# THE RESPONSE OF VARIETIES TO VERTICILLIUM WILT AND BACTERIAL BLIGHT IN THE SOUTHERN HIGH PLAINS OF TEXAS T. A. Wheeler J. K. Dever Texas A&M AgriLife Research Lubbock, TX J. E. Woodward Texas A&M AgriLife Extension Service Lubbock, TX

#### Abstract

Verticillium wilt and bacterial blight are important diseases for cotton producers in the Southern High Plains of Texas. A replicated small plot field trial was conducted in Floydada, TX in a field with a history of Verticillium wilt. Wilt incidence averaged between 20 and 48% in the 34 entries. Percent defoliation ranged from 16 to 72%. Varieties with the highest yields were FM 2334GLT, FM 2322GL, FM 1830GLT, Croplan Genetics [CG] 3226B2XF, FM 2484B2F, ST 4747GLB2, and PHY 243WRF. The poorest yielding varieties (PHY 340W3FE, CG 3475B2XF, NexGen [NG] 3406B2XF, DP 1518B2XF, DP 1522B2XF, DP 1614B2XF, and PHY 333WRF) also had among the highest wilt and defoliation values. The bacteria, *Xanthomonas citri* subsp. *malvacearum* (Xcm) was applied to cotton varieties and rated for disease incidence. Highly resistant new varieties to bacterial blight included DP 1820B3XF, DP 1851B3XF, DP 1845B3XF, DP 1840B3XF, NG 4777B2XF, NG 4689B2XF, NG 5711B3XF, PHY 230W3FE, PHY 250W3FE, PHY 300W3FE, PHY 330W3FE, PHY 340W3FE, PHY 430W3FE, PHY 440W3FE, PHY 450W3FE, PHY 480W3FE, PHY 490W3FE. Highly susceptible new varieties to bacterial blight included DP 1725B2XF, DP 1835B3XF, CG 3527B2XF, and NG 4601B2XF. NG 4782XF was moderately susceptible and NG 3780B2XF was partially susceptible to bacterial blight.

#### **Introduction**

Diseases that have significant impact on cotton in the U.S. include seedling diseases (*Rhizoctonia solani*, *Thielaviopsis basicola* and *Pythium* spp.), wilt diseases (Verticillium and Fusarium), and leaf spot diseases (Alternaria blight, bacterial blight, Corynespora leaf spot, etc.). Disease control tactics are often limited primarily to chemical control (seedling diseases, and some leafspots), however, varieties with at least partial resistance have been used to manage Verticillium wilt (caused by *Verticillium dahliae*) and bacterial blight (caused by *Xanthomonas citri* subsp. *malvaceraum*, Xcm race 18).

Verticillium wilt is caused by a soil-borne fungus which can survive many years in the absence of a susceptible host. The fungus can infect and colonize the root system during the seedling stage, and at some point enters the vascular system. The ability of the plant to limit or slow the spread of the fungus through the xylem and into the branches and leaves is probably related to resistance genes. The nature of resistance in cotton suggests multiple genes with relatively small effects. However, there is no question that some varieties will yield better in the presence of this pathogen than other varieties (Wheeler and Woodward, 2016). Field trials in *V. dahliae* infested fields is necessary to identify those varieties that producers should use in their own infested fields.

Bacterial blight of cotton has reemerged as a problem in the U.S. The percentage of cotton acres that are planted to blight susceptible varieties has increased in the last 12 years in Georgia, Mississippi, and Texas (Fig. 1). This same trend is also found throughout cotton growing states in the southeast, mid-south, and southwestern U.S. Resistance to bacterial blight race 18 was identified over 40 years ago (Bird, 1986). Race 18 is the only race currently found in the U.S. (Thaxton et al., 2001). Economic losses to this disease would be eliminated by the widespread use of blight resistant varieties.



Figure 1. Percentage of cotton planted to bacterial blight susceptible varieties in Georgia, Mississippi, and Texas from 2005 to 2017. The data was determined based on USDA Agricultural Marketing Service estimates of planting acres for each variety, and the author's knowledge from testing those varieties in inoculated trials.

