3-1936

# Hybrid Corn

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BULLETIN 299 MARCH 1936

# *Hybrid Corn*

By

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# Summary and Contents
## Bulletin 299

## Summary

This bulletin states two general things:

First, some elementary definitions of hybridity and the conditions of hybrid vigor; Second, at Brookings and Beresford it is possible that hybrid corn produced 2.8 bushels per acre higher than mass selected corn. (See tables on pages 16 and 18.)

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## Appendix

# HYBRID CORN

By

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Hybrid corn, in brief, is corn that is in a hybrid condition. Such definition may serve to dispel the somewhat prevalent impression that hybrid corn is the name of a single variety, possessing productive qualities peculiar to itself. Popularly speaking, hybrid corn is always the result of "crossing." The converse is not necessarily true. Not all "crossed" corn is hybrid.

A hybrid is the progeny of parents belonging to different genotypes, or hereditary groups. The same is true of corn as it is true of other biologic forms.

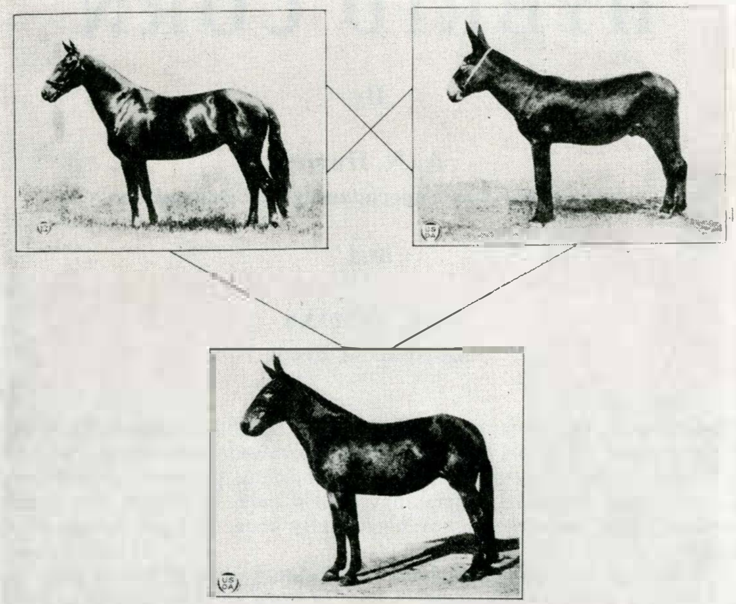
## A Classic Illustration of Hybrids

Nearly all individuals who are familiar with farm animals know that mules are hybrids, and know also that they are such because they are the progeny of parents that belong to different species that are therefore biologically or genetically unlike. All hybrids resemble mules in the respect that their parents are genetically different.

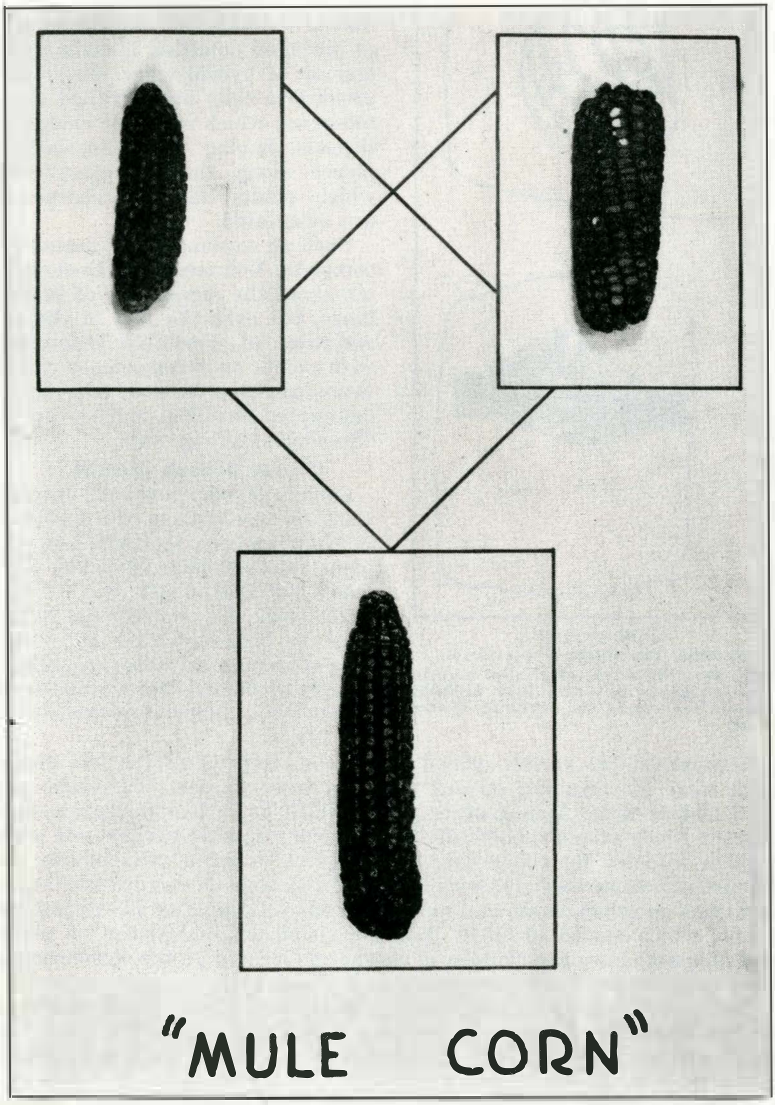
### Hybrid Vigor

It will be generally accepted that present day interest in "hybrid corn" grows from belief that varieties or strains coming under the designation of hybrid are relatively more vigorous than the relatively close-bred lines of their parent strains, and more remote ancestors. Existence of hybrid vigor has to be admitted as a fact at the start, if it is to be utilized by corn breeders. Moreover, it has to become clear practically that the condition of being hybrid makes corn enough more productive than corn selected in mass to pay for the trouble and labor of hybridizing it.

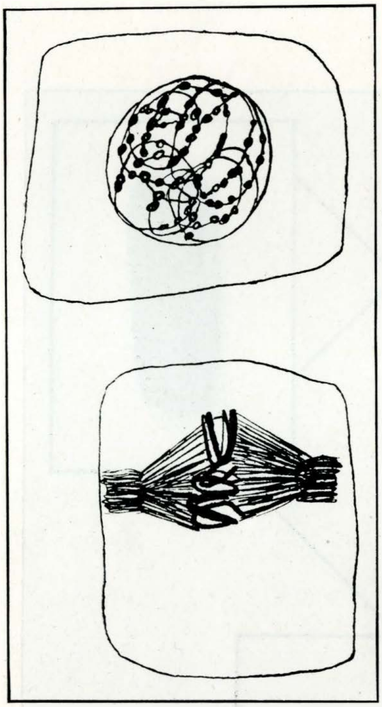
A discussion of a practical system, or systems, of corn breeding which shall produce bybrid corn becomes pertinent in that connection.



THE MULE
THE CLASSIC ILLUSTRATION OF HYBRID
HIS PARENTS DIFFER BIOLOGICALLY




The unlikeness of parentage in hereditary characters is that which defines corn as hybrid where it is so defined. In order to express the idea of hybridity in corn, someone has appropriated the term "mule-corn," which, properly understood, is fairly accurate.



**A Single Cell**
**(Showing two stages of the same)**
**Within the cell are threads, called chromosomes, which, in turn, bear knot-like points that carry the heritable characters.**

The unit of life in corn, and in other plants. is the single cell. By the same token the cell, usually in one of its specialized forms, is the unit of reproduction and the carrier of inherited qualities, including any amount of hybrid vigor. Within reproductive cells are so-called chromosomes, which resemble chains or threads, having points in various places along their lengths; with which points heritable characters are associated.

Such an explanation is indeed incomplete. Volumes have been written about the mechanism of inheritance, but even the fact of the association of heritable characters with points on chromosomes within reproductive cells, was not clearly announced until the re-discovery of "Mendel's law" in 1900.

**Gregor Johann Mendel**

Johann Mendel was born July 22, 1822. He was the son of a gardener in Northwestern Moravia, now the point where Czecho Slovakia, Germany and Poland join.

He became a churchman, but it may be asserted that he never ceased being a gardener, especially a lover of flowers. He learned from plants by studying them nearly all his life.

Throughout his earlier official years, the windows of the two rooms which were his dwelling opened upon his little garden, 35 meters long and 7 meters wide. Among other plants which he cultivated therein were different kinds of peas, some of them of the wrinkled variety and some of them smooth. By conducting experiments, crossing peas having the two distinct characters: (1) wrinkled, and (2) smooth, and by similar observations on other plants and animals, Mendel formulated his hypothesis or law, which stated in effect that the visible characteristics of plants (and animals) have their origin in characters located on the chromosomes of the reproductive cells from which such plants arise.

The notable conclusions of Mendel which can only be mentioned here, were published by him in 1866, but they were overlooked at the time. Two things are necessary for the wide publication of such an epoch making statement:

First, it's actual tabulation; and second, an audience able and competent to assimilate it. Mendel's facts were rediscovered in 1900 by three later Europen scientists: DeVries of Holland, Correns of Germany, and von Tschermak of Austria.

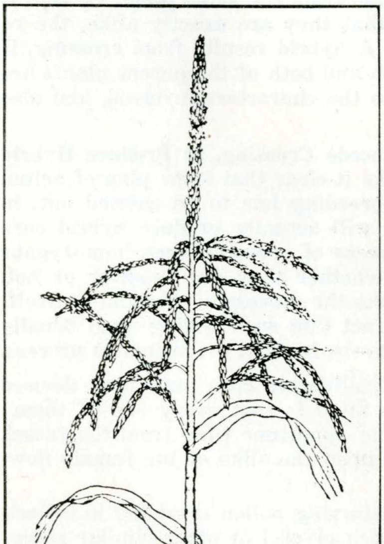
Long before Mendel, observations had been made of hybrid vigor, but until his time little was known about the way in which it came about, either in corn or in any other organism.

Now it is known that when fertilization takes place as in corn, the reproductive cell of the male parent unites with the reproductive cell of the female parent, with the result that an equal number of the foregoing characters from each parent go to make up a newly created organism. It is possible for the characters which go into this union from the male parent to be exactly like those of the female parent—it is possible, on the contrary, for some or all of them to be different.

To the extent that characters going to a new organism, like corn, from the male parent are different from those going into the same organism from the female parent, the new organism is hybrid. Organisms may be hybrid in respect to one or several character pairs, and close-bred or monozygote in respect to all other characters.

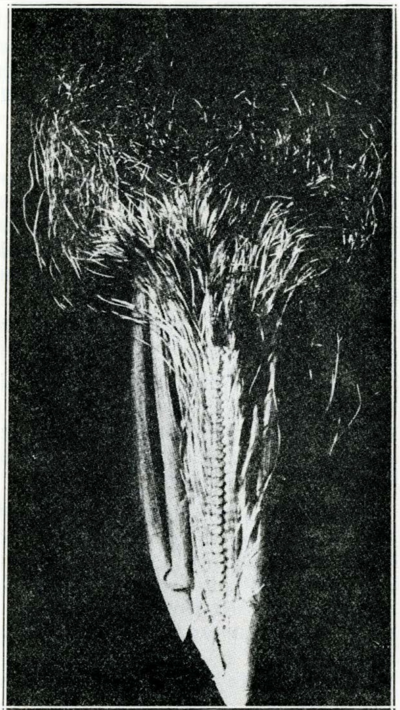
## Crossed Corn and Hybrid Corn

Corn is crossed or cross-bred when it is the result of fertilization with pollen from the tassel of one plant falling upon the silk of another plant,




**The Tassel**

**Tassels usually bear pollen—are therefore the male flowers of corn. —** (After Weatherwax—Story of the Maize Plant —University of Chicago Press.)



