A Comprehensive Guide to CORN MANAGEMENT IN KENTUCKY

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Introduction

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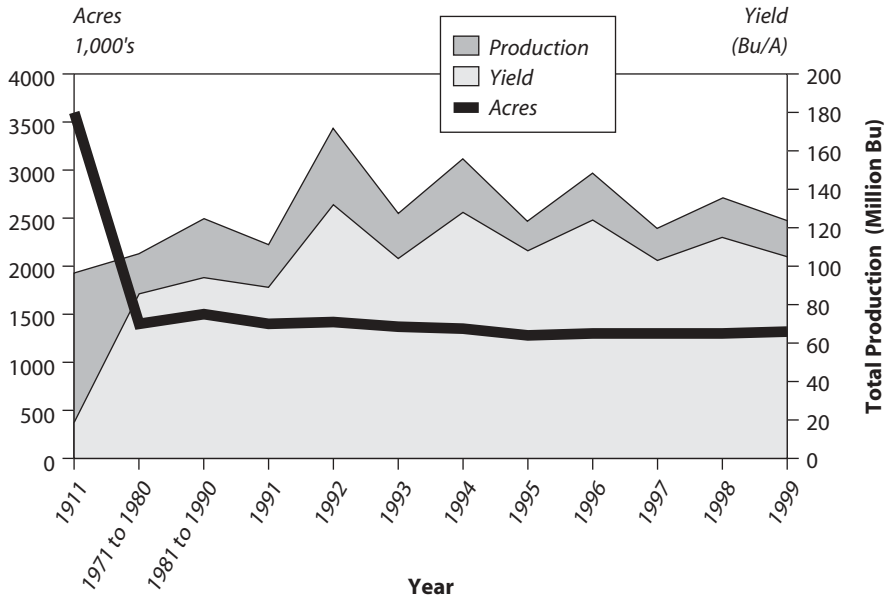
The corn (*Zea mays* L.) grown in Kentucky is used mainly for livestock feed (60 percent) and as a cash crop. As a cash crop sold from the farm, corn ranks third behind tobacco and soybeans but is the number one row crop in terms of acreage. However, in total crop value, as reported by the Kentucky Agricultural Statistics Service, corn ranks third after tobacco and hay. Corn is grown in every county in Kentucky, with a major portion of the acreage in Western Kentucky. Corn acreage in Kentucky dropped from a high of 3.6 million acres in 1911 to a low of 1.13 million acres in 1972. Acreage increased slightly in the 1980s to an average of 1.5 million acres but then declined to an average of 1.34 million acres in the 1990s (Figure 1).

Corn yields have risen dramatically over the last few decades. The average state yield in the 1970s was 85.5 bushels per acre; in the 1980s, 94.1 bushels per acre; and in the 1990s, 112.0 bushels per acre. Since 1990, the highest state average ever was 132 bushels per acre in 1992, and the lowest average during this period was 100 bushels per acre in 1991.

Because the cost of producing an acre of corn is high and the value per bushel has declined in recent years, producers must manage and market their corn crop more carefully for adequate profits. The goal of this publication is to serve as a guide for corn production strategies that focus on efficient use of resources and provide the principles and practices for obtaining maximum, profitable corn yields.

With the introduction of biotechnology in the marketplace, producers now have to make a new decision when selecting corn hybrids. Biotech-derived crops have been altered and improved to include resistance or tolerance to pesticides and improved food and feed qualities. A more thorough discussion of the impact of biotechnology on corn production is presented later in this publication.

Figure 1. Acreage, yield, and production in Kentucky.



Types of Corn

Corn may be classified by kernel characteristics such as dent, flint, flour, sweet, pop, and pod corn. Except for pod corn, these types are based on the endosperm composition of the kernel. The quantity or volume of endosperm determines the size of the kernel (e.g., the difference between dent and flint corns or flint corn and popcorn) is polygenic (controlled by many genes). The pod corn trait is monogenic and more of an ornamental type.

This publication deals mostly with the dent corns that originated from the hybridization of the southern dent or late-flowering maize race called Gourdseed and the early-flowering northern flints. Dent corn is characterized by the presence of corneous, horny endosperm at the sides and back of the kernels. The central core is a soft, floury endosperm extending to the crown of the endosperm where, upon drying, it collapses to produce a distinct indentation.

