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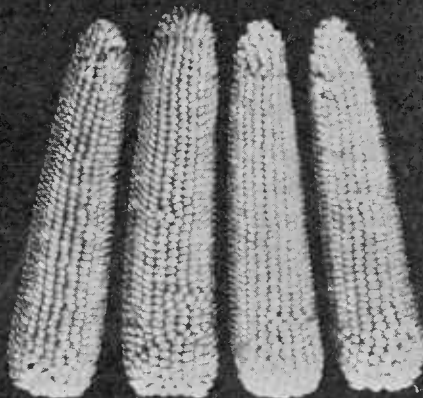
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POP CORN FOR THE MARKET



THE POP-CORN CROP is of slight importance when compared with field corn, most of it being grown in small patches for home use. In northwestern Iowa and eastern Nebraska, however, where the bulk of the market supply is produced, it may take the place of field corn in the rotation. In this section large storage cribs and elevators have been built at railroad stations by dealers who buy the crop direct from farmers at harvest time.

The culture of pop corn is similar to that of other corn. A well-drained and fertile soil should be selected. In the North the crop should be planted early, so it will ripen before frost. From 5 to 7 pounds of seed will plant an acre. For best results in popping, the ears should ripen fully on the stalk before harvesting and should then be stored in well-ventilated cribs to cure. Where grown on a commercial scale yields of from 2,000 to 4,000 pounds per acre are reported.

Pop corn is valuable only as it can be used for popping purposes. The market supply is taken by manufacturers of pop-corn confections, by pop-corn vendors, and by the retail trade.

Contribution from the Bureau of Plant Industry

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POP CORN FOR THE MARKET.¹

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DESCRIPTION OF POP CORN.

THE PRINCIPAL CHARACTERISTIC that serves to distinguish pop corn from other kinds of corn is the tendency of its kernels to evert or turn inside out on being heated. This peculiarity has given rise to the scientific name of *Zea everta*, by which term pop corn is known to the botanist. It differs from the flint type of corn in having a larger proportion of horny substance (corneous endosperm) constituting the starchy portion of the kernel. The ears and kernels are smaller than those of field corn and the stalks more slender and more inclined to show a purple color. Most varieties ordinarily bear more than one ear to the stalk. The origin and early history of pop corn are not known, but evidences seem to indicate that it was grown by the Indians.

TYPES AND CLASSES OF POP CORN.

Pop corn is of two well-defined types—the rice, with sharp-beaked kernels, and the pearl, with smooth or rounded kernels. Each of these two types may be subdivided into a number of different classes or varieties, according to color, size, and time required to mature. The subdivision of these two types according to these characters has given some 25 or more varieties of pop corn.

¹ For information regarding the home uses of pop corn, see Farmers' Bulletin 553, entitled "Pop Corn for the Home."

There is no demand for the colored varieties. Some of these have excellent popping quality and good flavor, but as the popped kernels do not completely hide the colored hull, they do not make as attractive an appearance as the white varieties. The less coloring matter there is in the hull or seed coat the more attractive will be the snowy white mass of popped kernels.

Of the pearl type the principal varieties are the White Pearl, Queen Golden, and Eight-Rowed. All of these are grown to a limited extent as compared to White Rice. Because of the large size of its popped kernels the Eight-Rowed variety is in demand at Christmas time for decorative purposes.

The White Rice variety is grown most extensively and is preferred on the large markets and by pop-corn venders. This variety is usually listed by dealers under the common name of White Rice. Some seedsmen have selected strains which they offer under special names, as Improved White Rice, Snowball, Early White Rice, Monarch White Rice, Old Homestead, etc.

EXTENT OF PRODUCTION.

Pop corn is grown in practically all of the States of the United States. The main portion of the market supply, however, comes from Sac and Ida Counties, in Iowa, and Valley and Greeley Counties, in Nebraska. In Iowa the principal centers of production, according to the most recent reports, are at Odebolt, Arthur, Idagrove, Battle Creek, Schaller, and Wall Lake; and in Nebraska at Arcadia, Bloomfield, North Loup, Ord, and Scotia. The latest available figures on acreage are those from the 1909 census, when 5,345 acres were reported in Iowa and 2,167 acres in Nebraska. The yield per acre has been reported as ranging from 1,600 to 4,000 pounds.

