

March 14, 1960

To the Graduate Council:

I am submitting herewith a thesis written by Gary N. Duren entitled "A Detailed Comparative Character Description of Some Early Tomato Varieties Under East Tennessee Conditions." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Horticulture.

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**A DETAILED COMPARATIVE CHARACTER DESCRIPTION
OF SOME EARLY TOMATO VARIETIES UNDER
EAST TENNESSEE CONDITIONS**

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N/C

**A Thesis
Presented to
the Graduate Council of
The University of Tennessee**

**In Partial Fulfillment
of the Requirements for the Degree
Master of Science**

**by
Gary N. Duren
March 1960**

ACKNOWLEDGEMENT

The writer wishes to express his gratitude to: Dr. B. S. Pickett, Head, Department of Horticulture and to Professors R. B. Thompson and H. D. Swingle, Department of Horticulture for reviewing the thesis; Mrs. Andrea Duren for typing preliminary copies of the work; and the writer is especially grateful to Dr. W. E. Roever, Department of Horticulture for supervision throughout this work.

G.N.D.

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CHAPTER I

INTRODUCTION

The cultivated tomato, Lycopersicon esculentum, although a relatively new addition to the American diet, has rapidly gained a place as one of our more important vegetables.

The origin of the tomato is obscure, but it seems likely that it is native to the Peru-Bolivia-Ecuador area of the Andes (20).⁵ The cultivated tomato was probably carried northward into Central America and Mexico by prehistoric migrations of Indians. For centuries it has been a staple food in the Mexican diet (1).³

Although Spanish explorers had found the tomato being used as a food, there was considerable reluctance in most of Europe to its use as anything but an ornamental. It was frequently said to be poisonous. The earliest record of tomatoes being used as a food in this country was in 1812 (20).⁵

Work is going on continually in the United States as well as other countries to breed better varieties of tomatoes. Probably the first American contribution toward tomato improvement was the introduction of Tilden by Henry Tilden of Davenport, Iowa in 1865. The next notable advance occurred in 1870 with the introduction of Trophy, a result of hybridization and selection by Dr. Hand, of Baltimore County, Maryland (20).⁵ Today there are over 350 horticultural varieties, most of which are only slightly different from each other (15).¹

To combine into one variety such factors as: bright red color, good fruit size, productiveness, quality, and good foliage cover, as well as resistance to disease, cracking and heat seems to be a very difficult task. Nevertheless, progress has been made. There are many genetic differences among these varieties. Therefore a variety could be quite desirable under one set of conditions; yet under another set, a complete failure. In order for one to make an intelligent selection of a variety for his growing and market conditions he must know the genetic factors the variety possesses. One should also know how these factors affect productivity under different conditions (4)¹¹². Descriptions found in commercial catalogs are often insufficient for the selection of varieties.

CHAPTER II

LITERATURE REVIEW

Variety trials have too often been concerned with yield without enough emphasis on genetic characteristics. These genetic characteristics are important to plant breeders in selecting parental material as well as to commercial producers in selecting varieties to fit particular conditions.

Ghodat and Gagnebin (6), both members of the botanical experiment station at Geneva University, made a survey of genetic and botanical characteristics of the tomato plant. They contended that variety descriptions are generally inadequate for scientific purposes, and suggest a more precise diagnosis. They also found that the difference between a northern and southern planting of the same variety has sometimes been so pronounced as to disqualify it for varietal authenticity if the accepted description had been applied. Fruit form, size, number of locules, type of fruit cluster, time of ripening, and content of vitamin C were among the characters most affected.

Ascorbic Acid

The ascorbic acid (vitamin C) content of tomatoes seems to vary greatly, not only between lines, but within lines when exposed to different environmental conditions.

Reynard and Kanapaux (18) report that most commercial varieties

range from about fifteen to forty mgs. of ascorbic acid per hundred gms. of fresh weight.

They found no significant differences due to position in the field, and slight but non-significant differences due to variation in ripeness, greener fruits having less ascorbic acid. Small but non-significant differences were found in successive pickings over a period of a month. The greatest variability appeared due to the differences between lines. They also found a highly significant negative correlation between fruit size and ascorbic acid content.

MacLinn, Fellers and Buck (13) found no correlation between tomato size and vitamin C Content. The degree of ripeness had no significant effect on vitamin C content. There were marked differences in vitamin C content among different strains of the same variety.

Murphy and Covell (16) conducted an experiment on the ascorbic acid content of tomatoes over a ten-year period. During this decade eighty-two varieties were tested and the range for that period of time was from nine to forty-three mgs. of ascorbic acid per hundred gms. of fresh weight. The crop year in which the tomatoes were grown affected the vitamin C content as much or more than variety. Other data led them to believe that vitamin C variability was not related to fruit maturity. Ripe fruits were found to be thirty-six to fifty-four per cent higher in vitamin C than immature green fruits on the same variety harvested on the same date. They believed weather was

the predominant influence in vitamin C production. Statistical analysis indicated that tomato vitamin C production responds directly to light intensity and inversely, but to a larger degree to temperature.

Reynard and Kanapaux (18), in crossing tomatoes for higher ascorbic acid content, found that when crossing varieties with almost equal amounts of ascorbic acid the first generation did not differ from the parent lines. A Red Currant tomato x Marglobe cross showed that the ascorbic acid content in the F₂ generation ranged from about nine to forty-two mgs. per hundred gms. of fresh weight. The parental lines had forty-two and sixteen mgs. respectively.

For several generations following crosses of Lycopersicon peruvianum with commercial varieties, Powers (17) states that there persists an apparent linkage between: (a) low yield, small fruit size, and high concentration of ascorbic acid from the former, and (b) relatively high yield, large fruit and low ascorbic acid from commercial varieties.

Schultz and Kelly (21) found no recognizable pattern between size of fruit and ascorbic acid content. They state, "In making selections, it does not appear necessary to sacrifice ascorbic acid content for fruit size to any great extent since large fruited plants were among those having the highest ascorbic acid content. In the present material it has been more difficult to combine high ascorbic acid content with other desirable horticultural characters than with large fruit size in the progeny."

Jointless Characteristic

Rick and Sawant (19) report that the absence of pedicel joints, conditioned by the (j) gene, has attracted more interest as a characteristic of potential value for breeding tomatoes than most other mutations. This complete elimination of the joint has been frequently proposed as a means of ridding the fruits of the short stems that are retained when separation occurs at the joint of the normal type. Damage to harvested fruits caused by the sharp ends of abscised pedicels can thereby be averted.

They found that freedom from joints is usually accompanied by a tight attachment of the pedicel to the fruit. It may become so difficult to separate fruits from the vine that portions of fruit tissue are torn away in harvesting. Another unsatisfactory condition associated with (j) is the indeterminate growth of inflorescences. Instead of being exclusively reproductive structures as are normal clusters, the inflorescence of (j) first produces one to three flowers and then continues growth as a normal vegetative shoot. According to most reports on the genetics of (j), the jointless and leafy traits are separable by crossing over, and, consequently, two linked genes, (j) and (lf), have been proposed to account for the relationships in the fifth linkage group.

Chodat and Gagnebin (6) state that the character nonarticulated pedicel (j) is monofactorial and recessive, as shown following effective crosses with articulate (j) varieties. The gene responsible for this is found on chromosome 5, as is that which determines leafiness of inflorescence.

Young and MacArthur (23) report that the F_2 segregation ratio was three jointed to one jointless. The pedicel joints develop abscission layers. The stemless Pennred variety has jointless fruit pedicels which facilitate removing the green calyx when the fruit is picked.

Pistil Length

In the morphology of the tomato flower the length of the pistil is an important character relating to pollination and the setting of fruit. Whether or not a variety naturally sets fruit freely without some form of mechanical pollination is determined largely by the length of the pistil in relation to the length of the stamens.

Burk (5) made a study of the pistil length in the Bonny Best variety, and found that it varied according to the length of photoperiod and intensity of the light. When grown in short photoperiod (eight hours) the pistils were much longer than the stamens, and when grown in long photoperiod (sixteen hours) the pistil did not extend beyond the stamens.

Bouquet (3) found in the varieties he used, that as a rule the styles in all the short pistil varieties are slender, delicate, brittle, and short. They are attached to ovaries that are smaller, rounder, smoother, and more regular than those in the long-style varieties.

Smith (22) reports that blossom drop is greatly increased by hot dry winds, low humidity and low soil moisture. There is a lag of approximately three days between the time when temperature

exerts an effect on blossom drop and time when the effect becomes visible. This was apparently due to the elongation of the styles. During periods of hot dry winds and low soil moisture the styles elongated abnormally, even before anthesis. Few flowers that had elongated styles in hot dry weather developed normally and set fruit.

Flowers Produced

Daily (7) reports there was an inverse relationship between the temperature at truss differentiation and the number of flowers produced. F_1 hybrids have been shown to be more stable for flower production than their inbred parents. When families were raised at high and low temperatures, the character was expressed more constantly in the hybrid than in the parent. Phenotypic stability, in spite of environmental variations, is a very useful attribute for crop plants. It reduces the effects of climatic variation, and facilitates prediction of yields.

Fruit Size

Zielinsky (25) reports that in commercial varieties, production of very early fruits three to four inches in diameter have been almost inseparably associated with prostrate stems and foliage that is inadequate to shade the fruits, as exemplified by Earliana and Bison. The genes for these characters are suspected to be linked, but this has not been proven. The combination of the characters of earliness, large fruits, and adequate foliage has not yet been accomplished.

MacArthur (12) states that tomato fruit size depends upon the growth and differentiation of the meristematic tissue of the fruit "anlage", which enlarges by a series of cell divisions (largely before anthesis) and by cell expansion (mainly after anthesis, when the pollen auxin effect is expressed). The limits of growth are set by both the surrounding environmental conditions and by hereditary factors. The standard explanation of size inheritance by multiple factors, which are assumed to act without dominance and with equal and additive effects, may be criticized as certainly inadequate and probably basically erroneous. Fruit size was controlled almost exclusively by genotypes under the relatively uniform conditions obtained in a Latin Square experiment. The F_1 fruit weights are not intermediate but closely approach the geometric means of the parental varieties.

Evidence from a series of diallel crosses raised in Latin Square arrangements confirm the view that genes determining fruit size and weight in the tomato act in a proportionate or geometric way.

Fruit Cracking

Fraser (9) found that heavy irrigation throughout the season induced more cracking than occurred in plots left continually dry. Dry treatment, followed by continued heavy irrigation, produced significantly more cracked fruits and larger cracking indices than heavy irrigation throughout the season.

He also discovered that rain is effective in producing cracking within a few hours. The water is absorbed through the corky layer of the stem end, or may be taken in through small corky areas in the skin. Perceptible increases in cracking following very light showers indicate that appreciable absorption of external water by the fruit is not necessary for cracking to occur, but that the mere decrease in transpiration of water from the fruit is apparently sufficient to cause expansion and subsequent rupture.

Fraser (10) also conducted a test on type and severity of fruit cracking, using seventy different strains of tomatoes. It was apparent that the greatest and the most consistent differences in cracking occurred between picking dates, as a result of variations in rainfall. However differences between varieties were in some cases appreciable, and consistent throughout the season. Most of the early varieties, such as Earliana, were far more severely cracked concentrically than most late varieties.

Locule Number

Zielinski (25) found that there was a significant difference in locule number between varieties. These must have a genetic basis. Some are characterized by as few as two locules, which number is typical of the genus as a whole, while at the other extreme as many as 215 locules have been observed in a single flower. He also reports a striking trend toward lower locule numbers as the season advances. This was exhibited in every one of the varieties grown: even in the

case of the three varieties (Ondheart, Brimmer and Stone) in which readings for August were slightly higher than those for July, there was a marked decrease in locule number in September. Analysis of variance indicated that the differences in mean locule number between months within a variety were highly significant. The differences between varieties were also highly significant.

Fruit Shape

Daily (7) reports that fruit shape is determined by several genes, of which the most important is that controlling locule number. The dominant allele results in even-shaped bilocular fruit, compared with the variable multi-locular fruit produced by the recessive allele. Pear shape, nipple tip, flattened shape and extreme fasciation, which are determined by other recessive genes, are not desirable characteristics. No investigations have been made on the developmental process which often result in the malformation of the first fruit of each cluster.

Site of Insertion of Flower Truss

Chodat and Gagnebin (6) show that with early varieties the inflorescences appear at the third internode. This placement is not absolute, but is the average of a number of counts. The varieties whose inflorescences appear at approximately the eleventh internode retard maturation of the fruit by about ten days. This appears to be a hereditary property influenced by the surrounding conditions. The

character of high insertion is completely dominant over the character of low insertion. This gives genetically, in part, a correlation between low placement and earliness and these two characters usually are recessive. These studies were made on lines from two wild races L. perasiforme and L. racenigerum. In 1933 it was shown at the German station at Muecheberg that the species L. racenigerum matured at least eight to fourteen days before the best commercial varieties, such as Bonny Best and Danish Export.

Uniform Color Genes

Bohn and Scott (2) state that genes for uniform color have been obtained from two different sources. The genes for uniform color in extremely early, determinate lines were obtained from the Danmark variety. Uniform color in this variety, and in lines derived from it, is governed genetically by genes (U/u) as shown by crosses with Bounty and Victor.

The genes for uniform color in midseason lines were obtained from Globe which is a pink, indeterminate, forcing variety.

The symbols (U_1/u_1 and U_2/u_2) are suggested to designate the previously described location on the chromosomes governing uniform color. Crosses between lines homozygous for (u_1) and lines homozygous for (u_2) yield F_1 hybrids ($U_1/u_1, U_2/u_2$) with green-shouldered fruits. F_2 progenies segregate plants with green-shouldered fruits in the ratio of nine to seven, indicating that the two genes are on different chromosomes.

Determinate Plants

MacArthur (11) found that non-determinate tomato varieties normally produce the first blossom cluster on the ninth to the thirteenth internode, and then repeat the inflorescences regularly every third internode thereafter all through the growth of the stem.

In the self-pruning varieties the stem segments between inflorescences are shortened to one or two internodes. In the latter the flower clusters begin at the usual height and then tend to recur on every internode or every second internode; they sometimes skip three leaves, but are then invariably closely spaced again. Nutrients seem to be diverted to fruits set on these clusters, and therefore terminal growth of the stem segments ceases. Leaves are seen to be interspersed among the close set clusters. Distinct lateral branches arise from the nodes immediately below, and then more basally, on which flower clusters soon appear in similar close succession. The result is that the self-pruned plant covers a much smaller circle of space than do normal plants, but covers the space densely.