# **Materials and Methods**

#### Verticillium wilt

Field locations with a history of Verticillium wilt were identified in Floyd, Hale, Hockley, and Gaines counties, TX. Trials with commercial varieties and advanced breeding lines were conducted. Plot size was 2-rows wide, 36 feet long, and entries were arranged in a randomized complete block design. Each location had between 34 and 40 entries with four replications. A resistant check, FM 2484B2F, and a susceptible check, PHY 333WRF, were included at all locations. Data collected included plant stand in both rows; incidence of plants with wilt symptoms during late August; % defoliation in mid-to late September; lint yield; and HVI ratings for fiber from each variety in two of the four replications.

## **Bacterial Blight**

Single row plots 36 feet in length included either 52 or 13 entries, with four replications arranged in a randomized complete block design. Two trials were conducted. The susceptible check in trial 1 was NexGen (NG) 3406B2XF and the resistant check was DP 1518B2XF. The susceptible check in trial 2 was PHY 499WRF and the resistant check was FM 1830GLT. Two isolates of Xcm race 18 were grown for 36 hours in trypticase soy broth (1-liter flasks) on a wrist action shaker (Burrell Scientific, Mighty Magnum model). This protocol was described in Wheeler et al. (2007), but a brief description is provided. The concentration was  $10^8$  colony forming units/ml. In a 50-gal tank, 1800 ml of this concentrated bacterial solution was added to 50 gallons of water + 0.2% Silwet L-77 (v/v). The mixture was sprayed over the cotton plots at a rate of 50 gal/acre. Test 1 was treated on 24 July and Test 2 on 16 July. The incidence of plants with blight symptoms was rated 2 weeks after application in test 2 and 24 days after application in test 1. Only those entries which are commercial varieties will be presented.

## **Results and Discussion**

# Verticillium wilt

The tests in Floyd and Hale counties had excellent Verticillium wilt pressure and a uniform distribution across the fields. An example of the defoliation caused in a resistant versus susceptible variety can be seen in Figure 2. The test in Hockley County was lost due to hail. The test in Gaines County had very light Verticillium wilt.



Figure 2. Defoliation due to Verticillium wilt in early October for trials in Floyd (A, B) and Hale (C, D) counties. The variety in A and C is FM 2322GL and the variety in B and D is DP 1614B2XF.

At the Floyd county site, the varieties that performed in the top statistical (P=0.05) group for lowest wilt incidence, lowest defoliation, highest yield, and highest loan value were: FM 2334GLT, FM 2322GL, FM 1830GLT, and FM 2484B2F (Table 1). In addition, Croplan Genetics 3226B2XF, ST 4747GLB2, and PHY 243WRF were in the top performing yield group, but lacked top ratings for one of the other categories. Croplan Genetics was the only variety with dicamba resistance in the top yield group, but it did have higher than desirable wilt and defoliation values. Wheeler and Woodward (2016) found that varieties with the lowest wilt and defoliation values yielded significantly higher than varieties with poorer wilt and defoliation ratings for a large database that included over 50 trials.

At the Hale county site, there were some factors affecting the yield that were unrelated to Verticillium wilt and have not at this time been identified. Varieties or breeding lines that combined good yield with good disease traits included NG 3640XF, NG 3500XF, NG 3780B2XF, AMX5140XF, PX2AX4W3FE, FM 2322GL, and Croplan Genetics 3226B2XF (Table 2).

At the Seminole site, disease was so light that wilt resistant varieties could not be identified. However, cultivars with relatively high defoliation or wilt incidence at this site included Croplan Genetics 3885B2XF, DP 1553B2XF, PHY 330W3FE, PHY 490W3FE, and ST 6182GLT (Table 3).

| ada, TX in | 2017. |         |
|------------|-------|---------|
| Plants/    | %Wilt | %Defol- |
| Ft row     |       | iation  |
| 2.04       | 26.0  | 16.1    |
| 1.89       | 19.8  | 24.0    |
| 2.07       | 21.9  | 25.4    |
| 1.91       | 38.2  | 33.6    |
| 2.33       | 23.3  | 18.4    |
| 2.07       | 24.5  | 35.3    |
| 2.22       | 21.5  | 26.2    |
| 1.85       | 29.0  | 24.3    |
| 2.18       | 24.9  | 21.3    |
| 1 89       | 32.1  | 28.3    |