POPPING QUALITY.

THEORY OF POPPING.

The exact nature of popping is not well understood. Formerly it was supposed to be caused by the expansion of oil in the kernel on being heated, but at the present time it is believed to be due to the expansion of the moisture contained in the starch cells. The general belief now is that on the application of heat, as from a good bed of coals, this moisture expands with sufficient force to cause an explosion of the cells and the kernel turns inside out, practically enveloping the embryo and hull. It is probable that the expansion of the air within the seed coat also has something to do with the popping. The seed coat should be sufficiently dry and hard to afford much resistance to expansion.

FACTORS INFLUENCING THE POPPING QUALITY.

Careful tests have shown that the pollination of white pop corn with pollen from field corn affects the flavor, texture, and color of the popped kernels that were cross-pollinated. In other words, the planting of good, pure pop corn within 10 or 20 rods of field corn is likely to ruin both kinds for seed and injure the popping quality of the pop corn.

To give satisfactory results in popping, corn should ripen fully on the standing stalk before frost and should then be stored where it will have sufficient ventilation, so it will not heat in curing. The kernels should be practically free from soft white matter in



FIG. 1.—A field of drilled pop corn, planted too thick for best results. Note the curling of the blades due to the thick stand and dry weather.

the endosperm and should have a moisture content of about 12 per cent. If properly stored, pop corn will retain its popping quality for a number of years.

INCREASE IN VOLUME DUE TO POPPING.

Good grades of pop corn will increase in volume from twelve to twenty times on popping. In popping there is usually more or less waste, due to imperfections in the kernels, slow or uneven application of heat, or other causes. Factories have reported from 7 to 25 per cent of waste in commercial grades of pop corn.

CULTURE OF POP CORN.

SOIL.

Any soil that is adapted to field corn will produce pop corn. For the best results the soil should be fertile and well drained. Avoid low

muck or peat soils, as they tend to delay ripening in the fall. Where grown for commercial purposes pop corn usually takes the place of the ordinary field corn in a rotation. Pop corn, oats, and clover make a good rotation, growing these crops in the order named. The clover may be sown with the oats. The land may be plowed in the fall or early spring. Old sod land, however, should be plowed in the fall, to expose the worms and insects to the freezing temperatures of winter.

PLANTING AND CULTIVATING.

Pop corn should be planted early, so it will have a long season in which to grow and mature. It is advisable to plant as soon as the ground is warm enough for good germination of the seed. The seed



FIG. 2.—A field of pop corn planted in hills. Pop corn has a stronger tendency to sucker than field corn; on rich ground it often suckers profusely.

bed should be thoroughly harrowed and pulverized. The rows may be laid off about $3\frac{1}{2}$ feet apart and the kernels dropped from 8 to 10 inches apart in the row. If it is desired to cultivate the pop corn both ways, a stand of three or four plants per hill with the hills 3 feet 4 inches apart each way will be thick enough. Pop corn has a strong tendency to sucker when planted thinly, especially on rich ground (figs. 1 and 2).

From 2 to 4 quarts will plant an acre, depending on the size of the kernels and the thickness of planting. A quart of White Rice pop corn contains about 7,000 kernels. There will be 3,920 hills per acre if the hills are 3 feet 4 inches apart each way. If planted at the rate of 4 kernels per hill, it will take 15,680 kernels, or a little over 2 quarts, to plant an acre of 3,920 hills. If the kernels are dropped 8 inches apart in rows $3\frac{1}{2}$ feet apart, it will take about the same quantity to plant an acre. The usual quantity of White Rice pop corn planted per acre is about 5 pounds.