In crossing of self-pruning with normal plants, the F_1 hybrids all produce their blossom clusters in the normal succession with three intervening leaves, the stems are indeterminate in growth, and the plant covers much more ground. In the F_2 a simple and clean segregation occurs on a monofactorial basis with a ratio of three to one.

Puffiness in the Tomato

Large air spaces under sunken areas in the fruit wall are symptoms of puff. Badly affected fruits are partly angular in shape with flattened sides. Puffed fruits are light in weight, and their sides yield to slight pressure. When cut open, large cavities are noticed in the locules where tissues and seeds have failed to develop.

Foster and Tatman (8) suggest that poor pollination is a main cause of puffing. Fruits that begin growth in rainy weather may get only enough pollen to stimulate growth. One pollen grain is needed for production of each tomato seed, and when pollination is incomplete, whole locules may be seedless and grow hollow. Hot dry weather can cause imperfect pollination of tomato flowers resulting in puffing. Other suspected causes of puffing are unbalanced fertilizers, excess water in the soil, and temperatures that are too warm or too cold for best growth.

Young (24) states that susceptibility to puffing is hereditary, and he regards it as a genetic weakness.

Structure of the Inflorescence

In studies on the structure of the inflorescence, Boquist (3) found that a single plant, may have a single raceme-like or a forked cluster. The forked clusters may be termed compound.

The single raceme-like type of inflorescence was found to be dominant over the branched type in all varieties except Earliana.

He also observed that the simple type of inflorescence appears more frequently on the lower clusters of the plant; the branched type occurs more commonly toward the upper part. There is no fixed nor uniform size of the inflorescence, each cluster being a variable unit. The range in size is wide, depending on whether the type is simple or compound, the location of the cluster on the plant, the season of the year when the crop is grown, and the general structure of the cluster of the variety. Average size clusters are more desirable than extremes, in the production of good marketable fruits.

Chodat and Gagnebin (6) state that certain varieties develop, at the site of the inflorescence, a group of small leaves. Each of these transfers this vegetative characteristic, and it is not a late expression of anomalies following the course of normal development. Rather, in each of these tomatoes the condition is due to precise genetic characters. The characteristic of exceptionally leafy inflorescence is recessive to the normal non leafy inflorescence.

Color in Tomatoes

McCollum (14) reports that high temperature inhibits good color in tomatoes. Lycopene is inhibited by temperatures above eighty-six degrees Fahrenheit. During sunny days in midsummer the temperature of tomato fruits may be much higher than this. Temperatures above seventy-five degrees Fahrenheit progressively inhibited the development of lycopene and promoted softening so that fruits picked during hot weather were poorly colored, soft and difficult to handle.

Fruits exposed to direct sunlight were fifteen to twenty degrees Fahrenheit higher than the air temperature, and ten to fifteen degrees Fahrenheit higher than fruits shaded by foliage. Fruit temperatures as high as one hundred twenty-two degrees Fahrenheit were recorded in 1947. Sunscald occurs at about this temperature.

CHAPTER III

MATERIALS, METHODS AND RESULTS

This study on tomato varieties in East Tennessee was conducted over a two year period. In 1958 fifty-one tomato varieties were chosen for the study. All of these varieties were classed in the first early group except Mammoth Wonder, which is in the second early group, and Rutgers, which was used as a standard for comparison.

The varieties were arranged in a randomized block design consisting of four replicates. Each replicate contained five plants. All of the small determinate varieties were left unpruned, while the others were pruned to two main stems. All tomatoes in the replicated studies were staked and tied regardless of size or type of pruning. A separate planting, consisting of five plants of each variety, was left unpruned and unstaked in order to record their natural growth habits. The plants in the replicated blocks were spaced two feet apart in rows four feet apart. The unstaked plants were spaced three feet apart in four foot rows.

Eight hundred pounds per acre of 6-12-12 fertilizer was broadcast and disked in prior to planting. Four hundred pounds of 6-12-12, and three hundred pounds of 0-20-20 fertilizer per acre was placed in the row at planting time.

Insects and diseases were controlled throughout the season by spraying every week to ten days with zineb and EDT.

Weeds were controlled by tractor cultivation before staking

and by roto-tiller and hoe after staking.

In 1959 sixteen of the varieties from the 1958 group were chosen for further study. Also, a new variety, "New Hampshire Surecrop", was added because it was resistant to late blight.

The seeds were planted in the greenhouse in flats on February 24. A growing medium of equal parts of soil and sand was used. The seedlings were transplanted into two and one-half inch clay pots containing soil on March 18. After transplanting they were moved to a cold frame, covered with glass and allowed to remain without additional heat. The plants were set in the field on April 25, and irrigated on April 29.

Eight hundred pounds of 6-12-12 fertilizer was applied prior to planting. Four hundred pounds of 6-12-12 and three hundred pounds of 0-20-0 fertilizer was applied in the row at planting time.

All other procedures were the same as in 1958, except the unstaked planting was omitted and maneb was substituted for sineb for disease control.

The tomatoes were picked every three days. The fruits of each replicate were graded, counted, and weighed. Fruits that were well formed, smooth, free from growth cracks, sunscald, puffiness, scars, dry rot, or any other damage caused by disease, insect or mechanical means were classed as grade A. Grade B consisted of tomatoes that were well formed, fairly smooth, free of serious damage caused by puffiness, growth cracks or other means. This grade was composed mostly of tomatoes that would have been grade A except for

slight circular or radial cracking. Grade C consisted of fruits which were cracked severely, puffy, sunburned, rotten, or other serious damage caused by insects, diseases, or other means. The fruits were not graded according to size. The average weight for each variety was determined by weighing and counting all fruit produced.

Total Yield

The total yield consisted of all fruits picked, without regard to size or grade. All of the tomatoes were weighed and the yields for 1958 and 1959 are shown in Tables I and II respectively. A summary of the yield for both years, and the difference between years, is given in Table III.

Marketable Yield

Marketable yield included all grade A and B fruits. All tomatoes in these grades were weighed to determine the total marketable yield. Tables IV and V show the total marketable yield for each variety in 1958 and 1959 respectively. Table VI gives the combined yields for the two years and the difference between years.

Fruit, Size and Shape

Size was determined by weight. All tomatoes were weighed and counted. The total weight was divided by the number of fruits to arrive at the average size. The average fruit size for the

TABLE I

TOTAL YIELDS FOR TOMATO VARIETIES TESTED IN 1958

Rank in Total Yield	Variety	Av. Yield Per Rep. in Lbs.	Not Different from Var. with Rank of
40	Alpha 5	18.73	16-50
45	Alpha 7	17.89	23-50
15	Bison	23.27	4-40
5	Bounty	26.05	30-25
29	Burgess Hybrid A	21.50	6-46
19	Burgess Hybrid #1	22.76	5-40
26	Burpeeana Early Hybrid	21.58	6-46
13	Burpee's Big Early	23.62	4-39
23	Bush Beefsteak	22.17	5-45
31	Cavalier	21.32	7-48
17	Gluster-mato	22.89	5-40
3	Guyano	29.25	2-8
16	Doublerich	22.90	5-40
21	Earliana #498	22.70	5-41
47	Earliana (Early Strain)	17.07	30-50
42	Earliana (McFayden Special)	18.29	22-50
28	Earliana (Mrs. Young's)	21.56	6-46
50	Early Chatham	15.78	37-50

TABLE I (continued)

TOTAL YIELDS FOR TOMATO VARIETIES TESTED IN 1958

Rank in Total Field	Variety	Ave. Yield Per Rep. in lbs.	Not Different from Var. with Rank of
43	Early Harkness	18.18	22-50
12	Early Jersey	23.87	4-37
1	Early Red Chief	34.36	1-2
49	Early Stokesdale #4	16.39	35-50
18	Early Wonder	22.84	5-40
48	Farthest North	17.06	30-50
46	Fireball	17.68	24-50
35	Firesteel	20.35	9-49
7	Harrow	25.53	3-31
38	Mammoth Wonder	19.32	13-50
11	Manitoba	23.90	4-37
36	Marmen	20.27	9-49
22	Meteor	22.27	5-44
27	Monarch	21.57	6-46
32	Moreton Hybrid	21.16	8-48
25	N.D.A.C. 38	21.91	5-46
6	Red Cloud	25.73	3-29
4	Red River	27.39	3-15

TABLE I (continued)

TOTAL YIELDS FOR TOMATO VARIETIES TESTED IN 1958

Rank in Total Yield	Variety	Ave. Yield Per Rep. in Lbs.	Not Different from Var. with Rank of
39	Rhode Island Early	19.30	13-50
14	Rutgers	23.46	4-39
33	Selandi	21.11	8-48
30	Sioux	21.35	7-48
9	Stokesalaska	24.62	3-36
2	Stokeschatham	33.30	1-3
8	Stokescross #1	25.13	3-34
20	Stokes Early Hybrid	22.73	5-41
10	Tenn. 29U	23.92	4-37
24	Valiant	21.98	5-46
41	Valiant #889	18.40	19-50
44	Valnorth	18.17	22-50
34	Vancross	20.95	8-48
37	Victor	20.06	10-50

L.S.M.D. at .05 level for total yield = 4.35 lbs.

L.S.M.D. at .01 level for total yield = 5.73 lbs.

TABLE II

TOTAL YIELDS FOR TOMATO VARIETIES TESTED IN 1959

Rank in Total Yield	Variety	Avg. Yield Per Rep. in Lbs.	Not Different from Var. with Rank of
3	Bison	36.33	1-11
10	Burpeeana Early Hybrid	30.75	2-17
2	Burpee's Big Early	36.56	1-11
1	Bush Beefsteak	39.33	1-7
17	Earliana (McFayden Special)	23.63	9-17
7	Early Red Chief	32.78	1-16
12	Early Stokesdale #4	27.86	5-17
6	Fireball	33.80	1-15
15	Firesteel	27.37	5-17
4	Moreton Hybrid	35.72	1-11
13	New Hampshire Surecrop	27.52	5-17
14	Rhode Island Early	27.42	5-17
11	Rutgers	30.05	2-17
9	Stokesalaska	30.91	2-17
5	Stokeschatham	23.16	1-15
8	Stokes Early Hybrid	31.97	2-16
16	Valiant	26.45	7-17

L.S.M.D. at .05 level for total yield = 7.29 lbs.

L.S.M.D. at .01 level for total yield = 9.72 lbs.

TABLE III

**SUMMARY OF TOTAL YIELDS FOR TOMATO VARIETIES
TESTED IN 1958 AND 1959**

Rank in Total Field	Variety	Av. Yield Per Rep. in lbs.	Not Different from Var. with Rank of
5	Bison	29.80	1-11
10	Burpeeana Early Hybrid	26.22	3-16
4	Burpee's Big Early	30.09	1-11
3	Bush Beefsteak	30.75	1-11
16	Earliana (McFayden Special)	20.96	10-16
2	Early Red Chief	33.98	1-6
15	Early Stokesdale #4	22.13	8-16
11	Fireball	25.74	3-16
13	Firesteel	23.86	6-16
6	Moreton Hybrid	28.44	1-14
14	Rhode Island Early	23.36	6-16
9	Rutgers	26.38	3-15
7	Stokesalaska	27.77	3-14
1	Stokeschatham	33.73	1-6
8	Stokes Early Hybrid	27.35	3-15
12	Valiant	24.22	6-16

L.S.M.D. at .05 level for total yield = 5.37 lbs.

L.S.M.D. at .01 level for total yield = 7.11 lbs.

Av. yield per rep. for 1958 and 1959 = 22.73 and 31.57 lbs. respectively.

L.S.M.D. between years at the .05 level = 1.89.

L.S.M.D. between years at the .01 level = 2.51.

TABLE IV

TOMATO MARKETABLE YIELD FOR 1958

Rank in Mkt. Yield	Variety	Av. Mkt. Yield Per Hm. 12 Lbs.	Not Different from Var. with Rank of
26	Alpha 5	15.09	6-44
42	Alpha 7	12.15	18-50
50	Bison	7.86	40-50
23	Bounty	15.68	4-44
19	Burgess Hybrid A	16.63	2-43
47	Burgess Hybrid #1	9.89	32-50
13	Burpeeana Early Hybrid	18.47	1-35
7	Burpee's Big Early	19.34	1-31
17	Bush Beefsteak	16.89	2-41
25	Cavalier	15.46	4-44
5	Cluster-mato	20.05	1-25
27	Guyano	14.99	6-44
30	Donblerich	14.90	6-45
36	Earliana #498	13.13	15-49
49	Earliana (Early Strain)	8.45	36-50
46	Earliana (McFayden Special)	10.04	31-50
43	Earliana (Mrs. Young's)	11.92	19-50
44	Early Chatham	11.63	21-50

TABLE IV (continued)

TOMATO MARKETABLE YIELD FOR 1958

Rank in Mkt. Yield	Variety	Avg. Mkt. Yield Per Row in Lbs.	Not Different from Var. with Rank of
34	Early Harkness	14.12	12-48
9	Early Jersey	19.20	1-31
2	Early Red Chief	21.05	1-20
33	Early Stokesdale #4	14.42	10-47
37	Early Wonder	13.01	16-49
39	Farthest North	12.66	17-49
38	Fireball	12.78	17-49
31	Firesteel	14.75	6-46
4	Harrow	20.12	1-25
18	Mammoth Wonder	16.78	2-42
15	Manitoba	17.83	2-36
48	Marman	9.63	34-50
22	Meteor	16.30	3-44
29	Monarch	14.93	6-41
12	Moreton Hybrid	18.53	1-35
35	N.D.A.C. 38	14.08	12-48
14	Red Cloud	18.30	1-35
41	Red River	12.44	17-49

TABLE IV (continued)

TOMATO MARKETABLE YIELD FOR 1958

Rank in Mkt. Yield	Variety	Av. Mkt. Yield Per Row. in lbs.	Not Different from Var. with Rank of
20	Rhode Island Early	16.59	2-43
6	Rutgers	19.37	1-31
45	Selandi	10.27	28-50
28	Sioux	14.95	6-45
10	Stokesalaska	18.94	1-33
1	Stokesathen	22.64	1-14
11	Stokescross #1	18.89	1-33
3	Stokes Early Hybrid	21.01	1-22
40	Tenn. 29U	12.51	16-49
16	Valiant	17.61	3-37
32	Valiant #889	14.45	10-47
24	Valnorth	15.62	4-44
8	Vancross	19.20	1-32
21	Victor	16.33	3-44

L.S.M.D. at the .05 level for marketable yield = 4.71 lbs.

