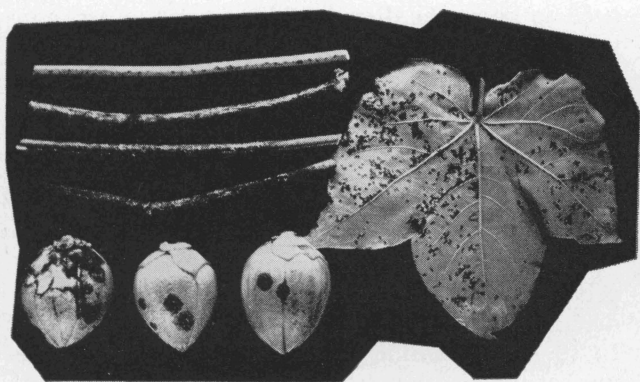


# Guide for REDUCING Cotton Disease LOSSES



Bacterial blight on stems, bolls and leaves.



THE AGRICULTURAL AND MECHANICAL  
COLLEGE OF TEXAS  
TEXAS AGRICULTURAL EXTENSION SERVICE  
J. E. Hutchison, Director, College Station, Texas

# GUIDE FOR REDUCING COTTON DISEASE LOSSES

HARLAN E. SMITH  
*Extension Plant Pathologist*

ROBERT C. LAMBE  
*Extension Area Plant Pathologist*  
The A&M College of Texas

## HOW TO USE THIS GUIDE

*Use only that portion of the guide that applies to your area.* This guide has been developed for state-wide use, but special problems of control in local situations have been noted. Controls for the major diseases are given, but these are not problems in every area where the crop is produced. Knowledge of the diseases that commonly occur in each of your fields or parts of fields will be helpful in planning a cotton disease control program.

## CHECK REGULARLY FOR DISEASE DAMAGE

Certain diseases will damage or kill your cotton plants. These same diseases may occur each year. To plan the best preventive control program, you need to know the diseases that are apt to occur in your fields and cause losses. Diseases generally occur at about the same time each year. Ask your County Agricultural Agent for a copy of MP-512, *Identifying Plant Diseases*. Also see Additional Information, pages 9 and 10.

## TRADE NAMES

It is sometimes necessary to use trade names of products or equipment rather than complicated descriptive or chemical identifications in this guide. In so doing, similar products which are on the market under other trade names may not be cited. Endorsement of named products is not intended, nor is criticism implied of similar products not mentioned.

## RESISTANT VARIETIES

Because of the buildup of certain races or variants of disease organisms, certain varieties may become less disease resistant over a period of years. To prevent buildup of new races and variants it is important to practice other disease control measures with the use of resistant varieties.

*Ascochyta blight*: The empire variety types such as Empire WR, Austin and Rex, have some tolerance except in cases where there is hail, insect or similar injury.

*Bacterial blight*: See Table 2.

*Fusarium wilt-nematode complex*: Auburn 56 has a high degree of Fusarium wilt and nematode resistance. Austin, Rex, Empire WR, Coker 100 WR and Dixie King have some tolerance to Fusarium wilt and nematodes.

*"Pseudomonas" wilt*: Early maturing varieties are more susceptible to "Pseudomonas" wilt than intermediate and late maturing.

*Verticillium wilt*: The long staple Pima-type varieties are resistant and most of the short staple upland varieties are susceptible to Verticillium wilt. Acala 1517 D and Acala 1517 C are less susceptible than Acala 1517 BR-1. Acala 1517 BR-2 has a much higher level of tolerance than Acala 1517 BR-1.

### **SUGGESTED CHEMICALS TO APPLY IN THE COVERING SOIL AT PLANTING FOR COTTON SEEDLING DISEASE CONTROL**

*In clay soils*: (1) 0.75 lb. active captan, 1.13 lb. active PCNB (Terraclor) and 1.30 lb. active zineb per acre, or (2) 0.75 lb. active captan, 1.13 lb. active PCNB, and 1.00 lb. active thiram<sup>1</sup> per acre or (3) 1.00 lb. active captan and 1.50 lb. active PCNB per acre or (4)<sup>2</sup> 1.00 lb. active captan and 1.00 lb. active folpet (Phaltan) per acre, or (5) 1 gallon of 22% nabam<sup>3</sup> per acre.

*In sandy or sandy loam soils*: Use treatments 1, 3 or 5 as suggested under clay soils. Also use 0.75 lb. of active captan and 0.75 lb. of active folpet (Phaltan) per acre.<sup>2</sup>

The following mixture is suggested for trial use in sandy or sandy loam soils:

0.75 lb. active captan, 0.75 lb. active folpet (Phaltan) and 1.00 lb. active DBCP (Nemagon or Fumazone) per acre.