An ordinary corn planter may be equipped with the special plates necessary for planting pop corn. For planting the common rice pop

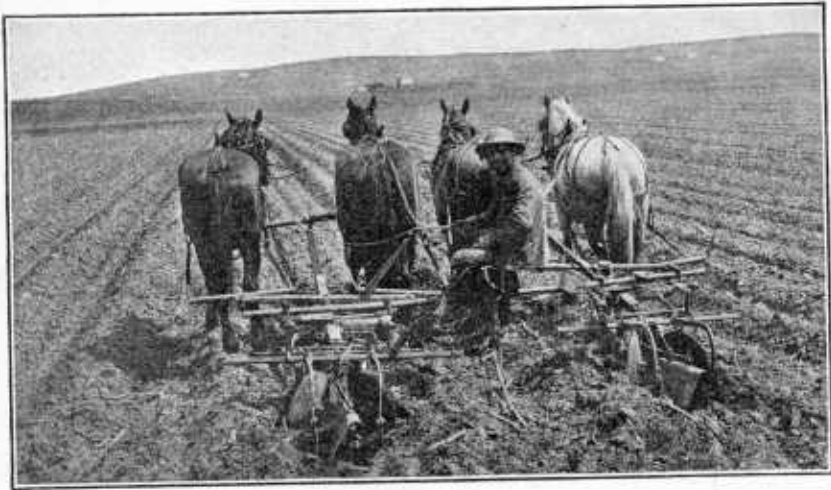


FIG. 3.—A 2-row cultivator used on listed pop corn. The middle row is cultivated on the return trip.

corn the holes in the plates should be three-eighths of an inch in diameter, countersunk on one side.

Begin cultivation as soon as the plants are a few inches high. Repeat the cultivation every week or 10 days, and oftener if heavy rains cause the surface to become crusted. Prepare a deep seed bed before planting and cultivate shallow after planting. For types of cultivators see figures 3 and 4.

RIPENING.

Pop corn ripens in 100 to 130 days from planting. The ripening may be hastened by liberal applications of a phosphatic fertilizer, but is sometimes retarded by the use of too much stable manure. It should ripen before frost comes; otherwise its popping quality will be injured and it will then have little value for marketing.

HARVESTING AND STORING.

The crop can be harvested as soon as it has fully ripened and the husks have whitened, provided the ears are not bulked but are so



FIG. 4.—A shovel cultivator used in growing pop corn.

placed that they will dry quickly. The best quality of pop corn is obtained by allowing the ears to ripen fully and dry out as much as possible on the standing stalks. Cutting the stalks with a corn

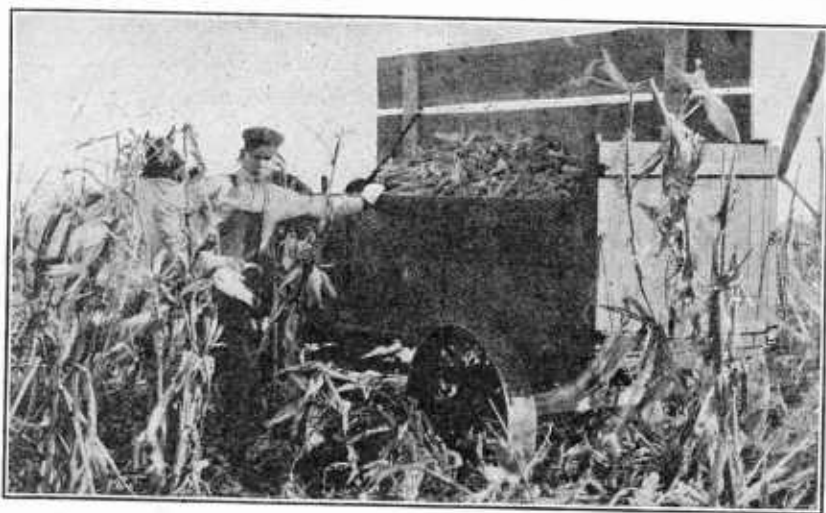


FIG. 5.—Picking pop corn by hand from the standing stalks.

binder and shocking up the bundles in the field to allow the pop corn to cure is not recommended. The most satisfactory way of harvesting is by hand from the standing stalks (fig. 5). Some farm-

ers use a modern corn harvester (fig. 6), and in some sections pop corn is husked from the shock.

The husked corn should be stored in well-ventilated cribs where it can cure without heating (figs. 7, 8, and 9). If the crib is wide, a special A-shaped ventilating device should extend through the mid-



FIG. 6.—Gathering pop corn with a modern corn-harvesting machine.

dle of the crib lengthwise, and provision should also be made for ventilating crosswise (fig. 10). If pop corn is not supplied with a free circulation of air while curing, it is likely to heat, and this heating will injure the popping quality and also the food value.

MARKETING.