Table 1. Verticillium wilt trial in FloydaYield xLint YieldLoan Variety<sup>1</sup> Yield x

|                 | Loan (\$/a) | (lbs/acre) | (C/lb) | Ft row |      | iation |
|-----------------|-------------|------------|--------|--------|------|--------|
| FM 2334GLT      | 770         | 1,487      | 51.79  | 2.04   | 26.0 | 16.1   |
| FM 2322GL       | 750         | 1,510      | 49.67  | 1.89   | 19.8 | 24.0   |
| FM 1830GLT      | 739         | 1,482      | 49.84  | 2.07   | 21.9 | 25.4   |
| CG 3226B2XF     | 720         | 1,445      | 49.79  | 1.91   | 38.2 | 33.6   |
| FM 2484B2F      | 701         | 1,426      | 49.12  | 2.33   | 23.3 | 18.4   |
| ST 4747GLB2     | 693         | 1,463      | 47.39  | 2.07   | 24.5 | 35.3   |
| PHY 243WRF      | 692         | 1,493      | 46.34  | 2.22   | 21.5 | 26.2   |
| NG 3640XF       | 672         | 1,349      | 49.82  | 1.85   | 29.0 | 24.3   |
| FM 1911GLT      | 662         | 1,358      | 48.74  | 2.18   | 24.9 | 21.3   |
| NG 3500XF       | 648         | 1,329      | 48.79  | 1.89   | 32.1 | 28.3   |
| PX 2AX2W3FE     | 637         | 1,282      | 49.69  | 2.22   | 40.6 | 35.3   |
| FM 2007GLT      | 623         | 1,317      | 47.29  | 1.95   | 45.0 | 41.1   |
| PX2A28W3FE      | 585         | 1,312      | 44.62  | 2.30   | 31.4 | 29.1   |
| NG 4792XF       | 575         | 1,146      | 50.17  | 2.04   | 29.0 | 46.0   |
| PX2A23W3FE      | 569         | 1,219      | 46.67  | 2.11   | 35.9 | 33.9   |
| PHY 223WRF      | 565         | 1,154      | 48.94  | 2.10   | 33.8 | 40.7   |
| AMX1725B3XF     | 556         | 1,124      | 49.52  | 1.75   | 25.9 | 20.0   |
| PHY 220W3FE     | 553         | 1,091      | 50.67  | 1.90   | 28.3 | 42.7   |
| PX3A82W3FE      | 530         | 1,171      | 45.22  | 2.29   | 29.1 | 55.7   |
| NG 3517B2XF     | 524         | 1,086      | 48.29  | 1.94   | 31.7 | 46.2   |
| AMX1718B3XF     | 511         | 1,147      | 44.52  | 1.89   | 30.7 | 43.3   |
| PHY 300W3FE     | 493         | 1,097      | 44.92  | 2.32   | 30.2 | 62.5   |
| NG 4545B2XF     | 492         | 1,065      | 46.22  | 2.05   | 28.6 | 51.0   |
| PHY 312WRF      | 490         | 1,040      | 47.09  | 2.05   | 43.0 | 61.5   |
| NG 3699B2XF     | 486         | 996        | 48.82  | 1.37   | 32.5 | 29.7   |
| FM 1900GLT      | 467         | 1,028      | 45.47  | 1.97   | 37.2 | 47.0   |
| WU17ZC8         | 460         | 976        | 47.17  | 1.83   | 40.5 | 58.2   |
| PHY 333WRF      | 412         | 930        | 44.34  | 2.03   | 33.7 | 67.7   |
| DP 1614B2XF     | 407         | 833        | 48.79  | 1.45   | 40.6 | 55.5   |
| DP 1522B2XF     | 391         | 853        | 45.89  | 1.70   | 46.1 | 58.0   |
| DP 1518B2XF     | 378         | 830        | 45.59  | 2.00   | 33.8 | 61.1   |
| NG 3406B2XF     | 371         | 842        | 44.02  | 1.96   | 43.7 | 67.7   |
| CG 3475B2XF     | 367         | 819        | 44.87  | 1.87   | 48.2 | 72.0   |
| PHY 340W3FE     | 364         | 834        | 43.69  | 2.03   | 47.8 | 71.4   |
| $^{2}MSD(0.05)$ | 58          | 124        | 3.42   | 0.26   | 13.3 | 11.4   |

<sup>1</sup>AMX = experimental line from Americot; CG = Croplan Genetics; DP = Deltapine; FM = Fibermax; NG = NexGen; PHY = Phytogen; PX = experimental line from Phytogen; ST = Stoneville; WU = Winfield United experimental line.

