Epidemiology of Southern Corn Leaf Blight in Continuous Corn Culture

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ABSTRACT

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The influence of cultural practices on the epidemiology of southern corn (*Zea mays*) leaf blight (SCLB) in continous corn culture was investigated. Field tests showed that tillage practices, row spacing, and fertilizer application methods influenced the development of SCLB in early growth stages of corn but not after tasseling. Tillage systems did not influence the resistance or susceptibility of cultivars to *Drechslera maydis* race O. In greenhouse studies, no one method of evaluation was adequate to show differences in disease reaction among cultivars. The number of lesions per plant, lesion size, number of conidia per lesion, and number of conidia per square millimeter of lesion were the most useful parameters in determining resistance of cultivars to the SCLB pathogen. Losses may be severe if cultivars susceptible or moderately susceptible to SCLB are grown in continuous corn culture with minimum tillage under overhead irrigation.

For the reduction of energy consumption and soil erosion, minimum-tillage or no-tillage systems are suggested as alternatives to conventional tillage in corn (*Zea mays* L.). These systems require lower investments in machinery, less fuel, and provide better soil conservation than the conventional system that exposes bare, fertile soil to wind and water erosion. Plant pathologists have been concerned that such shifts in cultural practices may influence the survival of foliar pathogens and the incidence of disease.

Southern corn leaf blight (SCLB) caused by *Drechslera maydis* (Nisik.) Subram. & Jain. (telemorph: *Cochliobolus heterostrophus* (Drechs.) Drechs.) occurs worldwide. The survival and spread of both races O and T and the type of resistance in different inbreds and hybrids of corn to the pathogen have been studied previously (1,2,11). In the Georgia coastal plain, lesions of *D. maydis* race T were observed on cytoplasmic-male-sterile-T (cms-T) plants earlier when corn residue was disk harrowed or rotary chopped than when residue was buried with a moldboard plow, and SCLB was more severe with minimal tillage (8,12). However, the change from cms-T to normal male-fertile cytoplasm in other states was paralleled by a shift in race frequency in favor of race O (7). Field and sweet corn severely infected with the SCLB pathogen have been observed in the second crop of double-cropped corn in the Georgia coastal plain since 1974 (15; D. R. Sumner, *unpublished data*), but the races of *D. maydis* causing the epidemic were not identified.

This study was undertaken to investigate some of the influences of cultural practices in continuous corn culture on the epidemiology of SCLB and to determine the reactions of inbreds and hybrids of corn to indigenous populations of the pathogen under different field conditions and to inoculations in the greenhouse.

MATERIALS AND METHODS

Four experiments in field plots in 1980 and 1981 were on land that had been in continuous corn for 2 or 3 yr. Randomized complete block designs in split-plot experiments with four replicates were used.

Field experiments 1 and 2. Corn hybrid Pioneer Brand 3369A was planted on Tifton loamy sand in whole plots (5.5 × 35 m) of three tillage treatments: soil inverted with a moldboard turning plow 25–30 cm deep; subsoiling 40 cm under the row and planting without disturbing residues between the rows; and no-tillage planting with a slot planter. Subplots (5.5 × 8.8 m) were broadcast compared with band application of 32, 64, and 128 kg/ha of N, P, and K, respectively; and sub-subplots were carbofuran compared with no carbofuran. Two identical experiments were on adjacent areas in the same field and were analyzed together. Experiment 1 was not irrigated, and experiment 2 was irrigated with overhead sprinklers. There were 64,000 plants per hectare in the irrigated experiment and 47,000/ha in the nonirrigated experiment. All SCLB data were taken on 3.0 m of row in the center two rows of each six-row sub-subplot. Data on SCLB and plant stands were taken in all tests beginning when the corn was in the four- to six-leaf stage and weekly until maturity. Southern corn leaf blight was rated with a 0–5 scale based on the amount of leaf area diseased (9).