L.S.M.D. at the .01 level for marketable yield = 6.19 lbs.

TABLE V

TOMATO MARKETABLE YIELD FOR 1959

Rank in Mkt. Yield	Variety	Ave. Mkt. Yield Per Acre in Lbs.	Not Different from Var. with Rank of
15	Bison	23.16	3-17
3	Burpeeana Early Hybrid	29.44	1-15
7	Burpee's Big Early	27.41	1-15
11	Bush Beefsteak	25.21	1-16
17	Earliana (McFayden Special)	17.92	12-17
8	Early Red Chief	26.80	1-15
10	Early Stokendale #4	26.00	1-15
4	Fireball	28.83	1-15
16	Firesteel	19.41	9-17
1	Moreton Hybrid	39.39	1-14
14	New Hampshire Surecrop	24.43	1-17
12	Rhode Island Early	24.72	1-17
9	Rutgers	26.24	1-16
5	Stokesalaska	28.39	1-15
6	Stokeschathan	27.66	1-15
2	Stokes Early Hybrid	30.14	1-14
13	Valiant	24.64	1-17

L.S.M.D. at the .05 level for marketable yield = 6.93 lbs.
 H.S.D. between varieties at the .01 level.

TABLE VI

SUMMARY OF MARKETABLE YIELDS FOR TOMATO VARIETIES
TESTED IN 1958 AND 1959

Rank in Mkt. Field	Variety	Av. Mkt. Yield Per Row, in lbs.	Not Different from Var. with Rank of
15	Bison	15.51	9-16
4	Burpeeana Early Hybrid	23.96	1-14
7	Burpee's Big Early	23.37	1-14
9	Bush Beefsteak	21.05	1-16
16	Earliana (McFayden Special)	13.98	9-16
5	Early Red Chief	23.93	1-14
12	Early Stokesdale #4	20.21	1-16
10	Fireball	20.81	1-16
14	Firesteel	17.08	4-16
3	Moreton Hybrid	24.46	1-13
11	Rhode Island Early	20.66	1-16
8	Rutgers	22.80	1-14
6	Stokesalaska	23.66	1-14
2	Stokeschatham	25.15	1-13
1	Stokes Early Hybrid	25.57	1-13
13	Valiant	18.62	1-16

L.S.M.D. at the .05 level for marketable yield = 7.08 lbs.

L.S.M.D. at the .01 level for marketable yield = 9.37 lbs.

Av. mkt. yield in 1958 and 1959 = 16.89 and 26.02 lbs. respectively.

L.S.M.D. between years at .05 level = 2.50 lbs.

L.S.M.D. between years at .01 level = 3.31 lbs.

varieties tested in 1958 and 1959 is given in Tables VII and VIII respectively. Table IX shows a summary of the two combined and the differences between the years.

Fruit shape was determined by taking a sample of sixteen average size fruits from each variety. A wedge shaped slice was taken from the tomato to permit accurate measurement of the fruit across the polar diameter. The tomato was then sliced open so the equatorial diameter could be measured. These measurements were made in centimeters, and Tables X and XI show the average polar and equatorial diameters of fruits for 1958 and 1959 respectively.

Ascorbic Acid Content

A sample consisting of one fully ripe average size fruit was taken from each replicate on July 22, 1958. These fruits were packaged in plastic bags and frozen until December, when analysis was run. Ascorbic acid content was determined by the method described in Methods and Calibrations for use with the Bausch and Lomb Spectronic 20 colorimeter. The tomatoes were thawed and a section taken from each. They were then put in the Waring Blender for mixing. A ten milliliter sample was used for analysis. Samples were run in duplicate. The average milligrams of ascorbic acid per hundred grams of fresh pulp is shown in Table XII. This test was run in 1958 only.

Glucose Content

The glucose content was determined by the Folin-Wu method as described in Methods and Calibrations for use with the Bausch and Lomb Spectronic 20 colorimeter. Samples were taken on the same date and

TABLE VII

TOMATO FRUIT SIZE IN 1958

Rank in Fruit Size	Variety	Av. Fruit Size in Ounces	Not Different from Var. with Rank of
39	Alpha 5	3.36	31-44
5	Alpha 7	5.56	3-11
36	Biscan	3.48	31-44
23	Bounty	4.22	17-31
10	Burgess Hybrid A	5.18	5-16
45	Burgess Hybrid #1	2.81	42-47
37	Burpeeana Early Hybrid	3.48	31-44
2	Burpee's Big Early	6.19	2-3
6	Bush Beefsteak	5.39	3-16
8	Cavalier	5.25	5-16
11	Cluster-mato	5.14	5-16
25	Guyano	4.18	17-32
24	Doublerich	3.63	30-41
21	Earliana #498	4.34	17-30
29	Earliana (Early Strain)	4.07	18-33
20	Earliana (McFayden Special)	4.36	17-30
18	Earliana (Mrs. Young's)	4.49	14-29
49	Early Chatham	1.80	48-49

TABLE VII (continued)

TOMATO FRUIT SIZE IN 1958

Rank in Fruit Size	Variety	Average Fruit Size in Gmms	Not Different from Var. with Rank of
47	Early Harkness	2.73	43-47
22	Early Jersey	4.34	17-30
12	Early Red Chief	5.08	6-16
13	Early Stokesdale #4	4.98	6-17
26	Early Wonder	4.17	17-33
48	Farthest North	2.19	48
44	Fireball	3.06	36-47
9	Firesteel	5.23	5-16
38	Harrow	3.36	32-44
1	Mammoth Wonder	8.09	1
31	Manitoba	3.88	23-37
33	Marman	3.66	28-41
40	Meteor	3.31	33-44
46	Monarch	2.76	42-47
7	Moreton Hybrid	5.35	3-13
30	N.D.A.C. 38	4.05	19-34
35	Red Cloud	3.61	31-42
15	Red River	4.88	8-18

TABLE VII (continued)

TOMATO FRUIT SIZE IN 1958

Rank in Fruit Size	Variety	Avg. Fruit Size in Ounces	Not Different from Var. with Rank of
43	Rhode Island Early	3.13	36-47
3	Rutgers	5.75	3-7
42	Selandi	3.19	35-46
14	Sioux	4.88	8-18
50	Stokesalaska	1.14	50
19	Stokeschatham	4.42	16-30
4	Stokescross #1	5.72	3-7
42	Stokes Early Hybrid	3.25	33-45
28	Tenn. 290	4.07	18-33
16	Valiant	4.82	8-19
24	Valiant #889	4.21	17-32
32	Valnorth	3.78	24-39
27	Vancross	4.16	17-32
17	Victor	4.59	13-27

L.S.M.D. at the .05 level for fruit size = .43 ounces.

L.S.M.D. at the .01 level for fruit size = .57 ounces.

TABLE VIII

TOMATO FRUIT SIZE IN 1959

Rank in Fruit Size	Variety	Av. Fruit Size in Ounces	Not Different from Var. with Rank of
15	Bison	3.97	11-16
13	Burpeeana Early Hybrid	4.55	10-16
1	Burpee's Big Early	7.74	1-4
7	Bush Beefsteak	6.40	2-9
10	Earliana (McFayden Special)	4.84	10-14
4	Early Red Chief	7.03	1-8
8	Early Stokesdale #4	6.36	2-9
16	Fireball	3.93	11-16
6	Firesteel	6.41	2-9
2	Moreton Hybrid	7.19	1-8
14	New Hampshire Surecrop	4.02	10-16
11	Rhode Island Early	4.71	10-16
3	Rutgers	7.11	1-8
17	Stokesalaska	1.15	17
9	Stokeschatham	5.92	3-9
12	Stokes Early Hybrid	4.70	10-16
5	Valiant	6.44	2-9

L.S.M.D. at the .05 level for fruit size 21.83 oz.

L.S.M.D. at the .01 level for fruit size 21.11 oz.

TABLE IX

SUMMARY OF TOMATO FRUIT SIZE FOR 1958 AND 1959

Rank in Fruit Size	Variety	Av. Yield Per Rep. in Lbs.	Not Different from Var. with Rank of
14	Bison	3.72	9-15
11	Burpeeana Early Hybrid	4.01	6-15
1	Burpee's Big Early	6.96	1-9
5	Bush Beefsteak	5.89	1-11
10	Earliana (McFayden Special)	4.60	2-15
4	Early Red Chief	6.06	1-10
7	Early Stokesdale #4	5.66	1-13
15	Fireball	3.50	9-15
6	Firesteel	5.82	1-11
3	Moreton Hybrid	6.27	1-10
13	Rhode Island Early	3.92	7-15
2	Rutgers	6.41	1-10
16	Stokesalaska	1.14	16
9	Stokeschatham	5.17	1-15
12	Stokes Early Hybrid	3.98	7-15
8	Valiant	5.63	1-13

L.S.M.D. at the .05 level for fruit size $\pm$ 1.81 oz.

L.S.M.D. at the .01 level for fruit size $\pm$ 2.40 oz.

The average size in 1958 and 1959 was 4.32 and 5.53 oz. respectively.

L.S.M.D. between years at the .01 level $\pm$.268 oz.

L.S.M.D. between years at the .05 level $\pm$.202 oz.

TABLE X

SHAPE OF TOMATO FRUIT IN 1958

Variety	Cm. Across Polar Diameter	Cm. Across Equatorial Diameter
Alpha 5	5.06	6.16
Alpha 7	5.74	7.04
Bison	5.10	6.64
Bounty	5.04	6.46
Burgess Hybrid A	5.94	6.92
Burgess Hybrid #1	5.30	5.98
Burpeeana Early Hybrid	5.22	5.96
Burpee's Big Early	5.96	7.26
Bush Beefsteak	6.22	7.58
Cavalier	5.94	7.48
Cluster-mato	6.16	7.32
Guyano	5.08	6.82
Doublerich	4.90	5.22
Earliana #498	5.04	6.12
Earliana (Early Strain)	5.20	7.36
Earliana (McFayden Special)	5.22	6.60
Earliana (Mrs. Young's)	5.64	7.28
Early Chatham	4.36	5.22

TABLE X (continued)

SHAPE OF TOMATO FRUIT IN 1958

Variety	Gm. Across Polar Diameter	Gm. Across Equatorial Diameter
Early Harkness	4.42	5.44
Early Jersey	5.86	7.34
Early Red Chief	5.58	6.50
Early Stokesdale #4	5.48	6.46
Early Wonder	5.62	6.74
Farthest North	4.82	5.44
Fireball	5.22	5.60
Firesteel	6.10	7.72
Harrow	4.98	5.56
Mammoth Wonder	6.50	8.12
Manitoba	4.88	6.02
Marman	4.64	6.34
Meteor	5.26	5.67
Monarch	5.40	6.56
Moreton Hybrid	5.78	7.12
N.D.A.C. 38	5.48	6.72
Red Cloud	5.26	6.44
Red River	5.62	7.18

TABLE I (continued)

SHAPE OF TOMATO FRUIT IN 1958

Variety	Gm. Across Polar Diameter	Gm. Across Equatorial Diameter
Rhode Island Early	5.12	6.14
Rutgers	6.24	7.64
Selandi	4.88	5.22
Sioux	5.96	7.12
Stokesalaska	3.40	4.12
Stokeschatham	5.60	7.12
Stokescross #1	5.76	7.06
Stokes Early Hybrid	5.16	6.02
Tenn. 29U	5.58	7.10
Valiant	6.26	7.52
Valiant #889	5.42	6.62
Valnorth	6.02	6.98
Vancross	6.14	7.30
Victor	5.72	6.72

TABLE XI

SHAPE OF TOMATO FRUIT IN 1959

Variety	Cm. Across Polar Diameter	Cm. Across Equatorial Diameter
Bison	5.12	7.38
Burpeeana Early Hybrid	5.63	6.38
Burpee's Big Early	6.50	8.75
Bush Beefsteak	6.30	8.05
Earliana (McFayden Special)	5.53	7.58
Early Red Chief	6.38	7.68
Early Stokesdale #4	6.10	7.53
Fireball	5.73	7.15
Firesteel	5.95	7.83
Moreton Hybrid	6.43	7.83
New Hampshire Surecrop	5.40	7.15
Rhode Island Early	6.05	6.70
Rutgers	6.10	8.00
Stokesalaska	3.45	4.58
Stokeschatham	5.93	7.60
Stokes Early Hybrid	6.00	7.00
Valiant	6.75	7.68

TABLE XII

ASCORBIC ACID CONTENT OF TOMATOES IN 1958

Variety	Mg. of Acid Per 100 gms. of Fresh Wt.
Alpha 5	15.56
Alpha 7	17.62
Bison	11.42
Bounty	11.86
Burgess Hybrid A	11.42
Burgess Hybrid #1	16.92
Burpeesana Early Hybrid	11.42
Burpee's Big Early	20.26
Bush Beefsteak	13.38
Cavalier	15.04
Cluster-mato	18.05
Cuyano	20.00
Doublerich	29.46
Earliana #498	15.10
Earliana (Early Strain)	22.54
Earliana (McFayden Special)	15.76
Earliana (Mrs. Young's)	8.18
Early Chatham	16.40

TABLE XII (continued)

ASCORBIC ACID CONTENT OF TOMATOES IN 1958

Variety	Mg. of Acid Per 100 gms. of Fresh Wt.
Early Harkness	21.14
Early Jersey	21.44
Early Red Chief	19.76
Early Stokesdale #4	16.40
Early Wonder	14.40
Farthest North	14.40
Fireball	15.17
Firesteel	9.58
Harrow	20.96
Manmoth Wonder	17.68
Manitoba	12.30
Marman	19.74
Meteor	17.62
Monarch	16.94
Moreton Hybrid	16.40
N.D.A.C. 38	16.95
Red Cloud	21.11
Red River	18.41

TABLE XII (continued)

ASCORBIC ACID CONTENT OF TOMATOES IN 1958

Variety	Mg. of Acid Per 100 gms. of Fresh Wt.
Rhode Island Early	17.36
Rutgers	28.19
Selandi	20.00
Sioux	11.42
Stokesalaska	12.30
Stokeschatham	15.84
Stokescross #1	17.36
Stokes Early Hybrid	19.20
Tenn. 29U	21.14
Valiant	18.40
Valiant #389	17.90
Valnorth	18.40
Vandross	18.41
Victor	14.58

prepared in the same way as those previously described for ascorbic acid analysis. Table XIII shows the average milligrams of glucose per hundred grams of fresh pulp. Tests on glucose content were run in 1958 only.

