

# The Effect on Yield of Cotton Due To Incidence and Severity Of Black Root Rot Caused by Thielaviopsis Basicola

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## ABSTRACT

*Incidence of Black Root Rot of cotton and soil inoculum potential of the causal agent Thielaviopsis basicola were monitored throughout the season in two adjacent fields planted in mid-April, 1987 in Duncan, Arizona. Mean inoculum potential in Field 1 soil was 65 cfu/g, and 20 % of the seedlings were infected. In Field 2 the inoculum potential and percentage of infected plants were 225 cfu/g and 93, respectively. No cortical decay was noted after June 6 in either field. Yields were similar in both fields.*

## INTRODUCTION

Thielaviopsis basicola causes Black Root Rot, a cortical rot of seedling cotton in many temperate, cotton-growing regions of the world. It is considered to be a cool temperature seedling disease found in cotton planted at high elevations or early in the year at low elevations. T. basicola was first discovered in Arizona in 1922 and infects both Gossypium hirsutum and Gossypium barbadense. Infection by T. basicola may cause stunting of the cotton seedling at very high inoculum levels or when the plants are subject to additional stresses. However, under suitable growing conditions and with proper management procedures, the maturing cotton plant is apparently able to recover from the infection. Occurrence of Black Root Rot can vary from field to field and from year to year depending on a number of factors, many of which are poorly understood. The actual effect of incidence and severity of Black Root Rot on yields of cotton in Arizona has not previously been determined.

## MATERIAL AND METHODS

Two adjacent fields were planted by a grower in mid-April, 1987 with Acala 1517 in Duncan, Arizona (1160 m elevation). Soil tests revealed that Field 1 soil was lighter in texture than Field 2 soil. Both fields were managed by the same grower. Study areas were chosen within each of the two fields. The study area in each field was 100 rows by 100 meters. Within that area samples were taken along four vectors of a diamond shape. Along each of the four vectors 10 samples were taken, one every five rows. At each sample site two plants were gently removed and a soil core was taken (3.5 cm. x 15 cm) from the root zone. All 10 soil cores of each vector were combined resulting in four composite soil samples and 80 plants per field per sample day. Sampling was done biweekly from 5/7/87 to 9/28/87.

Each plant was given a severity of disease rating on a scale of 0-4; 0 = no cortical decay; 1 = <25 %; 2 = 25 - 50 %; 3 = 50 - 75 %; and 4 = 75 - 100 % cortical decay. Incidence of disease was simply the number of diseased plants on a percentage basis.

The soil samples were air dried, and soil dilutions were prepared and plated onto a medium selective for T. basicola. After a 10-day incubation period, colonies of T. basicola were counted to determine the inoculum potential of the pathogen in the soil as colony forming units (cfu/g air dry soil).

## RESULTS AND DISCUSSION

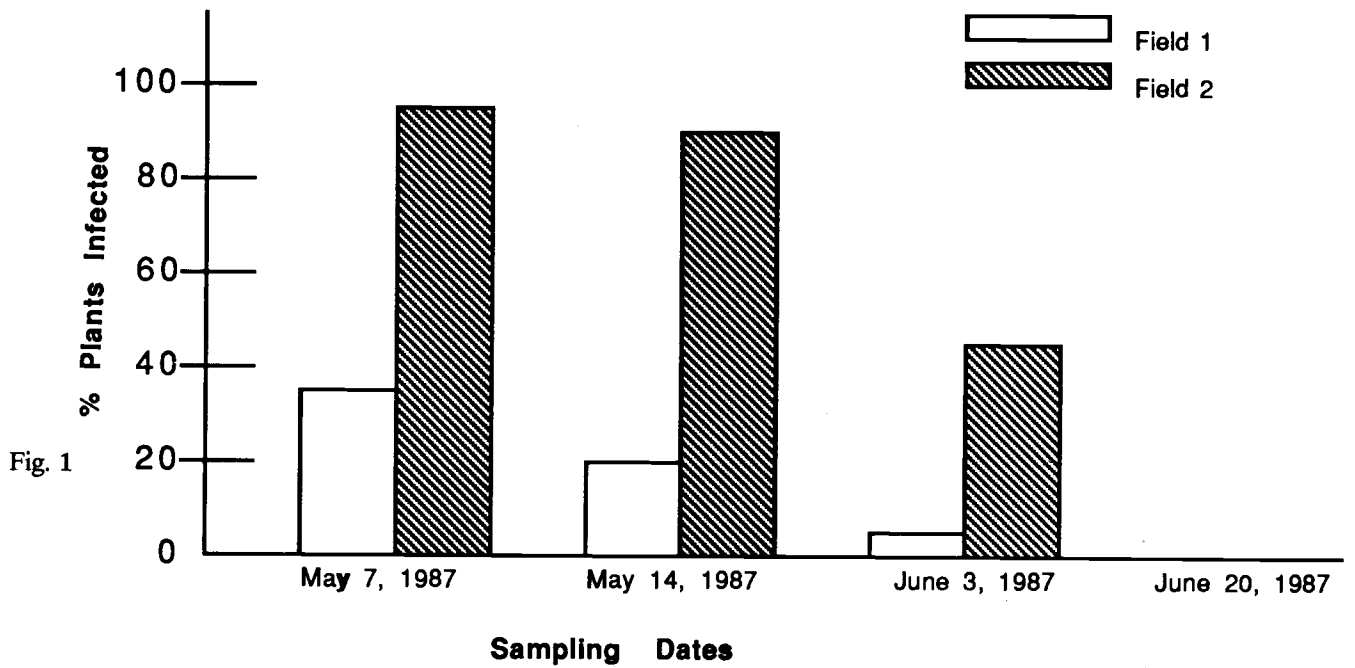
Mean inoculum potential in Field 1 soil was 65 cfu/g and 20 % of the seedlings were infected with a severity rating averaging 1.6. In Field 2 the inoculum potential, percentage of infected plants and disease rating were 225 cfu/g, 93, and 3.2, respectively. Field 1 had a low inoculum potential and a correspondingly low incidence of disease while Field 2 had a high inoculum potential and nearly 100 % disease incidence.

The disease incidence was highest in both fields approximately three weeks after planting (Fig. 1), and this steadily declined until June 20 when no cortical decay was noted in either field. This indicates that regardless of inoculum potential or incidence of Black Root Rot, all initial signs of the disease disappeared by mid-June as temperatures and plant growth increased significantly.

The average severity appeared to be highest approximately one month after planting (Fig. 2), but decreased to zero by June 20. This corresponds to the decrease in disease incidence.

Yields as determined by the grower were similar in both fields (1100 lbs. per acre). The data indicate that a nearly 100 % incidence of Black Root Rot with a high disease severity rating may have no more effect on yield than a 20 % disease incidence with a low severity rating. It is possible that given suitable environmental conditions the cotton plant is capable of successfully overcoming an early infection by *T. basicola*.

### Disease Incidence



### Average Severity Rating

