

**RAJMATA VIJAYARAJE SCINDHIA KRISHI
VISHWA VIDHYALAYA , GWALIOR (M.P.)**



SESSION

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**Diseases of vegetable, ornamental and
spices crops**

PRESENTED BY –

Dr. R.P. PATEL

**➤ K.N.K.COLLEGE OF
HORTICULTRE MANDSAUR**

Disease caused by Fusarium sp. In horticultural crops

SYMPTOMS

- Fusarium sp. is a fungus it is causing wilt disease in many plants that attacks potato, tomato, eggplant and pepper.
- symptoms of Fusarium wilt include a drooping and yellowing of the leaves, often starting on one side, and stunting of the plant.



- Disease symptoms often commence at the base of the stem and progress upwards, causing the leaves and flower heads to wilt, wither, and die.
- Lower parts of the stem are dark and discoloured.
- Infected stems are split, brown to black streaks are evident in the vascular system.

- Flowering plants that start from bulbs, corms, or tuberous roots show a dark discoloration within underground parts that commonly extends into the leaf bases.
- Seedlings of all flowering plants may suddenly wilt, collapse, and die.
- Masses of white or pinkish *Fusarium* spores (conidia) are formed in fungus fruiting bodies, called sporodochia, on the surface of infected or dead stems, usually near the soil line, or on infected bulbs and corms.



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ETIOLOGY

Disease caused by *Fusarium* sp.

Mycelium

The mycelium of *Fusarium oxysporum* white to pink, often with purple tinge, and are sparse to abundant.

Spores:

The fungus produces three types of spores:

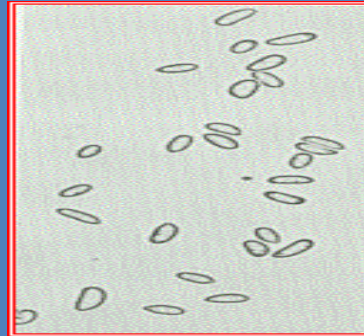
1. Microconidia. Microconidia are borne on simple phialides arising laterally and are abundant, oval-ellipsoid, straight to curved, 5-12 x 2.2-3.5 μm , and nonseptate.

2. Macroconidia (Plate 3). Macroconidia, sparse to abundant, are borne on branched conidiophores or on the surface of sporodochia and are thin walled, three- to five-septate, fusoid-subulate and pointed at both ends, have pedicellate base. Three-septate conidia measure 27-46 x 3-5 μm while five-septate conidia measure 35-60 x 3-5 μ

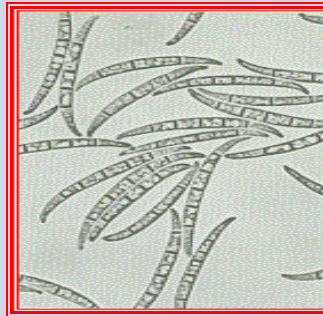
3. Chlamydospores (Plate 4). Chlamydospores are spherical, globose and thick wall found predominantly in the cortical tissues and size 100 to 400 micrometer.

- Chlamydospores, both smooth and rough walled, are abundant and form terminally or on an intercalary basis. They are generally solitary, but occasionally form in pairs or chains. No perfect stage is known.