Plant Size

Measurements for plant size were taken in 1958 on the five plants of each variety that were not pruned or staked. Measurements were made at the time of the first picking, and included the diameter of the stems at ground level as well as height and spread of the plant. Table XIV shows the average figures for these measurements.

Plant Growth Habits

Other plant characteristics observed were foliage density, plant form and whether the plant was determinate or indeterminate. Foliage density was determined by size of leaves, length of internodes, and form of plant. These plants were classed as dense, medium or open. Plant form was rated on how well the foliage and fruits were held off the ground. The varieties were classed as sprawling, semi-erect or erect. Classification of determinate and indeterminate varieties was based on the number of nodes between the flower clusters. Determinate varieties usually have only one node between flower clusters while indeterminate varieties have three. These observations were made in 1958 at the time of the first picking on the unstaked and unpruned plants. The results of these observations are given in Table XV.

TABLE XIII

GLUCOSE CONTENT OF TOMATOES IN 1958

Variety	Mg. Glucose Per 100 gms. of Fresh Wt.
Alpha 5	3.13
Alpha 7	3.45
Bison	2.76
Bounty	2.91
Burgess Hybrid A	2.13
Burgess Hybrid #1	1.82
Burpeeana Early Hybrid	2.32
Burpee's Big Early	3.02
Bush Beefsteak	3.20
Cavalier	3.16
Cluster-mato	4.95
Cuyano	2.21
Doublerich	2.59
Earliana #498	2.76
Earliana (Early Strain)	2.78
Earliana (McFayden Special)	2.62
Earlian (Mrs. Young's)	2.40
Early Chatham	2.20

TABLE XIII (continued)

GLUCOSE CONTENT OF TOMATOES IN 1958

Variety	Mg. Glucose Per 100 gm. of Fresh Wt.
Early Harkness	2.61
Early Jersey	3.40
Early Red Chief	2.48
Early Stokesdale #4	3.40
Early Wonder	2.51
Farthest North	1.76
Fireball	2.13
Firesteel	3.21
Harrow	2.32
Mammoth Wonder	3.40
Manitoba	3.11
Marman	2.01
Meteor	2.33
Monarch	1.08
Moreton Hybrid	3.72
N.D.A.C. 38	2.06
Red Cloud	3.55
Red River	2.63

TABLE XIII (continued)

GLUCOSE CONTENT OF TOMATOES IN 1958

Variety	Mg. Glucose Per 100 gms. of Fresh Wt.
Rhode Island Early	2.40
Rutgers	3.67
Selandi	2.03
Sioux	3.10
Stokesalaska	3.01
Stokeschatham	3.10
Stokescross #1	3.29
Stokes Early Hybrid	2.88
Tenn. 29U	2.27
Valiant	2.63
Valiant #889	2.54
Valnorth	2.49
Vancross	2.92
Victor	2.32

TABLE XIV

SIZE OF TOMATO PLANTS AT TIME OF FIRST HARVEST

Variety	Diameter of Stem at Base in Cm.	Height of Plant in Inches	Spread of Plant in Inches
Alpha 5	1.24	11.80	39.20
Alpha 7	1.25	16.40	41.40
Bison	1.26	13.80	30.80
Bounty	1.36	14.00	35.40
Burgess Hybrid A	1.24	21.20	34.80
Burgess Hybrid #1	1.40	11.80	37.40
Burpeeana Early Hybrid	1.32	25.00	40.20
Burpee's Big Early	1.34	26.40	43.00
Bush Beefsteak	1.28	12.20	33.20
Cavalier	1.36	14.00	36.00
Cluster-mato	1.36	28.00	42.20
Guyano	1.48	17.00	38.40
Doublerich	1.34	22.40	32.40
Earliana #498	1.26	16.60	39.20
Earliana (Early Strain)	1.26	17.80	44.60
Earliana (McFayden Special)	1.26	19.80	37.00
Earliana (Mrs. Young's)	1.32	20.80	33.40
Early Chatham	1.18	13.00	24.00

TABLE XIV (continued)

SIZE OF TOMATO PLANTS AT TIME OF FIRST HARVEST

Variety	Diameter of Stem at Base in Cm.	Height of Plant in Inches	Spread of Plant in Inches
Early Harkness	1.32	23.80	38.80
Early Jersey	1.40	20.60	38.60
Early Red Chief	1.28	27.80	32.80
Early Stokesdale #4	1.32	27.00	54.80
Early Wonder	1.32	14.80	35.20
Farthest North	1.25	14.60	31.20
Fireball	1.16	14.00	32.40
Firesteel	1.30	17.60	32.80
Harrow	1.30	19.80	31.80
Mammoth Wonder	1.42	25.20	31.80
Manitoba	1.30	12.60	27.80
Marman	1.36	18.00	35.80
Meteor	1.40	14.80	27.00
Monarch	1.26	10.60	30.30
Moreton Hybrid	1.34	22.40	42.60
N.D.A.C. 38	1.32	16.60	38.40
Red Cloud	1.38	18.00	40.60
Red River	1.38	17.80	42.60

TABLE XIV (continued)

SIZE OF TOMATO PLANTS AT TIME OF FIRST HARVEST

Variety	Diameter of Stem at Base in Cm.	Height of Plant in Inches	Spread of Plant in Inches
Rhode Island Early	1.30	22.20	54.60
Rutgers	1.50	27.20	38.20
Selandi	1.14	26.20	41.00
Sioux	1.44	20.40	40.00
Stokesalaska	1.22	15.60	33.80
Stokeschatham	1.30	23.20	42.80
Stokescross #1	1.38	25.40	36.80
Stokes Early Hybrid	1.28	17.00	41.80
Tenn. 290	1.38	17.80	41.40
Valiant	1.36	22.40	47.20
Valiant #889	1.52	23.40	45.00
Valnorth	1.30	20.40	52.00
Vanecross	1.22	22.60	36.00
Victor	1.20	15.00	36.00

TABLE IV

GROWTH HABITS OF THE TOMATO PLANTS

Variety	Determinate or Indeterminate	Form of Plant	Foliage Density
Alpha 5	Determinate	Sprawling	Open
Alpha 7	Determinate	Semi-erect	Dense
Bison	Determinate	Semi-erect	Medium
Bounty	Determinate	Semi-erect	Open
Burgess Hybrid A	Indeterminate	Semi-erect	Open
Burgess Hybrid #1	Indeterminate	Sprawling	Open
Burpeeana Early Hybrid	Indeterminate	Semi-erect	Medium
Burpee's Big Early	Indeterminate	Semi-erect	Medium
Bush Beefsteak	Determinate	Semi-erect	Open
Cavalier	Determinate	Semi-erect	Open
Cluster-mato	Indeterminate	Erect	Dense
Guyano	Indeterminate	Semi-erect	Medium
Doublerich	Indeterminate	Semi-erect	Medium
Earliana #498	Indeterminate	Semi-erect	Medium
Earliana (Early Strain)	Indeterminate	Semi-erect	Medium
Earliana (McFayden Special)	Indeterminate	Semi-erect	Medium
Earliana (Mrs. Young's)	Indeterminate	Semi-erect	Medium
Early Chatham	Determinate	Semi-erect	Open

TABLE XV (continued)

GROWTH HABITS OF THE TOMATO PLANTS

Variety	Determinate or Indeterminate	Form of Plant	Foliage Density
Early Harkness	Indeterminate	Semi-erect	Open
Early Jersey	Indeterminate	Sprawling	Open
Early Red Chief	Indeterminate	Semi-erect	Medium
Early Stokesdale #4	Indeterminate	Semi-erect	Medium
Early Wonder	Determinate	Semi-erect	Medium
Farthest North	Determinate	Sprawling	Open
Fireball	Determinate	Semi-erect	Open
Firesteel	Determinate	Semi-erect	Medium
Harrow	Indeterminate	Semi-erect	Medium
Mammoth Wonder	Indeterminate	Semi-erect	Dense
Manitoba	Determinate	Semi-erect	Medium
Marman	Indeterminate	Sprawling	Open
Meteor	Determinate	Semi-erect	Open
Monarch	Determinate	Semi-erect	Open
Moreton Hybrid	Indeterminate	Semi-erect	Medium
N.D.A.C. 38	Determinate	Semi-erect	Open
Red Cloud	Determinate	Semi-erect	Medium
Red River	Indeterminate	Sprawling	Open

TABLE XV (continued)

GROWTH HABITS OF THE TOMATO PLANTS

Variety	Determinate or Indeterminate	Form of Plant	Foliage Density
Rhode Island Early	Indeterminate	Sprawling	Open
Rutgers	Indeterminate	Semi-erect	Dense
Selandi	Indeterminate	Semi-erect	Medium
Sioux	Indeterminate	Semi-erect	Medium
Stokesalaska	Determinate	Semi-erect	Dense
Stokeschatham	Indeterminate	Semi-erect	Dense
Stokescross #1	Indeterminate	Semi-erect	Medium
Stokes Early Hybrid	Indeterminate	Semi-erect	Medium
Tenn. 290	Indeterminate	Semi-erect	Open
Valiant	Indeterminate	Semi-erect	Medium
Valiant #889	Indeterminate	Semi-erect	Medium
Valnorth	Indeterminate	Sprawling	Open
Vancross	Indeterminate	Semi-erect	Medium
Victor	Determinate	Semi-erect	Open

Early Yield

All fruits harvested before the first picking of Rutgers were considered early. This included three harvest dates for some of the earliest varieties. The yields for earliness include all fruits produced before the first picking of Rutgers without regard for grades. Fruits were harvested when they were almost fully ripe. Tables XVI, XVII, and XVIII show the 1958, 1959 and combined early yields respectively. Tables XIX and XX show the number of days between the first picking of each variety and the first picking of Rutgers for 1958 and 1959 respectively.

Circular and Radial Cracking

Separate data was collected on circular and radial cracking. Each year four medium sizes fully ripe fruits were picked at random from each replicate. A narrow flexible plastic ruler was used to measure the length of these cracks. All measurements were made on the same date. The average length of circular cracks for each fruit in 1958 is given in Table XXI. Table XXII shows the average length of circular cracks for each fruit in 1959. Table XXIII gives a summary of circular cracking over the two year period. Tables XXIV, XXV, and XXVI give the same information on radial cracking.

Flowers Produced on First Cluster and Number to Set Fruit

Each year the first three plants in each replicate were used for this study. A count was made of the number of flowers produced

TABLE XVI

EARLY YIELD FOR TOMATOES IN 1958

Rank in Early Field	Variety	Av. Early Field Per Acre in lbs.	Not Different from Var. with Rank of
14	Alpha 5	3.38	2-40
42	Alpha 7	1.55	17-50
24	Biscn	2.60	6-45
34	Bounty	2.17	9-48
15	Burgess Hybrid A	3.35	2-40
20	Burgess Hybrid #1	3.01	3-42
22	Burpeeana Early Hybrid	2.64	6-45
4	Burpee's Big Early	4.44	1-23
1	Bush Beefsteak	5.96	1-5
17	Cavalier	3.20	2-41
12	Cluster-mato	3.47	2-38
45	Guyano	.97	22-50
47	Doublerich	.62	32-50
30	Earliana #498	2.32	8-46
33	Earliana (Early Strain)	2.20	9-48
10	Earliana (McFayden Special)	3.53	2-38
41	Earliana (Mrs. Young's)	1.55	17-50
21	Early Chatham	2.95	3-42

TABLE XVI (continued)

EARLY YIELD FOR TOMATOES IN 1958

Rank in Early Field	Variety	Av. Early Yield Per Row in lbs.	Not Different from Var. with Rank of
18	Early Harkness	3.07	2-42
48	Early Jersey	.60	32-50
32	Early Red Chief	2.20	9-48
7	Early Stokesdale #4	4.09	2-26
11	Early Wonder	3.47	2-38
19	Farthest North	3.07	2-42
8	Fireball	3.96	2-31
2	Firesteel	4.72	1-19
43	Harrow	1.20	23-50
44	Mammoth Wonder	1.15	24-50
37	Manitoba	2.02	10-49
49	Marman	.47	35-50
16	Meteor	3.24	2-40
13	Monarch	3.44	2-39
3	Moreton Hybrid	4.49	1-21
36	N.D.A.C. 38	2.07	10-49
23	Red Cloud	2.84	3-43
28	Red River	2.34	8-45

TABLE XVI (continued)

EARLY YIELD FOR TOMATOES IN 1958

Rank in Early Yield	Variety	Av. Early Yield Per Rep. in Lbs.	Not Different from Var. with Rank of
9	Rhode Island Early	3.79	2-34
50	Rutgers	.00	41-50
46	Selandi	.61	32-50
31	Sioux	2.30	8-46
6	Stokesalaska	4.12	2-26
38	Stokeschatham	1.95	10-49
40	Stokescross #1	1.73	14-49
5	Stokes Early Hybrid	4.41	1-23
25	Tenn. 29U	2.58	6-45
27	Valiant	2.35	8-45
35	Valiant #889	2.11	10-49
26	Valnorth	2.48	6-45
29	Vancross	2.33	8-46
39	Victor	1.77	13-49

L.S.M.D. at the .05 level for early yield = 1.67 lbs.

L.S.M.D. at the .01 level for early yield = 2.19 lbs.

TABLE XVII

EARLY YIELD FOR TOMATOES IN 1959

Rank in Early Yield	Variety	Av. Early Yield Per Rep. in lbs.	Not Different from Var. with Rank of
2	Bison	5.61	1-12
6	Burpeesana Early Hybrid	3.30	2-17
14	Burpee's Big Early	1.21	3-17
9	Bush Beefsteak	2.75	2-17
5	Earliana (McFayden Special)	3.38	2-17
15	Early Red Chief	1.14	3-17
13	Early Stokesdale #4	1.63	3-17
10	Fireball	2.75	2-17
3	Firesteel	4.55	1-15
7	Moreton Hybrid	2.97	2-17
11	New Hampshire Surecrop	2.63	2-17
8	Rhode Island Early	2.89	2-17
17	Rutgers	0.00	5-17
1	Stokesalaska	7.50	1-4
16	Stokeschatham	.86	4-17
4	Stokes Early Hybrid	4.45	1-16
12	Valiant	2.28	2-17

L.S.M.D. at the .05 level for early yield = 3.59 lbs.
 N.S.D. between varieties at the .01 level.

