

SOME FACTORS UNDERLYING YIELD AND QUALITY IN TENNESSEE VARIETIES OF CORN

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Possibly no other state can boast of a more varied series of farm crop plants than Tennessee. Her geographical position in the mid-South, touching eight states, gives her a type of economic crop plants that is a complex blend of varieties common to the North as well as the sub-tropics. Many of the Northeastern counties practice a system of cropping that is similar to Ontario and northern New York, while the Southwestern counties lie definitely in the cotton belt.

This situation, desirable as it may seem, is not an unmixed blessing from the farmer's point of view, due to the fact that from the North, South, East and West, farm seed for planting purposes pours into the state, much of it either not adapted to our conditions or decidedly inferior to our own strains and varieties. With most crops grown for hay or pasture, this is not usually an important consideration. With cereal crops, when the final product is a high yield of mature seed, it is decidedly a serious problem.

Corn is the state's most valuable crop and literally hundreds of strains or name varieties are grown within her borders. Many of these are unadapted to our climate and soil, and some well established varieties are inferior yielders. Since the organization of the Tennessee Experiment Stations, scores of these varieties have been tested for yield and quality. At the present time only four have received the stamp of approval as outstanding varieties. These are: Neal Paymaster, Albemarle, Jarvis Golden Prolific, and Piedmont.

Examining the origin and history of these recommended varieties brings out a very significant fact. Neal Paymaster is a selection from a native corn, Tennessee Red Cob—a heritage from the Indians. Albemarle and Jarvis had their respective origins in North Carolina, and Piedmont is a hybrid between Hickory King—an old established variety—from North Carolina, and Boone County White from the Eastern cornbelt. Not a single recognized variety has come to us from north of the Tennessee line. Aside from our native stocks, all our worthwhile varieties have come to us from the East.

Indian corn or *Zea Mays* is classified agronomically on the basis of endosperm structure. The group that includes the dent varieties, constitutes the bulk of the corn crop of America. Either the white or yellow dents are grown almost exclusively in the region known as the corn belt and the cotton states. The dominant type in the central states, however, is a one-eared corn. In the Gulf states the prolific type, producing two or more ears to the stalk, is generally grown. The most widely grown variety in Tennessee does not

belong in either one of these classes, but is semi-prolific in its yield performance. This is Neal Paymaster, a selection from a native one-eared corn carrying most of the usual kernel characteristics of the one-eared type together with an approach to the ear bearing vigor of the true prolific type. In 1927 on the University Farm, Knoxville, seven varieties representing nearly twelve thousand plants were observed in their tendency to produce one ear to the plant. The same spacing was used in all cases.

<i>Variety</i>	<i>Usual Grouping</i>	<i>No. of Plants</i>	<i>Per Cent One Eared</i>
Piedmont	One Eared	1,652	94.6
Hickory King	One Eared	860	81.5
Moore	One Eared	835	70.3
Jarvis Golden	Semi-Prolific	2,516	50.4
Neal Paymaster	Semi-Prolific	4,252	54.8
Thompson Prolific	Prolific	851	31.1
Albemarle	Prolific	776	23.3

The tendency to produce multiple ears is not necessarily correlated with total yield per acre. In a series of corn yield tests conducted in 1927 in four widely separated counties in Tennessee, Greene, Knox, Putnam and Obion, twenty yield determinations on each of these standard varieties gave the following in bushels of dried shelled corn per acre:

<i>Variety</i>	<i>Usual Grouping</i>	<i>No. of Tests</i>	<i>Yield bu. per acre</i>
Piedmont	One Eared	20	39.7
Neal Paymaster	Semi-Prolific	20	51.9
Albemarle	Prolific	20	47.7

Here is a difference of 12.2 bushels in favor of the semi-prolific over the one-eared, and 4.2 bushels over the true prolific.

As Piedmont is an approved variety for Tennessee, the question naturally arises "Why recommend it at all when the yield differences are so great as shown by these figures?" A comparison of Piedmont and Neal Paymaster in Obion County grown in a fertile soil with a low elevation above sea level, and Putnam County grown in a soil of medium fertility with a high elevation, shows that a blanket recommendation of the semi-prolific type in all parts of the state is not warranted by the available experimental data.