**Every separate kernel is fertilized with pollen from tassels of male flowers, falling on silks of the female flowers.**—(After Montgomery—The Corn Crops, M. M. Co.)

as contrasted with having such pollen fall upon the silk of the same plant. When pollen falls on silk of the same plant, the resulting corn is self pollinated, or selfed.

It already has been stated that the process of crossing corn in and of itself does not provide a guarantee that the resulting progeny will be hybrid. It merely provides that it will be crossed, and crossed corn is not always hybrid corn. If and when it happens that the characters brought over by pollen from the male parent are the same as characters already present in the ovules at the base of the silk on the female parent, then the progeny may be called crossed corn, but is not hybrid, in respect to the specific characters, and may not posses the expected hybrid vigor. Growers and seedsmen appreciate that a guarantee of crossing, in and of itself, is not sufficient to establish the fact that corn is hybrid.

## Inbreeding

Inbreeding in corn is the process of fertilization when the silk-bearing female flowers of a given corn plant are fertilized with pollen from the tassel on the same plant. When inbreeding occurs, the factors from the male parent and the female parent come from the same plant. Of course they tend to be alike. To the extent that they are exactly alike, the re sulting plant is inbred or homozyous. A hybrid results from crossing, if and when the reproductive cells in each and both of the parent plants are pure-bred or homozygous in respect to the characters involved, and also different from one another.

**Selfing or Close-breeding must Precede Crossing, to Produce Hybrid Corn.**—Foregoing statements may make it clear that some plan of actual selfing (self pollination) or of close-breeding has to be carried out, in order to secure parental strains that will actually produce hybrid corn when they are later crossed. This process of securing such homozygous parents and of further ascertaining whether they are superior or not, is indeed more difficult and laborious than the process of crossing in itself. This is especially true in view of the fact that such selfing must usually be persisted in for several generations—is, in fact, a continuous process.

Various technical methods of self pollinating corn have been devised and utilized. The principle to have in mind is that every one of them must depend upon placing pollen at the opportune time from the tassel, or male flower, of a given corn plant upon the silks of the female flowers of the same plant.

Formerly, the method of thus transferring pollen consisted in collecting the grains of the latter into a watch crystal or other similar receptacle, then dusting them off immediately onto the silk of the same plant. A more recent method is one demonstrated by Dr. Merle T. Jenkins, cooperating with the Iowa Experiment Station. Such method consists essentially in pulling out or cutting off the entire tassel previous to the ripening of pollen, implanting the stem of the tassel in water retained in a bottle of approximately four-ounce size, and securing bottle and tassel to the ear shoot of the same plant in such manner that the ripening pollen will later fall upon the silks while the latter are still receptive. Dr. Jenkins ascertained that two workers can accomplish pollination of 380 ears of corn per six hours by this method. (See J. of Heredity, Apr. 1923.)

**A Corn Plant—Effect of Selfing or Inbreeding**
**Note dwarfed appearance due to shortening of internodes or stalks between the joints. This inbred corn plant, one of many types, was observed to bear neither fertile pollen, nor ovules.**—(From Corn Breeding Nursery—Brookings.)

## Selfing or Close Breeding Induces Loss of Vigor

It may be accepted as a fact that selfing or close breeding in corn is accompanied by a reduction of vegetative vigor. Successive generations of self fertilization in corn gives rise in general to a reduction in size and height of stalk, and to a similar, if not proportionate, reduction in size and yield of ear and of shelled corn. Occasionally the process of selfing or close breeding reduces the vigor of the plant and leaves it without reproductive parts. It is fairly easy to understand that since the process of selfing hypothetically reduces the number of heritable factors, it may leave different sets of factors in different selfed strains. In short, different selfed strains are not by any means all alike, although they resemble one another in the general respect of having reduced vigor.

Generally, close breeding or actual selfing produces quite the opposite effect in corn from that which is desired by the producer. This condition, which has to be guarded against in the final outcome of securing the most productive seed corn, nevertheless has to be present in parental strains of such seed corn.

## Crossing Selfed or Close-Bred Strains of Corn Tends Toward Hybrid Vigor

The effect of crossing strains of corn that differ from one another in some or many heritable factors is the production of progeny that has some degree of hybridity.

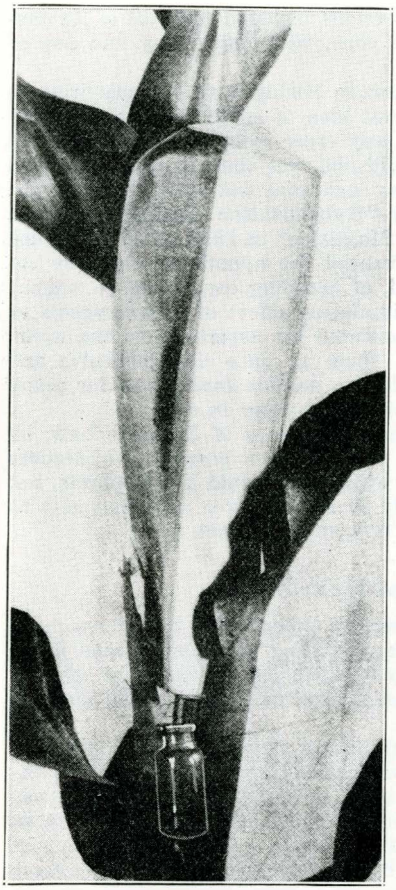
The only way to secure hybrid corn is to devise some plan for producing crossed corn of that kind. It is important to appreciate, however, that the differences in various kinds of hybrid corn, which evidently result from the differences in heritable factors, give rise to differences in yield and quality in hybrid corn, just as in other kinds.

Hybrid corn may, for instance, be early or late, or may have other qualities which may make it either fit or unfit for given localities. Corn of whatever kind must grow, if at all, under conditions of environment where it may chance to be planted. The fact that any given corn is hybrid gives it no universal adaptation.

# Older and Newer Experiments with Hybrid Corn
## (Historical)

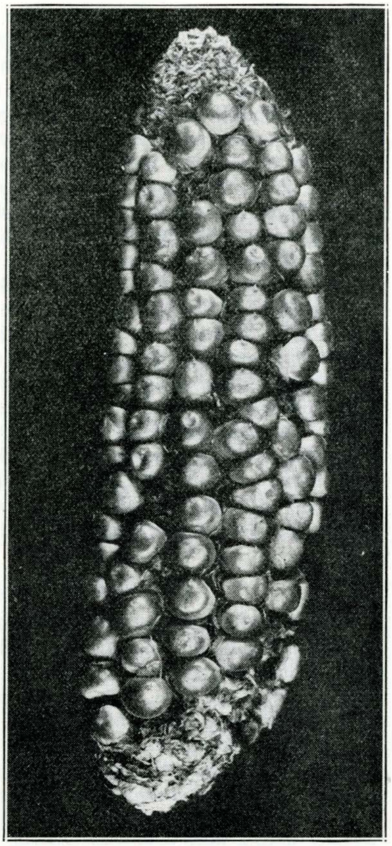
As early as 1878, Professor W. J. Beal of Michigan Agricultural College pointed out in Annual Reports of the Michigan State Board of Agriculture, and in the Farmers Review, that increased yields of corn had been secured by him with the use of seed secured by crossing two seperate varieties. He carried out such crossing by the comparatively simple process of removing the tassels of one of two varieties of corn planted together in a field, in order that this variety necessarily would be fertilized with pollen from the other, in the same field. Such varietal crosses sometimes prove to be hybrids, and apparently were so in a number of the trials carried out by Beal.

Similar experiments with crossing corn of two distinct commercial varieties were early carried out and published by Morrow and Gardner in Illinois. Some of their results were published by them in Bulletin No. 25, 1893, of the Experiment Station of that state.



**A New Method of Self-Pollinating Corn**

**Involving retaining the tassel by placing the bottom end in a bottle of water secured to the stalk, and bagging the tassel and silk together.**—(After Jenkins, Journal of Heredity.)



**An Inbred Ear of Corn**
**(Actual Size)**
**The product of generations of selfing or inbreeding.**

The crosses referred to were likewise made with planting seed of distinct commercial varieties in successive rows, with detasseling plants of one variety, thus leaving it free to become fertilized from pollen of another variety. The results were such in 1893 that in five seperate instances the yield from seed thus crossed yielded higher than the average of the two parent varieties. The crossed seed also yielded higher than the highest of the two parent varieties in three trials of five made that year.

Later, also in Illinois, Dr. C. G. Hopkins devised a plan for ear-to-row breeding, and published "Directions for Breeding Corn" in Illinois Bulletin No.100, in March, 1905. The directions included removal of all tassels from stalks in alternate rows of corn, with harvesting and use of seed from only said detasseled rows.

The foregoing experiments and others in Michigan and Illinois brought some favorable attention to the general idea of corn-crossing, but they did not serve as a basis for making any clear definitions about hybrid vigor in corn. One reason why they did not, was that, as already stated herein, mere varietal crosses of corn as such, may not always be hybrids.

George Harrison Shull published "Hybridization Methods in Corn Breeding" in the "American Breeders Magazine" in 1913, (now succeeded by the Journal of Heredity.) He advanced the hypothesis that the so-called ear-to-row, or pure-line method, of breeding corn (then in vogue) was defective, and pointed out the stimulating effect of heterozygosis or hybridity. More than that, he substantiated his assertions in the main, with experimental data, which made them at once comprehensive and permanent. The paper by Shull provided a definite foundation for many later discussions and investigations of hybrid-vigor in corn.

In the meantime, in 1900, came the rediscovery of Mendel's Law, by Correns, von Tschermak and DeVries, which made it possible for breeders of corn to connect the characteristics which they could see in plants, not only with those existing hypothetically in reproductive cells, but also to make practical application of them in crop improvement.

## Practical Utility of Hybrid Vigor

Within the last decade observations and experiments have been made by experiment stations and individuals, including members of seed firms, having the objective not only to demonstrate the existence of greater vigor in hybrid corn, but also to devise plans for utilizing such vigor in securing higher production.

The establishment of the fact that hybrid vigor may often occur in corn, was arrived at experimentally and clarified by Shull in 1913. It has been demonstrated over and over again in several states by many workers. The production and sale of strains of hybrid corn has grown to an extent which may warrant calling it an industry.

The detailed plans and methods whereby hybrid-vigor and its attendant conditions will be utilized are important to corn breeders and growers. It may be obvious that the cost of carrying out such plans would need to be covered by an increase in yield from hybrid corn, over and above the yield already secured from well adapted mass selected varieties.