TABLE XVIII

SUMMARY OF EARLY YIELDS FOR TOMATOES
TESTED IN 1958 AND 1959

Rank in Early Yield	Variety	Av. Early Yield Per Rep. in Lbs.	Not Different from Var. with Rank of
5	Bison	4.10	1-12
10	Burpeeana Early Hybrid	2.97	2-15
12	Burpee's Big Early	2.82	3-15
4	Bush Beefsteak	4.39	1-12
7	Earliana (McFayden Special)	3.45	5-13
14	Early Red Chief	1.67	8-16
11	Early Stokesdale #4	2.86	3-16
8	Fireball	3.36	2-14
2	Firesteel	4.64	1-10
6	Moreton Hybrid	3.73	2-13
9	Rhode Island Early	3.34	2-14
16	Rutgers	0.00	14-16
1	Stokesalaska	5.81	1-4
15	Stokeschatham	1.41	10-16
3	Stokes Early Hybrid	4.43	1-12
13	Valiant	2.32	6-15

L.S.M.D. at the .05 level for early yield = 1.71 lbs.

L.S.M.D. at the .01 level for early yield = 2.27 lbs.

Average early yield for these sixteen varieties in 1958 = 3.44 lbs.

Average early yield for these sixteen varieties in 1959 = 2.94 lbs.

N.S.D. between years at the .05 level.

TABLE XIX

NUMBER OF DAYS EARLIER THAN RUTGERS IN 1958

Variety	No. of Days Earlier Than Rutgers
Alpha 5	17
Alpha 7	11
Bison	17
Bounty	17
Burgess Hybrid A	7
Burgess Hybrid #1	17
Burpeeana Early Hybrid	11
Burpee's Big Early	17
Bush Beefsteak	17
Cavalier	11
Cluster-mato	17
Guyano	7
Doublerich	11
Earliana #498	17
Earliana (Early Strain)	11
Earliana (McFayden Special)	11
Earliana (Mrs. Young's)	11
Early Chatham	17

TABLE XIX (continued)

NUMBER OF DAYS EARLIER THAN RUTGERS IN 1958

Variety	No. of Days Earlier Than Rutgers
Early Harkness	11
Early Jersey	3
Early Red Chief	7
Early Stokesdale #4	17
Early Wonder	7
Farthest North	17
Fireball	17
Firesteel	11
Harrow	7
Mammoth Wonder	7
Manitoba	17
Marman	3
Meteor	11
Monarch	17
Moreton Hybrid	11
N.D.A.C. 38	7
Red Cloud	7
Red River	11

TABLE XIX (continued)

NUMBER OF DAYS EARLIER THAN RUTGERS IN 1958

Variety	No. of Days Earlier Than Rutgers
Rhode Island Early	17
Rutgers	0
Selandi	7
Sioux	7
Stokesalaska	17
Stokeschatham	7
Stokescross #1	7
Stokes Early Hybrid	17
Tenn. 29U	17
Valiant	11
Valiant #889	7
Valnorth	17
Vancross	7
Victor	7

TABLE XX

NUMBER OF DAYS EARLIER THAN RUTGERS IN 1959

Variety	No. of Days Earlier Than Rutgers
Bison	12
Burpeeana Early Hybrid	12
Burpee's Big Early	7
Bush Beefsteak	7
Earliana (McFayden Special)	12
Early Red Chief	7
Early Stokesdale #4	7
Fireball	7
Firesteel	12
Moreton Hybrid	7
New Hampshire Surecrop	12
Rhode Island Early	12
Rutgers	0
Stokesalaska	12
Stokeschatham	7
Stokes Early Hybrid	12
Valiant	7

TABLE XXI

CIRCULAR CRACKING OF TOMATO FRUITS IN 1958

Rank* in Circular Cracking	Variety	Av. Length (in Cm.) of Circular Cracks Per Fruit	Not Different from Var. with Rank of
34	Alpha 5	5.25	10-50
47	Alpha 7	1.50	15-50
8	Bison	19.50	1-27
45	Bounty	1.75	15-50
16	Burgess Hybrid A	12.75	3-49
31	Burgess Hybrid #1	6.50	10-50
27	Burpeeana Early Hybrid	9.25	7-50
29	Burpee's Big Early	7.00	10-50
11	Bush Beefsteak	15.00	2-37
6	Cavalier	20.25	1-27
26	Cluster-mato	10.00	5-50
13	Guyano	14.50	2-37
33	Doublerich	5.50	10-50
7	Earliana #498	20.00	1-27
10	Earliana (Early Strain)	17.00	2-34
12	Earliana (McFayden Special)	14.75	2-37
1	Earliana (Mrs. Young's)	30.00	1-9
43	Early Chatham	2.00	14-50

* The lowest numbers represent the highest amount of cracking.

TABLE XXI (continued)

CIRCULAR CRACKING OF TOMATO FRUITS IN 1958

Rank in Circular Cracking	Variety	Av. Length (in Cm.) of Circular Cracks Per Fruit	Not Different from Var. with Rank of
23	Early Harkness	10.25	5-50
26	Early Jersey	7.25	10-50
37	Early Red Chief	4.50	11-50
25	Early Stokesdale #4	10.00	5-50
38	Early Wonder	2.50	14-50
44	Farthest North	1.75	15-50
40	Fireball	2.50	14-50
21	Firesteel	11.00	5-50
39	Harrow	2.50	14-50
20	Mammoth Wonder	11.25	5-50
41	Manitoba	2.25	15-50
2	Marman	24.75	1-14
50	Meteor	.75	17-50
36	Monarch	4.50	11-50
18	Moreton Hybrid	12.00	5-50
30	N.D.A.G. 38	6.50	10-50
49	Red Cloud	1.00	15-50
3	Red River	24.50	1-16

TABLE XXI (continued)

CIRCULAR CRACKING OF TOMATO FRUITS IN 1958

Rank in Circular Cracking	Variety	av. Length (in Cm.) of Circular Cracks Per Fruit	Not Different from Var. with Rank of
46	Rhode Island Early	1.75	15-50
42	Rutgers	2.00	14-50
15	Selandi	12.75	3-49
35	Sioux	4.75	11-50
48	Stokesalaska	1.25	15-50
14	Stokeschatham	14.25	2-40
4	Stokescross #1	24.00	1-16
9	Stokes Early Hybrid	19.25	1-27
22	Tenn. 290	10.50	5-50
5	Valiant	21.25	1-26
24	Valiant #389	10.25	5-50
19	Valnorth	11.75	5-50
17	Vanecross	12.00	5-50
32	Victor	6.00	10-50

L.S.M.D. at the .05 level for circular cracks = 11.96 Cm.

L.S.M.D. at the .01 level for circular cracks = 15.74 Cm.

TABLE XXII

CIRCULAR CRACKING OF TOMATO FRUITS IN 1959

Rank* in Circular Cracking	Variety	Average Length (in Cm.) of Circular Cracks Per Fruit	Not Different from Var. with Rank of
2	Bison	5.82	1-2
10	Burpeeana Early Hybrid	1.63	5-17
6	Burpee's Big Early	2.75	3-10
7	Bush Beefsteak	2.65	3-12
1	Earliana (McFayden Special)	7.28	1-2
4	Early Red Chief	3.44	2-9
3	Early Stokesdale #4	3.44	2-9
15	Fireball	1.03	8-17
13	Firesteel	1.11	8-17
8	Moreton Hybrid	2.39	3-15
12	New Hampshire Surecrop	1.18	7-17
17	Rhode Island Early	.21	10-17
11	Rutgers	1.23	7-17
16	Stokesalaska	.48	9-17
14	Stokeschatham	1.06	8-17
9	Stokes Early Hybrid	1.96	3-16
5	Valiant	2.96	3-10

L.S.M.D. at the .05 level for circular cracking = 2.00 Cm. per fruit.
 L.S.M.D. at the .01 level for circular cracking = 2.68 Cm. per fruit.
 The lowest numbers represent the highest amount of cracking.

TABLE XXIII

SUMMARY OF CIRCULAR CRACKING FOR TOMATO
VARIETIES TESTED IN 1958 AND 1959

Rank in Circular Cracking	Variety	Av. Length (in Gm.) of Circular Cracks Per Fruit	Not Different from Var. with Rank Listed Below
1	Bison	12.66	1-8
10	Burpeeana Early Hybrid	5.44	3-16
11	Burpee's Big Early	4.87	3-16
5	Bush Beefsteak	8.82	1-12
3	Earliana (McFayden Special)	11.01	1-11
12	Early Red Chief	3.97	5-16
8	Early Stokesdale #4	6.72	1-16
13	Fireball	1.77	6-16
9	Firesteel	6.05	2-16
7	Moreton Hybrid	7.20	1-16
15	Rhode Island Early	.98	7-16
14	Rutgers	1.61	6-16
16	Stokesalaska	.87	7-16
6	Stokeschatham	7.66	1-14
4	Stokes Early Hybrid	10.60	1-11
2	Valiant	12.11	1-9

L.S.M.D. at the .05 level for circular cracks = 6.46 Gm.

L.S.M.D. at the .01 level for circular cracks = 8.56 Gm.

Average number of circular cracks per fruit in 1959 = .99 Gm.

Average number of circular cracks per fruit in 1958 = 4.13 Gm.

L.S.M.D. at the .05 and .01 level for year = 2.28 and 3.02 Gm. respectively.

TABLE XXIV

RADIAL CRACKING OF TOMATO FRUITS IN 1958

Rank in Radial Cracks	Variety	Av. Length (in Cm.) of Radial Cracks Per Fruit
48	Alpha 5	.75
50	Alpha 7	.50
33	Bison	2.75
40	Bounty	2.00
25	Burgess Hybrid A	4.13
22	Burgess Hybrid #1	4.25
37	Burpeeana Early Hybrid	2.25
8	Burpee's Big Early	5.25
29	Bush Beefsteak	3.25
12	Cavalier	5.00
24	Gluster-mato	4.13
41	Guyano	2.00
21	Houderlen	4.25
38	Harliana #498	2.25
10	Harliana (Early Strain)	5.18
42	Harliana (McFayden Special)	1.86
15	Harliana (Mrs. Young's)	4.75
35	Early Chatham	2.50

TABLE XXIV (continued)

RADIAL CRACKING OF TOMATO FRUITS IN 1958

Rank in Radial Cracks	Variety	Av. Length (in Cm.) of Radial Cracks Per Fruit
27	Early Harkness	3.75
30	Early Jersey	3.25
20	Early Red Chief	4.25
34	Early Stokesdale #4	2.75
36	Early Wonder	2.38
19	Farthest North	4.38
23	Fireball	4.25
9	Firesteel	5.25
14	Harrow	4.75
3	Mammoth Wonder	6.50
26	Manitoba	3.87
44	Marman	1.50
5	Monarch	5.75
18	Moreton Hybrid	4.38
39	N.D.A.C. 38	2.25
17	Red Cloud	4.50
46	Red River	1.25

TABLE XXIV (continued)

RADIAL CRACKING OF TOMATO FRUITS IN 1958

Rank in Radial Cracks	Variety	Av. Length (in Cm.) of Radial Cracks Per Fruit
45	Rhode Island Early	1.50
2	Rutgers	7.25
28	Selandi	3.50
1	Sioux	9.00
49	Stokesalaska	.75
16	Stokeschatham	4.50
6	Stokescross #1	5.50
11	Stokes Early Hybrid	5.00
43	Tenn. 290	1.75
4	Valiant	6.00
32	Valiant #889	2.88
13	Valnorth	5.00
31	Vancross	3.25
7	Victor	5.50

N.S.D. between varieties for radial cracks in 1958.

TABLE XXV

RADIAL CRACKING OF TOMATO FRUITS IN 1959

Rank in Radial Cracks	Variety	Av. Length (in Cm.) of Radial Cracks Per Fruit	Not Different from Var. with Rank of
1	Bison	8.68	1-2
11	Burpeeana Early Hybrid	3.07	7-15
2	Burpee's Big Early	8.12	1-2
10	Bush Beefsteak	3.09	7-15
15	Earliana (McFayden Special)	2.62	9-16
12	Early Red Chief	2.99	7-15
14	Early Stokesdale #4	2.71	8-15
16	Fireball	1.34	15-17
3	Firesteel	6.63	3-5
8	Moreton Hybrid	3.97	6-14
9	New Hampshire Surecrop	3.57	6-15
6	Rhode Island Early	4.54	4-9
7	Rutgers	4.09	6-13
17	Stokesalaska	.43	16-17
13	Stokeschatham	2.90	7-15
5	Stokes Early Hybrid	5.67	3-6
4	Valiant	5.77	3-6

L.S.M.D. at the .05 level for radial cracks = 1.33 Cm.

L.S.M.D. at the .01 level for radial cracks = 1.77 Cm.

TABLE XXVI

SUMMARY OF RADIAL CRACKS IN 1958 AND 1959

Rank in Radial Cracks	Variety	Av. Length (in Cm.) of Radial Cracks Per Fruit	Not Different from Var. with Rank of
4	Bison	5.71	1-9
14	Burpeeana Early Hybrid	2.66	7-16
1	Burpee's Big Early	6.68	1-6
10	Bush Beefsteak	3.17	6-15
15	Earliana (McFayden Special)	2.25	7-16
9	Early Red Chief	3.62	2-15
13	Early Stokesdale #4	2.73	7-16
12	Fireball	2.80	7-16
2	Firesteel	5.94	1-9
7	Moreton Hybrid	4.17	2-15
11	Rhode Island Early	3.02	6-15
5	Rutgers	5.67	1-9
16	Stokesalaska	.59	12-16
8	Stokeschatham	3.70	2-15
6	Stokes Early Hybrid	5.33	1-11
3	Valiant	5.88	1-9

L.S.M.D. at the .05 level for radial cracks = 2.32 Cm.

L.S.M.D. at the .01 level for radial cracks = 3.07 Cm.

Average length of radial cracks per fruit in 1958 and 1959 = 3.83 and 4.16 Cm. respectively.