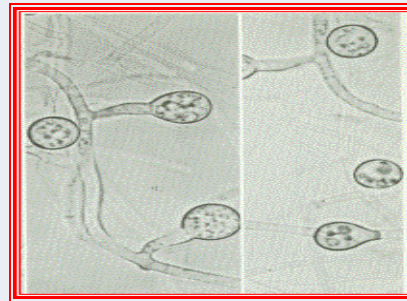
1. Microconidia



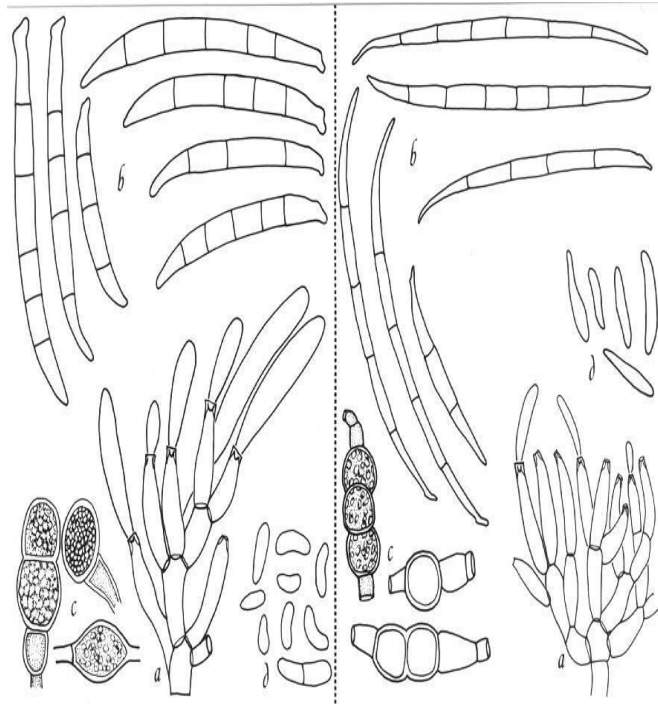
2. Macroconidia



3. Chlamydozoospores



This figure showing Microconidia, Macroconidia and Chlamydoconidia



EPIDEMIOLOGY

- In general, *Fusarium oxysporum* attacks plants and is most severe at air and soil temperatures of 24°C to 32° or 35°C (75° to 90° or 95°F) while the Verticillium wilt fungi (*V. Albo-atrum* and *V. dahliae*) infect plants at somewhat lower temperatures (optimum 21°C or 70°F).
- Fusarium wilt is most severe in the southern half of Illinois during warm-to-hot weather. Transplants that are grown in infested soil usually do not show typical wilt Symptoms until they have been transplanted for some time and soil temperatures

DISEASE CYCLE

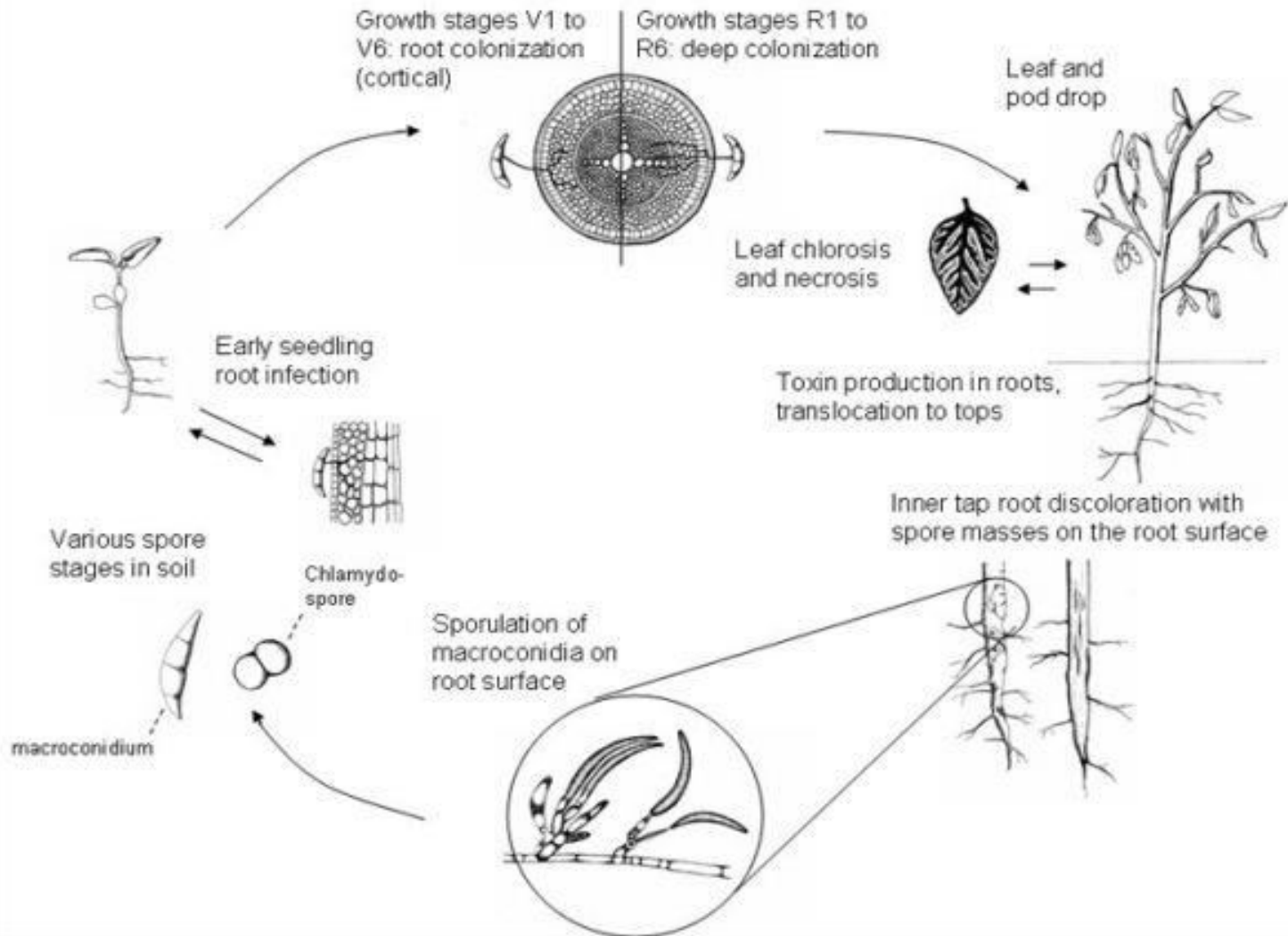
- The Fusarium wilt fungi invade the root systems or other underground parts of their host plants through wounds that are caused naturally by the growth of young rootlets through the soil and by wounds in older roots that are made during transplanting and cultivating by root-feeding organisms, such as insects or nematodes (burrowing, lesion, root knot, sheath, sting, stubby-root, and stunt); and by man-made injuries during transplanting, cultivation, harvest, sorting, and grading. Once within the plant, the fungus grows and multiplies in the vascular system (water- and food-conducting tissues) of the roots.

