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Identification of the main diseases of cotton and application of the combined protection method

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ABSTRACT

Cotton is a major crop in parts of the African Tropics, Australia, China, Egypt, India, Mexico, Pakistan, Soviet Union, the Sudan, United States, and warmer regions of Central and South America. Diseases have always been a problem wherever cotton is grown¹. Under the conditions of Uzbekistan, the productivity of cotton is significantly decreasing due to several diseases. Below are the diseases that have a negative effect on cotton and their main symptoms, as well as the substances used to fight against them, and their consumption standards.

Keywords:

cotton, disease, verticilliosis, fusarium wilt, black root rot.

In the conditions of Uzbekistan, gommosis, root rot, verticilliosis and fusarium wilt, macrosporiosis, many fiber and boll of cotton diseases occur in cotton. Among these, the most common and economically damaging diseases include root rot, gommosis, verticilliosis and fusarium wilt. Plants are infected with gommosis and root rot diseases mainly during the germination period and often die. As a result, the thickness of seedlings in the field decreases and the planned harvest is not obtained.

The most common diseases of cotton include verticilliosis and fusarium wilt. They reduce cotton yield and fiber quality in cotton. In infected plants, the fiber becomes brittle, and the seed's moisture content and germination rate decrease sharply. As a result of deterioration of the quality of the fiber, its price

in the market drops sharply. In most cases, early and severely infected plants die. Losses from cotton diseases amount to several million US dollars per year.

Common and black root rot diseases.

Common root rot is caused by the fungus *Rhizoctonia solani* Kuehn. Plants are affected from the period of germination to the period of 6-8 leaves. In some cases, large plants can also be affected, in which the vein throat and veins rot.

Black root rot is caused by *Thielaviopsis basicola* Ferraris *f.gossypii* Zaprometov fungus. Root rot can also be caused by *Fusarium* and *Phytium* fungi. The disease appears mainly during the period of germination of cotton and during the period of 3-4 true leaves. In some cases, even large plants are damaged in the fall when the air temperature is low (Fig 1).

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<https://www.shelbycountyttn.gov/DocumentCenter/View/1233/Cotton-Disease?bidId=>

Young sprouts are affected almost equally by both diseases. In the roots of diseased seedlings, sunken sores form and dry up.



Figure 1. Black root rot, pathogen is *Thielaviopsis basicola* Ferr.

Violation of aeration in the soil causes rapid development of this disease. Root rot occurs in all cotton growing areas and is caused by the exudates of bacteria and is the source of spreading the disease (Fig.2).



Figure 2. Gommosis in cotton

The disease can spread to healthy plants by insects, wind, rain and work tools. When the air temperature is 25-26°C degrees, there are very favorable conditions for the development of gommosis. When the air temperature is below +25°C, the viability of gommoz-causing bacteria decreases. But the overwintering generation of the fungus on the surface of the seed can withstand continuous heating at -21°C degrees and +80°C degrees for 2 days. This bacterium dies in 15-20 days in cool and moist soil, but in dry weather they retain their viability for several years.

Gommosis bacteria only damage cotton and do not damage other plants. If the disease occurs during the seed period of cotton, the yield will decrease by 18-62%.

by soil-dwelling fungi. The pathogen develops both in dead and developing parts of the plant. Root rot disease affects seedlings more in places where groundwater is near. The disease develops rapidly in rainy and cool spring months. In this case, the seeds and sprouts will rot, as a result, the seedlings will be sparse.

Gommosis is a bacterial disease caused by *Xanthomonas malvacearum* Dawson. In addition, the quality of fiber and seed deteriorates due to the disease. The disease appears as a dark green round oily spot during the seed stage of cotton, and when it spreads strongly, it moves to the leaf band, stem, and growth point, resulting in the death of the plant. When the disease progresses to cysts, the pods crack and go to the fiber and seed. This fiber is yellowish brown in color. A sticky liquid flows from the spots formed as a result of gommosis. This liquid

Verticillium wilt is caused by the soil-dwelling fungus *Verticillium dahliae* Klebahn, and the disease infects about 660 cultivated and wild plant species, except cotton. It is a semi-saprophytic fungus that overwinters as microsclerotia in soil and plant debris. The fungus that causes wilt disease consists of colorless mycelia, from which conidia and oidium are formed. It reproduces using conidia (spores) and mycelia. Favorable conditions for the fungus are 24-26°C degrees of heat and 60-70% relative humidity. Fungi die at temperatures above 30°C. This creates favorable conditions for the growth of fungi from microsclerotia and good mass growth of mycelia. The fungus can be found in the soil, plant debris, attached to the surface of the seed

in the soil, and spread by water, rain, wind, and work tools. The mycelium of the fungus enters the plant through the infected vascular system. It develops from the vascular system of the plant to the growing point of the plant. It can damage the leaves, fruit band and even the fiber and

seeds in severely infected plants. In unfavorable conditions (when the weather changes, when the plant or its parts die, etc.), the fungus forms microsclerotia in the plant.

