

# Control of Fusarium Wilt of Cotton



A FIELD OF COTTON DAMAGED BADLY BY THE FUSARIUM WILT DISEASE.

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UNIVERSITY OF NORTH CAROLINA  
AND  
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# CONTROL OF FUSARIUM WILT OF COTTON

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## INTRODUCTION

Fusarium wilt<sup>1</sup> is one of the most widespread and destructive diseases of the cotton plant in North Carolina. The disease is now present in practically every North Carolina county where cotton is grown, but it is more prevalent on the lighter, sandy soils in the Coastal Plains area (Figure 1). The cotton wilt parasite is not able to persist and spread as freely in the heavier

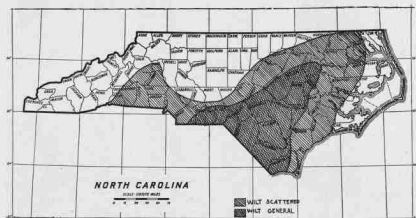


Fig. 1.—The approximate distribution of Cotton Wilt in North Carolina.

clay soils common to the Piedmont area of the state, although the parasite is now well established in some of the lighter soils in that region.

Highly accurate records of the annual losses resulting from Fusarium wilt of cotton in North Carolina are not available. However, it is estimated that the cotton wilt fungus is now present in approximately 175,000 acres of land on which cotton is grown. Losses from the wilt disease on these soils vary from year to year depending upon weather conditions, the amount of "wilt" land planted to cotton, and the extent to which growers practice control measures. It is estimated that the average annual loss from cotton wilt in North Carolina is in the neighborhood of 30,000 bales.

It is believed that a high percentage of this loss can be avoided, and it is the purpose of this circular to point out means of doing this.

## SYMPTOMS OF FUSARIUM WILT

Fusarium wilt of cotton can be identified with relative ease in North Carolina because there is no other disease of cotton prevalent in the state which produces symptoms similar to those produced by the wilt parasite.

<sup>1</sup> Caused by the fungus *Fusarium vasinfectum* Atk.

Characteristic symptoms of *Fusarium* wilt are general stunting of the plants, followed quickly by reddening, burning, and curling of the leaves (Figure 2, A and B).

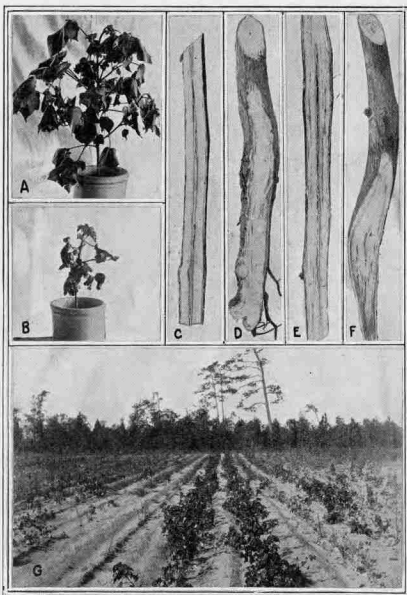


Fig. 2.—*Fusarium* wilt of cotton: A. Healthy plant. B. Wilted plant. C and D. Sections of healthy stalks; note clear condition of inner tissues. E and F. Sections of diseased stalks; note blackened condition of inner tissues which is a characteristic symptom of wilt. G. Wilt infested land planted with a wilt resistant variety (center), and a wilt susceptible variety (to either side).

The plant may die rather quickly or may persist in a relatively inactive and stunted condition for several weeks, depending largely upon weather conditions and the extent of invasion of the plant by the parasite. Affected plants are generally localized in a field, but it is not uncommon to find diseased plants widely scattered. The presence of field symptoms as described above can be considered as highly indicative that the disease is *Fusarium* wilt. However, more convincing evidence should be sought by pulling diseased plants and cutting into the stems and roots either lengthwise or crosswise. The presence of extensive blackened streaks in the inner tissues of the stems and roots can be considered as conclusive field proof that the disease is *Fusarium* wilt (Figure 2, C, D, E, and F).<sup>2</sup> If questionable cases arise, samples of diseased plants should be sent to the Department of Botany, State College Station, Raleigh, for microscopic and cultural study.

