

# AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE  
MANHATTAN, KANSAS

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DEPARTMENT OF BOTANY

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## TOMATO WILT DISEASE<sup>1</sup>

R. P. WHITE

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### DISTRIBUTION OF TOMATO WILT IN KANSAS

Wilt, the most serious disease of the tomato in Kansas, is caused by the fungous organism, *Fusarium lycopersici* Sacc. This disease was first observed in the state in 1918 in Neosho and Montgomery counties, where it was doing considerable damage. It has spread rapidly and at the present time is known to occur as far west as Finney county and as far north as Atchison county, including practically the entire southeastern quarter of the state.

### LOSSES FROM TOMATO WILT

The annual loss in Kansas due to tomato wilt has increased from a fraction of 1 per cent in 1918 to at least 10 per cent in 1926. This loss may be twofold: First, reduced yields, and second, impairment of the quality of the fruit produced. The disease kills plants of the more susceptible varieties early in the season, thereby greatly reducing the yield. Plants of the more resistant varieties are not killed immediately, but are weakened and the fruit does not reach its normal size and ripens prematurely.

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1. Contribution No. 251 from the Department of Botany.

### SYMPTOMS OF THE FUNGOUS WILT DISEASE

Wilt may be distinguished in the field by the yellowing of the lower leaves of the plant, preceded usually by a cessation of growth and accompanied by wilting of the tops. The yellowing of the leaves progresses upward. Wilting is very rapid in susceptible varieties. The leaves of the diseased plants dry up and finally become so brittle that they will crumble when rubbed between the hands. More resistant plants are usually dwarfed, but the wilting and yellowing of the leaves takes place more slowly. Plants only slightly diseased may wilt during hot days and recover during the nights. This does not happen more than two or three times, however, before permanent wilting results. Diseased plants may be pulled from the soil easily due to the decay of many of the roots. When the stems of diseased plants are cut lengthwise, it will be found that brown streaks extend up the stems and often into the leaves. The stems of healthy plants do not show this internal discoloration.

Wilt is often confused with leaf-spot or "blight," caused by *Septoria lycopersici* Sacc. However, the stems of plants diseased with tomato leaf-spot are not discolored internally and small circular brown spots with gray centers appear on the leaves. These contain small, black, pimple-like bodies, the pycnidia or spore cases of the fungus.

### CONTROL OF THE DISEASE

The organism causing tomato wilt lives in the soil on decaying organic matter. It attacks the roots of the tomato plant, causing a decay of the feeding rootlets, and grows up within the stem causing the brown streaks already mentioned. Spraying has proved of no benefit in controlling this disease, and rotation of crops has given only partial control.

The only practical method of control is the growing of resistant varieties. Investigations designed primarily to find or produce a resistant variety, which would also be acceptable from a commercial standpoint, have been conducted by the Kansas Agricultural Experiment Station for seven years. The work has developed along two lines; namely, the testing of varieties in infested soil to determine their wilt resistance or susceptibility and the hybridization of certain varieties in the attempt to produce a new variety having wilt resistance and other desirable characteristics. Both lines of investigation have been productive of results.

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### TESTING OF VARIETIES

#### RESISTANT VARIETIES

From the large number of varieties which have been tested a few have been found which are fairly wilt-resistant, produce a good quality of fruit, and are adapted to Kansas growing conditions. The following varieties have given the best results over the period under investigation: Louisiana Red, Louisiana Pink, Marvel, Norton, Norduke, Marvana, and Marglobe.