<i>Variety</i>	<i>County</i>	<i>Yield per acre</i>
Neal Paymaster	Obion	67.0
Piedmont	Obion	41.9
Neal Paymaster	Putnam	38.8
Piedmont	Putnam	40.7

In Obion County, Piedmont was outyielded by 25.1 bushels per acre. In Putnam County this variety outyielded Neal Paymaster by 1.9 bushels.

Each one of the four approved varieties appear to be adapted to certain prescribed areas and special purposes. Piedmont is recommended for high elevations and for soils of low fertility. Albemarle is particularly adapted as a variety for the silo. Jarvis Golden is the only yellow corn endorsed by the Tennessee Experiment

Station, and has recently won widespread favor among our farmers because of its sound quality and ability to yield on upland soils of medium fertility. The recent investigations of the superior vitamin-carrying quality of yellow corn over white corn has added to its popularity in this state. It is a favorite variety among poultrymen. Neal Paymaster is easily the most generally adapted variety over the state as a grain producer on medium to good soils, and this variety has been given the credit of raising the average corn yield of the state during the past decade.

BARREN PLANTS

Barren plants, having normal tassels but no pistillate branches, often occur in corn fields and constitute a measurable factor in decreasing the yield. The per cent of sterility is likely to be higher in the one-eared group and varieties that have not received special selection. The following data was collected on a few typical varieties in the corn yield test of 1927 on the University Farm:

<i>Variety</i>	<i>No. of Plants Examined</i>	<i>Per Cent Sterility</i>
Moore	835	4.1
Piedmont	816	4.0
Jarvis (selected)	828	1.1
Neal (selected)	865	1.0

The early progenitor of corn was probably a dioecious plant, and this tendency away from monoecism is thought to be inherited. The elimination of these purely staminate plants before the pollen matures is a practice to be recommended.

FIELD SELECTION OF SEED

Late spring and early fall frosts constitute a limiting factor in corn production in the Northern states. Because of this fact, field selection of seed corn for the following year's planting has been emphasized in areas where the season is short. The length of the growing season is ordinarily sufficient for our corn varieties in this state, aside from a few areas of high elevation. The vast majority of our farmers select their seed corn from the crib. With a semi-prolific variety like Neal Paymaster, this is not a desirable practice. The best looking and largest ears are naturally selected, and these are likely to come from one-eared plants. During the past few years, the writer has had the opportunity of making many actual counts of the per cent of one and two-eared plants from seed of crib selected, and field selected Neal Paymaster when grown under similar conditions. Crib selected seed, in many instances, would run 20 per cent two-eared plants while similar stocks of seed growing in the same field from mother plants producing two ears would furnish fifty to sixty two-eared progeny. One of the requirements of the Tennessee Crop Improvement Association, a voluntary organization of growers, is that registered Neal Paymaster seed must be gathered from two or more eared plants.

HYBRID VARIETIES

Piedmont White Dent, one of the approved Tennessee varieties, is a hybrid between Boone County White, and Hickory King, an eight-rowed variety that is still very popular in many parts of the state. The original cross was made by workers in the office of Corn Investigations, U. S. Department of Agriculture. For over ten years it has been grown in Tennessee, and has been generally recommended in place of Hickory King. Experience with cross bred varieties has shown that the peak of their hybrid vigor as measured by yields is in the first or second filial generation. A comparison of an F_2 Piedmont with the strain grown in Tennessee for a number of years gave seven bushels more per acre in favor of the F_2 . From a practical standpoint, it would seem as though synthetic varieties would have to be remade from time to time if satisfactory yields are maintained.

For a number of years, workers in the genetics of the corn plant have emphasized the value of isolating pure lines, and by selection eliminating undesirable germ plasm. F_1 crosses are then made between these pure lines for maximum production. In the corn breeding work of the Tennessee Experiment Station, a number of corn "families" have been selfed for as long as ten years. The production of improved varieties through the recombination of two or more homogygous selfed strains presents possibilities of great value to the corn grower.