Field experiments 3 and 4. On Bonifay sand under overhead center-pivot irrigation, corn had been double-cropped for 2 yr by planting in March, harvesting for grain in July, replanting in August, and harvesting for ensilage or grain in November. Whole plots were tillage (11 × 30 m), deep-turn compared with subsoil-plant; subplots were two-row spacings, single rows 91 cm apart compared with twin rows 25 cm apart with row centers 91 cm apart; sub-subplots were broadcast compared with band application of fertilizer (32, 65, 171, 119, 36, and 6 kg/ha) of N, P, K, S, Mg, and Zn, respectively; and sub-sub-subplots (two rows 15 m long) were starter compared with no-starter liquid fertilizer of 22 and 76 kg/ha of N and P, respectively, applied in the row. Corn hybrid Funks G-4507 was planted at 72,000 plants per hectare. Data on SCLB were taken on 4 m of row in each sub-sub-subplot. Experiment 4 followed experiment 3 on the same Bonifay sand plot area under center pivot irrigation. The corn debris from the 1980 second crop (sweet corn, Silver Queen) was chopped with a rotary cutter in the fall of 1980 and left on the surface. In the spring of 1981, whole plots (11 × 12 m) of tillage treatments were deep-turned or in-row subsoiled and planted. Subplots were four rows 12 m long of cultivars Pioneer Brand 3369A, Funks G-4507 and Pioneer Brand 3311, which were observed to be resistant, intermediate, and susceptible to *D. maydis* race O, respectively, in Kentucky (J. Hartman, *unpublished*). Data were taken on the center 4.6 m of the middle two rows. At maturity, the percentage of stalks rotted was determined empirically by squeezing 50–100 stalks per treatment by hand in the second internode above the ground.

Experiments 5 and 6. Twenty-one hybrids and 8 inbred lines in 1980 and 18 hybrids and 6 inbred lines in 1981 were planted by hand among corn debris in subsoiled plots of continuous corn adjacent to other experiments under overhead irrigation. Four replicates of 3-m rows of 20 seeds of each entry were planted. In 1980, inbreds C103 and WF9 and their counterpart with C, S, and T cytoplasms for male sterility were used; in 1981, inbreds MO17, B37, and W64A in

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normal and cms-T cytoplasms were used. The entries were evaluated weekly from the four- to six-leaf stage until maturity for their susceptibility to natural infection by *D. maydis*.

Greenhouse experiments. In tests in greenhouses and growth chambers, selected hybrids and inbreds were evaluated for resistance to *D. maydis*. In 1980, three plants of each inbred or hybrid (five- to seven-leaf stage) were inoculated by dusting with pulverized, naturally infected leaves from different sources or spraying with water suspensions of 110,000 or 10,000 conidia per milliliter from cultures of five different isolates grown on V-8 agar. Cultures were grown for 4 days under alternating 12 hr of light (5,000 lux) and 12 hr of dark at 26–34 C, and the colonies were wounded by scraping the aerial mycelium with a sterile scalpel. The cultures were incubated another 3 days and sporulated abundantly. Suspensions of conidia were prepared by filtering through a double-layer of cheesecloth and adding three drops of surfactant (Tween 20) per 100 ml of suspension. Plants were incubated in a moist chamber with 12 hr of light at 30 C and 12 hr of darkness at 25 C (constant 100% RH) for 48 hr after inoculation. Then the plants were transferred to a greenhouse and grown 8–10 days at temperature ranges of 25 to 40 C and rated for SCLB in the eight- to 10-leaf stage. The number of leaves severely blighted and the number of dead leaves on each plant were recorded.

Number of conidia per square millimeter of lesion was determined by measuring the area of a lesion from each of three plants and incubating a lesion in a petri dish containing moist filter paper in the dark for 48 hr at 30 C. Conidia were then washed off the lesion by shaking it in a test tube containing 1 ml of water mixed with a surfactant (four drops of Tween 20 per 100 ml of water). The number of conidia per square millimeter of lesion was determined with a hemacytometer.

The same methods were used in 1981, except that only one isolate was used at an inoculum concentration of 500 conidia per milliliter; plants were incubated at 25 C for 12 hr of light and at 30 C for 12 hr of dark, 25 C for 15 hr of dark, or 25 C for 10 hr of dark.

Data were analyzed by the least squares analysis of variance, correlations, and stepwise multiple regression. Yield and stalk rot were the dependent variables, with disease ratings as independent variables. The arc sine transformation was used before analysis on data recorded in percentages, but the nontransformed data are presented.

