

**Important plant  
pathogenic organisms**

**1.Fungi**

**2.Bacteria**

**3.Fastidious vascular bacteria (RLO's)**

**4.Mollicutes (phytoplasma and spiroplasma)**

**5.viruses**

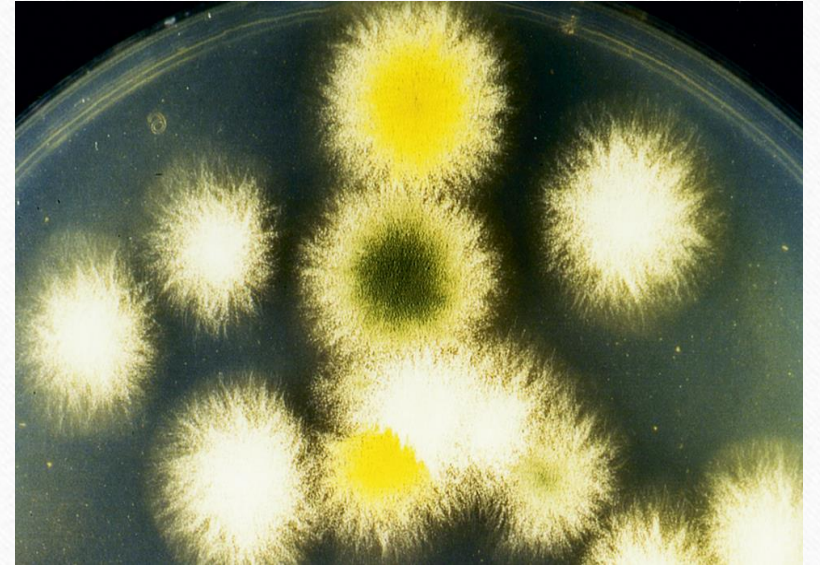
**6.viroids**

**7.Algae**

**8.Flagellated protozoans.**

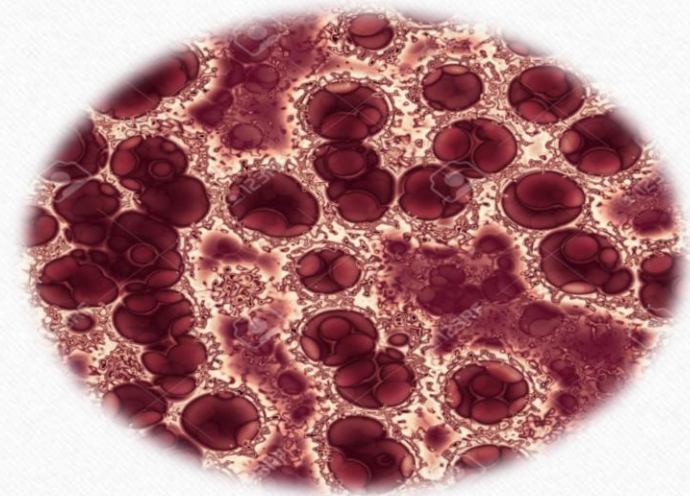
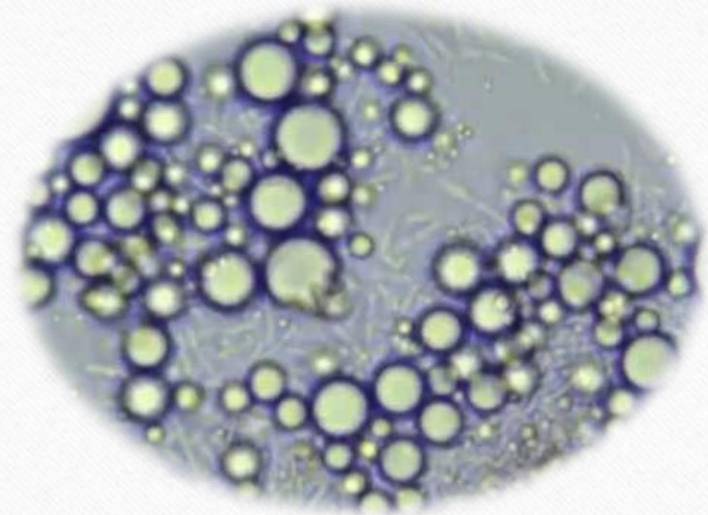
# Fungi

Fungi are eukaryotic, spore bearing, achlorophyllous organisms that generally reproduce sexually and asexually and whose filamentous, branched somatic structures are typically surrounded by cell walls consisting chitin or cellulose or both with many organic molecules.



