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MICROORGANISMS ASSOCIATED WITH BOLL ROT DISEASES OF COTTON (Gossypium hirsutum)

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ABSTRACT

Nane species of fungi and one bacterium were found to be associated with the boll rot disease of cotton. **Rhizopus stolonifer, Fusarium moniliforme, Trichothecium sp., F. oxysporum and Aspergillus flavus** were more common. **Penicillium sp. and Mucor sp.** were not pathogenic. **R.stolonifer** caused complete boll rotting in five days whereas with **Xanthomonas campestries pv. malvacearum** boll rotting was competed in 12 days.

Among the diseases of cotton, boll rot is very important in that it not only reduces the yield but also impairs the quality of lint as well as germination of seeds. Boll rot is an extremely complex problem involving diversified symptoms and varying nature of damage any time from boll set to boll bursting (Cauquil, 1975).

Belliard (1972) reported the pathogenicity of 19 fungi from rotten bolls in Senegal and Mali; of these **Fusarium moniliforme** was associated in most cases. Krishnamoorthy and Verma (1974) studied the bollrot complex of cotton in India and reported 37 species of organisms belonging to 22 genera associated with the disease. Of these, **Fusarium semitectum, Coprinus logopus, Chlamydomyces palmarum, Granhium sp, Phoma hibernica** and **Trichurus spiralis** were reported for the first time as causal organisms for bollrot. Srinivasan (1975) reported **Nematospora gossypii** and the bacterial blight pathogen as organisms involved in bollrot disease.

Chopra and Sharma (1979) reported a wide range of pathogenic and saprophytic organisms relating to fungal and bacterial group in cotton bollrot complex. Twenty genera, 17 from fungal and three from bacterial origin were isolated from rotted bolls. Predominant organisms isolated were **Fusarium oxysporum, Colletotrichum gossypii, Rhizopus nigricans, Aspergillus flavus, Penicillium sp, Myrothecium roridum, Mucor racemosus, Alternaria alternata, Cephalosporium sp.** and **Xanthomonas malvacearum.** Other organisms isolated frequently were **Aspergillus niger, Phytophthora sp,Helminthosporium spicifer, Curvularia lunata, Phoma sp, Chaetomium sp** Sharma and Sandhu (1985) reported **Fusarium equiseti** as the cause for bollrot of **Gossypium arboreum** for the first time.

MATERIALS AND METHODS

Diseased bolls of cotton variety MCU 9 (Gossypium hirsutum) were collected periodically from fields. Isolations from rotton tissues were made using potato dextrose agar for fungi and nutrient agar for bacteria by cutting thin fragments as close as possible to the

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edge of the necrosis. These were disinfected in 0.1% mercuric chloride for 2-3 minutes and rinsing them with sterilized water and kept in petriplates containing specific media under aseptic conditions.

PATHOGENICITY TESTS

The isolated organisms were tested for their pathogencity on healthy bolls of MCU 9 cotton. A week old fungal organisms consisting mycelial fragments and spores on potato dextrose both was mixed in 25 ml of sterilized water and homogenized; the bacterial growth in nutrient agar medium was diluted with adequate sterile water to obtain 10^6 Cells/ml of suspension. Inoculations on the bolls which were injured with sterilized needle were done by placing a piece of one cm diameter of sterilized cotton lint dipped in a suspension of microorganisms for one hour. Ten bolls were inoculated for each organisms. Similar number of bolls were inoculated with sterile water which served as check.

In **in vitro** studies, bolls after inoculation were arranged separately on wire mesh in humidity chamber with their peduncle dipped in sterilized water. In **in vivo** studies, sterilized filter paper was dipped in sterilized water and placed around the inner sides of polythene bags to maintain humidity. Degree of rotting on bolls was recorded on 15 days after inoculation. Disease intensity was calculated according to Prasad and Bilgrami (1973).

RESULTS AND DISCUSSION

The Pathogenic organisms associated with boll rot, their pathogenicity (in vitro) are presented in Table 1. Eig genera, seven fungal and one bacter in origin were isolated from rotton boll **Rhizopus stolonifer, Fusariu moniliforme, Trichothecium roseu F. oxysporium** and **Aspergillus fla** were predominant. Kurundkar and Ma (1986) reported 37 species of microo ganisms that were involved in cott bollrot. Among the microorganisms is lated except **Penicillium** sp and **Muc** sp, others were found to be pathogen **F. moniliforme, F. oxysporum, niger, A. Flavus** and **R. stolonifer** we highly pathogenic. **R. stolonifer** w found to cause complete bollrottin within a period of five days, where **X. campestris** pv **malvacearum** too 12 days for complete bollrotting. Simbwa-Bunnya and Boyle (1969) reported that **R. arrhizus** took three days for complete decay of the boll. Chopra and Sharma (1979) reported that **R. nigricans** was very rapid and caused complete rotting of the boll within 5-7 days of inoculation whereas **X campestris** pv. **malvacearum** took 12-15 days for complete rotting of the boll. Kurundkar and Mayee (1986) reported that **R.stolonifer** destroyed the bolls completely in four days whereas **X. campestris** pv. **malvacearum** took ten days for compete rotting of the boll. Among the organisms isolated, **T. roseum** was generally associated with the matured bolls with exit holes made by pink bollworm. The present observations are in agreement with the earlie observations of various workers and drives home the fact that no single species could be attributed as the cause for the bollrot disease.

Table 1. Microorganisms associated with boll rot, pathogenicity (in vitro) and incubation period

Microorganisms	Distribution[1] (%)	Rot[2] (%)	Rotting period (days)
Aspergillus flavus Link ex Fr	10.3	29.7	6.0
A. niger Van Tieghen	8.6	30.3	6.0
Fusarium moniliforme	13.2	40.2	6.0
F. oxysporum	10.8	32.6	6.0
Mucor sp	5.9	*	*
Penicillium sp	6.2	*	*
Rhizopus stolonifer	17.3	50.4	5.0
Colletotrichum indicum	4.0	10.3	7.0
Trichothecium roseum	12.5	25.6	8.0
Xanthomonas campestris pv. malvacearum	7.2	20.5	12.0

1. From field collected bolls (%)
2. In vitro infection (%)

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