

Mastigomycotina:

- These fungi produce flagellated cells during life cycle.
- Some unicellular forms also bear rhizoids.
- All mastigomycotina produce zoospores.
- The perfect state spores of all mastigomycotina are typically oospores.
- The mode of nutrition is typically absorption as some or other fungi produce haustoria.
- Majority of fungi shows coenocytic mycelium.

Albugo

Classification:

Kingdom: Fungi

Division: Eumycota

Sub-Division: Mastigomycotina

Class: Oomycetes (With flagellated zoospores)

Order: Peronosporales

Family: Albuginaceae

Genus: Albugo

- Albugo is represented by 45 species. *A. candida* is commonly occurring species through out world.
- It is obligate parasite and cause disease white rust to many vascular plants.
- It attacks on several cruciferae members like mustard, radish, carrot and cabbage. Even it also infects the plants of family chenopodiaceae and amaranthaceae
 - This fungus attacks on entire body of plant except roots. Initially white irregular pustules develop on lower surface of leaves but latter on the symptoms appear on both surfaces.

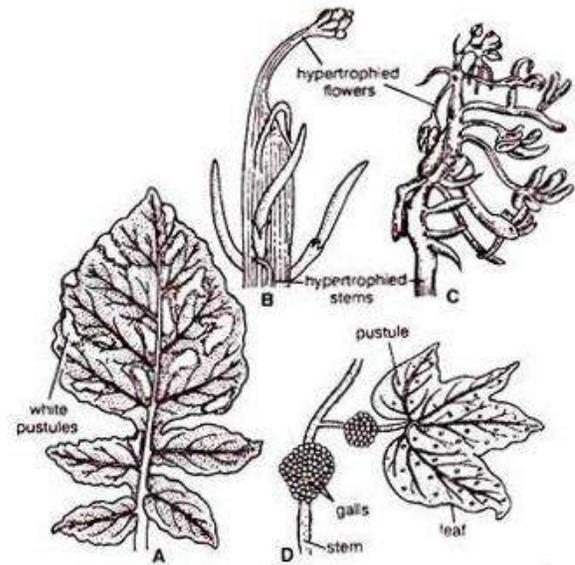
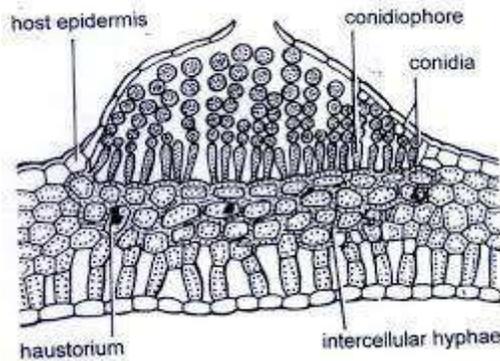


Fig. 1. (A-D). *Albugo*: Symptoms. (A) Infected radish leaf showing pustules; (B-C) Hypertrophied flowers and stem; (D) Galls on stem

Structure of mycelium

- The mycelium is well developed, branched, intercellular and coenocytic means aseptate.
- The wall of hyphae is made up of fungal cellulose called chitin
- The mycelium is multinucleate with many nuclei scattered through out the cytoplasm
- The protoplasm of hyphae contains many nuclei, oil globules, and glycogen. It also contain many mitochondria, endoplasmic reticulum and ribosomes.
- The terminal ends of hyphae grow inside cell (penetrate). After penetration the terminal ends swells up and develop knob like structure inside host cell called houstoria.

- Houstoria are spherical in structure. Each houstoria consist of two parts namely head and neck like stalk.
- The main function of houstoria is to absorb food nutrient from the host cell.
- The houstoria are spherical structure made up of head and slender neck like stalk.
- From plasma membrane, some infoldings or tubules develop towards cytoplasm such structures are called as lomasomes. These found more in houstoria.



Reproduction in Albugo

In Albugo reproduction takes place by sexual and asexual method.

Asexual Reproduction:

- It takes place by the formation of biflagellate zoospores
- Zoospores produce inside zoosporangia.

Sporangiophore/Conidiophore

- At maturity the mycelium forms palisade mat of hyphae below the host epidermis. The tip of erect growing hyphae forms short thick club shape structures called sporangiophore or conidiophore.
- The apical ends of conidiophores enlarges in size and at lower portion a septa formation takes place due to which a circular sporangium or conidia cut from the conidiophore.
- The arrangement of conidia is basipetal, in arrangement i.e. youngest at the base and oldest at the top. In between the conidia a disjuncter is present.
- Due to continuous production of conidia leaf epidermis ruptures and sporangia released on the surface as a powdery mass.
- Sporangia are smooth colourless, unicellular, and multinucleate.
- They are rounded in shape consisting of eight to ten nuclei.
- Sporangia get separated by drying of disjuncter and blow away by wind to another host.
- When the sporangia get suitable condition i.e. moist condition and low temperature it absorb water and multinucleate protoplast divides to form eight to ten biflagellate zoospores.