<sup>1</sup>Mixtures containing thiram tend to give better results in the Trans-Pecos area and in clay soils. Mixtures with thiram tend to do poorly in the Plains area and in sandy soils.

<sup>2</sup>This mixture tends to give better results in sand or sandy loam soils than in clay soils. The higher rate is best for clay soils.

<sup>3</sup>This fungicide tends to be ineffective in soils having a pH of 7.3 or above.

**IMMEDIATELY AFTER HARVEST**

Diseases	Location	Practices recommended
Root rot, root knot, other nematodes, bacterial blight, Ascochyta blight, seedling disease	All areas where root rot is a problem, especially in South Texas	<i>Deep plow</i> 6 to 18 inches with disk or moldboard plow during hot weather when the soil is dry. Avoid plowing up poor subsoil. Depth of plowing depends on subsoil, available equipment and cost.

**AFTER HARVEST AND UP TO PLANTING**

Ascochyta blight, Fusarium wilt, root knot, other nematodes, root rot, Verticillium wilt, "Pseudomonas" wilt, fungal leaf spots	In most cotton growing areas	<i>Plan crop rotations.</i> Avoid badly infested land. In general, grow cotton on the same land no more often than necessary. Grow crops on cotton land that are resistant to cotton diseases. Crops with most resistance are grain sorghum, wheat, corn, broomcorn, oats, barley, rye, rice, grasses and certain vegetables. Control root rot and Verticillium wilt susceptible weeds in disease-resistant crops. Rotate with corn or small grains to reduce "Pseudomonas" wilt.
Root rot	In heavy clay soils where disease has been serious in past years	<i>Year before cotton apply up to 5 tons (dry weight) of green or dry organic matter</i> such as stubble of grain sorghum or small grains, clovers, winterpeas or cotton burs. <i>Turn under organic matter 6 to 12 inches deep.</i> (Most organic matter requires more nitrogen for decomposition.) To be effective, organic matter should be decomposing most rapidly during early flowering stage of the cotton.
Verticillium wilt	West Texas	Avoid heavy manure applications on infested fields. Plan to avoid skip-row planting where Verticillium wilt has been a problem.
Seedling disease, Ascochyta blight, bacterial blight, Verticillium wilt	All areas (Verticillium wilt occurs mainly in West Texas)	<i>Properly prepare seedbed.</i> Avoid having excessive amounts of unrotted old crop trash in the seed placement soil area. Make raised seedbeds wherever possible so as to provide proper drainage. High double beds help reduce Verticillium wilt. Level fields to avoid large areas of standing water.
Bacterial blight, Verticillium wilt, Fusarium wilt, seedling disease (Seedling vigor), root knot, "Pseudomonas" wilt	All areas	<i>Select adapted, disease-resistant variety.</i> Consider results of nearby Experiment Station variety tests that are conducted on disease-infested land. Consider diseases that have been present in your fields. Carefully compare performance and yield of promising new varieties on your farm or ranch with older, established varieties. Because of the buildup of certain diseases and the effect of weather on diseases, the best variety for one year may not be the best another year. See <i>Resistant Varieties</i> .
Seedling disease, boll rots, bacterial blight, Ascochyta blight, Fusarium wilt, "Pseudomonas" wilt	All areas	<i>Select high-quality disease-free seed.</i> Ask seed laboratories to report 5 and 12-day germination test results for acid delinted seed and 7 and 12-day germination results for fuzzy and mechanically delinted seed. If seed is of good quality and low in disease molds, the difference between the early and final germination will not be more than 5 percent. Good-quality, disease-free seed is apt to be found in fields where little rain or heavy dew occurred near or during harvest and in fields where growth has not been cut short by an early freeze. Use seed from first picking or mature bolls and seed that have been properly stored. Seed stored without humidity control may be of low quality. Save planting seed from fields that are free of bacterial blight, Ascochyta blight, "Pseudomonas" wilt and Fusarium wilt.
Seedling disease, Verticillium wilt	Where diseases are problems	<i>Seeding rates.</i> Insofar as possible, seedling disease prevention should be considered when seeding rates are being determined. To reduce seedling disease, avoid using more than 30 pounds of seed per acre. If Verticillium wilt is a problem, plants should be uniformly spaced 4 to 6 per foot of row.
Bacterial blight, Ascochyta blight, boll rots, seedling disease, fungal leaf spots	All areas	<i>Properly treat seed.</i> Plant seed that have been treated properly with a recommended seed-protectant fungicide. See <i>Seed Treatment Chart</i> . Acid delinting helps reduce seed carryover of the bacterial blight and Ascochyta blight organisms.
Bacterial blight, Fusarium wilt, boll rots, Verticillium wilt	All areas	<i>Adequate fertilization.</i> Slightly susceptible bacterial blight varieties become resistant with adequate nitrogen. Adequate potash helps prevent Fusarium wilt and Verticillium wilt. Avoid excessive nitrogen with Verticillium wilt; on seriously infested fields, never use over 100 pounds of nitrogen per acre. Boll rots may be more severe with excessive nitrogen that causes tall, rank cotton.