### FACTORS AFFECTING THE DEVELOPMENT OF COTTON WILT

A wide variety of soil and climatic conditions affect the development of the cotton wilt disease primarily through their effects on growth of the wilt parasite. It has been shown in experimental work that soil temperatures ranging from 80° F. to 90° F. are most favorable for development of the disease. The frequency and severity of wilt is lessened at lower and higher temperatures and low soil temperatures during the spring months apparently prevent widespread development of wilt of cotton on seedling plants. Differences in soil temperature apparently are partially responsible for differences in the severity of wilt from year to year.

Soil moisture appears to have only a minor influence on the development of wilt under field conditions. The wilt parasite will grow over a wide range in acid or alkaline soils; hence, application of lime and other materials to change soil reaction are of no practical value in the control of wilt. Soil type has a very decided effect on development of the wilt parasite. Light, sandy soils are most favorable and heavy clay soils least favorable for development of the parasite and disease. The reason for this is not known. It has been a general observation and experience that infection of cotton plants with the root-knot nematode renders them more subject to wilt. Many of the better wilt resistant varieties of cotton have wilted badly on soils highly infested with the root-knot nematode. On lands harboring both the root-knot and wilt parasites grow the wilt resistant cottons in a rotation designed to control the nematode.

Rotation as a means of reducing the population of the wilt parasite in the soil is not highly effective because the parasite will persist in the soil for a large number of years in the absence of cotton or other hosts. So far as is known at present, the *Fusarium* wilt parasite of cotton is not able to attack any other common agricultural crop except okra. Therefore, any other crop can be grown in rotation with cotton without fear of injury from the cotton wilt fungus.

<sup>2</sup> There is another disease of cotton known as *Verticillium* wilt which produces blacking of the inner tissues of the stem and roots; however, so far as is known at the present time, this disease is not present in North Carolina.

### CONTROL OF WILT

Possible methods of controlling Fusarium wilt of cotton have been the subject of study by plant pathologists and plant breeders for a large number of years. As a result of these studies practical, economical, and highly successful means of controlling the disease are now available. Control of this disease involves the use of wilt resistant varieties and adequate potash fertilization.

### WILT RESISTANT VARIETIES

Wilt resistant varieties of cotton are recommended for planting on land sufficiently populated with the wilt parasite to cause substantial losses on any of the common wilt susceptible varieties. Wilt resistant varieties of cotton are now numerous, widely different in type, staple length, soil and climatic adaptability, and most of them are readily available. It follows, therefore, that if a farmer is confronted with the necessity of growing a wilt resistant variety of cotton he may choose from a large number with desirable qualities. The development and improvement of wilt resistant varieties is one of the most active fields of research on the cotton plant at the present time (Figure 2, G). As a result of this research program the older wilt resistant varieties and selections are constantly being improved and new ones introduced. As a result, it is not advisable in a publication of this type to recommend specific wilt resistant selections and strains because new developments would soon make them out of date. However, it can be stated that for North Carolina conditions the various strains and selections of Clewewilt, Dixie Triumph, and Humco Dixie have generally proven to be most desirable.

### FERTILIZATION OF COTTON ON WILT LAND

Liberal applications of potash have significantly reduced the amount of wilt on both resistant and susceptible varieties of cotton in experimental tests conducted at various points in the cotton belt in recent years. Results of these tests appear to be sufficiently conclusive to warrant the application of more potash to cotton on land subject to wilt than would normally be needed on similar land not subject to wilt. Kainit and muriate of potash appear to provide the most effective sources of potash. The exact fertilizer formula to use on wilt-infested land will vary with the soil type and previous cropping. If the potash content of fertilizers used in the past has been low and losses from wilt high, an increased amount of potash is suggested, even if a wilt resistant variety is planted.

For more detailed suggestions regarding your particular conditions, consult your County Agent.