The source of wilt is infected soil, plant residues and seeds.



Figure 3. Verticillium wilt in cotton

The first sign of wilt is the wilting of the leaves in the lower layer of the cotton, initially with the formation of white, yellow spots, so this disease is sometimes called "wilting". These spots are irregularly distributed over the entire surface of the leaf. Later, these spots turn brown and dry. Dry branches droop or fall off. In an infected plant, the disease develops from the bottom up. The affected plant stops growing, leaves fall off and completely dries up. If the disease occurs in cotton for a long time, the leaves will completely fall off, and the cotton boll in it will be forced to open early. Often, at the end of August, the lightning-fast form of the disease spreads, in which the plant completely dries up without any signs of disease in 2-3 days, and the dried leaves do not have time to fall off. Fiber and seed remain unripened.

In order to know the disease, when the vascular throat of the main stem of cotton is cut obliquely, brown-black spots are visible in its core, i.e. necrosis.

Fusarium wilt disease is caused by the fungi *Fusarium oxysporum f. sp. vasinfectum* (Atk.) Spuder et Nansen and *Fusarium verticillioides* (Sacc.) Nirenberg. This fungus infects about 1,000 cultivated and wild species of plants. Symptoms of the disease appear from the emergence of sprouts to the end of the

growing season. Yellowing of the veins is observed in the seed leaf of young seedlings. The main symptom is when a certain part of the leaf or the entire leaf is divided into small green parts by means of yellowing veins and gives a net-like appearance when held up to the light (Fig.4).



Figure 4. Fusarium wilt in cotton

Young seedlings are especially severely damaged by *F. verticillioides*. Under the influence of the disease, the number of cotton seedlings is sharply reduced, the bushes dry up, and in some cases the strength can be lost up to 50-100%.

Fighting methods:

Agrotechnics: planting healthy seeds; preventing soil compaction, timely and quality

cultivation and removal of diseased seedlings; feeding with nitrogen and potassium fertilizers.

High-quality seed treatment is an important preventive measure to protect cotton from various diseases.

Chemical agents used in seed treatment:

Dalbron 12% powder (120 g/kg) (active substance: Bronopol) - 6.0-7.0 l/t in the suspension of seed preparation against gommosis for 1 t of hairy seed, 25-30 l and 1 t of mechanical 15-20 l of solution is applied to the depilated seed.

Vitavaks 200 FF 34% suspension concentrate (active substance Karboxin thiram) is treated against root rot disease at the rate of 5.0 l/t by using 15-20 l of solution on 1 t of hairy seed, 25-30 l and 15-20 l of solution on 1 t of hairless seed mechanically.

GaUCHO WS 70, DALUCHO 70% wetting powder - (active substance: Imidacloprid) - 5.0 l/t against root rot, aphids, thrips 25-30 l per 1 t of hairy seed and 15 for 1 t of hairless seed by mechanical method - It is recommended to apply 20 l of solution and plant.

Spring 60% diluted emulsion (active substance: ammonium salt of salicylic acid) - 1.0 l/t against root rot and gommosis diseases, 25-30 l solution for 1 t hairy seed and 15-20 l solution for 1 t mechanically hairless seed spent and treated.

P-4, 65% suspension concentrate (active ingredient: Dimethylol-carbamide) - 4.0 l/t against root rot and gommosis diseases, 25-30 l per 1 t of hairy seed and 15- 20 l of solution is used.

The above preparations used for seed treatment have been showing good results in all regions of our republic for many years. Kruzer Ekstra Khlopok 362, suspension concentration (350 g/l+3.34 g/l+8.34 g/l) (active substance: Thiamethoxam + mefenoxam+fludioxonil) - at the rate of 3.0 l/t, it is recommended to medicate against root rot, aphids, thrips by spending 25-30 l per 1 t hairy seed and 15-20 l solution per 1 t mechanically depilated seed.

Sporagin, 1500 EA/g (active ingredient: *Vacillus subtilis*, strain AN 2004) 2.0 l/t + 2.0 + 2.0 l/ha in cotton to reduce the infection pressure of fusarium wilt pathogens in plants and soil, seed

before planting It is recommended to spray twice during the growing season of the plant as a medicine and as a fungicide.

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