On the Phenology of Field Corn, Silking to Maturity

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SOFTE corn results when field corn is killed by freezing before reaching maturity. Freezing temperatures kill the foliage of the immature plant and stop further development of the kernels. The two properties of soft corn of most interest from an economic standpoint are its reduced dry matter content and its high moisture percentage. The first property results in lowered test weight or feeding value and lowered yield. The second creates a storage problem if corn is picked too early and/or if weather conditions following freezing are unfavorable for drying.

The seriousness of the soft corn problem in Iowa is sometimes underestimated. Since 1921 there have been 8 years in which more than 10% of the corn crop in Iowa was damaged by frost (13). During the period 1921–1945 the average amount of the corn crop damaged by frost was 12%. In 1924, 67% was damaged by an early freeze. The large loss in test weight in 1945, resulting from late corn not having reached maturity before a killing freeze occurred, brought renewed interest to the problem. In that year the average test weight of the Iowa corn crop was 5.6 pounds below the 10-year mean (1938–1947). In bushels this meant a loss of over 40 million bushels of corn in Iowa. It is apparent that both national agricultural planning and the individual farmer's planning demand early estimates of the actual amount as soon as a killing freeze has occurred.

Many of the definitions of maturity are based on external appearances such as denting or glazing of kernels, or browning of the plant. Others are based on internal measurements such as moisture content while a large number are not defined but state only ripe or mature. Kiesselbach (7), Hopper (6), Wallace and Bressman (15), Alberts (2), and Smith (11), using different definitions of ripe found values ranging from 48 to 60 days from silking to mature or ripe. Data taken by the Iowa Department of Agriculture over the period 1921–1945 gave an average length for the interval from silking to safe from frost. During this time the yearly averages showed a range of from 48 to 55 days. From these experiments it can be seen that the amount of soft corn occurring in a particular year should be closely related to the lateness of silking, given a freeze early enough to kill corn before maturity. The period silking to maturity is little affected by weather conditions. A thorough analysis of this period is difficult to make because of the variety of definitions used in the past, and the vagueness of some of them. It was with these facts in mind that this study was undertaken to evaluate the different measures of maturity. Such information would be beneficial in developing methods of forecasting the time of maturity of corn and could be further used to estimate the contingency and actual amount of soft corn.