Corn Hybrid Maturity Management for the Central and Northern Corn Belt

D. R. Hicks, University of Minnesota
G. O. Benson, Iowa State University
D. Bullock, University of Illinois

Reviewers
P. Carter, University of Wisconsin *B. Reiss, Asgrow Seed Co., Inc.*
R. Nielsen, Purdue University *D. Wright, University of Florida*

The objectives of planting corn hybrids of different maturities are to 1) produce maximum profit, 2) minimize risk due to adverse weather conditions, 3) allow a longer harvest period when grain is near optimum moisture content for combining, and 4) allow harvest to begin early.

At one time agronomists recommended planting the short-season hybrids first, followed by mid- and full-season hybrids, successively. However, for corn production in the central and northern Corn Belt states, a better maturity management scheme is to plant full-season hybrids first, follow with mid-season hybrids, and plant early hybrids last. This publication discusses the basis for this maturity scheme.

Data presented are from three years and three locations in southern and central Minnesota. In this article, hybrids differ by 15 relative maturity days (Minnesota relative maturity), which is a large difference in maturity and may be larger than most corn farmer attribute to the terms “short,” “mid,” and “full.” However, while the data presented are from southern and central Minnesota, the concept applies throughout the central and northern Corn Belt. Although hybrids that are termed short-, mid-, and full-season are different hybrids as the location moves from north to south, the effects of planting date on yield, pollination date, and maturity date are similar. Actual calendar dates of optimum planting date and dates of pollination and maturity will, of course, vary with location.

Grain Production and Profit

Production costs and yields are major factors affecting profit from the corn enterprise. An individual’s decisions on production inputs will fix production costs. Management to produce the most grain from an individual’s corn acres will result in maximum profit from these inputs, at any corn price. Therefore, total grain production from all corn acres should be a producer’s objective.

With adequate rainfall or available moisture, highest yields are produced with early planting dates for all corn hybrid maturity groups. However, yield reduction with delayed planting is greatest for full-season hybrids compared with that of earlier hybrids (Figure 1). Therefore, maximum grain production occurs if the full-season hybrids are planted before the earlier maturing hybrids. For maximum production, all groups of hybrids should be planted early, with a major portion of the acreage planted to high-yielding, full-season hybrids.

In Minnesota trials with planting dates from April 24 to June 1, full-season hybrids always yielded higher than mid-season hybrids, which in turn yielded higher than short-season hybrids. For optimum planting dates (late April to early May in Minnesota), the full-season hybrids yielded 18% (20 bu/a) more than the mid-season hybrids, and they, in turn, yielded 16% more than the short-season hybrids. Yield differences due to maturity will be less when a smaller difference in maturity occurs between maturity groups.

IOWA STATE UNIVERSITY
University Extension

NCH 37 March 1991
Electronic version July 2001

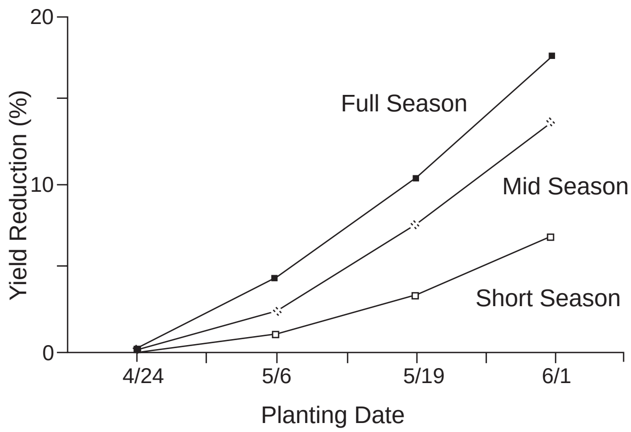

Figure 1. Corn grain yield reduction for three corn hybrid maturity groups planted through the month of May in Minnesota.

Full-season hybrids should not be planted after May 20-25 in most of the Corn Belt because they are unlikely to reach maturity before frost. Grain moisture content of late-planted, full-season hybrids will be higher and drying costs greater compared with that of late-planted, earlier maturing hybrids. Test weight may also be lower on the late planted, full-season hybrids.

The terms “full-,” “mid-” and “short-season hybrids” are relative and apply to normal planting dates. For example, 110 RM hybrids are full-season hybrids for southern Minnesota if planted prior to May 20. After May 20, they are not maturity adapted because they are unlikely to reach maturity before the average frost date. Hybrids with lower maturity ratings then become “full season” for the late planting dates. For example, 100 RM hybrids are “full-season” hybrids for southern Minnesota when planted between May 20 and 25. As planting is delayed, they, too, may not be maturity adapted because of the limited remaining growing season.

Many times corn is planted over a period during which soil conditions prevent continuous planting. If the full-season hybrids are planted first, seed exchanges may not be necessary to have hybrids that are maturity adapted for a late planting season. It may be difficult to return seed of full-season hybrids and obtain seed of good-performing, earlier hybrids. Therefore, planting the full-season hybrids first provides a hedge against this problem if planting is partially delayed because of weather conditions in the central and northern Corn Belt.

In the southern and southeastern U.S., grain yields of currently available hybrids are not affected by maturity differences as discussed here. As an average, short- and mid-season hybrids generally yield higher than full-season hybrids when grown under irrigation. However, full-season hybrids often produce higher yields than early and mid-season hybrids when planted late because of summer rains that normally occur during the grain filling period of full-season hybrids. When planted early, short- and mid-season hybrids often go through periods of no rain that may last from 4 to 6 weeks in April, May, and June. Husk coverage and grain quality are often poorer on short- and mid-season hybrids than full-season hybrids used in the southern U.S.