Pop corn will not be ready for marketing until the summer following the season in which it is grown. Manufacturers say it should not

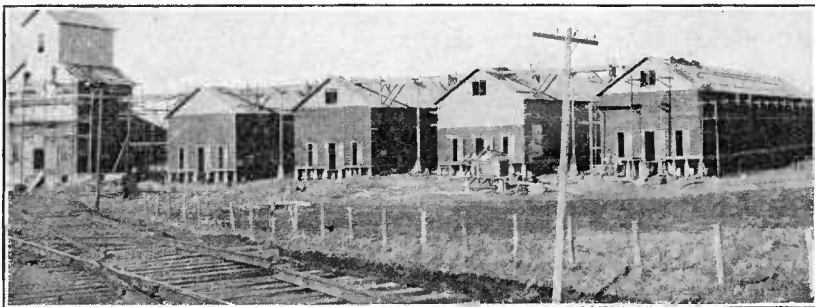


FIG. 7.—Elevator and pop-corn cribs at Arthur, Iowa. Each crib has a capacity of 18,000 bushels of ear corn.

be put on the market before June 1. Growers often sell their crop by the pound on the ear to elevator men, who store it in cribs and shell it as needed for the market. In some cases farmers sign contracts at the time of planting in which they agree to deliver the yield of entire fields at harvest time at a certain price per pound of ears.

Some growers have well-constructed cribs of their own in which they store the crop and sell direct to the consumer. This enables the growers to hold their crop until it can be marketed advantageously. Pop corn is usually shelled and put up in 100 or 150 pound bags for the trade.



FIG. 8.—Elevator men taking in the crop at time of harvesting, Odebolt, Iowa.

Where grown for local markets, as in the Eastern States, it is usually sold on the ear to merchants who retail it to consumers. A considerable quantity of shelled pop corn is put on the market in 1-pound pasteboard boxes, in which form it is convenient to handle. The market prices of pop corn vary considerably from time to time. In 1908 the price on the general market was as low as three-fourths of a cent, in 1912 as high as 6 cents, and in 1919 as high as 12 cents a pound. Retail dealers usually charge higher prices.

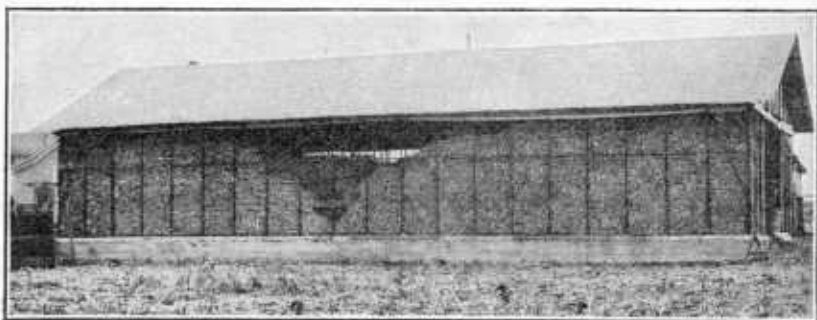


FIG. 9.—A rat and mouse proof crib having a concrete foundation, an iron frame covered with wire netting, and storm curtains on sides and ends.

In most States the weight per bushel is the same for pop corn as for field corn, 56 pounds shelled or 70 pounds of ears, air dried, constituting a bushel. One hundred pounds of ears should give 80 pounds of shelled pop corn.

SEED PLAT.

It is advisable to have a seed plat planted with exceptionally good seed and in an isolated location, to furnish seed for the next year. In this plat all weak, barren, or otherwise inferior stalks should be detasseled just as soon as the tassels appear and before they have shed any pollen. At harvest time the rows should be gone over and the seed ears selected from the best stalks. Early maturity is desirable in northern localities and can be attained by taking seed each