# Bacteria

- ❑ Bacteria are extremely minute, rigid, essentially unicellular organisms free of true chlorophyll and generally devoid of any photosynthetic pigment, most commonly multiplying asexually by simple transverse fission, the resulting cell, being of equal or nearly equal in size.
- ❑ These microorganisms are with a primitive nucleus lacking a clearly defined membrane.
- ❑ The bacteria are smaller than fungi and measure about 0.5 to 1.0 x 2.0 to 5.0  $\mu\text{m}$  in size.



## **Fastidious vascular bacteria (RLO's)/ (Rickettsia-like bacteria – RLB)**

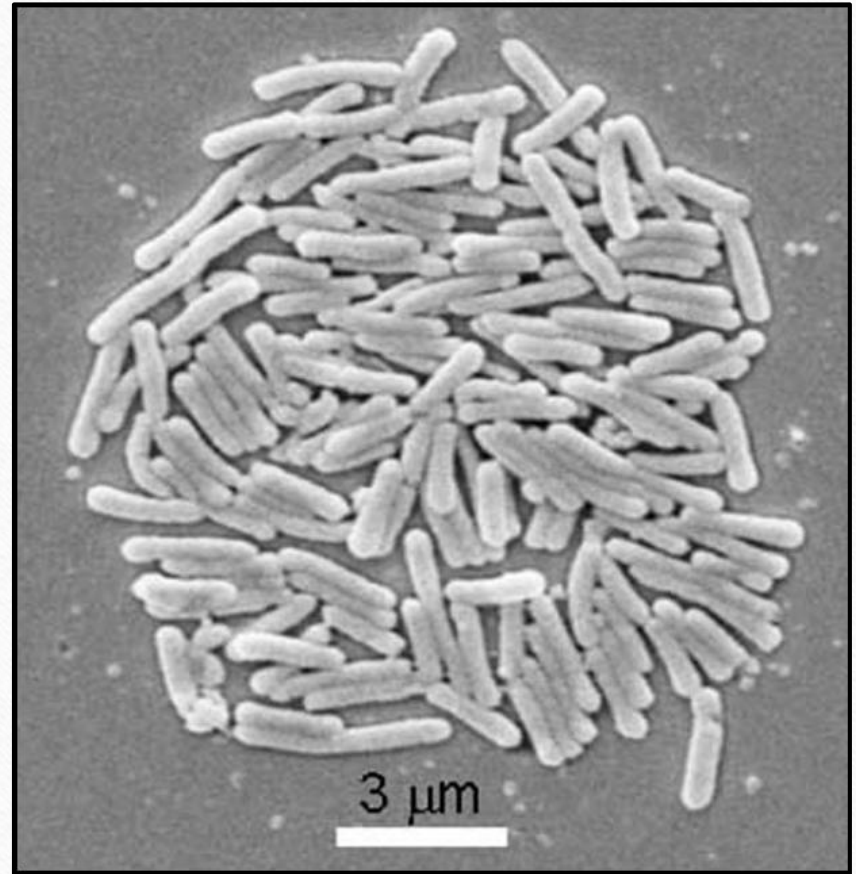
- ❑ Fastidious vascular bacteria are otherwise called Rickettsia - Like bacteria, Rickettsia like organisms (RLO), or fastidious prokaryotes or rickettsia -like walled bacteria.
- ❑ They are small bacteria with a cellular ultrastructure of typical gram-negative bacteria.
- ❑ They are very exacting in their nutritional requirements, refusing to grow on routine bacteriological media.
- ❑ They have a cell wall unlike MLO and spiroplasma.
- ❑ MLO is restricted to phloem tissues where as RLB are restricted mostly to xylem or phloem.

- ❑ A common habit for both is the **insect body fluid** (haemolymph).
- ❑ Both the groups are dependent on **insect vectors for transmission**. Nematode (*Xiphinema index*) also helps in transmission of RLB (yellow disease of grapevine).
- ❑ They reproduce by **binary fission**.
- ❑ They produce **phytoalexins**, which induce characteristic symptoms of the disease.
- ❑ They are **cultured in artificial media** e.g., Pierce's disease of grapevine, almond leaf scorch, phony disease of peach and plum leaf scald.