**THREE TO FOUR WEEKS BEFORE PLANTING**

Root knot, other nematodes, Fusarium wilt	Primarily in sandy or loam soils	<i>Fumigate soil</i> with Dowfume W-85, D-D, Nemagon, Fumazone or similar nematocides as manufacturer directs. Control of nematodes also may help to control Fusarium wilt.
---	----------------------------------	---

**AT PLANTING TIME**

Seedling disease	Where disease is a problem	Avoid planting poor-quality seed when the <i>soil temperature</i> is apt to be 68 degrees or lower at a 3-inch depth for several days except in areas with short growing seasons. High-quality seed can be planted at 62 to 68 degrees. <i>Properly mix fungicide spray or dust in the covering soil at planting time.</i> See pages 3 and 10. Hopper box treatments are suggested for the Trans-Pecos and other western areas when rain is not expected immediately after planting and when irrigation is not used in getting a stand. <i>Hopper box treatment</i> as manufacturer directs is suggested in other areas only where seed are covered with no more than $\frac{3}{4}$ inch of soil.
Verticillium wilt	West Texas	Use of plastic mulch raises soil temperature, thus helping to prevent wilt. Do not use where root rot is a problem.

**SOON AFTER YOUNG COTTON COMES UP**

Diseases	Location	Practices recommended
Seedling disease	In areas where disease is a problem	The <i>use of a rotary hoe</i> will help dry out the soil, raise soil temperature, and thus reduce seedling disease. <i>Practice early season insect control</i> to make stronger, fast-growing disease-free plants.

**DURING GROWING SEASONS**

Verticillium wilt	West Texas	<i>Avoid frequent irrigations.</i> Space irrigations as far apart as possible by applying more water per irrigation. Water lowers the soil temperature and the disease becomes active at 85 degrees or lower. <i>Lower rates of nitrogn sidedressing.</i> Sidedress as early as possible and well away from the rows to avoid cutting roots. <i>Avoid deep cultivation that damages roots.</i>
Bacterial blight	With susceptible varieties in West Texas and other areas where disease occurs	<i>Practice sanitation.</i> Avoid contaminating the disease-free fields. Water, soil and diseased plant parts that are moved from infested soil are apt to contaminate disease-free soil. <i>Adjust nitrogen fertilizer sidedressing</i> —slightly susceptible bacterial blight varieties become resistant with adequate nitrogen.
Boll rots	In many areas and especially with tall, rank cotton	<i>Control boll-damaging insects and bacterial blight.</i> Many molds that cause boll rots can only enter through wounds. <i>Practice bottom defoliation.</i> Loss of leaves in tall, rank cotton will permit quicker drying after dews and rains and thus reduce boll rots. Properly control weeds and grasses.
Rust	Close to Mexico, near vicinity of <i>infected</i> grama grasses	Apply 2 or 3 sprays at 2-to-3 week intervals beginning at first bloom stage. Begin earlier if rains are forecast. Use 2 pounds zineb (75%) in 20 to 40 gallons water/acre plus spreader-sticker. Thorough coverage of foliage is necessary. No sprays are applied after infection.

**JUNE, JULY AND AUGUST**

**(During hot, dry weather, following grain sorghum, oats, wheat or barley)**

Root rot, root knot, other nematodes, seedling disease, Verticillium wilt, Ascochyta blight	In all areas where diseases are a problem	<i>Deep plow</i> 6 to 18 inches with disk or moldboard plow to dry out soil for 10 days to 2 weeks. Avoid plowing up poor subsoil. If rain occurs before soil has dried, plant a resistant crop or repeat the deep plowing. Soil should be dried out the year before cotton is to be planted. Depth of plowing will depend on depth of subsoil, equipment available and cost. Deep plowing and summer fallowing have helped reduce Verticillium wilt in some areas.
---	---	---

**NEAR HARVEST**

Rust	Close to Mexico where rust has occurred on cotton	Check grama grasses for presence of rust. Prepare to apply fungicide the following year. See rust under <i>During Growing Seasons.</i>
------	---	--