## Comparative Yields from Hybrid Corn and Other Strains at Brookings

In past years, some of which have been climatically favorable, corn investigations have been conducted at experiment fields at Brookings, and the several experiment farms. At Brookings field, beginning 1923, a process of securing selfed, or monozygote strains of corn was begun by the junior author of this paper. Several strains of corn from important commercial varieties in common use in South Dakota were selfed or inbred for as many as eight successive generations. Such a degree of inbreeding is indicated as follows:

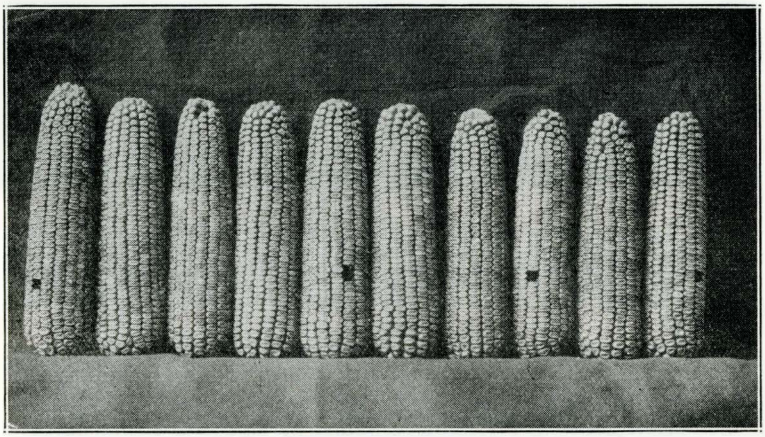
$S_8$, in which the capital S indicates the condition of being selfed or inbred and whatever digit (in this instance 8 ) indicates the number of generations of selfing.

Four of the varieties thus inbred, by the process of placing pollen from a given stalk upon the silk of the same stalk for eight successive generations are as follows:

Alta (H. P.); South Dakota No.86 (H. P.); All Dakota, and Golden Jewel.

The development of these strains came about largely as a necessary part of a so-called Adams Project, extended by the United States Office of Experiment Stations, and approved by Director J. W. Wilson of the South Dakota Experiment Station.

A word of explanation concerning each of the foregoing varieties may be in order. It is known by numerous growers that South Dakota No. 86 is a name and number which has long been applied to that strain of Minnesota No. 13 corn which was introduced years ago from the Minnesota Experiment Station.

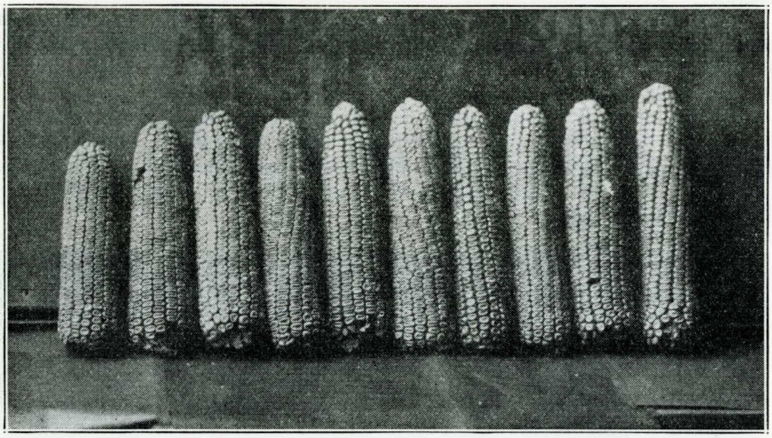


**South Dakota 86**

**Minnesota No. 13 was introduced into our state at Brookings previous to 1912. In that year, the strain which had been and was being cultivated at Brookings, and which had undergone some years of mass selection was recorded as South Dakota No. 86. As originally introduced, it is a medium early yellow dent variety adapted to the east central counties of South Dakota. Ears, seven to eight inches, length; six to eight and one-half inches, circumference. Kernels, medium length, with dimple indentation. Cob, red. The sample shown in the photograph was picked from the seed stocks of Fred Rilling, Brookings, crop of 1922, and consists of typical ears.**

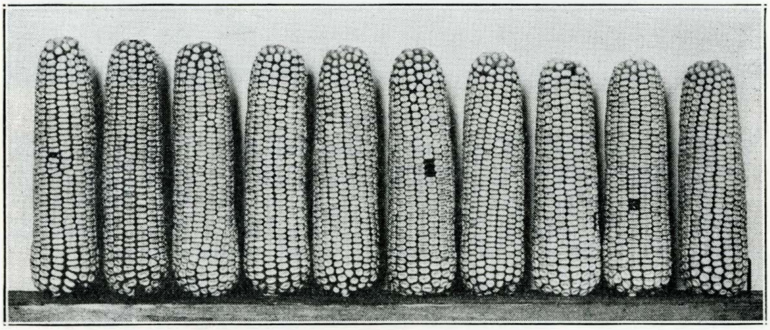
In successive years of mass selection, either by taking the best ears from the stalks in the field or by picking them from the seedhouse, the type of ears was perhaps modified in such a way that the corn took on some distinctive character. (South Dakota Bulletin No. 204—Varieties of Corn for South Dakota).

One of the additional varieties which has become popular and productive in central and northern South Dakota is Alta. A rather early variety, it was developed at the Highmore Experiment Farm, mainly from South Dakota No. 85; however, with some admixture. South Dakota No. 85 was the designation recorded in 1912 for the strain of Minnesota No. 13 which had been produced several successive years at Highmore Experiment Farm; which had therefore undergone successive generations of mass selection under the conditions there. Years of subsequent selection at the Highmore Experiment Farm, as well as at Eureka Experiment Farm, apparently isolated strains of Alta corn that were and are adapted to northern areas where seasons are shorter than they are farther south.



**Alta**

**Alta is a variety of yellow dent corn adapted to the central and northern and western counties. It is a contribution from Highmore Experiment Farm, selected from Minnesota No. 13 (South Dakota No. 85). With some admixture, it has also produced good yields at Eureka substation. The sample illustrated is merely a selection of ears from crib corn, which are the only ones available at present; fairly representative, however.**



**All Dakota**

**All Dakota is the name given to a variety or varieties of corn, developed with the use of an ear-row system of breeding, attempted by the senior author at Brookings. The illustration is that of first and sweepstakes shown at 1922 Little International, State College, from the corn of Donald Warnick, Leola, McPherson County.**

In connection with the names put down for the foregoing varieties, the letters H. P. may for the present be considered simply as a designation of the strains of the given varieties utilized in the present experiments.

The variety Golden Jewel is somewhat less commonly grown in South Dakota than either South Dakota No. 86 or Alta. However, it is one of the smaller yellow varieties commonly utilized. It has been observed in the present experiments that the hybrids where selfed strains of Golden Jewel were employed as one of the parents generally proved lower yielding than other hybrids.

All Dakota is the designation given to a variety of corn, or more accurately—several varieties. Presumably in this system several strains also become increasingly close-bred, although they may not be called inbred. The number of the particular strain of All Dakota utilized in the present experiments is 1210. Seed of the foregoing strains was planted by the junior author on the agronomy farm in the season 1927. Plants from this given strain were self-pollinated for two successive seasons, in 1927 and 1928. Ears of the strain thus inbred were utilized for planting sire rows, which rows were permitted to bear pollen for hybrids included in the experiment.

The selfed-strains of the varieties already described, and some others, were produced in a small separate plot or field where it was also possible to make record of yields of the separate rows. This plot has been designated as the selfing plot due to the fact that a number of the plants in the separate short rows are self pollinated or selfed usually with the method devised by Jenkins. (See page 8).

Strains of corn that are selfed or inbred as indicated in the foregoing, have been frequently crossed by the method of planting the ears of the inbred strains in several successive rows with the selection of one of the strains for a sire strain, which latter shall be planted in every third row of the plot and later permitted to bear pollen. All of the other strains in the remaining rows of the plot are detasseled. Therefore, they are pollinated from the aforementioned sire rows.

The following table gives comparative yields from a mass selected variety of South Dakota No. 86; likewise from the close-bred sire strain which is described, and additionally from three seperate hybrid strains.

## Deductions

Examination of yields put down in the foregoing table brings out the following:

(1). The lowest average yield was produced by the close-bred sire strain of All Dakota 1210.

(2). A mass-selected strain of South Dakota No. 86, which may be considered standard for this area produced 6.2 bushels per acre higher as an average for five years than the foregoing close-bred strain.

(3). Nevertheless, the hybrid of the two foregoing, produced 1.3 bushels per acre higher as an average than the highest parent, which might be called a standard variety.

(4). The highest average yield, 19.5 bushels, was produced by one of the hybrid strains, which was 2.8 bushels per acre above the mass selected standard, South Dakota No. 86.

(5). The fact remains that the next to the lowest average yield (the lowest being that of close-bred All Dakota 1210) was produced by the following hybrid strain: S. Dak. 86 H. P. x All Dakota 1210 (hybrid).
Golden Jewel.

**Comparative Yields of Corn in Bushels Per Acre From Hybrid Strains (at Brookings) With a Mass Selected Strain. 1931-1935. Summary—Abstracted from Appendix Table Page 21**

| Strain | Number of Replicate (rows) Included in Average | | | | | Average Yield in Given Year | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1931 | 1932 | 1933 | 1934 | 1935 | 1931 | 1932 | 1933 | 1934 | 1935 | Av. |
| Alta H. P. x All Dakota 1210 Hybrid | 10 | 17 | 12 | [illegible] | [illegible] | 23.0 | 29.8 | 3.5 | 10.2 | 31.0 | 19.5 |
| S. Dak. 86 H. P. x All Dakota 1210 (Hybrid) | 4 | 15 | 13 | 29 | 28 | 20.0 | 26.8 | 4.4 | 10.1 | 28.5 | 18.0 |
| South Dakota No. 86 (Mass selected) | [illegible] | 12 | 3 | 11 | 11 | 14.1 | 22.1 | 5.7 | 9.7 | 32.0 | 16.7 |
| S. D. 86, H. P. Golden Jewel x All Dakota 1210 (Hybrid) | 12 | 16 | 14 | 1 | 1 | 18.7 | 17.2 | 1.7 | 4.3 | 22.3 | 12.8 |
| All Dakota 1210 Close Bred Sire Strain | [illegible] | 12 | [illegible] | 12 | 10 | 9.3 | 16.8 | 1.1 | 8.3 | 17.2 | 10.5 |

The foregoing observations would be in accord with the general idea that a definite degree of inbreeding or close breeding reduces vigor and yielding power in strains of corn; that such reduction of vigor and yield may occur in standand mass selected strains; that a hybrid of two strains may be more vigorous and higher yielding than the one of them considered standard; that it is also possible for a strain of corn to rank low in production, even though it be hybrid.

## An Additional One Year Test of Hybrid Strains in South Dakota

Further information about comparative yields of hybrid corn in South Dakota was gained through a test made at Beresford. (Illustration—front cover.) This was made under the auspices of the South Dakota Crop Improvement Association in the season 1935. The executive board of the foregoing association requested the senior author of this bulletin to install a test to demonstrate as much as possible about the efficiency of hybrid corn in South Dakota and especially of those strains which might be likely to be utilized in the southeastern corn area.

William Leary, assistant secretary of the South Dakota Crop Improvement Association, turned over certain correspondence to the Agronomy department ,including offers of hybrid seed corn by several commercial firms, and at least one experiment station.

Further inquiries were made of additional experiment stations, and the list of introductions amplified by including some hybrid strains from the South Dakota Experiment Station in Brookings, and additional seed from some mass selected varieties for comparison.