1 Xylem-limited RLB

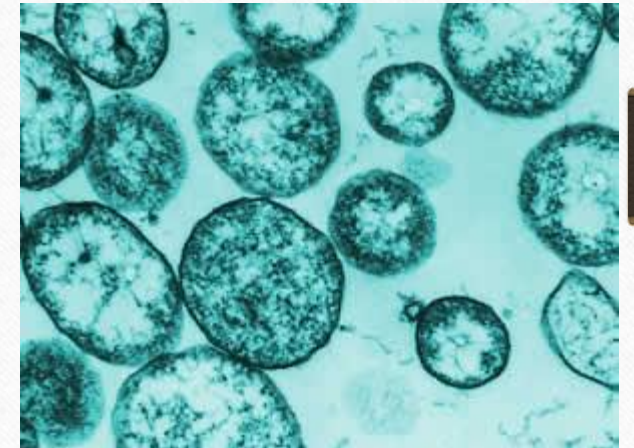
2 Phloem-limited RLB and

3 Non-tissue restricted RLB

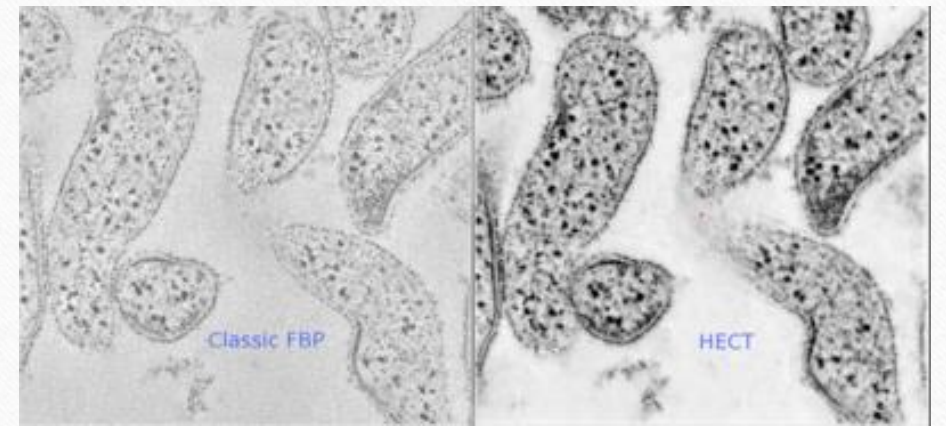
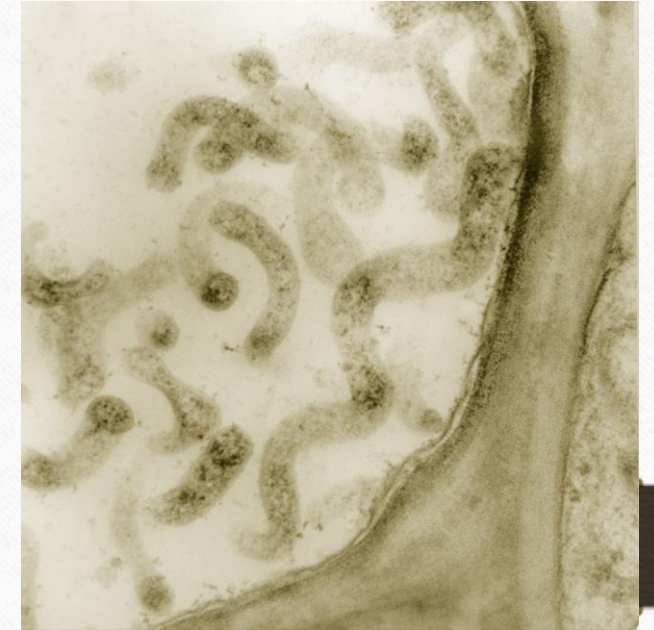


## Mollicutes (phytoplasma and spiroplasma)

**Phytoplasma:** Phytoplasma lack cell wall and are bounded by a unit membrane. They are pleomorphic. They lack cell wall. They have fried egg appearance of colony. They are filterable through 450 nm membrane. They have both DNA and RNA. They cannot be grown on artificial media. They produce symptoms like little leaf, phyllody, spike, yellows, stunting, witches' broom etc. They are mostly transmitted by leafhoppers. They are insensitive to penicillin and sensitive to tetracycline. e.g. phyllody of sesame, little leaf of brinjal.