- Zoospores get released when sporangium became mature. Each zoospore is a unicellular, uninucleate and kidney shape. It is biflagellate with one short hairy and another long smooth flagella.
- When zoospore comes in contact with leaf of host, it start germinating. A germ tube comes out of the zoospore and penetrates in the leaf epidermis. It enters inside the leaf and develop into new mycelium.

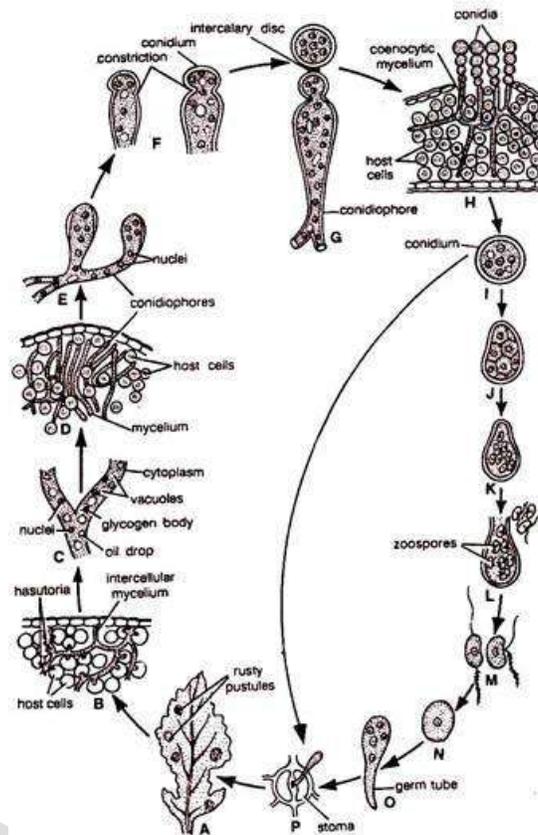


Fig. 2. (A-D). *Albugo* : A sexual reproduction

Sexual reproduction:

- In *Albugo* sexual reproduction is of oogamous type. At the maturity both male and female gametes are produced near to each other by two different strains of *Albugo*. The male sex organ is called Antheridium and female sex organ is called oogonium.
- Antheridium: it is elongated, club shaped and multinucleate. It develops at the terminal end of male hyphae. Each antheridium contains 6-12 nuclei (haploid).
- Oogonium: the terminal end of female hyphae swells up and become globose which ultimately produce oogonium. In mature condition the cytoplasm is divided into two parts 1. Central ooplasm- which is multinucleate and 2. Peripheral periplasm. Only one nucleus remain functional and others degenerate.

- At the point of contact between male and female sex organ, antheridium produce a tube like structure called fertilization tube inside oogonium. All the male nuclei migrate through the tube towards female nucleus.
- The tip of tube dissolve and male nucleus release in oogonium cytoplasm, which get fused with female nucleus and fertilization takes place.
- It results in formation of zygote or zygospore.
- It is thick wall diploid rounded structure. It can survive for long period of time.
- On the arrival of favourable condition the diploid zygote undergoes meiosis and four haploid nuclei produce which ultimately undergoes mitosis and form large number of zoospores.
- At maturity this zygospores get ruptured and all these zoospores liberated or comes out which are unicellular, uninucleate and kidney shape, having two flagellas, one long and smooth and another short and hairy. This zoospore on reaching suitable host germinates by producing germ tube. The germ tube enters into the host tissue and grow rapidly into new mycelium.

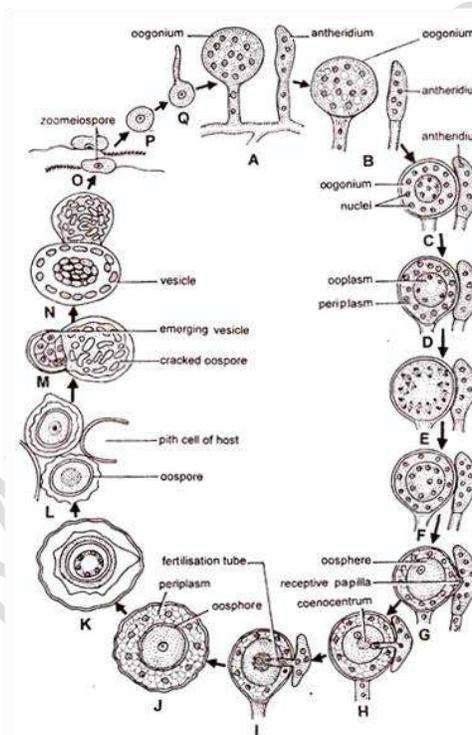


Fig. 4. (A-Q). *Albugo* : Sexual reproduction