B.Sc. Third Year, Semester - V

Botany Paper No. XVI (C)

Plant Pathology Unit-2

2) Pulses

a) Wilt of pigeon pea

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a) Wilt of Pigeon pea

Causal Organism: *Fusarium udum*

Host: *Cajanus cajan* (Pigeon pea)

- **Classification**
- **Division-** Mycota
- **Sub Division-** Eumycotina
- **Class-** Deuteromycetes
- **Order-** Moniliales
- **Family-** Tuberculariaceae
- **Genus-** *Fusarium*
- **Species-** *udum*

Distribution

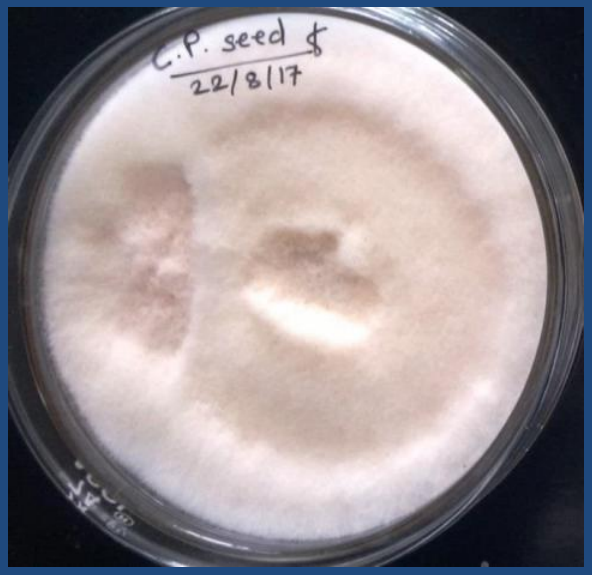
This disease widely occurs in Asia and Africa attacking pigeon pea. The disease was first reported in 1906 in India by E. J. Butler. Since then this has been reported also from Kenya, Tanzania, Uganda, Malavi, Thialand, Indonesia and Trinidad. In India, the disease is very destructive in Maharashtra, Rajasthan, Madhya Pradesh and U. P. the disease may cause as much as 50% mortality of plants if crop is continuously grown in the same field.

Symptoms:

The plants are susceptible to attack throughout their development. The infection occurring through fine lateral roots by either conidia or chlamydospores. The pathogen enters the vascular systems and traverse all along, producing conidia and chlamydospores within the xylem vessels. The xylem vessels are frequently blocked by clumped of mycelia. Blackening due to infection frequently appears in the vascular tissues. The wilt appears in early stages of plant growth (4-6 week old). The disease becomes most severe during flowering and pod formation stages.

Typically the first symptom is premature yellowing of leaves. The next symptom is the wilting or withering of leaves of the diseased plants. The plant is in a blighted condition. The leaves to be affected progressively from the bottom towards the top. Finally the entire plant completely dries up. In severe cases of the infection more than half of the plants in the field may fall victim to this disease.