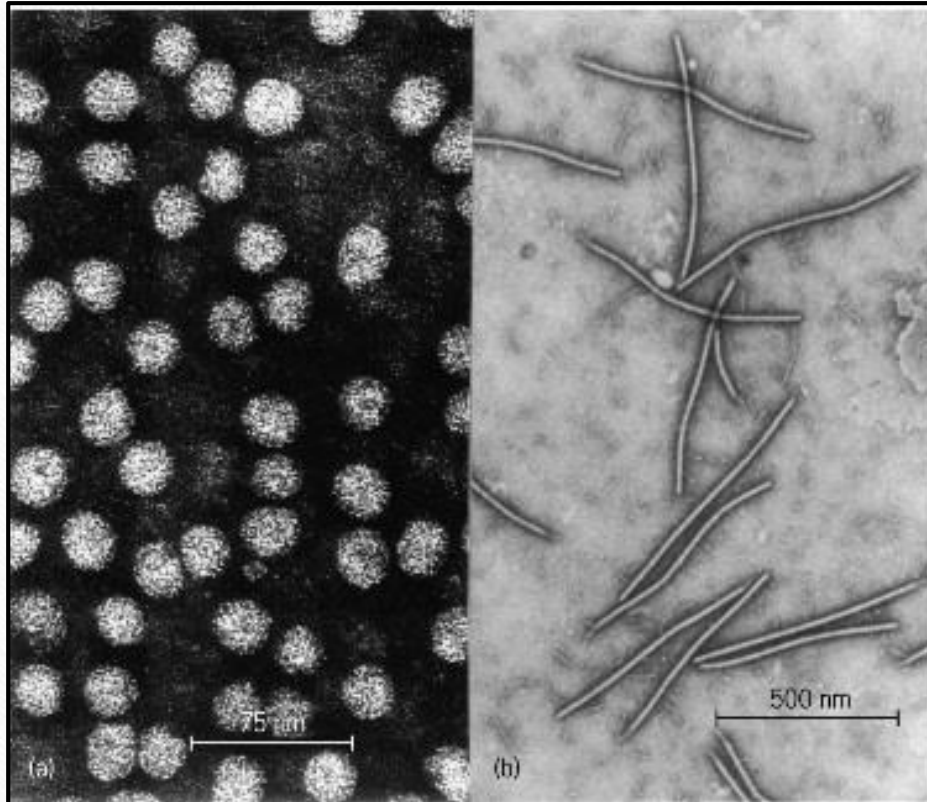


**Spiroplasma:** Spiroplasmas are helical, wall less prokaryotic micro organisms that are present in phloem of diseased plants and are thought to be a kind of mycoplasma and can be cultured on artificial medium. They require cholesterol for growth and cause diseases in plants, insects and rats. They are insensitive to penicillin and sensitive to erythrocin and tetracycline. e.g. corn stunt, citrus stubborn.



## VIRUS

- Viruses are **ultramicroscopic, nucleoprotein entities**, which are infectious agents and **obligately parasitic pathogens**, which are less than 200 m $\mu$  in size. They are **devoid of enzymes and depend on the host protein synthesis machinery** (ribosomes). They have **only one type of nucleic acid** viz., RNA or DNA. Most of the plant virus is having RNA. e.g. TMV. Few viruses contain DNA. e.g. Cauliflower mosaic virus, banana bunchy top virus, maize streak virus and sugar beet curly top virus.
- passive transmission – mechanically, vegetative propagation (cuttings) or seed
- active transmission requires vector
  - ✓ plant-feeding arthropods, especially aphids and whiteflies
  - ✓ nematodes
  - ✓ plant-parasitic fungi



range from 30 nm diameter (spherical viruses) to 2  $\mu\text{m}$  (filamentous viruses)