N.S.D. between years.

at the time of bloom. Later a count was taken on the number of fruit set on this cluster. The average number of flowers produced on the first cluster for each variety in 1958 is given in Table XXVII. Table XXVIII gives the same information on varieties tested in 1959. A summary for the two years is given in Table XXIX. Tables XXX and XXXI show the number of fruits to set on the first cluster for each variety in 1958 and 1959 respectively. A summary for the two years appears in Table XXXII.

Thickness of Exterior Wall

Measurements on thickness of exterior walls were made in 1958 only. Three samples were chosen at random from each replicate. Fruits were split along the equatorial diameter and a metric scale was used to measure the wall thickness. All measurements were made on the same date. Table XXXIII shows the average wall thickness for each variety.

Other Fruit Characteristics

Other fruit characteristics studied were, styler scar size, attachment scar size, range in locule number, and the ripening habits of the fruit. This study was made in 1958 and consisted of three fruits picked at random from each replicate. Observations of ripening habits were also made in the field. All data was collected on the same date. The styler scar was measured along its greatest axis, since some were almost round while others were long and narrow. The diameter was used in determining the size of the attach-

TABLE XXVII

NUMBER OF FLOWERS PRODUCED ON THE FIRST CLUSTER
FOR TOMATOES TESTED IN 1958

Rank in No. of Flowers	Variety	Av. No. of Flowers on First Cluster	Not Different from Var. with Rank of
22	Alpha 5	5.00	4-49
33	Alpha 7	4.75	6-50
37	Bison	4.62	8-50
21	Bounty	5.10	2-49
31	Burgess Hybrid A	4.75	6-50
44	Burgess Hybrid #1	4.25	11-50
25	Burpeeana Early Hybrid	5.00	4-49
42	Burpee's Big Early	4.37	10-50
28	Bush Beefsteak	4.75	6-50
27	Cavalier	4.87	6-50
36	Cluster-mato	4.62	8-50
7	Guyano	6.25	1-33
2	Doublerich	6.62	1-21
5	Earliana #498	6.50	1-25
1	Earliana (Early Strain)	7.62	1-9
4	Earliana (McFayden Special)	6.50	1-25
6	Earliana (Mrs. Young's)	6.25	1-33
46	Early Chatham	4.25	11-50

TABLE XXVII (continued)

NUMBER OF FLOWERS PRODUCED ON THE FIRST CLUSTER
FOR TOMATOES TESTED IN 1958

Rank in No. of Flowers	Variety	Average No. of Flowers on First Cluster	Not Different from Var. with Rank of
34	Early Harkness	4.62	8-50
30	Early Jersey	4.75	6-50
11	Early Red Chief	5.62	2-47
35	Early Stokesdale #4	4.62	8-50
23	Early Wonder	5.00	4-49
50	Farthest North	3.37	26-50
13	Fireball	5.62	2-47
20	Firesteel	5.12	2-49
14	Harrow	5.50	2-47
39	Mammoth Wonder	4.50	10-50
26	Manitoba	4.87	6-50
40	Marman	4.50	10-50
24	Meteor	5.00	4-49
48	Monarch	3.87	16-50
10	Moreton Hybrid	5.87	2-43
47	N.D.A.C. 38	4.25	11-50
15	Red Cloud	5.50	2-47
3	Red River	6.62	1-21

TABLE XXVII (continued)

NUMBER OF FLOWERS PRODUCED ON THE FIRST CLUSTER
FOR TOMATOES TESTED IN 1958

Rank in No. of Flowers	Variety	Average No. of Flowers on First Cluster	Not Different from Var. with Rank of
43	Rhode Island Early	4.37	10-50
12	Rutgers	5.62	2-47
9	Selandi	6.12	1-37
17	Sioux	5.37	2-49
38	Stokesalaska	4.50	10-50
18	Stokeschatham	5.25	2-49
16	Stokescross #1	5.37	2-49
41	Stokes Early Hybrid	4.37	10-50
19	Tenn. 290	5.25	2-49
8	Valiant	6.12	1-37
45	Valiant #389	4.25	11-50
29	Valnorth	4.75	6-50
32	Vanecross	4.75	6-50
49	Victor	3.75	18-50

L.S.M.D. at the .05 level = 1.54 flowers per cluster.

L.S.M.D. at the .01 level = 2.02 flowers per cluster.

TABLE XXVIII

NUMBER OF FLOWERS PRODUCED ON THE FIRST CLUSTER
FOR TOMATOES TESTED IN 1959

Rank in No. of Flowers	Variety	Average No. of Flowers on First Cluster
8	Bison	5.63
11	Burpeeana Early Hybrid	5.13
4	Burpee's Big Early	6.00
16	Bush Beefsteak	4.63
1	Earliana (McFayden Special)	7.88
9	Early Red Chief	5.50
12	Early Stokesdale #4	5.13
5	Fireball	5.88
10	Firesteel	5.38
6	Moreton Hybrid	5.75
2	New Hampshire Surecrop	7.25
15	Rhode Island Early	4.75
7	Rutgers	5.63
3	Stokesalaska	6.00
17	Stokeschatham	4.00
13	Stokes Early Hybrid	4.88
14	Valiant	4.75

N.S.D. between varieties for number of flowers produced in 1959.

TABLE XXIX

SUMMARY OF FLOWERS PRODUCED ON FIRST CLUSTER
FOR TOMATOES TESTED IN 1958 AND 1959

Rank in No. of Flowers	Variety	Av. No. of Flowers on First Cluster	Not Different from Var. with Rank of
9	Bison	5.13	2-16
10	Burpeeana Early Hybrid	5.06	2-16
7	Burpee's Big Early	5.19	2-16
12	Bush Beefsteak	4.69	3-16
1	Earliana (McFayden Special)	7.19	1
5	Early Red Chief	5.56	2-16
11	Early Stokesdale #4	4.88	2-16
3	Fireball	5.75	2-12
8	Firesteel	5.25	2-16
2	Moreton Hybrid	5.81	2-11
15	Rhode Island Early	4.56	4-16
4	Rutgers	5.63	2-15
6	Stokesalaska	5.25	2-16
13	Stokeschatham	4.63	4-15
14	Stokes Early Hybrid	4.63	4-15
16	Valiant	4.50	5-16

L.S.M.D. at the .05 level = 1.11 flowers.

L.S.M.D. at the .01 level = 1.47 flowers.

Av. No. of flowers on first cluster in 1958 and 1959 = 5.03 and 5.42 respectively.

N.S.D. between years in number of flowers produced.

TABLE XXX

NUMBER OF TOMATO FRUITS SET ON FIRST CLUSTER IN 1958

Rank in No. of Fruits Set	Variety	Av. No. of Fruits Set on First Cluster	Not Different from Var. with Rank of
31	Alpha 5	3.12	13-50
17	Alpha 7	3.87	4-40
49	Bison	2.12	36-50
28	Bounty	3.25	10-48
9	Burgess Hybrid A	4.37	2-26
27	Burgess Hybrid #1	3.25	10-48
12	Burpeeana Early Hybrid	4.25	4-29
37	Burpee's Big Early	3.00	14-50
22	Bush Beefsteak	3.87	4-40
39	Cavalier	2.87	17-50
13	Cluster-mato	4.12	4-35
29	Guyano	3.25	10-48
35	Doublerich	3.12	13-50
33	Earliana #498	3.12	13-50
1	Earliana (Early Strain)	5.50	1-6
3	Earliana (McFayden Special)	5.37	1-9
47	Earliana (Mrs. Young's)	2.50	25-50
43	Early Chatham	2.62	23-50

TABLE XXX (continued)

NUMBER OF TOMATO FRUITS SET ON FIRST CLUSTER IN 1958

Rank in No. of Fruits Set	Variety	Av. No. of Fruits Set on First Cluster	Not Different from Var. with Rank of
15	Early Harkness	4.00	4-37
26	Early Jersey	3.50	5-47
21	Early Red Chief	3.87	4-40
23	Early Stokesdale #4	3.62	5-24
18	Early Wonder	3.87	4-40
48	Farthest North	2.37	27-50
38	Fireball	2.87	17-50
6	Firesteel	4.50	1-26
14	Harrow	4.00	4-37
30	Mammoth Wonder	3.12	13-50
46	Manitoba	2.50	25-50
16	Marman	4.00	4-37
41	Meteor	2.75	23-50
20	Monarch	3.87	4-40
5	Moreton Hybrid	4.50	1-26
40	N.D.A.C. 38	2.87	17-50
32	Red Cloud	3.12	13-50
19	Red River	3.87	4-40

TABLE XXX (continued)

NUMBER OF TOMATO FRUITS SET ON FIRST CLUSTER IN 1958

Rank in No. of Fruits Set	Variety	Average No. of Fruits Set on First Cluster	Not Different from Var. with Rank of
45	Rhode Island Early	2.62	23-50
7	Rutgers	4.37	2-26
2	Selandi	5.37	1-9
34	Sioux	3.12	13-50
11	Stokesalaska	4.23	4-29
25	Stokeschatham	3.50	5-47
8	Stokescross #1	4.37	2-26
36	Stokes Early Hybrid	3.00	14-50
44	Tenn. 29U	2.62	23-50
42	Valiant	2.75	23-50
4	Valiant #889	4.75	1-22
50	Valnorth	2.12	36-50
10	Vancross	4.23	4-29
24	Victor	3.62	5-24

L.S.M.D. at the .05 level = 1.04 fruits.

L.S.M.D. at the .01 level = 1.37 fruits.

TABLE XXXI

NUMBER OF TOMATO FRUITS SET ON FIRST CLUSTER IN 1959

Rank in No. of Fruits Set	Variety	Av. No. of Fruits Set on First Cluster
9	Bison	3.63
10	Burpeeana Early Hybrid	3.63
6	Burpee's Big Early	3.88
13	Bush Beefsteak	3.13
3	Earliana (McFayden Special)	4.25
8	Early Red Chief	3.63
15	Early Stokesdale #4	2.88
4	Fireball	4.00
17	Firesteel	1.75
11	Moreton Hybrid	3.38
1	New Hampshire Surecrop	5.00
5	Rhode Island Early	3.88
12	Rutgers	3.38
2	Stokesalaska	4.88
16	Stokeschatham	2.50
7	Stokes Early Hybrid	3.75
14	Valiant	2.88

N.S.D. between varieties for number fruits set on first cluster in 1959.

TABLE XXXII

SUMMARY OF TOMATO FRUITS SET ON FIRST CLUSTER
IN 1958 AND 1959

Rank in No. of Fruits Set	Variety	Av. No. of Fruits Set on First Cluster	Not Different from Var. with Rank of
15	Bison	2.88	3-16
3	Burpeeana Early Hybrid	3.94	1-16
9	Burpee's Big Early	3.44	2-16
7	Bush Beefsteak	3.50	2-16
1	Earliana (McPayden Special)	4.81	1-6
6	Early Red Chief	3.75	1-16
10	Early Stokesdale #4	3.25	3-16
8	Fireball	3.44	2-16
4	Moreton Hybrid	3.94	1-16
11	Rhode Island Early	3.25	3-16
5	Rutgers	3.88	1-16
2	Stokesalaska	4.56	1-9
14	Stokeschatham	3.00	3-16
12	Stokes Early Hybrid	3.38	3-16
16	Valiant	2.81	3-16

L.S.M.D. at the .05 level $\approx$ 1.13 fruits.

N.S.D. between varieties at the .01 level.

N.S.D. between fruits set on first cluster in 1958 and 1959.

TABLE XXXIII

EXTERIOR WALL THICKNESS OF TOMATO VARIETIES
TESTED IN 1958

Rank in Wall Thickness	Variety	Average Thickness of Wall (in Gm.)	Not Different from Var. with Rank of
41	Alpha 5	.550	15-50
14	Alpha 7	.675	1-37
43	Bison	.525	18-50
32	Bounty	.575	10-49
11	Burgess Hybrid A	.675	1-37
36	Burgess Hybrid #1	.575	10-49
21	Burpeeana Early Hybrid	.600	4-44
2	Burpee's Big Early	.725	1-20
5	Bush Beefsteak	.700	1-27
9	Cavalier	.690	1-27
8	Cluster-mato	.700	1-27
22	Oxyano	.600	4-44
24	Doublerich	.600	4-44
42	Earliana #498	.525	18-50
16	Earliana (Early Strain)	.650	1-41
49	Earliana (McFayden Special)	.476	28-50
48	Earliana (Mrs. Young's)	.475	28-50
50	Early Chatham	.450	38-50

TABLE XXXIII (continued)

EXTERIOR WALL THICKNESS OF TOMATO VARIETIES
TESTED IN 1958

Rank in Wall Thickness	Variety	Average Thickness of Wall (in cm.)	Not Different from Var. with Rank of
36	Early Harkness	.550	15-30
3	Early Jersey	.725	1-20
33	Early Red Chief	.575	10-49
18	Early Stokesdale #4	.625	2-43
35	Early Wonder	.575	10-49
47	Farthest North	.475	28-50
37	Fireball	.575	10-49
12	Firesteel	.675	1-37
10	Harrow	.675	1-37
17	Mammoth Wonder	.650	1-41
30	Manitoba	.575	10-49
45	Marman	.675	28-50
31	Meteor	.575	10-49
40	Monarch	.550	15-50
27	Moreton Hybrid	.600	4-44
25	N.D.A.C. 38	.600	4-44
24	Red Cloud	.575	10-49
46	Red River	.475	28-50

TABLE XXXIII (continued)

EXTERIOR WALL THICKNESS OF TOMATO VARIETIES
TESTED IN 1958

Rank in Wall Thickness	Variety	Average Thickness of Wall (in Cm.)	Not Different from Var. with Rank of
29	Rhode Island Early	.575	10-49
1	Rutgers	.750	1-17
4	Selandi	.712	1-27
23	Sioux	.600	4-44
39	Stokesalaska	.550	15-50
7	Stokeschatham	.700	1-27
19	Stokescross #1	.625	2-43
28	Stokes Early Hybrid	.575	10-49
44	Tenn. 290	.500	21-50
6	Valiant	.700	1-27
13	Valiant #629	.675	1-37
15	Valnorth	.655	1-41
26	Vancross	.600	4-44
20	Victor	.625	2-43

L.S.M.D. at the .05 level = .113 Cm.