Wilt of Pigeon pea



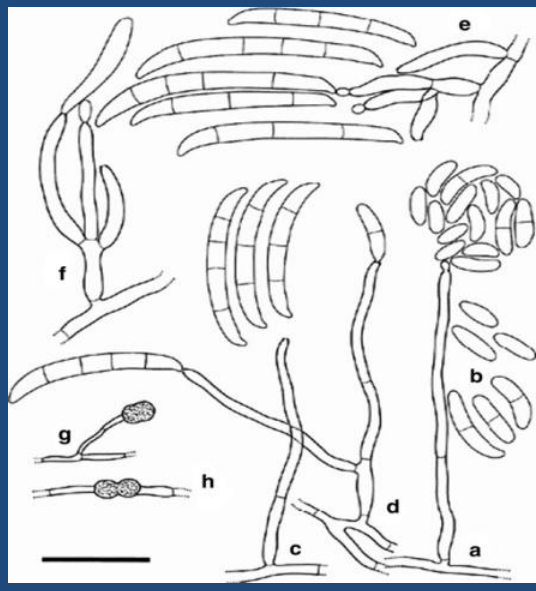
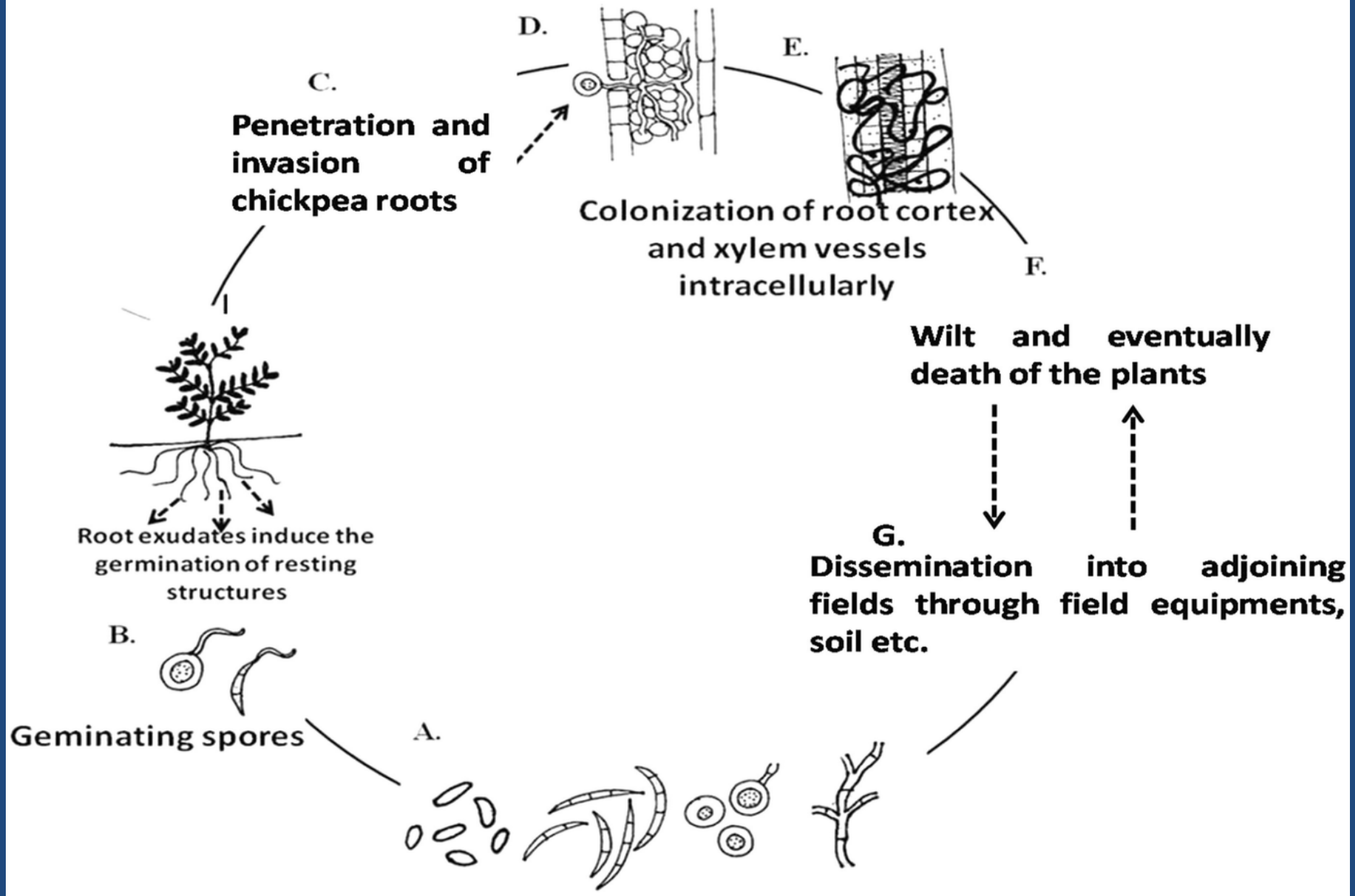


Photo- *Fusarium udam/ oxysporum*

Causal organism and disease cycle:

The disease is caused by *Fusarium udum*. The pathogen is specific to parasitism and pathogenic to only pigeon pea. It is soil borne parasite that enters through roots and become systemic in plant. It can be isolated from all parts of the host. The fungus occurs more frequently and in high population in the vicinity of infected and wilted plant roots. The pathogen is well developed in vascular tissues and are both inter- and intracellular. The mycelium produces three types of spores. Microconidia are small, elliptic or curved, unicellular or one or two septa and 5-15 □ 2-4 µm in size. Macroconidia are produced on small stromatic masses, the sporodochia. They are long, curved, pointed at tip, knotched at base, 3-4 septate and 15-20 □ 3-5 µm in size. Chlamydospores are spherical or oval, single or in chains, terminal or intercalary. Wilting is also caused by production of toxin, fusaric acid. Besides these the pathogen also produces enzymes – pectin methylesterase, polygalactrunase and cellulases which are involved in disease development.

The pathogen can survive saprophytically in soil in absence of its host for 3-4 years. The asexual state is more important and common in nature. The pathogen grows externally as well as internally. It produces mass of mycelia and conidia on the host surface. After the plant wilt, the pathogen survives as saprophyte in soil for several years. Saprophytic survival occurs mostly in the infected dead roots and other host debris. Chlamydospores are formed in parasitic as well as saprophytic phases from the hyphae and conidial cells. Pathogen may also survive as chlamydospores. They germinate at the turn of favourable conditions to cause primary infection. The disease spreads through contact of infected roots with healthy ones, irrigation, rain water and termites.


D.
E.
C.
Penetration and invasion of chickpea roots
Colonization of root cortex and xylem vessels intracellularly
F.
Wilt and eventually death of the plants
Root exudates induce the germination of resting structures
G.
Dissemination into adjoining fields through field equipments, soil etc.
B.
Geminating spores
A.
Microconidia, Macroconidia, chlamydospores and mycelium on seed, soil (for upto 6 years), crop residues buried in the soil

Control measures:

1. Use of disease resistance varieties such as NP15 and NP38.
2. Crop rotation is the most effective as it would check the buildup of inoculums in the soil.
3. Field sanitation is the effective measure. Removal of affected plant and their roots along with deep ploughing during summer are very effective.
4. Mixed cropping with jowar is very useful for disease control.
5. Use of chemical drugs such as soil drench with Bavistin (2000 ppm), soil treatment with Dithan Z-78 and Zinap.
6. Biological control by use of antagonists such as *Bacillus subtilis, Micromonospora globosa, Trichoderma viride* and *T. harzianum*.

Thank you