The outcome was that 25 separate kinds of seed corn, including 21 hybrid strains in sufficient quantity for this test were assembled and carried to the field. The planting was accomplished May 14, with a two-row planter. An attempt was made to adjust the planter plates to the size of seed for several kinds of corn by using plates with larger holes for the larger seed and plates with correspondingly smaller holes for the smaller seeded strains—thus possibly providing for a uniform stand of corn in all the rows.

One single row of each kind of corn was planted in a given place, and the order of succession for the different kinds, one after another, was determined by random sampling. However, the order of planting thus determined was the same in all four replicates in the test.

The rows of corn planted for each kind were approximately eight rods. However, the yields were finally determined on a basis of four rods (20 hills) husked from each row.

The husking was accomplished September 27 with the aid of students of crop breeding in State College. The four-rod rows of each kind were husked in succession. The weights of ear-corn thus husked from each of the rows were taken separately, immediately after husking. After all the rows had been completed, the total amount of ears from all four-rod rows of each kind was carried to a position at the end of one of the rows and there assembled. A 10-pound sample of ears was collected from the pile of each kind thus assembled, which 10-pound sample was carried to Brookings, air-dried, and later shelled to serve as a basis for computing the yields per acre of shelled corn from the various kinds in the test.

The following table (page 18) is a summary of yields from the foregoing comparative test of hybrid strains:

## Deductions

Examination of yields put down in the foregoing table brings out the following:

(1). It occurs that the strain ranking first from the standpoint of average yield in bushels of shelled corn per acre in this given yield test, and accordingly put down at the top of the table, is Sundstrom's No. 55, a hybrid strain.

(2). One of the four highest ranking strains, Wimple's Yellow Dent (W. Y. D) is a well known corn, developed in the immediate vicinity by the late A. J. Wimple. Mr. Wimple utilized ear-to-row selection. In recent years this strain has been mass selected. Wimple's Yellow Dent is one of the parent varieties of Sundstrom's No. 55, which ranks first in this test.

(3). The percentage of stand put down in the first column of the table (based on the number of hills having one or more stalks in the portion of rows harvested) for Sundstrom's No. 55 is only exceeded by two other strains in the test.

(4). Also the percentage of shrinkage during the process of drying (based on the loss of weight of a 10-pound sample of ears taken at husking time) is lower than that of other strains making a comparable yield.

(5). All of the strains of corn developed in the immediate vicinity of the location of the test, are found to take rank within the first seven, from the standpoint of yield.

The statement just completed might be taken as an indication that strains of corn, including hybrids, develolped under local conditions are as likely to produce high yields under those conditions as those introduced from a distance, where conditions might be dissimilar. Such a statement need not be construed to mean that only home grown varieties are worth trying out.

Statisticians and others will recognize the wide variations in yield, not only between varieties and strains in the foregoing table, page 18, but also between replicate rows of the same strains. It is clear that final decisions about the use of hybrid varieties of corn in South Dakota need not rest upon the tests recorded in this bulletin either from Beresford or Brookings.

Some calculations made by Prof. S. P. Swenson of this department have determined that the extent of the standard error of the difference in the

**Comparative Yields from Hybrid Strains and Mass Selected Varieties of Corn.**
**Crop Improvement Association Test—Beresford—1935**

| Rows | Kind of Corn | % Stand | Field Wt. (lbs.) Ear Corn From Separate Rows | | | | Total | % Shrink Of Ears | % Shelled Corn in 10 Lbs | Computed Bu. (56) Shelled Corn Per Acre | Rank |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20-45 70-95 | Sundstrom's No. 55 (Hybrid) | 96.2 | 7.8 | 6.4 | 13.1 | 7.4 | 34.7 | 19 | 70 | 21.8 | 1 |
| 10-35 60-85 | Iowa Hybrid No. 931 | 90.0 | 16.9 | 3.0 | 5.4 | 6.8 | 32.1 | 25 | 66 | 19.1 | 2 |
| 3-28 53-78 | Sundstrom's No. 90 (Hybrid) | 90.0 | 16.3 | 6.0 | 2.8 | 6.8 | 31.9 | 20 | 66 | 19.0 | 3 |
| 7-32 57-82 | W. Y. D. Mass Selection | 87.5 | 11.1 | 8.4 | 3.3 | 7.7 | 30.5 | 22 | 69 | 18.9 | 4 |
| 2-27 52-77 | Hybrid Commercial T6 | 92.5 | 14.7 | 7.9 | 1.7 | 5.5 | 29.8 | 22 | 69 | 18.6 | 5 |
| 19-44 69-94 | Sundstrom's No. 56 (Hybrid) | 90.0 | 9.4 | 4.1 | 9.7 | 5.1 | 28.3 | 18 | 70 | 17.8 | 6 |
| 17-42 67-92 | Sundstrom's No. 95 (Hybrid) | 95.0 | 8.7 | 5.2 | 8.0 | 7.0 | 28.9 | 20 | 64 | 16.6 | 7 |
| 5-30 55-80 | Iowa Hybrid No. 13 | 97.5 | 19.6 | 10.7 | 1.4 | 6.1 | 37.8 | 59 | 47 | 16.1 | 8 |
| 13-38 63-88 | Minhybrid No. 401 EXK | 96.2 | 7.7 | 4.7 | 6.8 | 5.8 | 25.0 | 14 | 71 | 16.1 | 9 |
| 12-37 62-87 | Comm. N. Central Iowealth B. S. (Hybrid) | 91.2 | 17.6 | 6.6 | 5.0 | 6.3 | 35.7 | 54 | 49 | 15.7 | 10 |
| 18-43 68-93 | S. Dak. No. 86 Mass Selection | 91.2 | 7.0 | 3.4 | 6.6 | 6.0 | 23.0 | 12 | 74 | 15.5 | 11 |
| 9-34 59-84 | Hybrid No. 437 | 97.5 | 11.4 | 7.0 | 3.4 | 3.7 | 25.6 | 19 | 66 | 15.2 | 12 |
| 25-50 75-100 | Iowa Hybrid No. 939 | 91.2 | 6.5 | 3.2 | 8.3 | 7.4 | 25.4 | 30 | 64 | 14.5 | 13 |
| 11-36 61-86 | All Dak. No. 1210 x S. Dak. 86, H. P. 632 (Hybrid) | 83.7 | 6.0 | 4.4 | 3.0 | 5.6 | 19.0 | 3 | 81 | 13.7 | 14 |
| 23-48 73-98 | R. Y. D. Sundstrom, Mass Selection | 87.5 | 6.0 | 3.0 | 7.3 | 4.3 | 20.6 | 20 | 71 | 13.0 | 15 |
| 1-26 51-76 | Commercial No. 2222 (Hybrid) | 87.5 | 13.6 | 5.7 | 0.5 | 3.6 | 23.4 | 39 | 58 | 12.1 | 16 |
| 8-33 58-83 | Commercial Pocahontas Co. (Hybrid) | 87.5 | 10.6 | 3.2 | 1.7 | 4.5 | 20.0 | 27 | 61 | 11.0 | 17 |
| 22-47 72-97 | Hybrid Comm. T4 (Hybrid) | 90.0 | 5.4 | 1.6 | 8.2 | 2.7 | 17.9 | 23 | 68 | 11.0 | 18 |
| 6-31 56-91 | Minn. Hybrid C—Double Cross of Silver King | 85.0 | 7.8 | 4.1 | 0.4 | 2.2 | 14.5 | 11 | 77 | 10.0 | 19 |
| 15-40 65-90 | Iowa Hybrid No. 942 | 75.0 | 6.5 | 2.8 | 3.5 | 5.0 | 17.8 | 39 | 58 | 9.3 | 20 |
| 4-29 54-79 | Minn. EXZ 1st Cross of Two Minn. 13 x 2 Hurlburt's (Hybrid) | 67.5 | 7.0 | 4.5 | 0.3 | 3.1 | 14.9 | 22 | 66 | 8.8 | 21 |
| 14-39 64-89 | Comm. Northern Iowealth A. U. (Hybrid) | 92.5 | 9.3 | 1.5 | 4.0 | 2.0 | 16.8 | 43 | 54 | 8.2 | 22 |
| 21-46 71-96 | S. D. S. C. 36-14a-30 1210 x R. Y. D. H. P. 378, (Hybrid) | 67.5 | 4.1 | 2.4 | 1.5 | 2.7 | 10.7 | 3 | 81 | 7.9 | 23 |
| 24-49 74-99 | Minhy. No. 301 EXB 164 Inbred R. Y. D. from Hibred | 92.5 | 3.6 | 2.7 | 4.5 | 2.4 | 13.2 | 25 | 62 | 7.4 | 24 |
| 16-41 66-91 | R. Y. D. Mass Selection (Union Co.) | 95.0 | 7.7 | 1.3 | 2.8 | 0.6 | 12.4 | 33 | 62 | 6.9 | 25 |

yield of two varieties of the one year test at Beresford may be 6.8 Thus: 2 x S.E.=13.6. It is not considered necessary here to put down the calculations at length. Such a brief statement will make it clear that the ranks put down in the table of yields are indications rather than absolute proof of the yielding capacity of the several varieties and strains.

## Appendix

**Number of Hills in Portions of Replicate Rows (Twenty Hills Planted in Each Rotation) Having One or More Stalks; With Average Percent Stand, Based Thereon, Beresford, 1935**

| Row in Consecutive Replicates | Kind of Corn | Number of Hills (in total of twenty) in Consecutive Replicates | | | | Total | Per Cent Of Hills Found in Total |
|---|---|---|---|---|---|---|---|
| 20-45<br>70-95 | Sundstrom's No. 55 (Hybrid) | 20 | 18 | 19 | 20 | 77 | 96.2 |
| 10-35<br>60-85 | Iowa Hybrid No. 931 | 18 | 18 | 19 | 17 | 72 | 90.0 |
| 3-28<br>53-78 | Sundstrom's No. 90 (Hybrid) | 19 | 15 | 18 | 20 | 72 | 90.0 |
| 7-32<br>57-82 | W.Y.D. Mass Selection | 15 | 19 | 17 | 19 | 70 | 87.5 |
| 2-27<br>52-77 | Hybrid Commercial T 6 | 20 | 18 | 19 | 17 | 74 | 92.5 |
| 19-44<br>69-94 | Sundstrom's No. 56 (Hybrid) | 19 | 16 | 17 | 20 | 72 | 90.0 |
| 17-42<br>67-92 | Sundstrom's No. 95 (Hybrid) | 19 | 20 | 19 | 18 | 76 | 95.0 |
| 5-30<br>55-80 | Iowa Hybrid No. 13 | 19 | 19 | 20 | 20 | 78 | 97.5 |
| 13-38<br>63-88 | Minhybrid No. 401 E.xK. | 17 | 20 | 20 | 20 | 77 | 96.2 |
| 12-37<br>62-87 | Commercial N. Central Iowealth BS (Hybrid) | 17 | 18 | 19 | 19 | 73 | 91.2 |
| 18-43<br>68-93 | S. Dak. No. 86, Mass Selection | 20 | 16 | 20 | 17 | 73 | 91.2 |
| 9-34<br>59-84 | Hybrid No. 437 | 19 | 20 | 20 | 19 | 78 | 97.5 |
| 25-50<br>75-100 | Iowa Hybrid No. 939 | 19 | 18 | 17 | 19 | 73 | 91.2 |
| 11-36<br>61-86 | All Dakota No. 1210 x S. D. 86 H. P. 632 (Hybrid) | 14 | 16 | 17 | 20 | 67 | 83.7 |
| 23-48<br>73-98 | R.Y.D. Secured by Sundstrom—Mass Selected | 15 | 18 | 17 | 20 | 70 | 87.5 |
| 1-26<br>51-76 | Commercial No. 2222 (Hybrid) | 14 | 19 | 18 | 19 | 70 | 87.5 |
| 8-33<br>58-83 | Commercial Pocahontas County (Hybrid) | 16 | 20 | 15 | 19 | 70 | 87.5 |
| 22-47<br>72-97 | Hybrid Commercial T 4 (Hybrid) | 19 | 15 | 20 | 18 | 72 | 90.0 |
| 6-31<br>56-91 | Minnesota Hybrid C—Double Cross of Silver King | 18 | 17 | 17 | 16 | 68 | 85.0 |
| 15-40<br>65-90 | Iowa Hybrid No. 942 | 14 | 13 | 16 | 17 | 60 | 75.0 |
| 4-29<br>54-79 | Minn. ExZ 1st cross of 2M.13x2 Hurlbert's (Hybrid) | 14 | 13 | 11 | 16 | 54 | 67.5 |
| 14-39<br>64-89 | Commercial Northern Iowealth AU (Hybrid) | 18 | 19 | 19 | 18 | 74 | 92.5 |
| 21-46<br>71-96 | SDSC 36-14a-30. 1210 x R.Y.D. H.P. 378 (Hybrid) | 18 | 13 | [illegible] | 14 | 54 | 67.5 |
| 24-49<br>74-99 | Minhybrid No. 301 E x B164 (inbred) R.Y.D. from Hibred | 20 | 19 | 17 | 18 | 74 | 92.5 |
| 16-41<br>66-91 | R.Y.D. Mass Selection (Union Co.) | 19 | 20 | 18 | 19 | 76 | 95.0 |