RESULTS

Field experiments 1 and 2. There was very little SCLB in the tests on Tifton loamy sand. The hybrid used (Pioneer Brand 3369A) was resistant to SCLB, and the unusually dry and hot weather conditions during the growing season greatly reduced development of the disease. Number of lesions per plant counted at the nine- to 11-leaf stage was significantly higher in plots treated with carbofuran than in untreated plots (0.7 vs. 0.4, LSD = 0.23), but there were no significant differences ($P = 0.05$) within tillage and fertilizer treatments nor between the irrigated and nonirrigated treatments. Leaf blight ratings at the dough stage were significantly higher ($P = 0.05$) in irrigated than in nonirrigated plots (1.2 vs. 0.6, LSD = 0.1). At that stage, the leaves may have been sufficiently dense to keep moisture from the irrigation water in the canopy long enough for some degree of secondary spread of the disease. The different tillage treatments did not affect disease development at any stage of the crop.

Field experiments 3 and 4. In the 1980 tests under center pivot irrigation, differences in the percentage of the plants (50 per treatment) with SCLB lesions at the nine- to 10-leaf stage were significantly greater in deep-turned than in subsoiled treatments, in single rows than in double rows, and when starter fertilizer was used than when it was not used. Disease levels were too low (leaf blight rating averaged 2.3 at tasseling) later in the season to detect treatment differences.

In the 1981 study under center pivot irrigation, numbers of lesions at the eight-leaf stage and leaf blight ratings at the tasseling and milk stages were significantly lower in the deep-turn than in the subsoil-plant tillage treatments (Table 1), but there were no significant ($P = 0.05$) differences in lesions per plant at the 11- to 12-leaf stage and in ratings at maturity.

Resistant cultivar Pioneer Brand 3369A had significantly fewer lesions and lower SCLB ratings in all stages, except at the 11- to 12-leaf stage, than the SCLB-susceptible Pioneer Brand 3311 or the intermediate Funks G-4507. The difference in ratings between Funks G-4507 and Pioneer Brand 3311 was significant until maturity. Small, circular to elongated, chlorotic lesions were commonly observed on the resistant Pioneer Brand 3369A as compared with the large and extended lesions on the susceptible Pioneer Brand 3311. There was no significant ($P = 0.05$) interaction between tillage treatments and the reaction of corn hybrids to SCLB at any stage of the crop.

The percentage of stalks rotted in the 1981 trial was not significantly ($P = 0.05$) different in the two tillage treatments. The SCLB-resistant cultivar, Pioneer Brand 3369A, had significantly less stalk rot than the other two cultivars. There were highly significant ($P = 0.01$) positive correlations between percentage of stalk rot and SCLB ratings made after tasseling ($r = 0.6$).

Yield (at 15.5% moisture) was not significantly different between the two tillage treatments nor among corn hybrids. Yield was not correlated significantly with stalk rot. The only significant ($P = 0.05$) negative correlation of yield with the leaf blight rating was with the rating made on 23 June 1 wk after tasseling ($r = -0.4$).

A stepwise multiple regression was run with yield as the dependent variable and with stand, the different SCLB evaluations, and percentage of stalk rot as independent variables. Yield regressed significantly and linearly to stand and leaf blight rating at tasseling. Stand explained 32% of the variation in yield, and SCLB rating at tasseling explained a highly significant ($P = 0.01$) additional 26.5%. However, the leaf blight rating at tasseling was independent of stand of plants per plot in its relationship with yield, indicating that the two variables were not interrelated.

Field experiments 5 and 6. The leaf blight ratings among cultivars in 1980 were significantly different at tasseling, dough stage, and maturity. Despite the dry weather there was some secondary spread of the disease, as indicated by increasing ratings with plant development (Table 2). Disease severity may have been increased by the few irrigations applied during the season.

Table 1. Effect of tillage and cultivar on southern corn leaf blight development under center pivot irrigation in 1981

Treatment	Lesions per plant[x]	Leaf blight rating[y]			Stalk rot (%)
		Tasseling	Milk stage	Maturity	
Tillage					
Deep turn	0.5 a[z]	2.4 a	3.4 a	4.1 a	34.8 a
Subsoil	1.5 b	2.9 b	3.8 b	4.3 a	27.6 a
Cultivars					
Pioneer Brand 3369A	0.5 a	1.8 a	2.6 a	3.2 a	14.4 b
Funks G-4507	0.8 a	2.8 b	3.9 b	4.7 b	44.5 a
Pioneer Brand 3311	1.8 b	3.3 c	4.3 c	4.8 b	34.8 a

[x] At the eight-leaf stage.