- It then moves upward in the plant by spores (macroconidia and microconidia) that are transported in the sap stream where they become lodged, germinate, and affect new plant parts; or the fungus extends its colonization as it grows in the vascular tissue of the host.
- The normal flow of liquids and nutrients from the roots to the foliage is greatly reduced or stopped because the conducting tissue becomes partially plugged or killed by fungal mycelium and spores, or by the overgrowth of neighboring cells.

- Toxic substances are believed to be secreted by interaction of the fungus and the host plant. These materials apparently cause the wilting and eventual death of the plant.
- Wilt symptoms typically are not observed until the fungus has colonized the underground parts of the plant.
- Resting structures (chlamydospores) are formed within infected plant parts.

- After the host plant dies or the growing season ends, the *Fusarium* fungi survive as mycelia and chlamydospores, overwintering indefinitely in the absence of the host plant, especially if the soil is warm, as in a greenhouse. Chlamydospores are stimulated to germinate by exudates from the roots of a host plant which they then infect.
- The *Fusarium* fungi spread from plantings of contaminated seed cuttings, transplants, tubers, roots, corms and bulbs
- Mycelia, conidia, and chlamydospores may be transported in infested soil by normal tillage operations, in soil clinging to hand tools, equipment, or shoes, by wind, and by surface rainage water. Once contact is made with a new plant host, the fungus again invades the underground parts, progresses upward, and the cycle is repeated. Soil moisture and soil reaction (pH) have little effect on *Fusarium* wilts, as the fungi establish themselves and thrive in a wide range of soil types.

DISEASE CYCLE



Management

- The *Fusarium* wilt fungi are difficult to control
- The first step in managing *Fusarium* wilt is proper diagnosis.
- Only by laboratory culturing of infected plant material can you positively identify *Fusarium* as the causal agent.
- Similar symptoms are produced by other pathogens. Once *Fusarium* has been identified as producing the symptoms expressed in the host, several measures can be taken to reduce the effects of the disease.
- Disinfest greenhouse, seedbed, and potting soil before planting. Use either steam (hold soil at 82°C [180°F] for 30 minutes at the coolest spot or 71°C [190°F] for one hour)
- or fumigate the soil with methyl bromide, chloropicrin, Vorlex, or Vapam Soil Fumigant.
- These chemicals also will control other pathogens, weeds, insects, and nematodes in the soil.

- You should also treat containers, benches, work surfaces, tools, and other equipment.
- Fumigation is usually done by larger growers and commercial applicators who are licensed to handle restricted-use chemicals. The manufacturer's directions should be followed carefully.
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- 2. Do not grow susceptible plants in Fusarium-infested soil where the same or closely related plants have grown previously. A rotation of 5 to 10 years or more may help to reduce the amount of infection.
- 3. Purchase only healthy, top-quality, disease-free seed, cuttings, transplants, bulbs, corms, or other
- plant material. Start with culture-indexed cuttings or clean, mother-block stock plants -4-
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Treatment

- Choose resistant varieties when available.
- Remove stricken growth and sterilize [pruning clippers](#) (one part bleach to 4 parts water) between cuts.
- Control garden insects, such as [cucumber beetles](#), which are known to spread the disease.
- Hand pull or spot treat weeds with a [weed flamer](#) or [natural herbicides](#) — many weed species host the disease.

- The organic fungicide [Mycostop](#) (Biofungicide) will safely protect your crops against wilt caused by *Fusarium*.
- If the disease persists, it is best to remove the entire plant and solarize the soil* before planting again.
- **Tip:** [Organocide Plant Doctor](#) is applied as a soil drench or foliar spray and moves throughout the entire plant systemically to combat a large number of diseases. Ideal for use on flowers, shrubs, fruit trees and vegetables.
- * To solarize the soil, you must leave a clear plastic tarp on the soil surface for 4-6 weeks during the hottest part of the year. [Soil solarization](#) will reduce or eliminate many soil inhabiting pests, including nematodes, fungi, insects, weeds and weed seeds.

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