

Was There an Outbreak of Bacterial Wilt of Corn in Central Illinois in 1891 and 1892?

Neil E. Stevens

University of Illinois, Urbana, Illinois

An apparent correlation between the temperature of the winter months at various stations in the northeastern United States and the prevalence of bacterial wilt of corn in this region was pointed out in a paper published in October, 1934. In the course of the study on which this publication was based, the writer had a number of conferences with Dr. W. H. Larrimer, then of the Division of Cereal Insects of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture. During one of these, Dr. Larrimer called attention to the following statement regarding the distribution of *Chaetocnema pulicaria*, on pages 109 and 110 of the Twenty-third Report of the Illinois State Entomologist, S. A. Forbes, published in 1905, which, because of its brevity and special interest is quoted nearly in full:

"In various years, but especially in 1891, reports of marked injury to corn by this flea-beetle came to us from many Illinois localities, in twelve different counties. About Jacksonville it appeared in corn fields within a radius of thirty miles from town. Whole fields were wilted more or less, and some hills entirely killed. As many as forty beetles were counted on one hill. An infested field near Manchester, in Scott county, was visited by an assistant July 19, 1892. The beetles were quite abundant in it, and the corn was very small (not over ten inches high) and pale and unhealthy looking. In 1891 similar injuries were recorded in Missouri and Indiana. In Maryland, in 1897, the first plantings of corn were ruined in parts of six counties. This flea-beetle seems especially fond of sweet corn, and also injures broom-corn and millet."

To anyone familiar with the disease, the description at once suggests bacterial wilt. The appearance of the fields, the fact that the sweet corn was most affected, and the fact that in Maryland the "first plantings" were ruined, all suggest this disease. Moreover, it has since been proved that this insect, *Chaetocnema pulicaria*, is one of those which carry *Aplanobacter stewarti*, the organism which causes bacterial wilt of corn. The accuracy of the records regarding the abundance of this insect in these years is, of course, unquestioned; the suggestion is merely that then, as now, it was carrying the bacterium and that part of the damage to the corn was due to bacterial wilt. Moreover, since the report above quoted was published in 1905, it seems fair to assume from the

statements that this insect was much less abundant in central Illinois in the years between 1892 and 1905 than it was in the years 1891 and 1892. The undoubted ability of Forbes and his associates as field observers, makes it all but certain that if *C. pulicaria* had become very abundant during any of the later years they would have seen and reported it.

Further indication of the probability of an epidemic of this disease having occurred in central Illinois in 1891 may be found in the weather records. The writer has elsewhere called attention to an apparent correlation between winter temperatures and the abundance of bacterial wilt.¹

In these earlier publications it was suggested as a working hypothesis, that bacterial wilt would usually be absent following winters with a temperature index below 90 and present in destructive amounts following winters with an index above 100, with intermediate conditions following winters with an index between 90 and 100, and that a series of warm winters would be worse than a single one. Winter temperature index, as used here, is a simple summation of mean temperatures for December, January, and February. The following table gives this index for each year, 1890 to date for Springfield, Illinois.

TEMPERATURE INDICES (SUMS OF MONTHLY MEANS) AT SPRINGFIELD, ILLINOIS FOR THE WINTERS PRECEDING THE GROWING SEASONS OF THE YEARS INDICATED

Year	Index	Year	Index	Year	Index	Year	Index
1890	122	1902	74	1914	94	1926	93
1891	98	1903	84	1915	87	1927	95
1892	94	1904	70	1916	87	1928	92
1893	70	1905	69	1917	82	1929	80
1894	86	1906	94	1918	67	1930	90
1895	76	1907	97	1919	105	1931	105
1896	96	1908	94	1920	78	1932	117
1897	93	1909	98	1921	104	1933	101
1898	92	1910	76	1922	92	1934	97
1899	74	1911	95	1923	93	1935	94
1900	89	1912	74	1924	93	1936	67
1901	88	1913	92	1925	89		

It will be noted that the winter preceding the summer of 1890 was the warmest for the entire period, that the index for the next winter was almost 100, and for the winter preceding the summer of 1892, was well above 90, while the next winter was notably cold, having the lowest index prior to 1904. In accordance with the hypothesis mentioned above and recent experience in the eastern states, one would have expected bacterial wilt to be bad during 1890, probably even worse in 1891, still abundant in 1892, and negligible in 1893. This is in accor-

¹ Stevens, Neil E., *Stewart's Disease in Relation to Winter Temperature: Plant Disease Reporter*, 18:141-149, 1934.

dance with the facts so far as known. Moreover, the whole picture corresponds closely with what occurred in the northeastern states a few years ago, as shown by the accompanying tables.

RELATION BETWEEN WINTER TEMPERATURES AND ABUNDANCE OF FLEA BEETLE IN CENTRAL ILLINOIS

Year	Winter index at Springfield	Abundance of Flea Beetle
1890.....	122	(No record)
1891.....	98	Highest of any year
1892.....	94	High but less than previous year
1893.....	70	Probably scarce

RELATION BETWEEN WINTER TEMPERATURES IN SOUTHEASTERN NEW YORK AND ABUNDANCE OF BACTERIAL WILT

Year	Winter index at West Point	Abundance of Bacterial Wilt
1932.....	108	Very bad
1933.....	99	Highest of any year
1934.....	70	Only a trace—No commercial loss

It is tempting to speculate on the possibility that winter temperatures affect the abundance of the flea beetle directly and that this accounts at least in large part, for the fluctuations in bacterial wilt. There is, however, as yet no evidence of that. In fact, we have been unable to find any adequate eastern record of the abundance of *Chaetocnema pulicaria* during the critical years of 1932, 1933, and 1934, which is one of the unfortunate results of the fact that those of us who do field work, habitually confine our observations to so few natural phenomena. This is almost pathetic, as is the fact that the student of the history of plant disease is driven to use such fragmentary clues as these here discussed.