<sup>2</sup>MSD is the minimum difference that is significant at P=0.05.

| Tal                      | Table 2. Verticillium wilt trial in Plainview in 2017. |            |        |         |       |         |  |  |
|--------------------------|--|------------|--------|---------|-------|---------|--|--|
| Variety <sup>1</sup>     | Yield x  | Lint Yield | Loan   | Plants/ | %Wilt | %Defol- |  |  |
|                          | Loan (\$/a)  | (lbs/acre) | (C/lb) | Ft row  |       | iation  |  |  |
|                          |  |            |        |         |       |         |  |  |
| NG 3640XF                | 652  | 1,497      | 43.54  | 1.65    | 19.4  | 11.1    |  |  |
| AMX5140XF                | 645  | 1,479      | 43.62  | 1.95    | 20.3  | 25.2    |  |  |
| PX2AX4W3FE               | 616  | 1,301      | 47.37  | 2.01    | 25.0  | 44.7    |  |  |
| NG 3517B2XF              | 603  | 1,326      | 45.52  | 2.68    | 24.0  | 33.8    |  |  |
| FM 2322GL                | 595  | 1,263      | 47.14  | 1.84    | 20.2  | 24.7    |  |  |
| CG 3226B2XF              | 588  | 1,307      | 44.97  | 2.42    | 27.0  | 15.6    |  |  |
| NG 3780B2XF              | 588  | 1,264      | 46.49  | 2.60    | 25.5  | 23.3    |  |  |
| FM 1320GL                | 583  | 1,217      | 47.94  | 2.28    | 28.7  | 52.5    |  |  |
| FM 1888GL                | 572  | 1,201      | 47.62  | 1.60    | 23.5  | 16.7    |  |  |
| FM 1911GLT               | 570  | 1,263      | 45.12  | 2.13    | 26.5  | 13.6    |  |  |
| PHY 312WRF               | 567  | 1,299      | 43.69  | 2.67    | 18.4  | 62.6    |  |  |
| PX2AX3W3FE               | 560  | 1,223      | 45.77  | 1.41    | 38.1  | 26.6    |  |  |
| FM 2484B2F               | 553  | 1,250      | 44.27  | 1.70    | 34.3  | 18.6    |  |  |
| NG 3406B2XF              | 537  | 1,202      | 44.72  | 2.10    | 16.2  | 17.0    |  |  |
| AMX1720B3XF              | 528  | 1,204      | 43.84  | 2.47    | 24.3  | 35.0    |  |  |
| DP 1612B2XF              | 523  | 1,129      | 46.34  | 2.74    | 27.5  | 33.9    |  |  |
| PHY 223WRF               | 518  | 1,164      | 44.49  | 2.44    | 18.2  | 12.0    |  |  |
| PHY 300W3FE              | 510  | 1,102      | 46.24  | 2.35    | 34.3  | 45.5    |  |  |
| PHY 333WRF               | 499  | 1,101      | 45.37  | 2.09    | 29.3  | 36.9    |  |  |
| PX2A28W3FE               | 498  | 1,127      | 44.17  | 2.49    | 32.2  | 42.9    |  |  |
| CG 3475B2XF              | 493  | 1,098      | 44.87  | 2.32    | 26.9  | 24.1    |  |  |
| NG 3699B2XF              | 491  | 1,059      | 46.37  | 1.90    | 27.1  | 42.5    |  |  |
| PX3A99W3FE               | 490  | 1,163      | 42.17  | 1.86    | 31.5  | 34.8    |  |  |
| FM 1953GLTP              | 468  | 1,026      | 45.62  | 2.33    | 24.6  | 23.7    |  |  |
| PHY 220W3FE              | 458  | 1,021      | 44.89  | 2.41    | 35.4  | 51.4    |  |  |
| PHY 243WRF               | 455  | 1,081      | 42.09  | 1.36    | 32.9  | 31.8    |  |  |
| PX2A36W3FE               | 447  | 1,012      | 44.19  | 2.41    | 19.3  | 27.2    |  |  |
| WU17XL8                  | 436  | 1,015      | 42.94  | 2.07    | 30.5  | 38.4    |  |  |
| DP 1614B2XF              | 431  | 953        | 45.24  | 1.61    | 28.4  | 35.3    |  |  |
| DP 1518B2XF              | 429  | 1,004      | 42.72  | 1.97    | 16.3  | 18.4    |  |  |
| PX2A27W3FE               | 417  | 927        | 44.97  | 2.18    | 33.5  | 29.5    |  |  |
| PHY 308WRF               | 374  | 880        | 42.57  | 1.56    | 23.5  | 21.8    |  |  |
| FM 1830GLT <sup>3</sup>  |  |            | 46.29  | 1.65    | 19.4  | 11.1    |  |  |
| NG 3500XF <sup>3</sup>   |  |            | 41.02  | 1.95    | 20.3  | 25.2    |  |  |
| PHY 330W3FE <sup>3</sup> |  |            | 42.32  | 2.01    | 25.0  | 44.7    |  |  |
| PX2A31W3FE <sup>3</sup>  |  |            | 46.17  | 2.68    | 24.0  | 33.8    |  |  |
| $^{2}$ MSD (0.05)        | 64   | 140        | 9.54   | 0.50    | 15.5  | 11.7    |  |  |