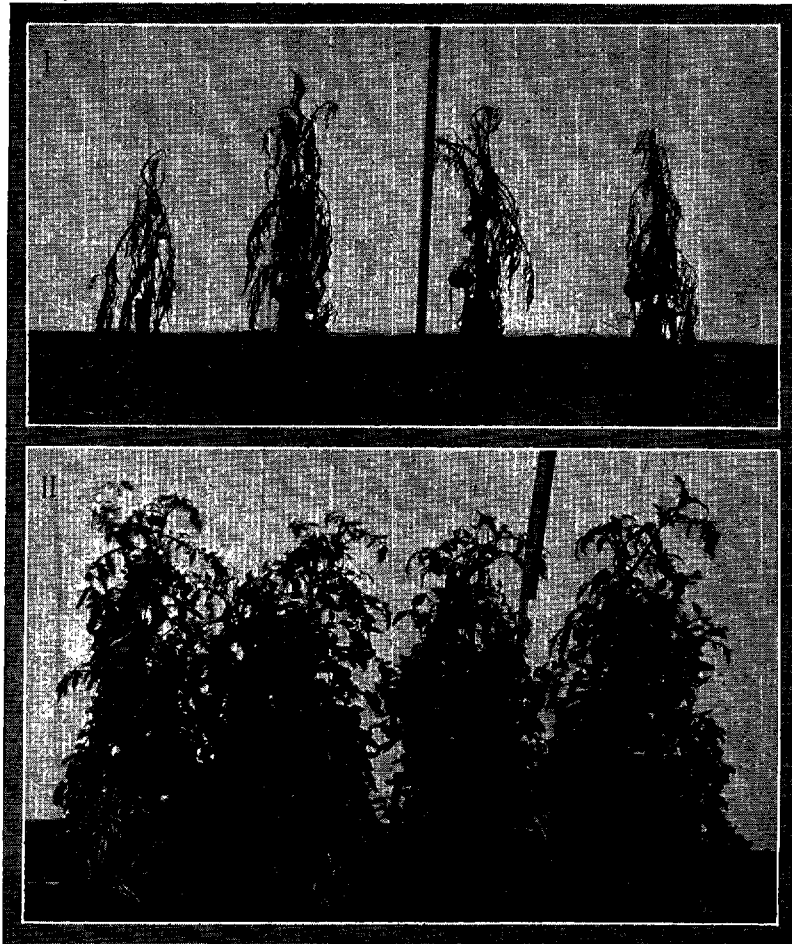


FIG. 1.—I. Bonny Best tomatoes grown in heavily infested soil at Cherryvale in 1922. II. Kanora, a wilt-resistant variety, grown in heavily infested soil in the same locality as I, and in the same season.

These are all red varieties with the exception of Louisiana Pink. They are all wilt-resisting but none are immune. The Louisiana pink variety has proved, on the whole, the most wilt-resistant but is closely followed in this respect by Louisiana Red and Norton. Marvana has proved the earliest of the wilt-resistant varieties tested, but is closely followed in this respect by Marvel, Louisiana Red, and other varieties.

**SUSCEPTIBLE VARIETIES**

Comet, John Baer, Earliana, Jewell, Bonny Best, Grand Rapids, Beauty, Greater Baltimore, Dwarf Champion, Bolgiano Red, and Texas Belle have proved susceptible in all trials. (Fig. 1.) The Comet variety is less susceptible than the other varieties listed, but is not resistant enough to be of value for Kansas growers.

**HYBRIDIZATION**

During the course of these investigations several hundred crosses have been made between those varieties that have proved wilt-resistant and the commercially grown wilt-susceptible varieties. The result has been the production of a new variety known as Kanora. (Fig. 1.) This variety is a selection from a cross between Norton and John Baer, made in 1921. Since the original cross was made the variety has passed through eight generations and has proved a wilt-resistant, high-yielding variety. The fruit is medium to large, deep red, globular, meaty, and firm. The foliage of the plant is rather heavy, preventing sun scald and growth cracks to a large extent. The variety has outyielded all other varieties, whether wilt-resistant or wilt-susceptible, in the tests conducted at Manhattan.

**RECOMMENDATIONS**

For the market gardener desiring an early wilt-resistant variety for local market, the Marvel is recommended in spite of its low-yielding and small fruit-size characteristics. In two years' experiments the Marvana has proved an earlier, heavier yielding, wilt-resistant variety and should prove of value.

For canners and shippers of tomatoes the Kanora and Louisiana Red can be recommended. They are both wilt-resistant, medium early, red, firm varieties which yield well on either infested or disease-free soil. The Norton has proved desirable for this group of tomato growers, but is a later variety than the other two mentioned.

In addition to the above varieties the Louisiana Pink and Nor-

duke are recommended for the home gardener. The Louisiana Pink is a very wilt-resistant variety, producing a medium large, pink-skinned fruit. The Norduke is a later, deep red, wilt-resistant variety, excellent for home canning on account of its size and firmness. This is also true of the Kanora variety.

It has been found that varieties wilt-resistant in one part of the state may be less resistant in other parts. It would be advisable, therefore, for those troubled with this disease to obtain seed of several of the most desirable wilt-resistant varieties and choose that variety which best suits their needs. After obtaining the original seed and making the choice of varieties, each individual grower should save his own seed from selected plants which prove to be most highly resistant to wilt and the best yielders.

For more detailed information concerning this disease write to the Agricultural Experiment Station, K. S. A. C., Manhattan, Kan.

**SOURCES OF WILT-RESISTANT TOMATO SEED**

	<i>Variety.</i>
Moore's Seed House..... Philadelphia, Pa.	Marvel, Norduke.
Job P. Wyatt & Sons Company..... Raleigh, N. C.	Norton, Marvel, Norduke.
Henry Field ..... Shenandoah, Iowa.	Norton.
Stark Brothers Nursery Company..... Louisiana, Mo.	Norton, Marglobe.
Griswold Seed and Nursery Company..... Lincoln, Neb.	Marvel, Norton.
Barteldes Seed Company..... Lawrence, Kan.	Kanora.
Arthur G. Lee..... Fort Smith, Ark.	Norton.
Chris Reuter Seed Company..... New Orleans, La.	Louisiana Pink, Louisiana Red.

