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POPCORN

R. B. Ashman, Associate Professor of Botany

Popcorn, along with all other types of corn, originated in the Americas, and some believe it is the earliest form of corn. Popcorn was used by the Indians of the Western Hemisphere in pre-Columbian times. Probably one of the first popping methods was placing popcorn on stones heated on a fire, or by tossing it into hot ashes and letting it pop out. Later, clay pots were widely used and are still in common use in some areas of Mexico, Guatemala, and Peru. Popcorn does not appear to have been widely used in colonial America, however. By the late 1800s the popping of corn was widespread, and popcorn was becoming a commercially important crop. Prior to 1940, open pollinated varieties were used in most commercial production, and the major varieties were Super gold, South American, White Rice, and Japanese Hullless.

Popping

Popping corn in the home is most convenient if you use one of the many types of small electric poppers now on the market. A heavy bottomed frying pan or sauce pan with a cover can also be used and can give better results than small electric poppers, which sometimes do not have large enough heating elements to maintain the temperature necessary for maximum popping expansion.

Popcorn can be popped dry or in an edible oil, but expansion is always better if oil is used since the kernels are heated more evenly. Oil should never be used in the hot air type poppers now on the market. When popping in oil, the amount should be about one third the amount of popcorn (by volume), and the oil should be preheated in the popper before adding the popcorn. Most salad and cooking oils are satisfactory, but butter and margarine should not be used since they cannot be heated enough without burning.

After the corn is added to the preheated oil it should begin to pop in 1½ to 2 minutes and should complete popping in 3½ to 4 minutes. If either of these times is much longer it is likely that popping expansion can be improved by modifying the procedure. Both of these times can be shortened by preheating the oil to a higher temperature or by reducing the amount of corn being popped at one time. A little experimentation can ensure that you get the best possible performance from your particular popper.

Popping Characteristics

The popcorn industry has adopted several useful terms to describe different popping characteristics. A kernel of popcorn is called a “flake” after it has been popped. Flakes are classified into two types although the distinction is not sharp and intermediates occur: butterfly flakes, which have an irregular winged appearance and are the most common, and mushroom flakes, which are nearly round.

Popcorn generally moves in commercial channels in three kernel types: small yellow, large yellow, and white. The three types fill different needs within the industry. Vendors of popped corn prefer the eye appeal of the large kernel hybrids that pop into a large butterfly flake, even though large flakes can be tough and hully. The home popping trade generally prefers the small yellow or white hybrids, which are very tender with little hull. Manufacturers of carmeled corn prefer popcorn that pops with a mushroom flake because it does not break up under handling, even though this type of flake is usually obtained with some sacrifice in tenderness.

Popcorn Processing

The commercial processing of popcorn involves a sizable investment in cleaning, grading, and packaging equipment. Most popcorn is now shelled in the field as it is harvested, and the grower delivers the shelled corn to the processor. The first step in processing is to dry the popcorn to about 14 percent moisture for maximum popping expa-
sion. Popcorn should be dried slowly with little or no application of heat. Rapid drying reduces popping expansion. When the popcorn reaches the proper moisture, it is graded for size, cleaned, fumigated for insect control, and packaged in a manner to prevent further moisture loss.

Improper drying is one reason home gardeners often are disappointed with popcorn they have grown. Few home gardeners are equipped to test grain moisture, and they do not know when the popcorn has reached the optimum moisture content for best popping expansion. Popcorn at the proper popping moisture can be stored indefinitely in moisture-proof containers in the home refrigerator.

Popcorn can become infested with several different types of insects if not fumigated or stored under refrigeration. If popcorn is stored in a freezer at 0°F or colder for 5 days, insects or insect eggs will be killed, and it can then safely be stored at room temperature, if in tightly closed moisture proof containers to prevent reinfestation and moisture loss.

Probably the major difficulty in obtaining good quality popped corn in the home is maintaining the proper moisture in the unpopped popcorn for maximum popping expansion. Even carefully handled popcorn from a hybrid with a high potential popping expansion will not pop satisfactorily if the kernel moisture drops much below 14.0 percent. During the winter months, the air inside homes can be very dry, and popcorn left in an open jar can easily lose 1/2 percent moisture in 24 hours and even more if left in a shallow pan or paper bag. Under these conditions only 3 or 4 days are required for high quality popcorn to lose much of its popping ability. Popcorn is best stored in a container with a screw-type moisture-proof lid, and if purchased in a plastic bag it should be transferred to a container of this type.

Popcorn that has become too dry to pop satisfactorily has not likely been permanently damaged. If water is added to bring the kernel moisture back up to the proper level, nearly full popping ability will be restored. A tablespoon of water added to a quart of popcorn will raise the moisture level about 1/2 percent. After water is added the corn should be stirred or shaken to distribute the moisture evenly. Then allow the corn to stand in a sealed container at room temperature for 2 or 3 days before popping; it is important that the water be distributed evenly through all the kernels.

**Popcorn Breeding**

Popcorn breeding and testing at Purdue University was started in 1938 when Arthur M. Brunson came from Kansas and brought a large collection of popcorn breeding material. The popcorn program has continued without interruption since. For many years Purdue had the only publicly supported popcorn program; however, both the Iowa and Nebraska Agricultural Experiment Stations have initiated investigations recently into various areas of popcorn research. The Purdue program serves the popcorn industry by developing new inbreds and hybrids and by conducting performance trials in the major popcorn production areas of the U.S.

The breeding procedures used for popcorn improvement are essentially the same as those employed for other types of corn. Progress is often slower, though, because popping expansion must be considered in addition to such agronomic characters as yield, stalk strength, and disease resistance. High popping expansion is dependent upon the presence of probably 4 or 5 major genes with a number of minor genes contributing to such other characteristics as hull thickness and texture and tenderness of the flakes. The development of superior inbred lines involves collecting many of these desirable genes into each line. Hybrids are produced by crossing the inbred lines, and the crosses are tested over several years at different locations to identify the best combinations.

The first popcorn hybrid was released in 1935 by the Minnesota Agricultural Experiment Station. It was adaptable to only the northern edge of the Corn Belt and never became widely used by commercial popcorn growers. The first hybrids adapted to the central Corn Belt were released by the Indiana and Kansas Agricultural Experiment Stations in the early 1940s. By the late 1940s these hybrids had completely replaced the open pollinated varieties for commercial plantings. Hybrids are superior in yielding ability, stalk strength, popping expansion, and uniformity of plants and ears.

The ideal popcorn hybrid means different things to different people. To the grower it is a hybrid that yields well and has a strong stalk and good disease resistance. To the consumer, it has a tender flake and is free from objectionable hulls. Many commercial hybrids involve some compromise between these different requirements, but the ultimate goal of the plant breeder is to bring together into one hybrid all the requirements of the grower and the consumer.

Commercial popcorn production is currently centered in the Corn Belt states. For many years Indiana and Iowa alternated as the leading producer. However, production recently shifted to the more western Corn Belt area, and Nebraska is now the major producing state. Indiana is second in popcorn production and with Nebraska accounts for about 60 percent of total U.S. production. Iowa and Ohio produce another 20 percent.