Harvest Maturity Order

Calendar dates of reaching 32% kernel moisture are given in Figure 2 for three hybrid maturity groups planted from late April through May. (32% kernel moisture occurs at or near the same time of physiological maturity.) For all maturity groups, maturity occurs at later dates when planted later. However, late-planted, short-season hybrids will mature before early-planted, full-season hybrids if the early hybrids are planted prior to late May. If mid-season hybrids are planted before mid-May, they will mature before early-planted, full-season hybrids. These differences in maturity dates will be reduced when smaller differences exist in short-, mid-, and full-season hybrids. Planting all maturity groups as early as possible maximizes the spread in harvest maturity dates. For example, the greatest spread in harvest maturity dates occurs when all maturity groups are planted in late April.

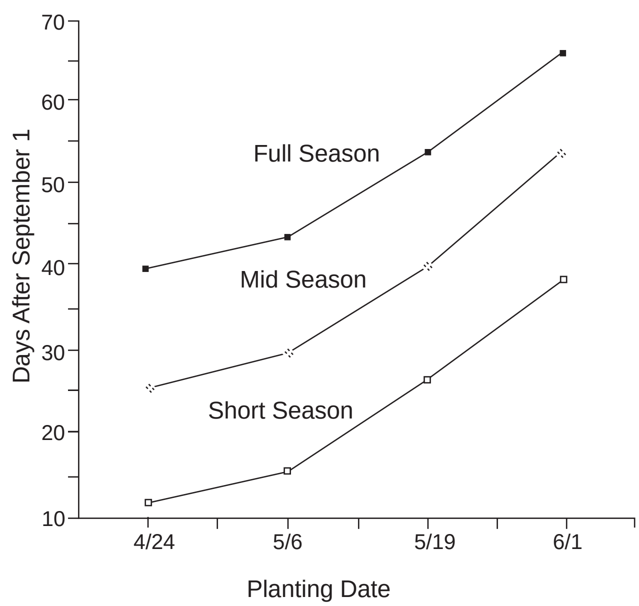

Figure 2. Maturity date (32% kernel moisture) for three corn hybrid maturity groups planted through the month of May in Minnesota.

Scheduled Harvest

Harvesting corn when grain moisture is between 23 and 27% minimizes both harvest loss and kernel damage. The effect of planting full-season hybrids first on pollination period and time when grain is between 23 and 27% moisture is given in Figure 3. The planting scheme in Figure 3 provides for planting the

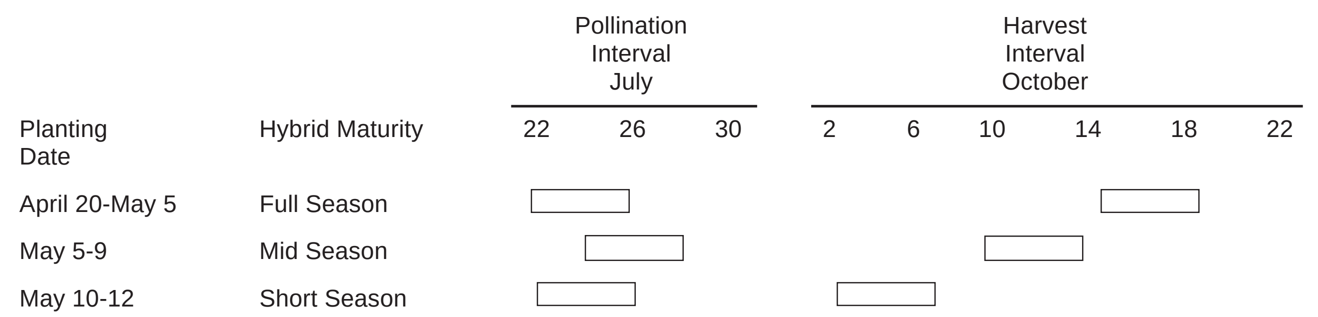

Figure 3. Pollination intervals and fall calendar dates when kernel moisture is in the harvest range of 27 to 23% for three corn hybrid maturity groups when the full-season hybrids are planted first, followed by planting the mid- and short-season hybrids.

full-season hybrids by May 5, followed by 4 days of planting mid-season hybrids and 3 days of short-season hybrids. A greater time interval is allocated to planting full-season hybrids because a major portion of the acreage should be planted to the higher yielding, full-season hybrids.

With this example, pollination would occur for all maturity groups during the last part of July. Pollination dates can be spread over a greater number of calendar days by planting the early hybrids first. But pollination for later planted, full-season hybrids then occurs during early August, when there is a greater probability of higher temperatures and soil moisture shortages which adversely affect pollination. And later planting of full-season hybrids results in substantially lower grain yields in the central and northern Corn Belt.

With the scheme in Figure 3, early hybrids are between 23 and 27% kernel moisture content during early October, while mid-season and full-season hybrids are in that moisture range during mid and late October, respectively. Actual calendar dates for both pollination and harvest intervals may vary with years, locations, and hybrids, but the relative order of these events will occur as described.

Summary

Corn maturity management of planting full-season hybrids first, followed by mid- and short-season hybrids, maximizes the grain production and quality of corn for the central and northern Corn Belt. Grain is in the harvestable moisture range for a longer period to facilitate harvest with minimum field loss. Although the data used were from Minnesota and there were large differences (15 RM days) among short-, mid-, and full-season maturity groups, the principles described should apply throughout the central and northern Corn Belt states.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

File: Agronomy 2-2