Table 1. Seed Treatment.<sup>1</sup> (Fungicides listed at random)

Seed protectant fungicide	Rates in ounces per 100 pounds of seed		
	Acid delinted	Mechanically delinted	Fuzzy
Panogen 15	2.0	3.0	4.0
Chipcote 75	2.0	3.0	3.5
Mer-Sol 51	2.5	4.5	5.5
Ceresan M	2.0	3.0	4.0
Agrox	3.0	4.0	5.0
Captan (75%)	2.0	2.0	3.0
Orthocide LM	2.0	3.0	4.0
Mer Sol 48	3.0	5.0	6.0
Chipcote 25	1.0	1.5	2.5
Ceresan 100 <sup>2</sup>	2.0	2.5	3.5

<sup>1</sup>With low-quality seed, increase the above dosages by 1 to 1½ ounces per 100 pounds of seed. Because of possible damage, use caution in increasing dosages of Ceresan M.

<sup>2</sup>Ceresan 75 or Ceresan 200 may be used at equivalent mercury dosages.

Table 2. Response of Resistant Varieties to Known Races and Variants of the Bacterial Blight Pathogen.

Variety	Race	Race	Var.	Var.	Var.
	1	2	3	4	5
Acala 1517 BR	R	SS	R	SS	R
Acala 1517 BR-1	R	SS	R	SS	R
Acala 1517 BR-2	R	R	R	S	S
Austin	R	S	R	SS	R
Rex	R	S	R	SS	R
Blightmaster	R	SS	R	SS	R
Gregg	R	R	SS	SS	SS
Mebane B-1	R	R	R	R	SS

R = resistant, S = susceptible, SS = highly susceptible. The official race designation of variants 3, 4 and 5 has not been established at this time.

## ACKNOWLEDGMENTS

The authors are grateful to L. S. Bird, Fred C. Elliott, Billy C. Gunter, P. J. Lysterly and Levon Ray for their contributions and assistance in preparing this publication.

## ADDITIONAL INFORMATION

### General Publications

Plant Disease Handbook (available only from Exchange Store, College Station, Texas, at nominal cost)

USDA F. B. No. 1745 Cotton Diseases and Methods of Control

MP-512 Identifying Plant Diseases

B-984 Cotton Production on the Blackland Prairies of Texas

### Ascochyta Blight

TAP-214 Ascochyta Blight of Cotton

### **Bacterial Blight**

- L-145 Cotton Defoliation Guide for Texas
- L-292 Blightmaster
- L-330 Austin, a Disease-resistant Open Boll Cotton
- MP-534 Bacterial Blight of Cotton

### **Nematodes**

- PR-2026 Soil Fumigation for the Control of Root Knot of Cotton on the High Plains
  - MP-356 Plant Nematodes, Their Identification and Control
- Utilization of Farm Equipment as a Method of Fumigating Cotton Land for Control of Wilt Caused by Fusarium-nematode Complex. Shell Chemical Company, 110 West 51st Street, New York 20, N. Y.

### **"Pseudomonas" Wilt**

- MP-471 Pseudomonas Wilt of Cotton

### **Root Rot**

- MP-361 Root Rot Losses of Cotton Can Be Reduced
- TAP-145 The Cotton Root Rot Story

### **Seedling Diseases**

- PR-2003 Fungicides Mixed with the Covering Soil at Planting for Cotton Seedling Disease Control
  - PR-2001 Methods of Applying Fungicides in the Covering Soil at Planting for Controlling Seedling Disease of Cotton
  - PR-2181 Spray Nozzles Arrangement for the Application of Soil Chemicals at Planting for Seedling Disease Control in Cotton
- Chem Soil Mixers for Seed Row Treatment. Gustafson Manufacturing Co., Inc., P. O. Box 2409, Corpus Christi, Texas
- MP-312 Effect of Combinations of Pathogenic Organisms at Different Temperatures on the Cotton Seedling Diseases
  - MP-465 Soil Temperature, a Guide to Timely Cotton Planting
- Drawing of Mixer Made from Oil Drum. Serial No. 235

### **Verticillium Wilt**

- PR-2175 Effect of Fertility Level, Soil Moisture and Trace Elements on the Incidence of Verticillium Wilt in Upland Irrigated Cotton

### **Virus Diseases**

- PR-1962 A New Virus Disease of Cotton in Texas

---

Cooperative Extension Work in Agriculture and Home Economics, The Texas A&M College System and the United States Department of Agriculture cooperating. Distributed in furtherance of the Acts of Congress of May 8, 1914, as amended, and June 30, 1914.

35M-8-62