[y] 0 = No lesions, 1 = slight infection, 2 = light infection, 3 = moderate infection, 4 = heavy infection, and 5 = very heavy infection with abundant lesions on all leaves.

[z] Numbers followed by the same letters within tillage and cultivar treatments are not significantly different ($P = 0.05$) according to Duncan's multiple range test. Percentage figures for stalk rot were analyzed after an arc sine transformation; however, nontransformed means are shown in the table.

Table 2. Reaction of corn cultivars in 1980 to southern corn leaf blight on subsoiled plots that were in corn the previous season

Cultivars	Plants with lesions[x] (%)	Leaf blight ratings[y] Tasseling	Maturity
Greenwood 747	3.5 i[z]	0.9 defg	1.9 i
Pioneer Brand 3369A	12.9 efghi	1.6 bc	2.0 hi
C103 cms-T	46.1 a	0.7 efg	2.0 hi
Dekalb 1295	4.5 i	1.5 bcd	2.0 hi
C103 × WF9 cms-T	26.0 bcdefg	1.3 bcdef	2.0 hi
Sawan Px 715	10.9 fghi	1.0 cdefg	2.0 hi
Dekalb XL80	6.2 hi	0.4 g	2.1 ghi
C103 cms-C	35.1 abc	1.0 cdefg	2.1 ghi
C103	30.3 abcde	0.8 defg	2.1 ghi
McNair ×300	7.9 ghi	1.5 bcd	2.3 fghi
Pioneer Brand 3030	13.3 efghi	0.9 defg	2.3 fghi
Sawan Px 95	2.4 i	1.4 bcde	2.3 fghi
C103 × WF9 cms-C	16.6 cdefghi	1.0 cdefg	2.3 fghi
C103 cms-S	37.9 ab	0.6 fg	2.3 efghi
C103 × WF 9	20.2 bcdefghi	1.3 bcdef	2.4 efghi
Coker 77	10.1 fghi	0.6 fg	2.4 efghi
C103 × WF9 cms-S	18.1 cdefghi	1.3 bcdef	2.5 defgh
PAG 751	10.1 fghi	1.3 bcdef	2.5 defgh
Funks G-4864	3.5 i	0.4 g	2.6 cdefg
Funks G-4507	13.1 efghi	0.9 defg	2.8 bcdef
WF9 cms-S	32.5 abcd	1.3 bcdef	2.8 bcdef
Coker 16	4.3 i	1.4 bcde	2.9 bcde
Pfizer Txs 113	11.3 fghi	1.6 bc	3.1 bc
McCurdy 67-14	4.5 i	2.3 a	3.3 b
WF9 cms-C	20.8 bcdefghi	1.6 bc	3.9 a
WF9	25.0 bcdefgh	1.5 bcd	3.9 a
WF9 cms-T	33.1 abc	1.6 bc	4.0 a
Pfizer Exp 137	14.2 defghi	1.9 ab	4.0 a

[x] At the three- to five-leaf stage. Percentage of the total number of plants per plot with one or more lesions, analyzed after an arc sine transformation; however, nontransformed means are shown in the table.
[y] 0 = No lesions, 1 = slight infection, 2 = light infection, 3 = moderate infection, 4 = heavy infection, and 5 = very heavy infection with abundant lesions on all leaves.
[z] Numbers followed by same letters are not significantly different ($P = 0.05$) according to Duncan's multiple range test.

Table 3. Reaction of corn cultivars in 1981 to southern corn leaf blight on subsoiled plots that were in multiple cropping, continuous corn culture under center pivot irrigation