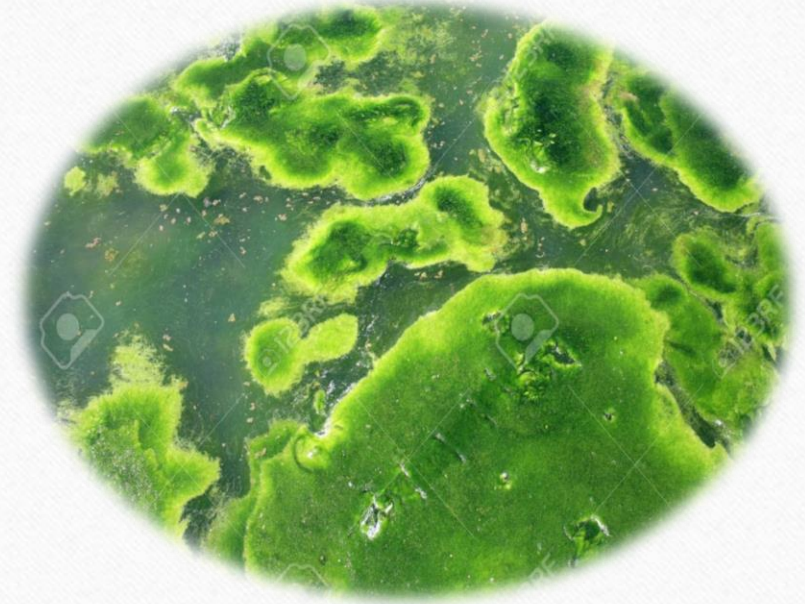
## VIROIDS

- They are also called as **mini viruses**.
- naked, infectious RNA – **no protein coat**
- genomes between 246-375 nucleotides
- do not produce any proteins when they infect a plant cell
- use the host cell RNA polymerase to reproduce their RNA and move into other plant cells
- spread through vegetative propagation, mechanical contamination, pollen and seed; vectors not necessary
- They may be small, but the diseases can still be devastating! **Cadang-Cadang** is a viroid disease of coconut palms that has destroyed over 30 million palms in the Philippines
- **Potato spindle tuber viroid** is model pathogen



# ALGAE

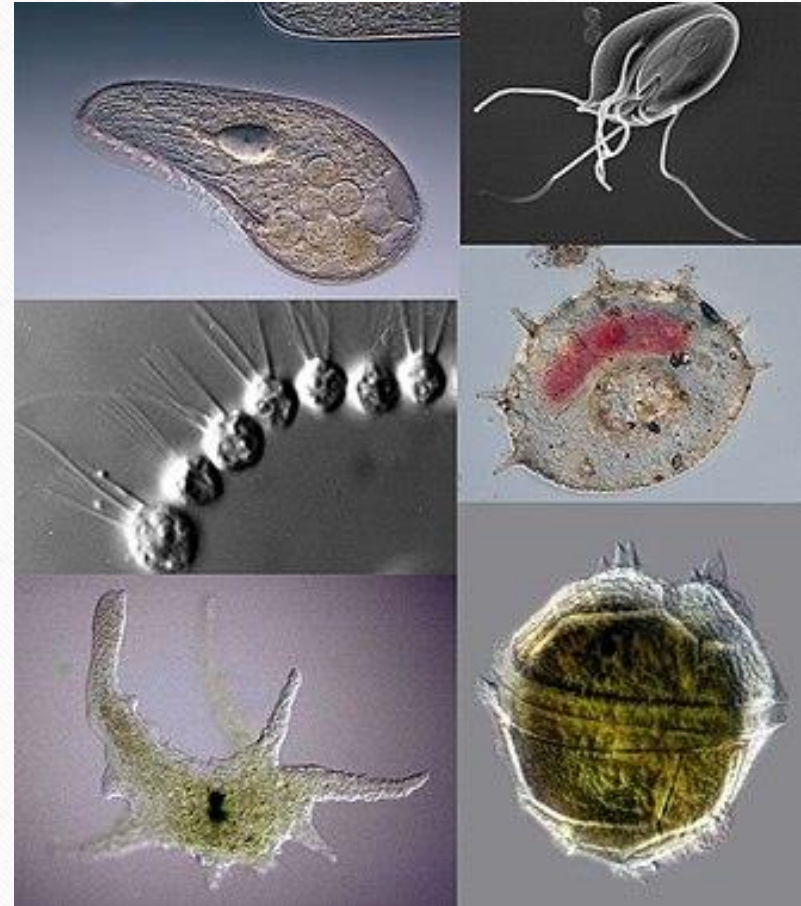
- ❑ Algae are **eukaryotic**, unicellular or multicellular organisms and mostly occur in aquatic environments.
- ❑ Many algae thrive as terrestrial or subterranean algae.
- ❑ The size of algae ranges from 1.0mm to many centimetres in length.
- ❑ They **contain chlorophyll** and are photosynthetic.
- ❑ They reproduce by **asexual and sexual** processes.
- ❑ The study of algae is called **phycology or algology**.



## PROTOZOA

- ❑ Protozoa (trypanosomatid flagellates) belonging to the class Mastigophora, order Kinetoplastida and family Trypanosomatidae have been known to parasitize plants.
- ❑ The Mastigophora, or flagellates, are characterized by **one or more long slender flagella** at some or all stages of their life cycle.
- ❑ The flagella are used **for locomotion and food capture**. They are also used as **sense organs**.
- ❑ The body of the flagellates has a definite **long, oval or spherical form**, which is maintained by a thin, flexible membrane cover. In some groups it may be armoured.