In closing, it may be evident that this is not an attempt to propose technical plans for the application of the principle of hybrid vigor to the production of seed corn which shall in time be used for planting. Some discussion of the possibility of utilizing selfed strains may be found in South Dakota Experiment Station Bulletin 245.

The writers believe that considerably more information will be attained about economical methods for producing hybrid seed corn in usable quantities for large areas. It is our plan to make a later statement bearing on that specific subject.

## Appendix

**Yields of Corn from Replicate Rows—Bushels Per Acre From Three Hybrids, One Mass-Selected, and One Close-Bred Strain—in Given Years**

| Alta, H. P. x All Dak. 1210 (Hybrid) | S. D. 86 H. P. x All Dak. 1210 (Hybrid) | S. D. 86 (Mass Selected) | S. D. 86 Golden Jewel x All Dak. 1210 (Hybrid) | All Dak. 1210 Close-bred Sire Strain |
|---|---|---|---|---|
| | | **1931** | | |
| 18.0 | 21.7 | 8.0 | 20.8 | 9.1 |
| 26.6 | 20.0 | 18.6 | 20.0 | 9.4 |
| 19.7 | 22.6 | 9.4 | 14.0 | 9.4 |
| 25.7 | 15.7 | 17.3 | 13.4 | 7.4 |
| 22.6 | | 17.4 | 20.0 | 11.4 |
| 20.6 | | | 21.0 | |
| 25.9 | | | 20.3 | |
| 20.3 | | | 17.0 | |
| 23.1 | | | 23.4 | |
| 27.7 | | | 18.0 | |
| | | | 18.8 | |
| | | | 18.0 | |
| *23.0 | 20.0 | 14.1 | 18.7 | 9.3 |
| | | **1932** | | |
| 26.9 | 28.6 | 29.1 | 24.0 | 27.7 |
| 37.7 | 33.1 | 38.9 | 32.6 | 28.0 |
| 38.9 | 41.1 | 28.6 | 32.6 | 30.9 |
| 22.3 | 33.1 | 36.0 | 24.6 | 16.0 |
| 23.4 | 22.3 | 14.3 | 28.0 | 14.3 |
| 26.3 | 23.4 | 14.9 | 16.0 | 12.0 |
| 11.4 | 24.0 | 5.7 | 3.4 | 8.6 |
| 11.4 | 18.3 | 14.3 | 5.7 | 13.1 |
| 38.3 | 10.9 | 23.4 | 2.9 | 13.1 |
| 36.6 | 16.0 | 24.0 | 14.3 | 17.1 |
| 29.7 | 16.6 | 28.6 | 12.0 | 12.0 |
| 26.9 | 38.9 | 8.0 | 14.3 | 8.6 |
| 47.4 | 32.0 | | 8.6 | |
| 27.4 | 32.6 | | 9.7 | |
| 38.9 | 31.4 | | 33.7 | |
| 28.6 | | | 13.1 | |
| 35.4 | | | | |
| *29.8 | 26.8 | 22.1 | 17.2 | 16.8 |
| | | **1933** | | |
| 1.7 | 3.9 | 5.1 | 1.7 | 0.4 |
| 3.4 | 2.6 | 7.3 | 1.3 | 3.0 |
| 1.7 | 7.3 | 4.7 | 2.1 | 0.0 |
| 0.0 | 2.1 | | 2.6 | |
| 0.0 | 4.7 | | 1.3 | |
| 0.4 | 9.4 | | 3.4 | |
| 5.6 | 3.0 | | 0.4 | |
| 7.3 | 5.1 | | 0.0 | |
| 6.0 | 1.7 | | 0.9 | |
| 3.4 | 2.1 | | 0.4 | |
| 7.3 | 3.4 | | 1.7 | |
| 5.4 | 9.9 | | 1.3 | |
| | 2.1 | | 2.1 | |
| | | | 4.7 | |
| *3.5 | 4.4 | 5.7 | 1.7 | 1.1 |

* Average

# Appendix

**Yields of Corn from Replicate Rows—Bushels Per Acre from Three Hybrids, One Mass-Selected, and one Close-Bred Strain—in Given Years**

| Alta, H. P. x All Dak. 1210 (Hybrid) | S. D. 86 H. P. x All Dak. 1210 (Hybrid) | S. Dak. 86 (Mass Selected) | S. Dak. 86 Golden Jewel x All Dak. 1210 (Hybrid) | All Dak. 1210 Close-bred Sire Strain |
|---|---|---|---|---|
| | | 1934 | | |
| 10.0 | 7.8 | 3.8 | 4.3 | 7.5 |
| 9.8 | 9.5 | 12.5 | | 10.3 |
| 10.0 | 7.0 | 8.8 | | 7.5 |
| 11.3 | 9.0 | 9.3 | | 10.0 |
| 11.0 | 7.0 | 8.8 | | 8.8 |
| 8.8 | 12.5 | 5.0 | | 5.0 |
| 9.3 | 12.0 | 11.5 | | 9.5 |
| 11.5 | 8.8 | 6.8 | | 10.8 |
| | 12.3 | 8.0 | | 5.5 |
| | 14.8 | 12.5 | | 7.8 |
| | 10.0 | 12.8 | | 13.3 |
| | 10.8 | | | 3.3 |
| | 19.0 | | | |
| | 10.0 | | | |
| | 10.3 | | | |
| | 11.5 | | | |
| | 11.8 | | | |
| | 16.5 | | | |
| | 6.3 | | | |
| | 6.3 | | | |
| | 11.3 | | | |
| | 8.0 | | | |
| | 9.8 | | | |
| | 6.3 | | | |
| | 6.5 | | | |
| | 9.0 | | | |
| | 7.5 | | | |
| | 8.3 | | | |
| | 11.8 | | | |
| *10.2 | 10.1 | 9.7 | 4.3 | 8.3 |
| | | 1935 | | |
| 29.1 | 25.1 | 30.6 | 22.3 | 14.0 |
| 36.6 | 29.7 | 26.0 | | 13.7 |
| 37.1 | 10.9 | 34.9 | | 20.0 |
| 29.1 | 12.9 | 26.9 | | 16.0 |
| 29.4 | 27.1 | 28.6 | | 17.1 |
| 26.3 | 27.4 | 33.4 | | 18.6 |
| 32.9 | 37.1 | 39.4 | | 18.3 |
| 27.7 | 40.3 | 38.6 | | 21.3 |
| | 42.9 | 28.0 | | 17.1 |
| | 28.3 | 37.7 | | 15.4 |
| | 36.0 | 28.6 | | |
| | 45.1 | | | |
| | 24.0 | | | |
| | 21.4 | | | |
| | 17.4 | | | |
| | 17.1 | | | |
| | 31.4 | | | |
| | 32.9 | | | |
| | 29.4 | | | |
| | 24.3 | | | |
| | 31.1 | | | |
| | 26.9 | | | |
| | 22.0 | | | |
| | 28.9 | | | |
| | 36.3 | | | |
| | 27.1 | | | |
| | 24.9 | | | |
| | 39.1 | | | |
| *31.0 | 28.5 | 32.0 | 22.3 | 17.2 |