Cultivars	Lesions per plant[x]	Leaf blight ratings[y] Tasseling	Dough stage	Maturity
MO17-cms-T	0.12 a[z]	0.75 a	0.88 a	1.13 a
MO17-N	0.14 a	0.88 a	1.25 ab	1.25 a
Dekalb XL 80	0.10 a	0.88 a	1.63 bc	2.63 b
Pioneer Brand 3369A	0.10 a	1.50 abcd	2.13 de	2.63 b
Greenwood 747	0.24 a	1.75 bcde	2.00 cde	2.63 b
Funks G-4864	0.56 a	0.75 a	1.75 cd	2.75 bc
Dekalb 1295	0.25 a	1.50 abcd	2.38 ef	2.88 bcd
Pioneer Brand 3030	0.18 a	1.38 abc	2.75 fgh	2.88 bcd
Northrup King PX 95	0.63 ab	2.38 efgh	3.00 ghi	2.88 bcd
Northrup King Px 715	0.41 a	2.75 ghi	3.13 hij	2.88 bcd
Silver Queen (sweet corn)	0.10 a	1.13 ab	2.38 ef	3.00 cd
Pioneer Brand 3145	0.47 a	1.88 bcdef	2.75 fgh	3.00 cd
Coker 16	0.28 a	2.13 cdef	3.00 ghi	3.13 de
PAG 751	0.34 a	1.75 bcde	2.88 gh	3.38 ef
McNair 508A	0.29 a	2.38 efgh	2.63 fg	3.50 fg
Funks G-4507	0.61 ab	2.25 defgh	2.88 gh	3.50 fg
B37-cms-T	0.80 ab	2.50 efghi	3.00 ghi	3.50 fg
Pfizer Txs 113	1.46 bc	2.63 efghi	3.00 ghi	3.63 fg
B37-N	2.14 c	2.75 ghi	3.13 hij	3.63 fg
Pioneer Brand 3311	2.06 c	3.00 ghij	3.50 j	3.63 fg
McCurdy 67-14	0.77 ab	2.63 efghi	3.50 j	3.75 g
Pfizer Exp 137	2.23 c	2.88 ghij	3.38 ij	4.25 h
W64A-cms-T	5.14 d	3.25 ij	4.50 k	5.00 i
W64A-N	2.05 c	3.63 j	4.63 k	5.00 i

[x] At the 10- to 13-leaf stage.
[y] 0 = No lesions, 1 = slight infection, 2 = light infection, 3 = moderate infection, 4 = heavy infection, and 5 = very heavy infection with abundant lesions on all leaves.
[z] Numbers followed by the same letters are not significantly different ($P = 0.05$) according to Duncan's multiple range test.

Inbred lines with cms-T (C103 cms-T, WF9 cms-T) and the hybrid C103 × WF9 cms-T that were highly susceptible to *D. maydis* race T were not more severely blighted by SCLB than their counterparts with N, S, or C cytoplasms. In 1981, lesions of SCLB were observed on lower leaves of the susceptible Pioneer Brand 3311 on 4 May when the crop was at the five- to six-leaf stage. Number of lesions per plant at the 10- to 13-leaf stage varied significantly. Although differences in reaction to SCLB among cultivars could be detected at that stage, more detailed variations among cultivars were obtained at later stages of the crop. All weekly leaf blight ratings after tasseling showed significant differences among cultivars similar to ratings at tasseling, at dough stage, and at maturity (Table 3). The inbreds, regardless of the nature of their cytoplasm, were significantly different in their response to the pathogen, and again there was no indication of race T being present in the population of the fungus.

Disease severity was greater on SCLB-resistant hybrids in 1981 when the humidity and free moisture were increased by center pivot irrigation as compared with infrequent irrigation in 1980. In general, hybrids that were identified as SCLB-resistant in previous trials were resistant in both years (ie, Pioneer Brand 3369A and Greenwood 747). They had significantly lower ratings than the SCLB-susceptible hybrids such as McCurdy 67-14 or Pioneer Brand 3311.

Greenhouse experiments. Cultivars were inoculated with infected leaf tissues from different sources in separate experiments and evaluated in the eight- to 10-leaf stage. A cultivar that had the lowest leaf blight rating did not necessarily have the fewest dead or severely blighted leaves, or produce the fewest number of conidia per square millimeter of lesion area. On the other hand, if cultivar-inoculum interactions are ignored, there were no significant differences in SCLB resistance among the cultivars in any of the methods used to evaluate disease severity.