- ❑ Flagellates reproduce by **longitudinal fission**.
- ❑ Flagellates apparently cause the phloem necrosis disease of coffee, the heart rot disease of coconut palm and the Marchitez suppressive (sudden wilt or wither) disease of oil palm,
- ❑ Marchitez suppressive is one of the important diseases in oil palm. *Phytomonas staheli* was described from sieve tubes of coconut and oil palm.



## **PHANEROGAMIC PARASITES**

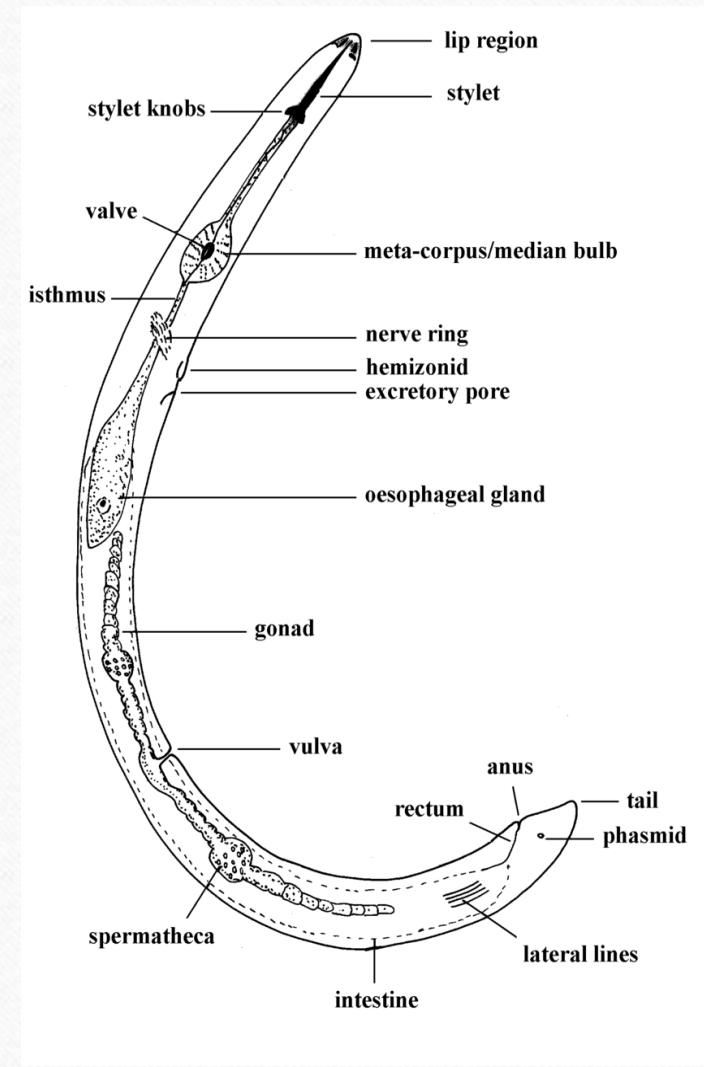
- ❑ Phanerogamic parasites are **flowering plants or seed plants**, which lead a parasitic life on other living plants. They parasitize a great number of economic plants and cause considerable loss in yield.
- ❑ The phanerogamic parasites invade stem or root of the host plants.
- ❑ Nearly 2,500 species of phanerogamic parasites in 11 families have been recorded throughout the world. Among them Orobanchaceae, Scrophulariaceae, Loranthaceae, Convolvulaceae and Lauraceae are important.

- ❑ Some of the parasites, which do not have chlorophyll, depend entirely on the host plants for their food materials. They are called **holo or total parasites**.
- ❑ Some of these parasites possess chlorophyll, which manufacture carbohydrates to a limited extent and depend on the host for mineral, salts and water. These are generally called as **semi or partial parasites**.



## Nematodes

- are roundworms (multicellular animals)
  - ✓ have a hollow mouth spear called a stylet
  - ✓ stylet connected to pharynx, which is connected to the intestine
  - ✓ stylet used to puncture plant cells, withdraw food, and secrete protein and metabolites that aid the nematode in parasitizing the plant
- most are free-living (40%) – feed on bacteria, fungi, protozoans and other nematodes. but, many are parasites of animals (44%) and plants (15%)
- need water (even if minimal)
- *Caenorhabditis elegans* – bacterial-feeding nematode (not plant parasitic)



*Thank you..*