocking of the water flow through the xylem. This blockage can be caused by the presence of fungi (*Fusarium*) in the xylem.

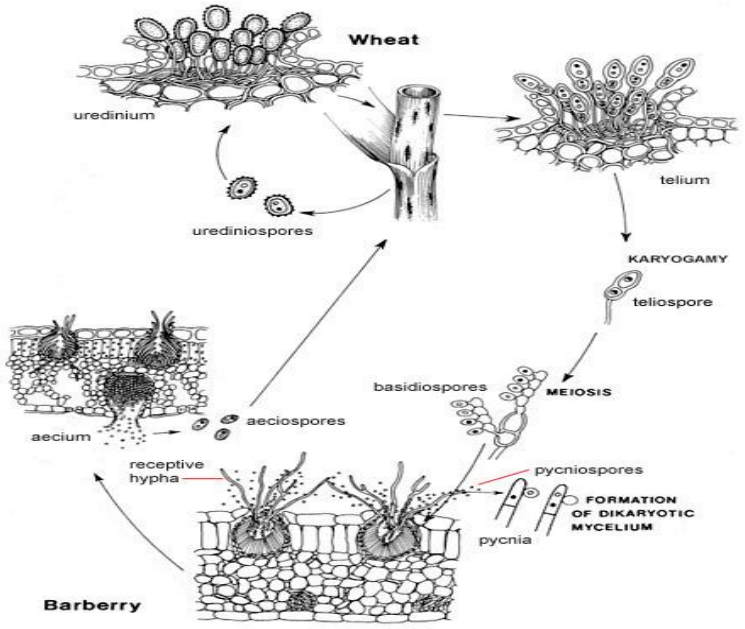
Mechanisms of vascular Wilt in fungi	
Causal pathogen	***F. oxysporium***
Symptoms	Wilt,flagging, stunting, yellowing**,** discoloration of active xylem. Wilt progressing in plant from bottom up,if pathogen is soilborne
Mechanisms	Hyphae and tyloses pluge the vessel. Vessel collapse. Toxin disorder the selective permeability.

3- Symptoms and Disease Cycle **of Stem rust (black rust)**

Oval pustules (uredinia) of powdery, brick-red urediniospores break through the epidermis . Microscopically, these red spores are covered with fine spines . The pustules may be abundant and produced on both leaf surfaces and stems of grass hosts. Later in the season, pustules (telia) of black teliospores begin to appear in infected grass species . Microscopically, teliospores are two celled and thick walled.

The disease cycle of wheat stem rust starts with the exposure of wheat crop to spores of *Puccinia graminis* f. sp. *tritici*, which are the primary inoculum. The first spores to infect the young wheat plants in the fall are urediniospores. *Puccinia graminis* overwinters as black, thick-walled, diploid teliospores. In the spring, each teliospore germinates to produce thin-walled, colorless, haploid basidiospores. Basidiospores infect the alternate hosts such as common barberry.

Basidiospores germinate and produce a haploid mycelium which colonizes the leaf tissue. From this mycelium, pycnia are formed inside the leaf but with the tops extending through the surface, usually in the upper surface, of barberry leaves. Pycnia produce receptive hyphae and pycniospores . Pycniospores are produced in a sticky honeydew that is attractive to insects and helps ensure that successful cross-fertilization occurs . Over a period of days, the dikaryotic mycelium grows through the barberry leaf until a new structure, the aecium, breaks through the lower surface of the leaf to release the dikaryotic aeciospores .