When five cultures of *D. maydis* were used separately as inoculum and plants were incubated in a mist chamber for 48 hr, all cultures caused considerable infection and killed leaves on all cultivars. There were no significant ($P = 0.05$) differences among the cultures, but there were significant culture-cultivar interactions in leaf blight ratings and number of dead leaves. Some cultivars were consistent in some evaluations but not in others (Table 4). For example, the SCLB-resistant hybrid Pioneer Brand 3369A had significantly lower ratings and fewer dead leaves than the susceptible McCurdy 67-14 (Table 4), but there was no significant difference in the number of conidia produced per square millimeter of lesion area. The two cultivars were not

significantly different in any of the evaluations with leaf inoculum.

A higher concentration of conidia in the inoculum, (17,000 conidia per plant) and a 24-hr incubation period caused higher leaf blight ratings (in all cultivars) and more severely blighted and dead leaves (in some cultivars) than a lower concentration of conidia in the inoculum (8,000 conidia per plant). However, there was some indication that leaf blight ratings, number of dead leaves per plant, and number of leaves severely blighted decreased as the period of incubation decreased. Although results were not consistent for all cultivars, the number of lesions per plant, lesion size, number of conidia per lesion (Table 5), and number of conidia per square millimeter of lesion did not seem to be affected by a decrease in incubation period. The latter three parameters were not influenced by inoculum concentration.

Cultivars, regardless of the kind of inoculum used, were not significantly different in most of the parameters measured except in the number of dead leaves per plant and the number of conidia per square millimeter of lesion. However, there was a highly significant cultivar × inoculum interaction in the different tests. It was very difficult to determine which of the evaluation methods measured the true differences among cultivars. Each method used showed some difference among cultivars, but the ranking of the cultivar differed according to the method used. There were no significant differences between Pioneer Brand 3369A and Pioneer Brand 3311 in the number of lesions per plant with tissue inoculum in one experiment or with culture inoculum in another experiment. However, there were differences between the cultivars in lesion size (average of 8 vs. 32 mm^2 in Pioneer Brand 3369A and Pioneer Brand 3311, respectively) and the number of conidia per lesion (Table 5) or per square millimeter of lesion area.

Even with the variations among the disease measurements, some differences among hybrids and inbreds were obvious. In general, MO17-N, MO17-T, and Pioneer Brand 3369A had significantly lower leaf blight ratings, number of dead leaves per plant, number of severely blighted leaves per plant, smaller lesion size, and fewer conidia per lesion than W64A-N, W64A-T, Pioneer Brand 3311, or McCurdy 67-14. Similar results were observed in the field tests. Based on the disease reactions of the inbreds, all isolates of the pathogen used as inoculum were race O.

DISCUSSION

There was no indication that *D. maydis* race T or races other than race O were present in the field tests. Reactions of the various inbred lines and hybrids showed that infection was caused primarily by race O. Our results agree with other reports that minimum tillage practices can cause a significantly greater increase in early season development of SCLB (2,12) than plowing, but row spacing and fertilizer application methods have less influence on development of SCLB. The best regression equation between percentage of yield loss and disease severity was derived from disease severity assessed at the dough stage with race T on corn with cms-T (3). In contrast, we found that disease severity at tasseling had a greater correlation with yield loss than disease severity at any other time with race O. If northern corn leaf blight, caused by *Exserohilum turcicum* (Pass.) Leonard & Suggs, was severe 2–3 wk after pollination, yield losses were as much as 50% (13). Such yield losses with SCLB did not occur in our tests.

Several consecutive periods of at least 6 hr of relative humidity of more than 90% favor the spread of SCLB (4,10). Even in dry weather, we observed a continuous increase in SCLB severity with both infrequent solid-set irrigation and frequent center-pivot sprinkler irrigation. More disease occurred in all cultivars in 1981 with more frequent rains in corn grown under a center pivot system.

In greenhouse experiments, temperature, relative humidity, and incubation period were provided that were considered optimum for the pathogen to infect, produce lesions, and sporulate on corn plants (5,6,14). Nevertheless, it was very difficult to separate cultivars according to their reaction to SCLB in greenhouse conditions compared with field conditions. No one method of evaluation was adequate to evaluate relative susceptibility to *D. maydis* race O. Perhaps the environmental conditions in mist chambers were so favorable that the pathogen was able to overwhelm the defense mechanisms in even the most SCLB-resistant hybrids and inbreds.