## Annual Rainfall by Months at the Several Stations

### Brookings

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1905 | 0.22 | 1.00 | 0.68 | 1.01 | 6.14 | 6.09 | 0.98 | 4.54 | 2.16 | 1.50 | 2.45 | T | 22.77 |
| 1906 | 0.17 | 0.02 | 0.58 | 1.40 | 3.51 | 4.87 | 1.86 | 4.28 | 5.13 | 3.01 | 0.89 | 0.52 | 26.26 |
| 1907 | 1.06 | 0.28 | 0.55 | 1.07 | 2.36 | 5.65 | 3.77 | 1.41 | 1.28 | 0.96 | 0.10 | 1.12 | 20.21 |
| 1908 | 0.26 | 1.80 | 1.16 | 2.10 | 6.46 | 6.35 | 4.69 | 2.37 | 3.89 | 1.43 | 1.30 | 0.42 | 32.17 |
| 1909 | 1.20 | 1.57 | 0.37 | 1.16 | 4.85 | 2.29 | 2.44 | 3.39 | 1.67 | 1.71 | 0.65 | 1.14 | 22.44 |
| 1910 | 1.07 | 0.40 | 0.35 | 2.34 | 0.87 | 1.85 | 1.68 | 2.46 | 0.96 | 0.38 | 0.17 | 0.10 | 12.63 |
| 1911 | 0.61 | 0.53 | 0.53 | 1.62 | 1.90 | 3.78 | 3.32 | 3.81 | 3.08 | 5.12 | 0.23 | 0.42 | 24.95 |
| 1912 | 0.28 | 0.24 | 0.26 | 3.36 | 6.98 | 2.09 | 2.52 | 4.68 | 1.61 | 0.96 | 0.00 | 0.20 | 23.18 |
| 1913 | 0.02 | 0.09 | 0.45 | 2.24 | 3.60 | 1.96 | 2.99 | 1.33 | 1.55 | 1.18 | 0.81 | 0.09 | 16.31 |
| 1914 | 0.22 | 0.40 | 0.42 | 1.64 | 4.16 | 6.67 | 1.62 | 3.16 | 3.32 | 2.21 | T | 0.33 | 24.15 |
| 1915 | 0.18 | 1.12 | 0.18 | 2.03 | 2.12 | 3.28 | 3.04 | 3.52 | 2.68 | 1.37 | 0.28 | 0.62 | 20.42 |
| 1916 | 1.47 | 0.32 | 0.40 | 2.95 | 3.72 | 4.27 | 0.40 | 2.03 | 0.84 | 0.45 | 0.03 | 0.36 | 17.34 |
| 1917 | 1.54 | 0.47 | 1.09 | 3.09 | 3.08 | 3.49 | 2.03 | 1.20 | 2.89 | 0.12 | 0.04 | 0.31 | 19.35 |
| 1918 | 0.19 | 0.14 | 0.44 | 1.28 | 3.40 | 1.85 | 3.95 | 4.19 | 0.72 | 1.56 | 1.61 | 1.09 | 20.42 |
| 1919 | 0.07 | 0.63 | 0.73 | 1.90 | 3.87 | 9.30 | 5.60 | 1.48 | 1.69 | 1.14 | 1.35 | 0.10 | 27.86 |
| 1920 | 0.34 | 0.24 | 1.85 | 2.95 | 3.84 | 7.27 | 5.45 | 2.15 | 1.99 | 0.66 | 1.30 | 0.30 | 28.34 |
| 1921 | 0.09 | 0.05 | 1.49 | 1.42 | 2.99 | 0.85 | 3.44 | 2.11 | 4.25 | 0.27 | 0.50 | 0.10 | 17.56 |
| 1922 | 0.40 | 1.73 | 0.79 | 0.42 | 1.82 | 3.75 | 2.81 | 1.70 | 0.36 | 0.81 | 3.08 | 0.20 | 17.87 |
| 1923 | 0.27 | 0.07 | 0.29 | 3.00 | 2.59 | 5.74 | 1.94 | 3.03 | 1.73 | 1.41 | 0.23 | 0.23 | 20.53 |
| 1924 | 0.10 | 0.31 | 1.34 | 1.82 | 1.32 | 6.88 | 1.22 | 3.89 | 1.02 | 0.84 | 0.11 | 0.35 | 19.20 |
| 1925 | 0.11 | 0.06 | 0.22 | 1.88 | 0.49 | 6.17 | 1.26 | 0.64 | 0.77 | 0.26 | 0.57 | 0.33 | 12.76 |
| 1926 | 0.70 | 0.06 | 0.14 | 0.13 | 1.44 | 3.64 | 3.14 | 1.46 | 2.10 | 0.68 | 0.56 | 0.63 | 14.38 |
| 1927 | 0.14 | 0.35 | 0.83 | 4.04 | 4.29 | 1.46 | 4.88 | 0.35 | 1.98 | 0.49 | 0.49 | 1.10 | 20.40 |
| 1928 | 0.09 | 0.30 | 0.44 | 0.96 | 0.53 | 2.97 | 2.69 | 4.52 | 1.37 | 1.68 | 0.78 | 0.15 | 16.48 |
| 1929 | 0.96 | 0.45 | 0.68 | 3.32 | 2.11 | 1.12 | 3.25 | 2.33 | 4.80 | 2.41 | 0.04 | 0.07 | 21.54 |
| 1930 | 0.42 | 0.40 | 0.25 | 1.25 | 2.04 | 1.68 | 0.27 | 1.50 | 3.28 | 1.84 | 2.01 | 0.10 | 15.14 |
| 1931 | 0.03 | 0.04 | 0.30 | 1.33 | 0.68 | 2.42 | 1.62 | 3.24 | 2.00 | 1.11 | 1.89 | 1.07 | 15.73 |
| 1932 | 0.54 | 0.13 | 0.27 | 1.34 | 2.23 | 3.07 | 2.34 | 4.07 | 2.07 | 0.81 | 0.32 | 0.24 | 17.43 |
| 1933 | 0.07 | 0.18 | 1.08 | 0.98 | 1.44 | 0.67 | 1.42 | 2.40 | 3.82 | 0.05 | 0.09 | 0.50 | 12.40 |
| 1934 | 0.21 | 0.05 | 0.47 | 0.14 | 1.49 | 4.77 | 3.56 | 0.82 | 4.38 | 1.26 | 0.38 | 0.18 | 17.71 |
| 1935 | 0.32 | 0.16 | 1.47 | 3.47 | 2.11 | 2.75 | 1.66 | 4.19 | 0.04 | 0.23 | 0.43 | 0.62 | 17.45 |

## Annual Rainfall by Months at the Several Stations (Con'td.)

### Centerville

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1897 | *2.04 | *0.60 | *2.90 | 2.10 | 1.09 | 3.91 | 3.41 | 1.67 | 0.95 | 1.40 | 0.25 | 1.02 | 21.34 |
| 1898 | 0.23 | 0.39 | 1.06 | 1.11 | 6.11 | 4.44 | 3.36 | 1.66 | 0.71 | 1.77 | 0.32 | 0.14 | 21.84 |
| 1899 | 0.54 | 0.69 | 1.19 | 0.91 | 6.41 | 7.86 | 5.67 | 7.14 | 0.33 | 1.79 | 0.68 | 0.99 | 34.20 |
| 1900 | 0.15 | 0.28 | 2.03 | 2.78 | 2.81 | 1.60 | 12.54 | 3.98 | 3.44 | 1.64 | 0.20 | 0.38 | 31.83 |
| 1901 | 0.16 | 0.67 | 1.02 | 1.64 | 3.64 | 7.72 | 1.45 | 2.84 | 5.80 | 1.52 | 0.89 | 0.80 | 28.15 |
| 1902 | 0.76 | 0.78 | 1.82 | 1.59 | 4.07 | 1.68 | 5.57 | 3.00 | 2.22 | 0.32 | 0.61 | 1.80 | 24.22 |
| 1903 | 0.27 | 1.52 | 2.23 | 1.14 | 7.86 | 5.23 | 7.19 | 3.92 | 1.76 | 1.43 | 0.42 | 0.71 | 33.68 |
| 1904 | 0.44 | 0.32 | 0.61 | 2.88 | 1.06 | 3.00 | 3.52 | 1.55 | 0.61 | 4.62 | 0.06 | 0.75 | 19.42 |
| 1905 | 1.52 | 0.68 | 1.94 | 0.92 | 5.16 | 5.13 | 1.00 | 1.63 | 4.56 | 1.73 | 2.91 | 0.06 | 27.24 |
| 1906 | 0.64 | 0.75 | 1.94 | 1.16 | 3.16 | 4.86 | 1.32 | 10.15 | 6.00 | 3.87 | 0.37 | 1.10 | 35.32 |
| 1907 | 0.43 | 0.65 | 0.71 | 0.46 | 3.43 | 5.45 | 7.04 | 0.99 | 3.05 | 0.16 | 0.05 | 1.28 | 23.70 |
| 1908 | 0.10 | 1.10 | 0.99 | 4.19 | 6.91 | 8.20 | 4.61 | 3.19 | 1.34 | 1.92 | 1.32 | 0.93 | 34.80 |
| 1909 | 0.56 | 2.37 | 0.84 | 2.04 | 5.08 | 6.91 | 5.16 | 1.84 | 5.85 | 1.52 | 2.81 | 2.42 | 37.40 |
| 1910 | 1.03 | 0.22 | 0.28 | 1.34 | 1.69 | 2.21 | 3.50 | 2.35 | 2.50 | 1.30 | 0.09 | 0.13 | 16.64 |
| 1911 | 0.09 | 1.27 | 0.17 | 3.65 | 1.11 | 2.76 | 2.78 | 4.09 | 1.72 | 5.12 | 0.25 | 0.96 | 23.97 |
| 1912 | 0.56 | 0.41 | 1.09 | 2.39 | 3.00 | 0.73 | 3.52 | 3.02 | *1.71 | 1.24 | 0.00 | 0.41 | 18.08 |
| 1913 | 0.09 | 0.62 | 0.81 | 3.96 | 5.57 | 5.36 | 2.26 | 1.72 | 0.94 | 1.25 | 1.10 | 0.18 | 23.86 |
| 1914 | 0.62 | 0.84 | 0.61 | 1.11 | 4.64 | 5.34 | 3.14 | 0.91 | 5.22 | 2.20 | T | 0.51 | 25.14 |
| 1915 | 0.35 | 2.29 | 1.42 | 1.18 | 3.33 | 4.90 | 7.76 | 2.40 | 4.87 | 1.27 | 0.70 | 0.63 | 31.10 |
| 1916 | 1.10 | 0.49 | 0.62 | 1.95 | 5.09 | 4.21 | 3.85 | 1.48 | 2.29 | 0.83 | 0.37 | 0.55 | 22.83 |
| 1917 | 1.82 | 0.62 | 2.13 | 2.98 | 3.53 | 5.94 | 3.28 | 1.80 | 2.07 | 0.15 | 0.34 | 0.75 | 25.41 |
| 1918 | 1.48 | 0.62 | 1.50 | 1.66 | 5.96 | 3.73 | 3.63 | 3.69 | 0.87 | 1.93 | 2.41 | 1.12 | 28.60 |

## Annual Rainfall by Months at the Several Stations (Con'td.)

### Centerville†

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1919 | 0.20 | 2.03 | 1.32 | 2.48 | 2.23 | 2.47 | 2.84 | 2.34 | 3.37 | 1.38 | 2.41 | 0.25 | 23.32 |
| 1920 | 0.15 | 1.00 | 1.41 | 3.41 | 3.98 | 3.19 | 1.30 | 1.94 | 1.51 | 1.67 | 2.37 | 0.95 | 22.88 |
| 1921 | 0.36 | 0.40 | 1.14 | 2.10 | 6.86 | 1.21 | 2.14 | 5.50 | 3.36 | 0.41 | 0.38 | 0.70 | 24.56 |
| 1922 | 1.15 | 1.01 | 0.91 | 1.82 | 1.67 | 2.25 | 5.51 | 2.50 | 2.64 | 1.05 | 2.68 | 0.44 | 23.63 |
| 1923 | 0.70 | 0.10 | 1.60 | 2.48 | 3.99 | 3.84 | 1.78 | 3.97 | 3.39 | 0.76 | 0.41 | 0.60 | 23.62 |
| 1924 | 0.40 | 0.88 | 2.49 | 2.62 | 1.09 | 4.95 | 1.58 | 2.49 | 0.79 | 1.32 | 0.42 | 2.25 | 21.28 |
| 1925 | 1.05 | 0.52 | 0.50 | 1.50 | 0.69 | 6.16 | 1.63 | 0.76 | 2.58 | 1.02 | 0.84 | 0.49 | 17.74 |
| 1926 | 0.95 | 0.24 | 0.40 | 0.10 | 2.72 | 3.52 | 2.24 | 4.72 | 4.66 | 1.25 | 2.54 | 0.85 | 24.19 |
| 1927 | 0.16 | 1.04 | 2.31 | 6.00 | 5.10 | 2.49 | 1.50 | 3.37 | 2.11 | 0.62 | 0.60 | 1.10 | 26.40 |
| 1928 | 0.15 | 2.97 | 1.57 | 0.52 | 2.62 | 3.67 | 1.68 | 5.45 | 1.27 | 2.80 | 0.50 | 0.20 | 23.40 |
| 1929 | 0.45 | 0.30 | 0.50 | 2.58 | 2.63 | 3.44 | 2.84 | 1.60 | 3.95 | 2.28 | 0.17 | 0.10 | 20.84 |
| 1930 | 1.00 | 0.20 | 0.10 | 1.68 | 4.03 | 4.42 | 0.50 | 1.21 | 1.74 | 2.04 | 2.58 | 0.25 | 19.75 |
| 1931 | T | 0.08 | 0.63 | 1.28 | 1.34 | 2.50 | 0.72 | 0.34 | 3.13 | 1.97 | 2.68 | 1.40 | 16.07 |
| 1932 | 1.92 | *0.74 | 1.77 | 1.58 | 5.04 | 1.68 | 3.07 | 4.30 | 2.58 | 0.93 | 0.60 | 0.36 | 24.57 |
| 1933 | 0.09 | 0.57 | 2.05 | 1.34 | 2.10 | 0.81 | 3.99 | 3.55 | 3.04 | 0.21 | 0.04 | 0.93 | 18.72 |
| 1934 | 0.35 | 0.36 | 1.42 | 1.00 | 0.50 | 7.20 | 2.38 | 1.97 | 5.06 | 1.31 | 0.43 | 0.40 | 22.38 |
| 1935 | 0.67 | 1.25 | 0.76 | 3.45 | 2.45 | 4.79 | 2.56 | 2.67 | 1.15 | 0.29 | 1.20 | 0.39 | 21.63 |

* Interpolated

† Through the courtesy of the U. S. Weather Bureau, Huron.

