

SORESHIN DISEASE OF COTTON IN WEST BENGAL : A PRELIMINARY ACCOUNT

BY

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Soreshin disease incited by *Rhizoctonia solani* Khun on cotton crop in West Bengal was found to be present in both kharif and rabi seasons. The disease, however, was observed to be severe in rabi season in the month of December. Average mortality of seedlings was found to range between ten to twenty percent but death of seedling as high as eighty percent, was recorded. Field symptoms showed formation of lesions at soil line, which gradually enlarged and girdled the stem. The optimum temperature for the growth of the fungus was found to be 30°C. Host range studies showed that the isolates from cotton, besides attacking cotton can incite infection on bean, pea, sugarbeet, and wheat.

INTRODUCTION

Cotton as kharif (rainy season) crop occupies a negligible area in West Bengal, because the land is covered by jute and up-land paddy. In recent years, attempts have been made to introduce cotton as rabi (winter season) crop in areas where a single crop of paddy is grown. Introduction of cotton cultivation in the rabi season has been mainly concentrated in the coastal districts of 24 Parganas including Sunderban, Midnapore and Howrah. Soreshin disease incited by *Rhizoctonia solani* Khun, is becoming increasingly important on cotton grown in rabi than kharif. A preliminary survey carried out in different areas in the rabi season of 1972-73, revealed that mortality of seedling usually ranged from ten to twenty percent, however, the highest mortality recorded was eighty percent.

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In India soreshin disease was first reported from Madhya Pradesh by Dastur (1931), who attributed the incitant of the disease to *Rhizoctonia bataticola* (Taub) Butter, though he could also isolate *R.solani* Khun from diseased samples. Subsequently it was recorded from Hyderabad, Andra Pradesh (Swohney and Narayanayya 1932), Maharashtra (Uppal, 1948) Occasional record of *R.solani* Khun as the causal organism of the disease, probably led to the conclusion that soreshin is incited by *R.bataticola* (Taub.) Butler in India and by *R solani* Khun, in other countries (Vasudeva, 1960).

Studies on the symptoms noted in the field, morphology, identity of the pathogen, effect of temperature and host range are presented here.

MATERIAL AND METHODS

Diseased seedlings of cotton were collected from different places during rabi and kharif seasons. Isolations from these seedlings were made from bits taken from the juncture of diseased and healthy hypocotyl. Bits after sterilization in 0.1% mercuric chloride and washing in sterile distilled water, were placed on *potato dextrose agar* (PDA) tubes and incubated at 30°C. Pure cultures of isolates obtained from hyphal tips were maintained on PDA.

Comparatively high mortality of seedlings in cotton crop sown in cooler months of November and December promoted the investigation to determine the optimum temperature for the growth of the pathogen. Isolates were grown on PDA plates with four replications at different temperatures viz., 10, 15, 20, 25, 30, 35, and 40°C. Diameters of the colony in petriplates were recorded.

Studies on pathogenicity were conducted under greenhouse condition at State Agricultural Research Institute, Tollygunge in both rabi and kharif seasons. The average maximum and minimum temperature prevailing during December, 1972 were 28.4°C and 15.5°C respectively, while for June, 1973 these were 33.9°C and 25.5°C. Seeds of c v. Krishna, which has been introduced in this State for rabi cropping, were surface sterilized and germinated by blotter technique of International Seed Testing Association, before sowing. The sterilized soil in the 15 cm. pots were inoculated, incorporating fungus grown on *Sand-maize medium* for 10 days prior to sowing.

Flentje and Saksena (1957) used wheat, cabbage, lettuce, sugarbeet tomato for differentiating strains of *Pellicularia filamentosa* (Pat) Roger (*C.solani*). Besides the five

defferential hosts mentioned above, been, pea, sunflower and carrot were also included in the study of host range.

OBSERVATIONS

Field symptoms

Seedlings in the field showed discolouration and lesions on the hypocotyl at soil line. The lesions were first brown in colour. The lesions gradually enlarged and gridled the stem. The infected region gradually became necrotic and thinner. The attacked seedlings were paler in colour and showed signs of reduced vigour and eventually died in most cases. Sometimes the symptoms of pre-emergence of damping off were noted.

Etiology

R.solani Khun was consistantly isolated from the diseases samples. In culture medium, the mycelia were hyaline and granular when young empty at maturity. Mycelia on the agar surface penetrated slightly into the substrate and showed tendency to grow over the surface of the glass. The young branch hyphae commonly grew at right angles to the main hyphae. The mycelium was septate, hyphal cells measured 92.4 to 171.6 μ in length and 4.9 to 6.6 μ in diameter. The sclerotia which were small predominantly brown and roundish on PDA ranged between 49.5 $\times$ 49.5 and 198.0 $\times$ 264.0 μ . The typical isolate was sent to Commonwealth Mycological Institute, England, which was identified as *R.solani* Khun and the perfect stage as *Corticium solani* (Piil & Del) Bourd, and Galz.