Despite the lack of consistency in cultivar reaction, some information was obtained that could be related to field conditions. There are long periods from late spring to early fall in the southeastern United States when temperatures are

Table 4. Reaction of corn cultivars inoculated with conidia of *Drechslera maydis* in greenhouse experiments in 1980[x]

Cultivar	Leaf blight ratings[y]	Number of dead leaves per plant	Conidia per mm^2 of lesion
Pioneer Brand 3369A	2.0 c[z]	3.3 b	130 bc
Pfizer Txs 113	2.3 ab	3.6 ab	109 c
Coker 16	2.7 a	3.9 ab	314 a
Funks G-4507	2.4 ab	3.4 b	273 a
Golden Harvest (H-2666)	2.1 bc	3.6 ab	69 c
Dekalb XL 80	2.7 a	3.8 ab	261 a
McCurdy 67-14	2.5 a	4.2 a	132 bc
Pfizer Exp 137	2.4 a	3.4 b	212 ab
Silver Queen	2.6 a	3.9 ab	324 a

[x]There were significant culture-cultivar interactions in leaf blight ratings and number of dead leaves, but figures presented are an average of five cultivars.
[y]0 = No lesions, 1 = slight infection, 2 = light infection, 3 = moderate infection, 4 = heavy infection, and 5 = very heavy infection with abundant lesions on all leaves.
[z]Numbers followed by same letters are not significantly different ($P = 0.05$) according to Waller-Duncan k ratio t test.

Table 5. Number of conidia (×1,000) of *Drechslera maydis* produced per lesion for each cultivar-inoculum interaction in greenhouse experiments in 1981

	Inoculum					
	Experiment 2[w]		Experiment 3[x]		Experiment 4[y]	
Cultivars	Culture	Leaf tissue	Culture	Leaf tissue	Culture	Leaf tissue
MO17-N	0.4 de[z]	0.0 c	1.1 de	0.0 b	1.5 bc	0.7 c
MO17-cms-T	0.4 de	0.0 c	0.0 e	0.7 b	0.7 c	0.7 c
Pioneer Brand 3369A	0.0 e	0.0 c	1.1 de	0.7 b	0.7 c	0.0 c
Greenwood 747	0.0 e	0.4 bc	0.4 e	0.0 b	0.4 c	0.4 c
Pfizer Txs 113	1.9 bcd	2.6 a	17.4 a	9.3 a	5.6 a	2.6 bc
Pfizer Exp 137	0.7 cde	0.4 bc	11.9 ab	1.9 ab	1.5 bc	4.1 b
McCurdy 67-14	3.7 a	3.0 a	9.6 bc	3.3 ab	4.8 a	7.8 a
Pioneer Brand 3311	3.0 ab	3.3 a	8.1 cd	3.3 ab	3.3 abc	9.6 a
W64A-N	2.2 abc	3.3 a	4.8 cde	3.7 ab	6.3 a	1.9 bc
W64A-cms-T	2.5 ab	1.9 ab	15.9 ab	5.6 ab	4.4 ab	1.9 bc

[w]From culture, 5,000 conidia per milliliter (8,500 conidia per plant); leaf tissue = 160 mg of air-dried tissue per plant. Plants were incubated 24 hr in a mist chamber, 12 hr of light at 25 C and 12 hr of dark at 30 C.
[x]Same as experiment 2 but with 15 hr of incubation at 25 C and no light.
[y]Same as experiment 3 but with 10 hr of incubation.
[z]Numbers followed by the same letters are not significantly different according to Waller-Duncan k ratio t test ($P = 0.05$).

optimum for development of SCLB, but often sufficient moisture for infection is lacking. However, optimum conditions of relative humidity and free moisture for infection by *D. maydis* could occur frequently under center-pivot irrigation systems. With minimum tillage in continuous corn culture under irrigation, secondary inoculum could increase so rapidly early during the season that leaf blight as severe as observed in greenhouse conditions could occur in fields. Such epidemics have been observed by the second author in second crops of both field and sweet corn since 1973, when research was begun on double-cropping of corn in southern Georgia (15). Also, continous double-cropping of corn may lead to greater levels of inoculum in the spring than monocropping because of less time for residues to deteriorate during the winter. Thus, it is imperative that growers use hybrids with a high level of resistance to *D. maydis* race O when using minimum tillage practices and overhead sprinkler irrigation.

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