## Annual Rainfall by Months at the Several Stations (Con'td.)

### Highmore

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1908 | T | 0.53 | 0.00 | 1.35 | 2.68 | 5.78 | 2.49 | 3.53 | 0.62 | 2.19 | 1.39 | 0.31 | 28.87 |
| 1909 | 0.26 | 0.34 | 0.13 | 0.30 | 4.72 | 1.69 | 1.81 | 3.74 | 1.70 | 1.04 | 0.71 | 1.41 | 17.85 |
| 1910 | 0.82 | 0.19 | 0.58 | 1.40 | 0.94 | 3.74 | 0.85 | 0.66 | 0.89 | 0.24 | 0.40 | 0.44 | 9.05 |
| 1911 | 0.11 | 0.39 | 2.54 | 0.32 | 2.31 | 0.09 | 2.69 | 2.52 | 3.06 | 1.05 | 0.35 | 0.44 | 15.87 |
| 1912 | 0.13 | 0.11 | 0.27 | 1.05 | 2.20 | 1.31 | 1.44 | 3.39 | 0.71 | 0.20 | 0.00 | 0.35 | 12.00 |
| 1913 | 0.05 | 0.30 | 0.87 | 1.27 | 4.56 | 0.97 | 1.79 | 1.20 | 0.53 | 0.61 | 0.03 | 0.28 | 12.46 |
| 1914 | 0.13 | 0.62 | 0.45 | 3.65 | 2.23 | 4.09 | 2.01 | 1.16 | 1.01 | 1.92 | -.-- | 0.25 | 17.52 |
| 1915 | 0.43 | 1.28 | 0.37 | 2.50 | 3.48 | 4.48 | 5.55 | 0.78 | 2.36 | 1.15 | 0.32 | 0.20 | 23.29 |
| 1916 | 1.40 | 0.27 | 0.74 | 0.89 | 4.15 | 4.54 | 2.10 | 4.10 | 2.75 | 0.58 | 0.13 | 0.47 | 22.12 |
| 1917 | 1.12 | 0.52 | 1.27 | 2.79 | 2.04 | 2.04 | 1.91 | 0.68 | 2.03 | 0.06 | 0.07 | 0.27 | 14.80 |
| 1918 | 0.60 | 0.25 | 0.45 | 2.57 | 3.57 | 1.59 | 5.26 | 1.88 | 0.62 | 0.49 | 1.10 | 0.86 | 19.24 |
| 1919 | 0.10 | 1.35 | 1.24 | 1.96 | 6.63 | 1.95 | 2.65 | 0.82 | 0.54 | 2.16 | 1.80 | 0.15 | 21.35 |
| 1920 | 0.27 | 0.33 | 1.20 | 2.56 | 6.04 | 7.05 | 3.56 | 2.47 | 1.51 | 0.75 | 0.34 | 0.20 | 27.08 |
| 1921 | 0.25 | T | 0.49 | 1.78 | 2.60 | 0.55 | 3.10 | 3.68 | 4.79 | 1.20 | 0.33 | 0.20 | 18.97 |
| 1922 | 0.45 | 0.93 | 1.05 | 0.93 | 2.78 | 3.65 | 2.85 | 0.41 | 0.48 | 0.39 | 2.83 | 0.35 | 17.10 |
| 1923 | 0.42 | 0.01 | 1.01 | 1.63 | 2.04 | 5.15 | 3.81 | 5.01 | 1.17 | 0.87 | 0.21 | 0.19 | 21.52 |
| 1924 | 0.07 | 0.58 | 1.63 | 1.40 | 0.50 | 5.66 | 2.11 | 1.13 | 2.69 | 1.10 | 0.34 | 0.82 | 18.03 |
| 1925 | 0.60 | 0.21 | 0.08 | 1.30 | 1.08 | 5.39 | 0.70 | 1.49 | 0.71 | 0.12 | 0.20 | 0.52 | 12.40 |
| 1926 | 1.56 | 0.00 | 0.03 | 0.16 | 1.96 | 9.50 | 2.53 | 2.09 | 1.07 | 2.78 | 0.16 | 0.36 | 14.20 |
| 1927 | 0.21 | 0.08 | 0.85 | 3.35 | 5.80 | 2.22 | 1.04 | 1.77 | 1.47 | 0.83 | 0.71 | 0.76 | 19.09 |
| 1928 | 0.04 | 0.22 | 0.48 | 1.11 | 0.96 | 2.94 | 2.50 | 2.32 | 0.76 | 1.66 | 0.91 | 0.09 | 13.99 |
| 1929 | 0.67 | 0.22 | 1.75 | 2.76 | 1.89 | 1.71 | 0.69 | 1.55 | 1.76 | 3.08 | 0.33 | 0.05 | 16.46 |
| 1930 | 0.07 | 1.36 | 0.74 | 2.90 | 4.37 | 2.48 | 0.55 | 2.45 | 0.74 | 2.69 | 0.81 | T | 19.16 |
| 1931 | 0.10 | 1.83 | 0.68 | 1.60 | 1.64 | 0.38 | 0.38 | 0.56 | 1.53 | 0.75 | 0.83 | 0.93 | 10.94 |
| 1932 | 0.12 | 0.08 | 0.80 | 1.60 | 2.82 | 3.31 | 1.52 | 1.75 | 2.11 | 0.88 | T | 0.12 | 15.11 |
| 1933 | 0.05 | 0.20 | 1.83 | 1.43 | 2.55 | 1.38 | 1.44 | 1.36 | 1.34 | 0.05 | 0.06 | 0.88 | 12.57 |
| 1934 | T | 0.10 | 0.76 | 0.27 | 0.39 | 2.73 | 4.33 | 1.05 | 1.12 | 1.76 | 0.46 | 0.21 | 13.18 |
| 1935 | 0.08 | 0.82 | 2.02 | 5.13 | 1.36 | 1.89 | 0.19 | 1.54 | 0.25 | 0.13 | 0.55 | 0.32 | 14.28 |

## Annual Rainfall by Months at the Several Stations (Con'td.)

### Eureka

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909 | 0.10 | 0.45 | 0.14 | 0.50 | 2.65 | 3.35 | 2.21 | 1.39 | 1.25 | 0.17 | 0.60 | 2.40 | 15.21 |
| 1910 | 0.60 | 1.70 | 1.23 | 0.82 | 0.42 | 3.80 | 0.53 | 2.60 | 3.65 | 0.18 | T | 0.25 | 15.78 |
| 1911 | 0.50 | 0.73 | 0.63 | 2.24 | 0.97 | 1.29 | 0.43 | 3.27 | 1.15 | 0.61 | 0.88 | 0.80 | 13.79 |
| 1912 | 0.25 | 0.40 | 1.05 | 1.29 | 3.37 | 1.50 | 2.19 | 3.27 | 1.43 | 0.07 | T | 0.11 | 14.93 |
| 1913 | 0.10 | 0.03 | 0.09 | 0.68 | 1.97 | 2.91 | 2.16 | 1.53 | 0.54 | 1.52 | 0.06 | 0.52 | 12.11 |
| 1914 | 0.22 | 0.05 | 0.13 | 2.07 | 2.20 | 4.28 | 1.25 | 2.11 | 0.70 | 0.87 | T | 0.53 | 14.41 |
| 1915 | 0.90 | 1.08 | 0.23 | 1.83 | 2.58 | 4.66 | 3.38 | 2.47 | 3.74 | 3.10 | 0.56 | 0.36 | 24.89 |
| 1916 | 0.79 | 0.13 | 1.78 | 0.88 | 3.57 | 4.16 | ---- | 4.62 | 1.05 | 0.29 | 0.14 | 0.06 | 17.47 |
| 1917 | 0.40 | 0.20 | 1.46 | 2.18 | 1.30 | 1.61 | 1.04 | 0.93 | 0.67 | 0.06 | 2.00 | 0.75 | 12.60 |
| 1918 | 0.14 | 0.50 | 0.58 | 1.98 | 1.97 | 0.93 | 1.03 | 1.77 | 0.36 | 0.55 | 0.53 | 0.20 | 10.54 |
| 1919 | 0.07 | 1.04 | 0.52 | 1.28 | 3.68 | 2.29 | 4.08 | 0.77 | 0.04 | 1.13 | 0.12 | 0.32 | 15.34 |
| 1920 | 0.16 | 0.08 | 0.27 | 1.63 | 1.82 | 4.26 | 2.49 | 2.05 | 3.90 | 0.36 | 0.54 | 0.09 | 17.65 |
| 1921 | 0.44 | 0.06 | 1.27 | 3.74 | 3.31 | 0.52 | 4.57 | 4.45 | 3.29 | 1.64 | 0.36 | 0.24 | 19.90 |
| 1922 | 0.16 | 0.94 | 0.30 | 0.89 | 3.39 | 3.38 | 1.66 | 0.45 | 0.54 | 0.63 | 3.90 | 0.23 | 16.47 |
| 1923 | 0.13 | 0.17 | 0.35 | 1.31 | 3.55 | 4.17 | 3.67 | 1.72 | 2.56 | 1.52 | 0.22 | 0.20 | 19.57 |
| 1924 | 0.02 | 0.24 | 0.48 | 1.28 | 0.44 | 5.24 | 3.29 | 1.35 | 2.65 | 2.16 | 0.00 | 0.27 | 17.42 |
| 1925 | 0.41 | 0.01 | 0.17 | 2.37 | 1.08 | 6.56 | 0.70 | 1.38 | 1.38 | 9.31 | 0.17 | 0.09 | 14.63 |
| 1926 | 0.00 | 0.00 | 0.00 | 0.25 | 2.66 | 1.18 | 1.16 | 2.45 | 3.21 | 0.81 | 0.16 | 0.00 | 11.88 |
| 1927 | 0.00 | 0.27 | 0.19 | 1.31 | 3.72 | 2.90 | 6.39 | 3.43 | 1.15 | 1.89 | 0.05 | 0.39 | 21.69 |
| 1928 | 0.36 | 0.07 | 0.12 | 1.05 | 0.11 | 4.55 | 3.68 | 2.56 | 3.30 | 1.15 | 0.52 | 0.06 | 17.53 |
| 1929 | 0.52 | 0.24 | 0.36 | 1.06 | 1.57 | 0.77 | 2.42 | 0.70 | 1.55 | 2.57 | 0.17 | 0.09 | 12.02 |
| 1930 | 0.11 | 1.08 | T | 1.43 | 2.65 | 1.00 | 1.06 | 3.94 | 0.74 | 1.94 | 0.63 | 0.18 | 14.77 |
| 1931 | 0.10 | 0.38 | 0.86 | 0.81 | 2.54 | 5.12 | 1.30 | 5.34 | 0.99 | 1.43 | 0.62 | 0.59 | 20.08 |
| 1932 | 0.18 | 0.02 | 0.31 | 1.98 | 5.15 | 5.19 | 1.95 | 1.18 | 1.28 | 1.08 | 0.02 | 0.08 | 18.33 |
| 1933 | 0.24 | 0.10 | 0.74 | 1.23 | 3.03 | 3.28 | 3.27 | 1.28 | 0.60 | 0.05 | 0.26 | 0.15 | 14.23 |
| 1934 | T | 0.01 | 0.49 | 0.03 | 0.25 | 2.61 | 0.72 | 0.49 | 0.90 | 1.64 | 0.15 | 0.14 | 7.43 |
| 1935 | 0.13 | 0.32 | 1.29 | 3.25 | 2.52 | 3.47 | 3.38 | 1.09 | 0.24 | 0.04 | 0.26 | 0.17 | 16.16 |