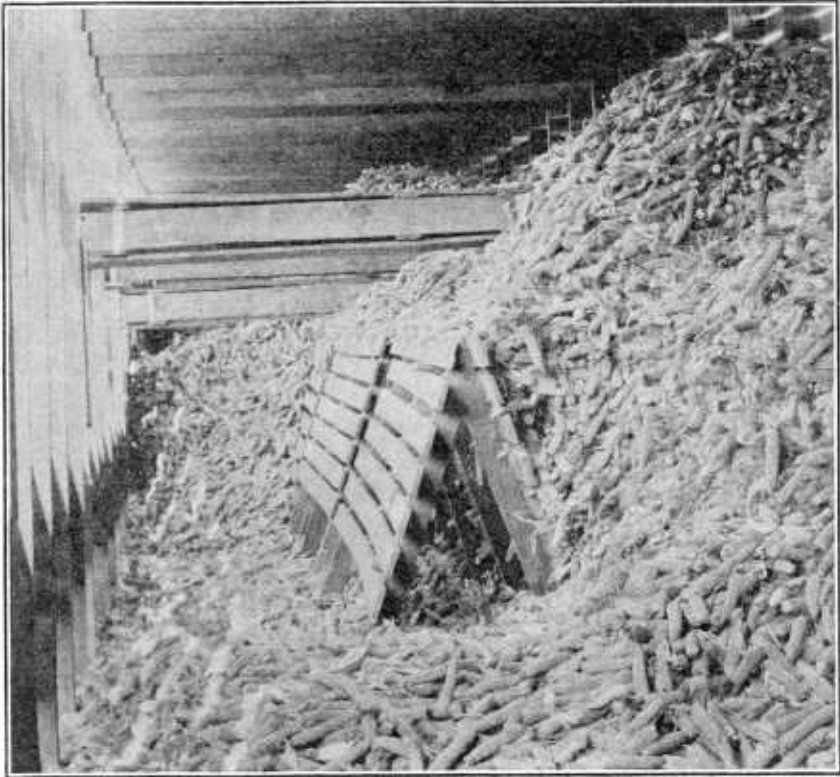


FIG. 10.—Interior of a pop-corn crib. Note the ventilating devices running lengthwise and crosswise. The sections of the ventilators are removed as the crib is emptied.

year from good early-maturing stalks. Care should be exercised not to take seed ears from diseased stalks, which are often the ones to ripen first. It is not necessary or desirable to procure new seed from a distance each year for planting. Pop corn is not at its best until fully acclimated, which takes several years, and for this reason home-grown seed is to be preferred. The yearly planting of a seed plat with seed from the best stalks of the previous crop will improve the strain at the same time it is becoming adapted to the soil and climatic conditions of the locality.

MARKET SUPPLY.

In the pop-corn sections of Iowa and Nebraska farmers grow from 10 to 50 acres of pop corn on a single farm. The bulk of the crop is usually sold to elevator men at railroad stations at the time of harvesting. These buyers store the corn in large cribs, where it is allowed to cure. They then sell to manufacturers of pop-corn confections, commission merchants, and jobbers.

The market supply is taken by manufacturers, pop-corn venders, and dealers who supply a local trade. Venders usually handle roasted peanuts in connection with pop corn. Shelled pop corn in 1-pound pasteboard packages sells readily in eastern markets for a home supply.

POP-CORN PRODUCTS.

A large quantity of pop corn is used annually in the manufacture of pop-corn package goods. In these the popped corn is coated with a preparation of sugar, glucose, and molasses, and in some cases with chocolate. Some packages contain small quantities of peanuts, and in others both peanuts and sliced coconut are mixed with the pop corn. These confections are put on the market under special trade names and usually sell for 5 to 10 cents a package. Other pop-corn preparations are corn bar, sugar-coated pop corn, pop-corn balls, and pop-corn bricks. Pop-corn package goods have become quite popular and are sold in large quantities at parks, summer resorts, picnic grounds, fruit stands, stores, railroad stations, and on trains.

EXPORT TRADE.

The export trade in pop corn is as yet in its infancy. Small shipments of pop corn have been made from several of our ports and some popping machines have been exported. This phase of the industry needs to be encouraged.

DOES IT PAY TO GROW POP CORN?

The question "Does it pay to grow pop corn?" is frequently asked, and the answer to it is "Yes." It pays to grow pop corn, but owing to the limited market for this crop it would not be advisable to begin its culture on a large scale. The supply at present just about equals the demand. No farmer should expect to become rich in a few years' time by growing pop corn. If the good years are averaged up with the poor ones this crop will be found to pay about as well as field corn. Any farmer in the corn-producing States can produce pop corn, but the profit depends largely upon the producer's ability to grow corn of good quality, store his crop properly, and market it advantageously.