L.S.M.D. at the .01 level = .148 Cm.

ment scar. Data on these two measurements is given in Table XXXIV. Range in locule number was determined by splitting the fruit along the equator and counting the locules. The ripening habits were determined by observation of unripe as well as ripe fruits in the field. These were divided into three groups. Those possessing the uniform color gene are very light green or almost white when immature, and ripen uniformly. Fruits that were medium green when immature, but ripened fairly evenly were classed as apple green. Those with dark green color when immature and with green shoulders when ripe were classed as green shouldered. The results of these observations are given in Table XXXIV.

Characteristics of the Flower and Flower Truss

These observations were made to determine whether the inflorescence was leafy or not leafy, if the pedicel was jointed, or whether the flower clusters were simple or compound. Also included in this study were the length of pistils, and the site of insertion of the first cluster. These observations were made in 1958 only. The first three plants in each replicate were studied except for the evaluation on jointed peduncles. All varieties studied possessed the jointed peduncle characteristic, and only one observation of each variety was required to determine this. All of the clusters on these plants were observed to determine if they were leafy. Since none of the varieties had leafy clusters exclusively, the ones with both leafy and non-leafy clusters were termed mixed. These plants were

TABLE XXXIV

TOMATO FRUIT CHARACTERISTICS

Variety	Stylar Scar Size (in Cm.)	Diameter of Attachment Scars (in Cm.)	Range in Locule No.	Ripen- ing Habits
Alpha 5	.360	1.18	5-6	U.C.G.
Alpha 7	.400	1.44	6-7	U.C.G.
Bison	.460	1.22	9-12	G.S.
Bounty	.560	1.34	5-8	U.C.G.
Burgess Hybrid A	.600	1.36	5-7	G.S.
Burgess Hybrid #1	.160	1.22	5-6	G.S.
Burpeeana Early Hybrid	.120	1.06	4-6	G.S.
Burpee's Big Early	.220	1.24	7-8	G.S.
Bush Beefsteak	.660	1.58	6-8	A.G.
Cavalier	.540	1.52	5-6	A.G.
Cluster-mato	.520	1.40	5-10	G.S.
Guyano	.920	1.18	5-10	G.S.
Doublerich	.100	.88	4-5	A.G.
Earliana #498	.500	1.38	6-8	G.S.
Earliana (Early Strain)	.500	1.40	5-13	G.S.
Earliana (McFayden Special)	.580	1.26	6-12	G.S.
Earliana (Mrs. Young's)	.760	1.46	10-13	G.S.
Early Chatham	.200	.92	3-10	U.C.G.

TABLE XXXIV (continued)

TOMATO FRUIT CHARACTERISTICS

Variety	Stylar Scar Size (in cm.)	Diameter of Attachment Scars (in cm.)	Range in Losele No.	Ripen- ing Habits
Early Harkness	.160	.78	3-5	G.S.
Early Jersey	.320	1.50	5-8	G.S.
Early Red Chief	.320	1.20	5-7	U.C.G.
Early Stokesdale #4	.300	1.14	4-5	G.S.
Early Wonder	.460	1.16	4-7	A.G.
Farthest North	.140	1.08	4-6	U.C.G.
Fireball	.120	.84	5-8	U.C.G.
Firesteel	.920	1.72	6-11	G.S.
Harrow	.700	.92	3-6	G.S.
Mammoth Wonder	.126	1.96	5-8	U.C.G.
Manitoba	.160	.94	5-8	A.G.
Marman	.360	1.30	6-8	G.S.
Meteor	.120	1.16	3-5	A.G.
Monarch	.320	1.18	6-10	G.S.
Moreton Hybrid	.580	1.44	6-9	G.S.
N.D.A.C. 38	.540	1.36	6-11	A.G.
Red Cloud	.240	.96	6-7	G.S.
Red River	.520	1.44	7-9	G.S.

TABLE XXXIV (continued)

TOMATO FRUIT CHARACTERISTICS

Variety	Stylar Scar Size (in Cm.)	Diameter of Attachment Scars (in Cm.)	Range in Locule No.	Ripen- ing Habits
Rhode Island Early	.100	.96	5-6	U.C.G. ^a
Rutgers	.500	1.60	4-7	G.S.
Selandi	.120	.88	2-3	G.S.
Sioux	.580	1.30	5-6	U.C.G.
Stokesalaska	.100	.58	2-4	G.S.
Stokeschatham	.250	.92	5-6	G.S.
Stokescross #1	.360	1.78	4-6	G.S.
Stokes Early Hybrid	.120	.92	4-5	G.S.
Tenn. 29U	.740	1.20	8-10	G.S.
Valiant	.580	1.42	6-7	G.S.
Valiant #889	.360	1.28	5-6	G.S.
Valnorth	.280	.88	6-8	G.S.
Vancross	.400	1.48	5-12	G.S.
Victor	.800	1.46	3-7	U.C.G.

^aU.C.G. denotes uniform color gene. G.S. denotes green shouldered.
A.G. denotes apple green.

also observed for types of flower clusters. None of the varieties had compound clusters exclusively, so those with both compound and simple clusters were classed as mixed. The style was termed enclosed if its length was insufficient to make it protrude beyond the anthers, or extended if it protruded past the end of the anthers. The number of nodes between clusters were counted on each plant. The modal number of nodes are presented in the table. The site of insertion, or the internode at which the first cluster appeared, was determined by counting the number of internodes from the ground up to the first cluster. The number occurring most frequently in each variety is given in Table XXXV, with other data collected for the above characteristics.

Number of Locules Per Fruit

A randomized sample of four fruits per replicate was taken to determine the number of locules per fruit. These tomatoes were split along the equatorial diameter so the locules could be counted. All measurements were taken from fruits harvested on the same date so there would be no variation due to season. Tables XXXVI and XXXVII show the average locule numbers for 1958 and 1959 respectively. Table XXXVIII gives a summary of the two years and shows the difference between years.

TABLE XXXV

CHARACTERISTICS OF THE TOMATO FLOWER AND FLOWER TRUSS

Variety	Pistil Length (Extended or Enclosed)	Site of Insertion	Inflores- cence Leafy or Not Leafy	Flower Truss Simple or Com- pound
Alpha 5	Enclosed	6	Not leafy	Simple
Alpha 7	Enclosed	8	Not leafy	Simple
Bison	Enclosed	7	Not leafy	Simple
Bounty	Enclosed	7	Not leafy	Simple
Burgess Hybrid A	Enclosed	7	Not leafy	Simple
Burgess Hybrid #1	Enclosed	7	Not leafy	Simple
Burpeeana Early Hybrid	Extended	7	Not leafy	Simple
Burpee's Big Early	Extended	8	Not leafy	Simple
Bush Beefsteak	Extended	7	Not leafy	Simple
Cavalier	Extended	7	Not leafy	Simple
Clustermato	Extended	7	Mixed	Simple
Cuyano	Enclosed	7	Mixed	Mixed
Doublerich	Enclosed	7	Not leafy	Simple
Earliana #498	Extended	10	Not leafy	Mixed
Earliana (Early Strain)	Extended	7	Mixed	Mixed
Earliana (McPayden Special)	Extended	8	Mixed	Mixed
Earliana (Mrs. Young's)	Extended	7	Not leafy	Mixed
Early Chatham	Extended	5	Mixed	Simple

TABLE XXV (continued)

CHARACTERISTICS OF THE TOMATO FLOWER AND FLOWER TRUSS

Variety	Pistil Length (Extended or Enclosed)	Site of Insertion	Inflores- cence Leafy or Not leafy	Flower Truss Simple or Com- pound
Early Harkness	Extended	7	Not leafy	Mixed
Early Jersey	Enclosed	7	Not leafy	Simple
Early Red Chief	Extended	7	Not leafy	Simple
Early Stokesdale #4	Enclosed	8	Mixed	Mixed
Early Wonder	Extended	7	Not leafy	Simple
Farthest North	Enclosed	5	Not leafy	Simple
Fireball	Enclosed	7	Not leafy	Simple
Firesteel	Enclosed	8	Not leafy	Simple
Narrow	Enclosed	7	Not leafy	Simple
Mammoth Wonder	Extended	8	Mixed	Simple
Manitoba	Extended	5	Not leafy	Simple
Marman	Enclosed	7	Mixed	Mixed
Meteor	Enclosed	6	Not leafy	Mixed
Monarch	Enclosed	7	Not leafy	Simple
Moreton Hybrid	Enclosed	7	Not leafy	Simple
N.D.A.C. 38	Enclosed	7	Not leafy	Simple
Red Cloud	Enclosed	8	Not leafy	Simple
Red River	Extended	7	Not leafy	Mixed

TABLE XXXIV (continued)

CHARACTERISTICS OF THE TOMATO FLOWER AND FLOWER TRUSS

Variety	Pistil Length (Extended or Enclosed)	Site of Insertion	Inflores- cence Leafy or Not Leafy	Flower Truss Simple or Com- pound
Rhode Island Early	Enclosed	6	Not leafy	Simple
Rutgers	Extended	10	Mixed	Simple
Selandi	Enclosed	7	Not leafy	Mixed
Sioux	Extended	7	Not leafy	Simple
Stokesalaska	Enclosed	7	Not leafy	Simple
Stokeschatham	Extended	8	Mixed	Simple
Stokescross #1	Enclosed	8	Not leafy	Simple
Stokes Early Hybrid	Extended	8	Not leafy	Simple
Tenn. 29U	Extended	7	Not leafy	Mixed
Valiant	Enclosed	7	Mixed	Simple
Valiant #389	Enclosed	7	Not leafy	Simple
Valnorth	Enclosed	7	Not leafy	Simple
Vancross	Extended	7	Not leafy	Simple
Victor	Extended	6	Not leafy	Simple

TABLE XXXVI

NUMBER OF LOCULES PER TOMATO IN 1958

Rank in No. of Locules	Variety	Average No. of Locules Per Fruit	Not Different from Var. with Rank of
39	Alpha 5	5.20	18-48
23	Alpha 7	5.20	11-46
2	Bison	10.00	1-7
27	Bounty	6.00	11-46
24	Burgess Hybrid A	6.20	11-46
36	Burgess Hybrid #1	5.40	18-48
40	Burpeeana Early Hybrid	5.20	18-48
11	Burpee's Big Early	7.40	5-30
19	Bush Beefsteak	6.60	8-40
38	Cavalier	5.40	18-48
12	Cluster-mato	7.40	5-30
3	Guyano	9.40	2-10
43	Doublerich	4.60	23-49
17	Earliana #498	7.20	6-35
4	Earliana (Early Strain)	9.20	2-10
7	Earliana (McFayden Special)	8.80	2-24
1	Earliana (Mrs. Young's)	11.20	1-2
25	Early Chatham	6.00	11-46

TABLE XIXVI (continued)

NUMBER OF LOCULES PER TOMATO IN 1958

Rank in No. of Locules	Variety	Av. No. of Locules Per Fruit	Not Different from Var. with Rank of
48	Early Harkness	3.80	36-50
20	Early Jersey	6.40	9-42
30	Early Red Chief	5.80	11-47
44	Early Stokesdale #4	4.60	23-49
29	Early Wonder	5.80	11-47
41	Farthest North	4.80	20-48
28	Fireball	5.80	11-47
6	Firesteel	8.80	2-24
45	Harrow	4.60	23-49
18	Mammoth Wonder	6.80	8-40
26	Manitoba	6.00	11-46
13	Marman	7.40	5-30
47	Meteor	4.20	28-49
8	Monarch	8.20	3-19
15	Moreton Hybrid	7.40	5-30
10	N.D.A.G. 38	8.00	3-22
21	Red Cloud	6.40	9-42
9	Red River	8.00	3-22

TABLE XXXVI (continued)

NUMBER OF LOCULES PER TOMATO IN 1958

Rank in No. of Locules	Variety	Average No. of Locules Per Fruit	Not Different from Var. with Rank of
34	Rhode Island Early	5.60	3-22
35	Rutgers	5.60	16-47
50	Selandi	2.40	48-50
32	Sioux	5.60	16-47
49	Stokesalaska	3.00	43-50
33	Stokeschatham	5.60	16-47
42	Stokescross #1	4.80	20-48
46	Stokes Early Hybrid	4.50	23-49
5	Tenn. 29U	9.00	2-15
22	Valiant	6.40	9-42
31	Valiant #889	5.60	16-47
16	Valnorth	7.20	6-35
14	Vandross	7.40	5-30
37	Victor	5.40	18-48

L.S.M.D. at the .05 level = 1.68 locules.

L.S.M.D. at the .01 level = 2.20 locules.

TABLE XXXVII

NUMBER OF LOCULES PER TOMATO IN 1959

Rank in Locule No.	Variety	Av. No. of Locules Per Fruit	Not Different from Var. with Rank of
1	Bison	10.31	1-2
16	Burpeeana Early Hybrid	4.81	12-17
4	Burpee's Big Early	7.88	5-7
3	Bush Beefsteak	7.88	5-7
2	Earliana (McFayden Special)	9.75	1-2
6	Early Red Chief	7.06	3-11
11	Early Stokesdale #4	6.19	6-15
8	Fireball	6.69	5-11
7	Firesteel	7.00	3-11
5	Moreton Hybrid	7.56	3-8
14	New Hampshire Surecrop	5.50	10-17
17	Rhode Island Early	4.75	12-17
9	Rutgers	6.50	6-12
13	Stokesalaska	5.50	10-17
10	Stokeschatham	6.31	6-15
15	Stokes Early Hybrid	5.50	10-17
12	Valiant	5.56	7-17

L.S.M.D. at the .05 level for locule number = .98 locules.

L.S.M.D. at the .01 level for locule number = 1.31 locules.

TABLE XXXVIII

SUMMARY OF LOCULE NUMBERS PER TOMATO FOR 1958 AND 1959

Rank in Locule No.	Variety	Av. No. of Locules Per Fruit	Not Different from Var. with Rank of
1	Hison	10.28	1
14	Burpeeana Early Hybrid	4.91	12-14
5	Burpee's Big Early	7.56	3-6
6	Bush Beefsteak	7.31	4-6
2	Earliana (McFayden Special)	9.38	2
7	Early Red Chief	6.41	7-11
12	Early Stokesdale #4	5.34	12-14
8	Fireball	6.34	7-11
3	Firesteel	8.00	3-5
4	Moreton Hybrid	7.66	3-6
15	Rhode Island Early	4.24	15-16
10	Rutgers	6.00	7-11
16	Stokewalaska	4.13	15-16
11	Stokeschatham	5.91	7-11
13	Stokes Early Hybrid	5.13	12-14
9	Valiant	6.03	7-11

L.S.M.D. at the .05 level = .54 locules.