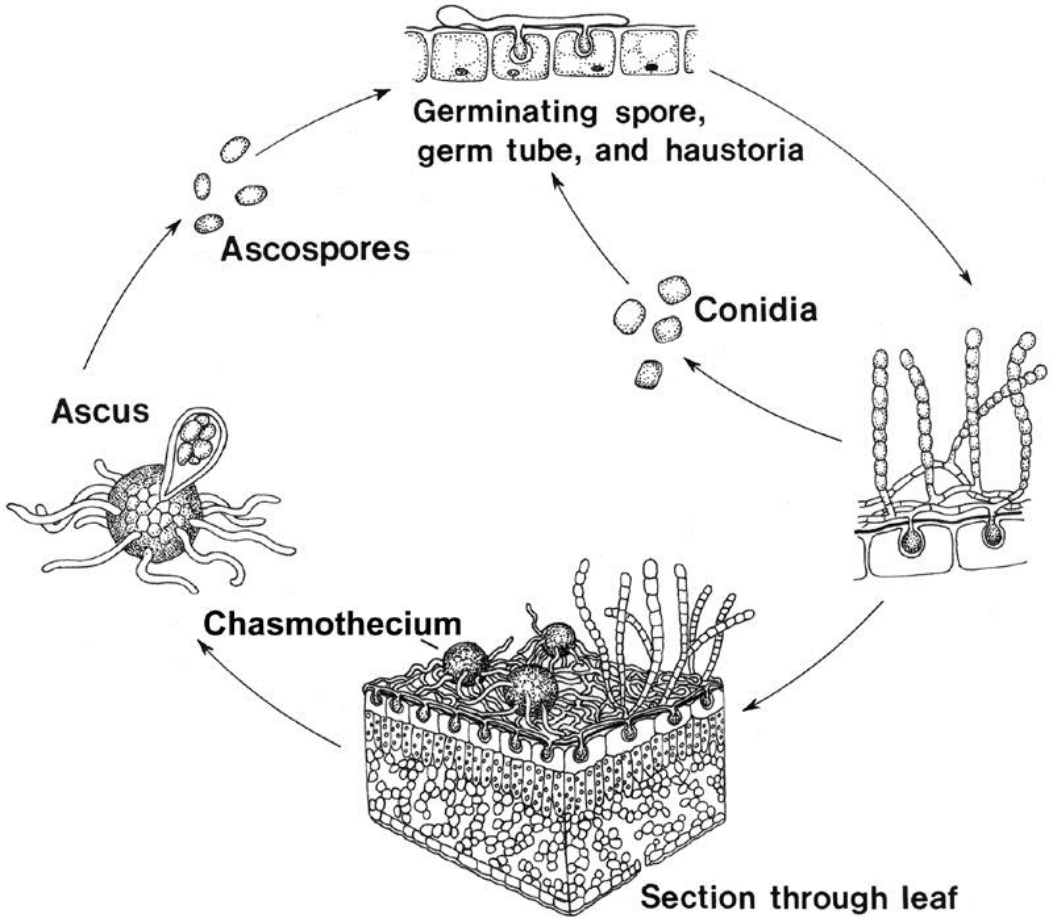


4- Symptoms and Disease Cycle of Powdery mildews

Powdery mildew are caused by ascomycetes pathogens that are biotrophs(obligate parasites) and host specific.

Powdery mildew are characterized by a superficial white mycelium, often on the upper surface of leaves.The hyphae absorb nutrients via haustoria.White conidia are the asexual,dispersal stage.Cleistothecia dark round,filled with asci and ascospores, are the sexual ,survival stage.

Powdery mildew can affect leaves, stems, flowers and fruits with a white to gray surface coating of mycelia which can be rubbed off. Black specks may later develop in the mycelia. These specks are mature cleistothecia, the overwintering fungal structures which contain ascospores. Tissue may turn yellow, reddish or remain green under the mycelia and some leaf distortion may be observed especially on actively growing tissues.



Life cycle of a powdery mildew fungus.

5 :-A – **Polycyclic Pathogens**

• several to many generations of inoculum per year
• primary inoculum and secondary inoculum produced
• often are airborne or vectorborne

Management: reduce primary inoculum and reduce the rate of infection

Disease examples: apple scab, downy mildews, late blight, leaf spots, powdery mildews, rusts (most), virus diseases (most)

B -avirulence (*avr*) gene

gene in a pathogen that causes the pathogen to elicit an incompatible (defense) response in a resistant host plant and may enhance pathogen virulence in a susceptible host plant. The outcome of the interaction of an avirulence gene product with its corresponding plant resistance (R) gene product is usually a hypersensitive response.