<sup>1</sup>AMX = experimental line from Americot; CG = Croplan Genetics; DP = Deltapine; FM = Fibermax; NG = NexGen; PHY = Phytogen; PX = experimental line from Phytogen; ST = Stoneville; WU = Winfield United experimental line.

<sup>2</sup>MSD is the minimum difference that is significant at P=0.05.

<sup>3</sup>The north half of the test had lower yields than the south half. Regression analysis was used to adjust yields in the north half. These four cultivars had all plots in the north half and no estimate of yield loss could be obtained. NG 3500XF had the highest yields of any variety within the poorer yielding half of the field.

| ole in 20 | )17   |         |
|-----------|-------|---------|
| Plants/   | %Wilt | %Defol- |
| Ft row    |       | iation  |
| 2.56      | 3.3   | 0.2     |
| 2.35      | 2.9   | 9.7     |
| 2.78      | 2.4   | 5.2     |
| 2.65      | 0.5   | 2.3     |
| 2.24      | 4.3   | 3.7     |
| 2.47      | 2.0   | 4.1     |
| 2.50      | 2.1   | 2.5     |
| 2.43      | 5.2   | 10.7    |
| 2.52      | 2.1   | 2.1     |
| 2.57      | 2.5   | 8.7     |

Table 3. Verticillium wilt trial at Semino Lint Yield Loan

Yield x

|                   | Loan (\$/a) | (lbs/acre) | (C/lb) | Ft row |      | iation |
|-------------------|-------------|------------|--------|--------|------|--------|
| FM 2334GLT        | 1,490       | 2,710      | 54.97  | 2.56   | 3.3  | 0.2    |
| DP 1558NRB2RF     | 1,482       | 2,677      | 55.37  | 2.35   | 2.9  | 9.7    |
| PHY 340W3FE       | 1,440       | 2,647      | 54.39  | 2.78   | 2.4  | 5.2    |
| FM 1830GLT        | 1,392       | 2,555      | 54.49  | 2.65   | 0.5  | 2.3    |
| NG 5711B3XF       | 1,362       | 2,484      | 54.84  | 2.24   | 4.3  | 3.7    |
| ST 5115GLT        | 1,323       | 2,605      | 50.82  | 2.47   | 2.0  | 4.1    |
| FM 1888GL         | 1,303       | 2,512      | 51.89  | 2.50   | 2.1  | 2.5    |
| CG 3527B2XF       | 1,303       | 2,398      | 54.34  | 2.43   | 5.2  | 10.7   |
| NG 3500XF         | 1,298       | 2,388      | 54.37  | 2.52   | 2.1  | 2.1    |
| PHY 450W3FE       | 1,290       | 2,409      | 53.54  | 2.57   | 2.5  | 8.7    |
| NG 4792XF         | 1,281       | 2,339      | 54.79  | 2.86   | 0.8  | 2.3    |
| PHY 333WRF        | 1,272       | 2,475      | 51.42  | 2.69   | 5.8  | 9.5    |
| NG 4601B2XF       | 1,265       | 2,289      | 55.27  | 2.50   | 6.2  | 9.3    |
| ST 6182GLT        | 1,259       | 2,359      | 53.37  | 2.80   | 11.5 | 17.4   |
| FM 2484B2F        | 1,242       | 2,317      | 53.59  | 2.47   | 3.2  | 0.6    |
| PX4A57W3FE        | 1,239       | 2,526      | 49.04  | 2.62   | 2.4  | 7.5    |
| NG 3406B2XF       | 1,231       | 2,335      | 52.74  | 2.74   | 1.9  | 7.9    |
| NG 4545B2XF       | 1,227       | 2,283      | 53.74  | 2.18   | 3.5  | 7.0    |