Dent corn is used primarily as animal food but also serves as a raw material for industry and as a staple food. There are two types of dent corn, yellow and white. Except for some sweet corn and popcorn, dent corn is the main commercial type of corn grown in Kentucky. The majority of dent corn in Kentucky has yellow kernels; however, Kentucky is one of the leading states in the production of white corn, which is grown mainly for the food industry and is about 10 percent of the total corn acreage. In 1995, Kentucky

had 116,000 acres of white corn, and this acreage remains fairly constant from year to year. Very little flint or flour corn is grown in the United States. Pod corn is mainly a curiosity and is not grown commercially.

Special-Purpose Corn

Some corn hybrids have been altered genetically to produce changes in starch, protein, oil, or other properties of the kernels. Some of these special-purpose corns grown in Kentucky are waxy, high-amylose, high-lysine, high-oil, and low-phytate varieties. A very limited acreage of waxy and high-amylose corn is being grown, and only a few swine producers are raising high-lysine corn, but several thousand acres of high-oil corn are contracted each year in Kentucky.

Waxy corn is used as the raw material for the production of waxy cornstarch by wet-corn millers for industry and food uses. Waxy cornstarch contains more than 99 percent amylopectin, whereas regular corn contains 72 to 76 percent amylopectin and 24 to 28 percent amylose. High-amylose corn has an amylose content greater than 50 percent. It is grown exclusively for wet milling for the textile industry, gum candies, biodegradable packaging materials, and as an adhesive in the manufacture of corrugated cardboard. High-lysine corn contains the single recessive gene, opaque-2, that reduces the zein in the endosperm and increases the concentration of lysine, thus improving the nutritional quality of the grain. Its primary use in the United States is feed for nonruminants.

The most recent improvement in special-purpose corn has been the development of hybrids with higher concentrations of oil. The high-oil seeds are produced by a topcross procedure in which the planted seed is a mixture of 9 percent of a very high-oil inbred pollinator seed and 91 percent seed of a male-sterile, high-yielding, single-cross hybrid. The seed produced contains upwards of 8 percent oil compared to a normal hybrid, which contains only 3.5 to 4 percent oil. The added oil makes a high energy feed. Most high-oil corn is contracted and sold at a premium price. The average yield of these high-oil hybrids has usually been about 10 percent lower than normal hybrids. It is usually recommended to plant these at a 10 percent higher seeding rate in an effort to offset some of this yield loss.

Another recent development has been the testing and release of low-phytate corn hybrids. Phosphorus in regular corn is stored as phytate, but phosphorus in kernels of low-phytate corn is digested more efficiently. This results in lowering the need for supplemental phosphorus, better use of the phosphorus by the animal, and less phosphorus excreted into the environment. Initial tests of low-phytate corn hybrids have been encouraging, but economic viability remains to be determined.

Special-purpose corns are usually grown under contract at a price premium. It is important to understand the contract requirements before the special-purpose corn is grown. There may also be certain recommended production management practices, e.g., soil type, fertility, population, planting date and harvest, drying, and handling practices to obtain the highest possible yields while maintaining grain quality. It is important that grain identity of special-purpose corns be preserved from planting through storage to avoid contamination that would eliminate premium prices and decrease marketability. Special-purpose corns also require isolation from other corn to eliminate cross-pollination.

Most, but not all, special-purpose corns have an inherently lower yield compared to normal dent-corn hybrids. However, special-purpose corns can compensate for this reduction in yield potential with adequate premiums. Before producers decide to grow a specialty corn, it is imperative that they determine potential yield reductions, production risks, contract requirements, and the premium amount needed to ensure a profitable return. Because of improved hybrid development, the yield of some specialty corns has improved as compared to normal hybrids.

White and Yellow Food Grade Corn

Kentucky is one of the leading states in the production of white and yellow corn for food. Food grade corn is used to make corn flakes, tortilla flour, and cornmeal. The hybrids for this market are usually selected by the company offering the production contract. The regional testing of the yellow food corn hybrids has been discontinued; however, the white food corn hybrids are still being tested, and results are available from the University of Kentucky corn testing program.