## Annual Rainfall by Months at the Several Stations (Con'td.)

### Cottonwood

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1910 | 0.66 | 0.97 | 0.76 | 1.06 | 2.54 | 1.30 | 1.11 | 0.48 | 0.82 | 0.32 | 0.53 | 3.00 | 12.65 |
| 1911 | T | 0.15 | T | 0.85 | 1.10 | 0.64 | 0.59 | 2.41 | 3.59 | 1.15 | 0.20 | 0.42 | 11.10 |
| 1912 | 0.17 | 0.05 | 3.00 | 3.32 | 1.18 | 0.95 | 2.42 | 2.42 | 1.30 | 0.11 | T | 0.12 | 16.04 |
| 1913 | 0.16 | 0.10 | 0.43 | 1.15 | 2.95 | 0.59 | 0.81 | 1.84 | 1.15 | 0.76 | 0.14 | 0.38 | 10.46 |
| 1914 | 0.03 | 1.18 | 0.35 | 2.26 | 2.35 | 1.64 | 1.04 | 1.88 | 1.19 | 2.23 | 0.02 | 0.84 | 15.28 |
| 1915 | 0.39 | 1.57 | 0.46 | 2.80 | 6.61 | 4.79 | 4.58 | 2.51 | 2.42 | 0.90 | T | 0.10 | 27.31 |
| 1916 | 0.04 | 0.02 | 0.04 | 0.81 | 3.87 | 1.83 | 1.80 | 2.22 | 0.18 | 0.57 | 0.15 | 0.14 | 11.67 |
| 1917 | 0.45 | 1.50 | 0.31 | 0.80 | 3.30 | 0.62 | 0.90 | 2.00 | 1.17 | 0.14 | 0.39 | 0.50 | 12.08 |
| 1918 | 0.32 | 1.50 | 0.34 | 2.27 | 2.78 | 1.37 | 2.29 | 3.43 | 1.43 | 0.28 | 0.11 | 0.25 | 16.37 |
| 1919 | 0.04 | 0.29 | 0.71 | 3.57 | 1.29 | 4.97 | 2.05 | 0.20 | 0.25 | 2.03 | 0.71 | 0.20 | 16.31 |
| 1920 | 0.27 | 0.54 | 0.58 | 2.80 | 5.83 | 4.02 | 0.67 | 1.87 | 1.63 | 0.93 | 0.36 | 0.18 | 19.68 |
| 1921 | 0.17 | 0.10 | 0.17 | 0.40 | 2.91 | 0.78 | 3.58 | 1.10 | 0.41 | 3.43 | 0.29 | 0.21 | 13.55 |
| 1922 | 0.94 | 0.32 | 0.00 | 1.25 | 2.37 | 5.43 | 6.48 | 0.72 | 0.16 | 0.92 | 2.32 | 0.00 | 21.41 |
| 1923 | 0.00 | T | 0.00 | 0.66 | 2.41 | 4.87 | 5.28 | 3.08 | 3.05 | 1.89 | 0.18 | 4.00 | 25.42 |
| 1924 | 0.00 | 0.00 | 0.32 | 0.06 | 0.29 | 3.03 | 1.78 | 1.48 | 3.05 | 0.85 | 0.31 | 0.17 | 11.34 |
| 1925 | 4.00 | 0.20 | 1.07 | 1.17 | 0.72 | 4.80 | 0.60 | 0.39 | 0.49 | 0.48 | 0.08 | 2.10 | 13.41 |
| 1926 | 0.00 | 0.50 | 0.00 | 0.75 | 2.77 | 1.97 | 3.52 | 1.56 | 0.37 | 1.12 | 1.06 | 0.00 | 13.62 |
| 1927 | 2.00 | 0.00 | 0.03 | 2.74 | 5.16 | 3.26 | 2.38 | 2.21 | 0.63 | T | 0.00 | 0.00 | 16.61 |
| 1928 | 0.00 | 0.03 | 0.86 | 0.35 | 1.14 | 3.83 | 3.11 | 0.94 | 1.65 | 1.19 | 0.77 | T | 13.87 |
| 1929 | 0.46 | 0.03 | 4.34 | 2.51 | 2.20 | 3.56 | 1.74 | 0.89 | 1.44 | 0.61 | 0.10 | 0.03 | 17.91 |
| 1930 | 0.35 | 0.49 | 3.59 | 1.85 | 0.94 | 0.97 | 0.99 | 7.82 | 1.20 | 3.98 | 0.05 | 0.05 | 21.77 |
| 1931 | 0.00 | 0.05 | 1.23 | 0.17 | 1.27 | 0.62 | 0.84 | 0.82 | 1.65 | 0.71 | T | 0.00 | 7.36 |
| 1932 | 0.00 | 0.00 | T | 3.67 | 3.60 | 4.34 | 2.35 | 0.74 | 0.26 | 0.51 | T | 0.00 | 15.47 |
| 1933 | 0.04 | T | 0.58 | 2.72 | 4.65 | 0.56 | 0.43 | 3.14 | 0.32 | 0.03 | 0.27 | 0.02 | 12.76 |
| 1934 | 0.13 | T | 1.15 | 0.39 | 0.45 | 4.69 | 1.01 | 1.35 | 0.26 | 1.41 | 0.50 | 2.00 | 13.34 |
| 1935 | 0.25 | 1.80 | 0.85 | 3.65 | 3.60 | 1.68 | 2.76 | 1.08 | 0.06 | 0.11 | 0.24 | 0.92 | 17.00 |

## Annual Rainfall by Months at the Several Stations (Con'td.)

### Vivian

| | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1915 | 0.50 | 1.77 | 1.19 | 2.62 | 3.02 | 4.31 | 6.76 | 1.12 | 3.16 | 1.12 | 0.38 | 0.03 | 25.98 |
| 1916 | 1.00 | 0.04 | 0.29 | 1.08 | 3.46 | 4.49 | 3.53 | 3.52 | 0.90 | 0.57 | 0.12 | 0.04 | 19.04 |
| 1917 | 1.35 | 0.18 | 1.00 | 2.38 | 5.20 | 1.18 | 1.02 | 2.01 | 2.64 | 0.00 | -.-- | 4.32 | 17.28 |
| 1918 | 1.10 | 0.50 | 0.50 | 3.92 | 3.33 | 1.70 | 2.07 | 3.32 | 0.75 | 0.82 | 0.22 | 0.90 | 19.13 |
| 1919 | 0.00 | 0.33 | 0.66 | 4.14 | 3.23 | 5.01 | 4.00 | 0.94 | 1.70 | 1.95 | 1.91 | 0.13 | 23.99 |
| 1920 | 0.00 | 0.58 | 1.52 | 4.55 | 7.51 | 5.54 | 3.42 | 1.86 | 0.80 | 2.09 | 1.32 | 0.28 | 29.47 |
| 1921 | 0.19 | 0.01 | 0.68 | 1.53 | 4.23 | 1.22 | 4.34 | 0.44 | 3.55 | 1.68 | 0.63 | 0.28 | 18.78 |
| 1922 | 0.47 | 0.40 | 0.75 | 0.71 | 2.49 | 5.85 | 3.44 | 3.86 | 0.27 | 0.45 | 2.32 | 0.15 | 21.16 |
| 1923 | 0.03 | 0.03 | 0.00 | 1.47 | 1.59 | 4.04 | 1.98 | 3.19 | 1.03 | 1.03 | 0.33 | 1.50 | 16.22 |
| 1924 | 0.00 | 0.70 | 0.85 | 0.90 | 0.05 | 4.44 | 2.14 | 1.16 | 1.79 | 1.17 | 0.28 | 0.40 | 13.88 |
| 1925 | 0.17 | 0.12 | 0.04 | 1.00 | 0.49 | 7.53 | 2.00 | 1.16 | 0.02 | 0.28 | 0.08 | 0.35 | 11.03 |
| 1926 | 1.37 | 0.17 | 0.00 | 0.04 | 2.17 | 3.05 | 1.40 | 0.60 | 1.28 | 1.15 | 0.03 | 0.29 | 11.55 |
| 1927 | 0.03 | 0.02 | 1.06 | 6.65 | 6.41 | 1.88 | 1.38 | 1.40 | 0.59 | 1.54 | 0.35 | 0.73 | 21.99 |
| 1928 | T | 0.16 | 0.92 | 0.17 | 2.24 | 4.70 | 1.26 | 0.55 | 0.71 | 1.74 | 0.78 | 0.07 | 13.30 |
| 1929 | 0.75 | 0.53 | 1.19 | 4.17 | 1.96 | 2.27 | 0.37 | 0.42 | 2.33 | 5.59 | 0.57 | 0.13 | 20.28 |
| 1930 | 0.19 | 1.00 | 0.45 | 1.13 | 3.52 | 2.17 | 0.38 | 4.71 | 2.49 | 2.71 | 1.80 | 0.00 | 20.55 |
| 1931 | 0.20 | 0.08 | 2.52 | 0.37 | 2.74 | 1.77 | 1.45 | 2.35 | 1.06 | 1.00 | 0.55 | 1.05 | 15.14 |
| 1932 | 0.33 | 0.39 | 0.90 | 0.68 | 2.45 | 5.26 | 3.42 | 1.38 | 0.65 | 0.93 | T | 0.39 | 16.78 |
| 1933 | T | 0.17 | 2.12 | 1.72 | 3.87 | 1.37 | 2.12 | 1.33 | 1.09 | 0.03 | 0.32 | 0.70 | 14.84 |
| 1934 | 0.03 | 0.20 | 1.08 | 1.46 | 0.61 | 1.70 | 0.83 | 0.52 | 1.28 | 1.89 | 0.37 | 0.40 | 10.37 |
| 1935 | 0.37 | 0.36 | 0.82 | 5.80 | 2.92 | 1.43 | 0.50 | 1.47 | 1.21 | 0.24 | 0.00 | 0.51 | 15.63 |