| NG 3780B2XF       | 1,222       | 2,235      | 54.69  | 2.82   | 5.2  | 11.6   |
| WU 17ZC8          | 1,220       | 2,304      | 52.94  | 2.05   | 5.2  | 2.1    |
| FM 1911GLT        | 1,211       | 2,321      | 52.19  | 2.62   | 1.4  | 1.9    |
| NG 3699B2XF       | 1,206       | 2,213      | 54.52  | 2.06   | 1.9  | 3.1    |
| NG 4689B2XF       | 1,204       | 2,249      | 53.52  | 2.21   | 3.4  | 9.5    |
| CG 3885B2XF       | 1,199       | 2,335      | 51.37  | 2.35   | 8.1  | 20.7   |
| PHY 444WRF        | 1,195       | 2,438      | 49.02  | 2.53   | 6.2  | 9.1    |
| DP 1646B2XF       | 1,192       | 2,283      | 52.22  | 2.02   | 8.8  | 7.5    |
| NG 3522B2XF       | 1,190       | 2,240      | 53.12  | 2.70   | 4.2  | 10.5   |
| NG 1717B2XF       | 1,179       | 2,170      | 54.34  | 2.72   | 5.8  | 13.7   |
| DP 1522B2XF       | 1,173       | 2,282      | 51.42  | 2.51   | 3.0  | 8.9    |
| DP 1639B2XF       | 1,162       | 2,238      | 51.92  | 2.28   | 9.3  | 12.8   |
| PHY 308WRF        | 1,157       | 2,370      | 48.84  | 2.65   | 4.1  | 13.4   |
| PX3A96W3FE        | 1,147       | 2,107      | 54.44  | 2.60   | 1.1  | 4.3    |
| PHY 330W3FE       | 1,127       | 2,119      | 53.19  | 2.54   | 4.3  | 15.7   |
| NG 4777B2XF       | 1,108       | 2,057      | 53.87  | 2.73   | 2.4  | 4.4    |
| PX4A52W3FE        | 1,098       | 2,207      | 49.74  | 2.73   | 5.2  | 7.0    |
| PX2AX1W3FE        | 1,096       | 2,122      | 51.64  | 2.69   | 6.3  | 3.5    |
| DP 1549B2XF       | 1,087       | 2,117      | 51.37  | 2.34   | 1.3  | 0.8    |
| PHY 490W3FE       | 1,082       | 2,176      | 49.72  | 2.88   | 14.1 | 15.7   |
| AMX1725B3XF       | 1,044       | 1,924      | 54.27  | 2.36   | 1.1  | 1.1    |
| DP 1553B2XF       | 1,028       | 1,896      | 54.24  | 1.45   | 21.2 | 13.9   |
| $^{2}$ MSD (0.05) | 187         | 395        | 4.86   | 0.41   | 9.3  |        |

<sup>1</sup>AMX = experimental line from Americot; CG = Croplan Genetics; DP = Deltapine; FM = Fibermax; NG = NexGen; PHY = Phytogen; PX = experimental line from Phytogen; ST = Stoneville; WU = Winfield United experimental line.

<sup>2</sup>MSD is the minimum difference that is significant at P=0.05.

Variety1

## **Bacterial blight**

In Test 1, varieties which were highly susceptible were DP 1725B2XF, DP 1835B2XF, and the susceptible check, NG 3406B2XF (Table 4). Varieties that were moderately susceptible were PHY 312WRF and PHY 444WRF. A partially susceptible variety was DP 1612B2XF, and a less susceptible or somewhat resistant variety was DP 1646B2XF. The partially resistant variety was PHY 243WRF. Resistant varieties included the resistant check DP 1518B2XF, DP 1639B2XF, DP 1820B3XF, DP 1845B3XF, DP 1840B3XF, DP 1951B3XF, PHY 300W3FE, PHY 340W3FE, PHY 450W3FE, and PHY 490W3FE.

