Weather Pattern Effect on Corn

relationship between weather extremes, silk distortion, and blanking in sweet corn indicated by Coachella Valley studies

James W. Cameron and Donald A. Cole, Jr.

A peculiar distortion of silk growth related to an unusual weather pattern was associated with severe and widespread blanking—failure of seed set—in early sweet corn in Coachella Valley in 1958. As a result, much corn harvested in various areas of the Valley during the first two weeks of May was discarded as cull. Later harvests were of much better quality.

Effect of Winds

Earlier studies—1955–57—established a definite relationship between blanking and the occurrence of winds during the flowering period. High winds during morning pollinating periods can blow away the pollen so it does not alight on the silks. Under the drying conditions caused by such winds pollen can die within five minutes after being shed. If a strong wind occurs only during the first days of the flowering period, most ears are pollinated after the wind subsides. However, if there are such winds on the mornings of the last days of the flowering period, serious increases in blanking can occur among ears which began to silk during and after the middle of the period. Such winds were not frequent in the spring of 1958, and evidently were not the cause of silk distortion.

In early May, severe blanking was found in fields being harvested. Therefore, a series of plantings—belonging to various growers—were studied. Plots of 50–100 plants in uniform, vigorous areas of the fields were scored for time of flowering, plant and ear characters, and blanking.