Effect of temperture on the growth of the fungus

The fungus in culture was found to grow at temperature ranging from 10° to 35°C. However, the optimum growth was observed at 30°C, where the petridishes were covered with profuse mycelial growth within 72 hours.

Infection studies

Infection studies of cotton in two different seasons showed that the severe attack of seedings took place in the month of December and the mortality recorded being 100%. The incidence of soreshin was low in the month of June and the mortality being recorded as 30 percent. The seedling growth was comparatively slower in the month of December in comparison to that recorded in June.

Host range study

The isolates severely attacked been, pea, and sugarbeet causing damping-off of seedlings. These produced typical eyespot lesions on the foot region in wheat, but mortality was not observed. Incidence of the disease was not noticed on lettuce, carrot, cabbage, sunflower and tomato.

DISCUSSION

Extensive isolations from diseased seedlings collected from various places revealed that soreshin disease of cotton in West Bengal is associated with *R. solani* Khun (*Corticium solani* (Prill. & Del.) (Bourd. & Galz) and not with *R. bataticola* (Taub) Butler as reported earlier (Vasudeva 1960). The severity of the disease appeared to be affected by the season of planting.

Dickson (1923) has indicated through his work on seedling blight of corn and wheat by *Gibberella zeae* (Schwabe) Petch. (*G. subnietii*) that the same pathogen can have different optima in relation to host pathogenicity. In seedling blight disease the host remains vulnerable to attack for a comparatively short period and conditions for growth determine the duration of infection period. Arndt (1957) indicated the optimum temperature for cotton and for the fungal pathogen of the seeding disease was between 28°C and 30°C. The cotton plants are subjected to an increasingly greater relative disadvantage in comparison with the pathogenic fungus when the temperature is progressively lowered (Fulton and Bollenbacher, 1959). Cotton seedlings showed a slower rate of growth under lower temperature condition in the month of December and were subjected to more intense attack of soreshin. *R. solani* Khun caused root rot by damage of extrastelar tissues in the seedlings and its attack is primarily limited to stages prior to formation of barriers by the formation of corky tissues on the epidermal region and sclerenchymatous tissue in the hypodermal region. Such conditions have been noted in Egypt (Balls, 1908).

Flentje and Saksena (1957) established the existence of strains on the basis of host range indicated the organism to be more limited in its pathogenicity.

Wide spread incidence of the disease indicated that the pathogen is well distributed in soil even where only single crop of paddy is grown. This suggests that the organism may be particularly successful competitor in saprophytic existence, moreover its possibility of being carried over, in the seed cannot be ruled out as has been indicated by Peebles and Bain (1966).

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REFERENCES

- Arndt, C.H. (1957). Temperature as a factor in the infection of cotton seedlings by ten pathogens. *Plant Dis Repr* Suppl 246.
- Balls, W.L. (1933). The physiology of the parasite of soreshin of cotton. Yr.-B.K., *Khedy Agric Soc.*, Cairo 173-195.
- Dastur, J.F. (1931). A short note on the disease of cotton seedlings in Central Provinces. *Agric Live Stk.*, India, 1 : 44-48.
- Dickson, J.G. (1923). The influence of soil temperature and moisture on the development of seedling blight of wheat and corn caused by *Gibberella saubinetii*. *Jour. Agric Research* 23 : 837-870.
- Flentje, N.T. and Saksena, H.K. (1957). Studies on *Pellicularia filamentosa* (Pat.) Rogers. II Occurrence and distribution of pathogenic strains., *Trans. Brit Mycol Soc.* 40 : 95-108.
- Fulton, N.D. and Bollenbacher, K. (1959). Pathogenicity of fungi isolated from diseased cotton seedlings., *Phytopathology*, 49 : 684-689.
- Peebles Jr., J.L. and Bain, D.C. (1966). Infection of cotton seed by *Rhizoctonia*, *Plant Dis Repr*, 50 : 770-772.
- Sawhney, K. and Nayyanayya, D.V. (1932). Some observation on dry rot (soreshin) of cotton, *Proc. 19th. Indian Sci. Congr.* 76.
- Uppal, B.N. (1943). Diseases of cotton in India., Indian Central Cotton Committee, Bombay.
- Vasudeva, R.S. (1963) in *Cotton in India*. A monograph, Vol. II, India Central Cotton Committee, Bombay.

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