In Test 2, the susceptible check PHY 499WRF, NG 4601B2XF, and Croplan Genetics 3527B2XF were highly susceptible. NG 4792XF was moderately susceptible. NG 3780B2XF was partially susceptible. NG 4777B2XF, NG 5711B3XF, NG 4689B2XF, and the resistant check, FM 1830GLT were resistant to bacterial blight (Table 4).

|                      | o moculation with bacterial origin | 1acc 10.                  |        |  |  |  |
|----------------------|------------------------------------|---------------------------|--------|--|--|--|
| Test 1               |                                    | Test 2                    |        |  |  |  |
| Variety <sup>1</sup> | Blight                             | Variety                   | Blight |  |  |  |
|                      | (%)                                |                           | (%)    |  |  |  |
| DP 1725B2XF          | 100 a <sup>2</sup>                 | Croplan Genetics 3527B2XF | 100 a  |  |  |  |
| DP 1835B3XF          | 100 a                              | NG 4601B2XF               | 100 a  |  |  |  |
| NG 3406B2XF          | 100 a                              | PHY 499WRF                | 100 a  |  |  |  |
| PHY 312WRF           | 97 ab                              | NG 4792XF                 | 92 a   |  |  |  |
| PHY 444WRF           | 90 b                               | NG 3780B2XF               | 72 b   |  |  |  |
| DP 1612B2XF          | 65 c                               | NG 4777B2XF               | 3 c    |  |  |  |
| DP 1646B2XF          | 40 d                               | FM 1830GLT                | 3 c    |  |  |  |
| PHY 243WRF           | 18 e                               | NG 5711B3XF               | 0 c    |  |  |  |
| DP 1518B2XF          | 5 f                                | NG 4689B2XF               | 0 c    |  |  |  |
| DP 1820B3XF          | 4 f                                |                           |        |  |  |  |
| DP 1639B2XF          | 2 f                                |                           |        |  |  |  |
| DP 1851B3XF          | 2 f                                |                           |        |  |  |  |
| PHY 490W3FE          | 2 f                                |                           |        |  |  |  |
| DP 1845B3XF          | 0 f                                |                           |        |  |  |  |
| DP 1840B3XF          | 0 f                                |                           |        |  |  |  |
| PHY 230W3FE          | 0 f                                |                           |        |  |  |  |
| PHY 250W3FE          | 0 f                                |                           |        |  |  |  |
| PHY 300W3FE          | 0 f                                |                           |        |  |  |  |
| PHY 330W3FE          | 0 f                                |                           |        |  |  |  |
| PHY 340W3FE          | 0 f                                |                           |        |  |  |  |
| PHY 430W3FE          | 0 f                                |                           |        |  |  |  |
| PHY 440W3FE          | 0 f                                |                           |        |  |  |  |
| PHY 450W3FE          | 0 f                                |                           |        |  |  |  |
| PHY 480W3FE          | 0 f                                |                           |        |  |  |  |
| PHY 490W3FE          | 0 f                                |                           |        |  |  |  |

| TT 1 1 / D    | c ·           |               | 1            | 1 4 . 11    | 1.1. 10       |
|---------------|---------------|---------------|--------------|-------------|---------------|
| I able 4 Rest | onse of varie | ties to inoci | ulation with | hacterial r | NIGht race 1X |
|               |               |               |              | ouclerial c | mgm race ro.  |

<sup>1</sup>DP = Deltapine;  $\overline{FM} = Fibermax$ ; NG = NexGen; PHY = Phytogen.

<sup>2</sup>Blight ratings followed by the same letter are not significantly different at P=0.05.

#### <u>Summary</u>

Varieties that performed the best in fields with Verticillium wilt included FM 2334GLT, FM 1830GLT, FM 2322GL, FM 2484B2F, Croplan Genetics 3226B2XF, NG 3640XF, and NG 3500XF. Recently introduced varieties with high resistance to bacterial blight included DP 1639B2XF, DP 1820B3XF, DP 1845B3XF, DP 1840B3XF, DP 1851B3XF, PHY 230W3FE, PHY 250W3FE, PHY 300W3FE, PHY 330W3FE, PHY 340W3FE, PHY 430W3FE, PHY 440W3FE, PHY 450W3FE, PHY 480W3FE, PHY 490W3FE, NG 4777B2XF, NG 5711B3XF, and NG 4689B2XF.

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