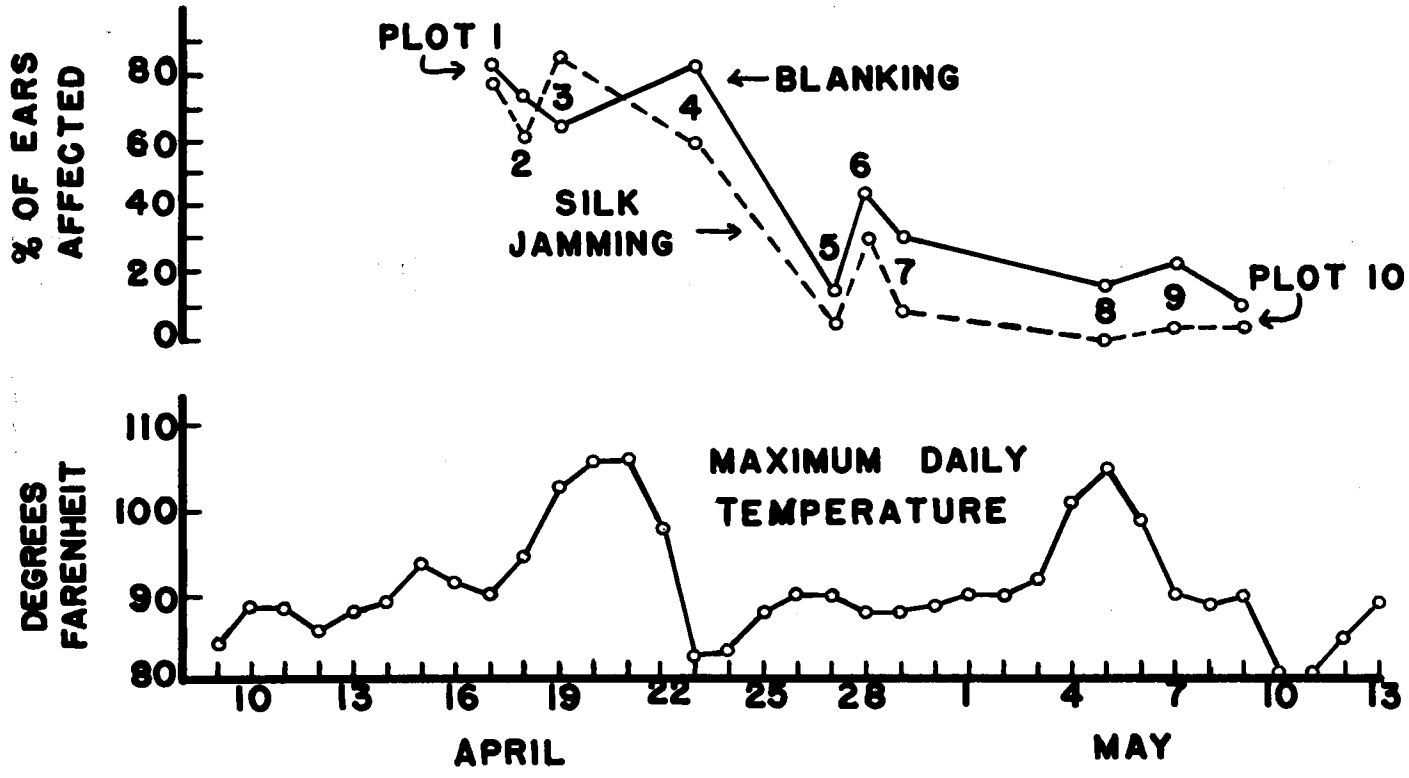
Silk Growth

It was immediately apparent that a distortion of silk growth—called jamming—was present in most of the ears which showed blanking. Many silks on these ears, instead of growing straight up and emerging from the husk tips, had grown first upward, then downward, and sometimes up and down again, within the husks. Other silks, usually from the basal ovules of the ear, had grown straight out in the normal manner. These silks led back to normally developed kernels while the jammed silks were usually attached to undeveloped ovules. In the left-hand photograph, two silk masses are separated to show the normal and distorted types of silk growth. The right-hand photograph is an enlargement of a fully developed kernel with a straight silk and an undeveloped ovule with a long silk in the approximate position in which it lay within the husks. The straight silk is detached, as normally occurs as the kernel matures.

Test Plots

Ten plots of corn were scored for blanking and silk jamming. The plots were at average first silking on the dates shown on the graph. The ears were harvested from 15 to 20 days after silking, between May 5 and May 22. The graph shows that the percentages of ears having

Relation between high April temperature, silk jamming, and blanking. Each pair of circles in the upper two graph lines, at a given date, represent a plot of corn which silked at that time.



blanking and silk jamming are closely parallel. The percentage of affected ears ranges from 58% to 84% for plots *1* to *4* which first silked between April 17 and April 22. The percentages decreased sharply in later plots, dropping to 0% to 19% for plots *8*, *9*, and *10*. In some cases the folded silks had finally emerged from the husks although usually too late for pollination. In the later maturing fields the total length of folding decreased sharply; in most cases none or only a little was found.

Weather Pattern Plotted

Weather patterns in Coachella Valley show unusual conditions in 1958 which were apparently responsible for the silk distortion. In most years the earliest plantings of spring sweet corn flower in late March and April. Temperatures are usually warm but not hot during this period. In May much higher temperatures occur, yet most fields flower and set seed satisfactorily. In 1958 unusually damp, cloudy weather prevailed during March and through the first week of April. Six periods of rainfall occurred. The maximum temperature during March was 81°F, and the average maximum temperature was only 71°F. After April 7 there was rapid warming. An early, unseasonably hot period occurred from April 19 to April 22 with temperatures reaching 103°F, 106°F, and 108°F on three successive days.

The lower line in the graph shows this sudden heat wave. It coincides closely with the silking times of plots *1* to *4*. These plots and other commercial fields which flowered at the same time were harvested during the first two weeks of May. It appears that the plants were in an extremely tender, succulent condition and that the sudden, excessive heat damaged the ear shoots in such a way that many silks were prevented from emerging and receiving pollen. The silks were not prevented from growing, as evidenced by the long, folded growth inside the husks. In most of the damaged ears the upper one fourth to one half of the silks and kernels were affected, as in the photograph. Basal silks, which are the first to emerge, usually grew normally. This suggests that a shriveling or tightening of the husk tissue reduced the opening of the silk channel and prevented the upper, later silks from emerging.

Combination of Factors

Considerable silk distortion and blanking were also evident in one plot—Plot *6*—which silked several days after the end of the hot period. This blanking might be attributed to other causes, were it not that typical silk folding was present. Apparently the abnormal effect on shoot growth sometimes carried over for some days after April 22.

The graph shows that a less severe hot period occurred on May 4, 5, and 6, during the silking periods of Plots *8* and *9*. However, there was little silk distortion and blanking was minor. Plants would be expected to be more tolerant of high temperature by that time.

High wind was evidently not the primary cause of the jamming. However, the break in the heat wave on April 22 was accompanied during the afternoon and evening by a severe drying wind. No doubt that wind increased over-all injury to the ear shoots. No strong morning winds such as would interfere directly with pollination occurred during this hot period. The specific series of events which brought about the damage is not likely to occur frequently.

James W. Cameron is Associate Geneticist in Horticulture, University of California, Riverside.

Donald A. Cole, Jr., is Principal Laboratory Technician in Horticulture, University of California, Riverside.

Weather records were obtained from the United States Department of Commerce Airway Observations Group, Thermal, California.

The above article is the second progress report on the blanking of corn based on Research Project No. 1380 by the same authors. The first was published in the December 1957 issue of California Agriculture *under the title, "Blanking and Shrivel Disorders of Fresh Market Sweet Corn."*

***Left*—ear with long, folded silks arising from undeveloped ovules near tip, and normal silks arising from normal kernels. *Right*—enlargement of a normal kernel and an undeveloped ovule with their silks.**