L.S.M.D. at the .01 level = .71 locules.

Av. locules per fruit in 1958 and 1959 = 6.38 and 6.83 locules respectively.

L.S.M.D. between years at the .05 level = .19 locules.

L.S.M.D. between years at the .01 level = .25 locules.

CHAPTER IV

DISCUSSION OF RESULTS

Most of the data collected in these studies were treated statistically by the analysis of variance method. Where quantity of data was insufficient for this type of analysis, or if it did not lend itself to analysis, it is presented in averages for each variety, or in descriptive words. Analysis of variance was run at the .05 level of probability. The .05 level was chosen because it was felt that it would be more meaningful. This choice of probability link appeared to provide the best segregation of results.

Total Yields

In 1958 Early Red Chief and Stokeschatham were significantly higher in total yield than all other varieties tested. Early Stokesdale #4 and Early Chatham were significantly lower in total yield than the other varieties in the test. In 1959 the total yields were considerably higher than in 1958. Probably this was due to better water supply because of higher rainfall during the productive period. There was some shifting in the order for highest yields, but Early Red Chief and Stokeschatham were still in the highest yielding group. The total yields for Early Red Chief and Stokeschatham varied very little from 1958 to 1959, while Bison and some of the others varied greatly from one year to the next.

Some varieties that were in the average group for total yield

in 1958 moved up to the highest yielding group in 1959. The following varieties were in the highest yielding group in 1959 in this order: Bush Beefsteak, Burpee's Big Early, Bison, Moreton Hybrid, Stokeschatham, Fireball, and Early Red Chief. Earliana (McFayden Special) was significantly lower in total yield than the other varieties tested.

In the summary of the two years' total yields, Stokeschatham, Early Red Chief, Bush Beefsteak, Burpee's Big Early, Bison and Moreton Hybrid were in the highest yielding group in that order. Early Stokesdale #4 and Earliana (McFayden Special) were in the lowest yielding group. Analysis of variance showed that there was a highly significant difference between the same varieties from one year to the next. The data on total yields is presented in Tables I, II and III pages 21-23.

Marketable Yields

Stokeschatham and Early Red Chief were the two highest in marketable yield in 1958. They were followed by Stokes Early Hybrid, Harrow, Cluster-mato, Rutgers, Burpee's Big Early, Vancross, Early Jersey, Stokesalaska, Stokescross #1, Moreton Hybrid, Burpeeana Early Hybrid, Red Cloud, and Manitoba in that order. Bison was significantly lower in marketable yield than all other varieties tested. This was due to circular cracking and some radial cracking.

In 1959 Firesteel, Bison, and Earliana (McFayden Special) were

significantly lower in marketable yield than the other varieties tested. All other varieties were in the upper group. Firesteel had few circular cracks, but several radial cracks and were rough. Bison and Earliana (McFayden Special) were high in both circular and radial cracks.

The summary for the two years showed that Firesteel, Bison and Earliana (McFayden Special) were significantly lower in marketable yield than the other varieties that were tested in both years. There was a highly significant difference between years for the same varieties. All varieties produced more marketable fruits in 1959. Results of the studies on marketable yields are shown in Tables IV, V, and VI pages 26-30.

Fruit Size

In 1958 Mammoth Wonder produced the largest fruits. It is a midseason variety and cannot be compared with those in the first early group. Burpee's Big Early produced the second largest fruits, which were significantly larger than all others tested except Mammoth Wonder. Farthest North, Early Chatham, and Stokesalaska produced the smallest fruits.

Burpee's Big Early, Moreton Hybrid, Rutgers, and Early Red Chief produced the largest fruits in 1959. Most of the varieties produced larger fruits than in 1958. Stokesalaska produced the smallest fruits, the average size in 1958 and 1959 being 1.14 and 1.15 ounces respectively.

The differences between fruit sizes from one year to the next were significant.

Tables VII, VIII and IX pages 33-37 show the results of studies made on fruit size.

Fruit Shape

Baily (7) reports that fruit shape is determined by several genes, of which the most important is that controlling locule number. A Correlation was not run on this but it appears that those fruits with the smaller number of locules more closely approach the spherical shape, and those with many locules are more oblate.

Doublerich, Selandi, Fireball, and Meteor produced the most nearly spherical fruits in 1958. Selandi was significantly lower in locule number than all others tested. Meteor was in the second lowest group, and both Doublerich and Fireball were below average in locule numbers. Earliana (Early Strain), Marman and Guyano produced the most oblate fruits. When comparing locule numbers at the one percent level of significance Earliana (Early Strain), and Guyano are in the highest group while Marman is in the second highest group for locule number.

In 1959 Bison produced the most oblate fruits, and Rhode Island Early the most spherical. The fruits of Bison contained the highest number of locules and those of Rhode Island Early the lowest. Tables X and XI give the data on fruit shapes.

Ascorbic Acid

The samples taken for analysis of ascorbic acid were not replicated; therefore, analysis of variance could not be applied to the data. Doublerich and Rutgers produced fruits with the highest average content of ascorbic acid. Earliana (Mrs. Young's) and Firesteel produced fruits with the lowest average content of ascorbic acid. Doublerich was developed for its high acid content. The description given in the catalog states that it contained twice as much acid as most varieties. Earliana (Mrs. Young's) was recommended as a low acid tomato.

Analysis was run to determine the effect of fruit size on ascorbic acid content. Results indicated no correlation between fruit size and ascorbic acid content of those varieties tested in 1958. This is in agreement with studies made by MacLinn, Fellers, and Buck (13), Shultz and Kelly (21), Murphy and Covell (16). It does not agree with the work of Powers (17), or with Reynard and Kanapaux (18) who found a correlation between fruit size and ascorbic acid content.

The results of studies on ascorbic acid are presented in Table XII pages 42-44.

Glucose

Data in 1958, the only year that fruits were analyzed for glucose content, showed that Gluster-mato, Moreton Hybrid, Red Cloud

and Alpha 7 produced fruits containing the highest average amounts. Monarch, Farthest North, Burgess Hybrid #1, and Marman produced fruits with the smallest amounts of glucose. These results are reported in Table XII.

Size of Plants

Plant size was determined by height and spread, as well as the diameter of the stem at the ground level. It was difficult to evaluate plants on the basis of size, since varieties were of both determinate and indeterminate types. In this discussion the varieties are divided into those two groups. In the indeterminate group Rhode Island Early, Early Stokesdale #4, Cluster-mato, Valiant, and Burpee's Big Early produced the largest plants when all measurements were considered. Burgess Hybrid #1 and Harrow produced the smallest plants in this group. In the determinate group Alpha 7, N.D.A.C. 38, and Red Cloud produced the largest plants and Early Chatham, Manitoba, Monarch, and Meteor produced the smallest plants.

Size is not necessarily an indication of a good plant. Rhode Island Early was one of the largest plants, yet the stems were spindly and had very long internodes with few lateral branches. As a result of this, it had fewer clusters and did not have enough foliage to protect the fruits. These measurements were made on unstaked and unpruned plants in 1938. The results of this study appear in Table XIV pages 46-48.

Growth Habits

Plant growth habits were studied to evaluate shape and density, as well as to observe whether they were determinate or indeterminate. The determinate or indeterminate condition is a definite varietal characteristic. Form and density were determined by observation. The results of this study appear in Table IV.

Nineteen of the varieties were of the determinate type. Cluster-mate was the only variety which was erect at the time of the first harvest. Alpha 5, Burgess Hybrid #1, Early Jersey, Farthest North, Marman, Red River, Rhode Island Early, and Valnorth were sprawling. All of the other varieties tested were semi-erect. Alpha 7, Cluster-mate, Mammoth Wonder, Rutgers, Stokesalaska, and Stokeschatham had dense foliage. Nineteen of the varieties had the open type of foliage. All of the varieties with sprawling type plants were open and allowed an excess amount of sunlight to strike the fruits. Twenty-three of the varieties had medium foliage density and gave fair protection to the fruits.

Early Yield

In 1958 Bush Beefsteak, Firesteel, Moreton Hybrid, Burpee's Big Early, and Stokes Early Hybrid were significantly higher in early yield than all other varieties tested. Selandi, Doublerich, Early Jersey, Marman and Rutgers were significantly lower in early yield than all others tested. In 1959 Stokesalaska, Bison, Firesteel and Stokes Early Hybrid were highest in early yield. All other varieties

tested were in the same group except for Rutgers, which provided the base date for the measurement of early yield.

In the summary of early yield Stokesalaska, Firesteal, Stokes Early Hybrid, Bush Beefsteak, and Bison produced the most early fruits. Valiant, Early Red Chief and Stokeschathan were in the lowest group except for Rutgers.

There are many things other than yield to consider in selecting a variety for earliness. During the two years test Stokesalaska produced more pounds of early fruit, but it was the smallest tomato of all varieties tested and would not ordinarily be accepted on the commercial market. However, it was sold in quart boxes at the U.T. Roadside Market and was well accepted. Bison also produced a high early yield, but it had a low marketable yield due to cracks. The data on early yield is presented in Tables XVI, XVII, and XVIII pages 56-60.

Number of Days Earlier Than Rutgers

The number of days between the time each variety produced its first normal ripe fruit and the time Rutgers produced its first normal ripe fruit were used to determine the number of days earlier than Rutgers.

In 1958 nineteen of the varieties produced fruits seventeen days earlier than Rutgers. The latest varieties were Marman and Early Jersey which were only three days earlier than Rutgers. In 1959 there were only twelve days between the earliest varieties and

Rutgers. There were three harvest dates before the first harvest of Rutgers. The varieties Bison, Burpeeana Early Hybrid, Earliana (McFayden Special), Firesteel, New Hampshire Surecrop, Rhode Island Early, Stokesalaska, and Stokes Early Hybrid ripened their first fruits twelve days before Rutgers. The other varieties were seven days earlier than Rutgers. This material is presented in Tables XIX and XX.

Circular Cracking of Fruits

The data on circular cracking is in agreement with the work done by Frazier (10). Early varieties, such as Earliana and Bison, were far more severely cracked concentrically than most late varieties.

Earliana (Mrs. Young's), Marman, Red River, Stokescross #1, Valiant, Cavalier, Earliana #498, Bison, and Stokes Early Hybrid had more circular cracks per fruit in 1958 than other varieties tested. Alpha 7, Stokesalaska, Red Cloud, and Meteor were in the group having the lowest number of circular cracks. In 1959 Earliana (McFayden Special), and Bison were significantly higher in number of circular cracks per fruit, while Rhode Island Early had the lowest number of circular cracks. The summary shows that Bison, Valiant, Earliana (McFayden Special), Stokes Early Hybrid, Bush Beefsteak, Stokeschatham, Moreton Hybrid, and Early Stokesdale #4 had the highest number of circular cracks. The varieties tested were not different from one another in amount of circular cracking.

The data on circular cracking is presented in Tables XXI, XXII, and XXIII pages 63-67.

Radial Cracking of Fruits

There were no differences between varieties for radial cracking in 1958. In 1959 Bison and Burpee's Big Early produced fruits with the highest numbers of radial cracks. Fireball and Stokesalaska had the lowest number of radial cracks. The summary of the two years shows that Burpee's Big Early, Firesteel, Valiant, Bison, Rutgers and Stokes Early Hybrid had the highest number of radial cracks. Stokesalaska had fewer radial cracks than any other variety tested. This material is presented in Tables XXIV, XXV, and XXVI pages 67-71.

Number of Flowers on First Cluster

In 1958 Earliana (Early Strain), Doublerish, Red River, Earliana (McFayden Special), Cuyano, Valiant and Selandi produced the greatest numbers of flowers on the first cluster. All other varieties were divided into two large groups with N.D.A.C. 38, Monarch, Victor, and Farthest North having the fewest flowers in the lowest group. In 1959 there was no difference between the varieties tested in both years Earliana (McFayden Special) produced the highest number of flowers on the first cluster. Early Stokesdale #4, Bush Beefsteak, Stokeschatham, Stokes Early Hybrid, Rhode Island Early, and Valiant had the smallest number of flowers in the first

cluster. This data is presented in Tables XXVII, XXVIII, and XXIX.

Number of Fruits Set on first Cluster

In 1958 Earliana (Early Strain), Selandi, Earliana (McFayden Special), Valiant #889, Moreton Hybrid and Firesteel set the highest number of fruit on the first cluster. Bison and Valnorth set the lowest number of fruits. In 1959 there was no difference between varieties in the number of fruits set on the first cluster. The summary for the two years shows that Earliana (McFayden Special), Stokesalaska, Burpeeana Early Hybrid, Moreton Hybrid, Rutgers, and Early Red Chief had the highest number of fruits to set on the first cluster. All remaining varieties were in the same group and not significantly different from each other. The results of studies on fruit set are presented in Tables XXX, XXXI, and XXXII.

Thickness of Exterior Wall

Rutgers, Early Jersey, Cluster-mato, Stokeschatham, Valiant, Bush Beefsteak, Burpee's Big Early, Selandi, Cavalier, Harrow, Burgess Hybrid A, Firesteel, Valiant 889, Alpha 7, Valnorth, Earliana (Early Strain), and Mammoth Wonder produced fruits which had the thickest exterior walls. Tenn. 29U, Marman, Red River, Farthest North, Earliana (Mrs. Young's), Earliana (McFayden Special) and Early Chatham had the thinnest exterior walls. This material is presented in Table XXXIII.

Fruit Characteristics

Fruit characteristics were grouped together in Table XXXIV. The size of the styler scar seems to be affected directly by the size of the pistil. Although no direct measurements were made on the pistils it was observed that they were characteristically small for certain varieties. These varieties usually produce smaller fruits which are very smooth, and in some cases the styler scar is almost negligible. Rhode Island Early, Selandi, Stokesalaska, and Double-rich were varieties that had extremely small styler scars. Mammoth Wonder, Victor, Tenn. 29U, and Guyano had extremely large styler scars.

In measuring the diameter of the attachment scars the entire corky area around the stem was measured. In some of the smaller varieties the attachment scar was only as large as the stem where it was attached, in others fairly large corky areas surrounded the stem attachment. Mammoth Wonder, Rutgers, Stokescross #1, and Bush Beefsteak had large attachment scars. Stokesalaska, Valnorth, Fireball, and Early Harkness were among the varieties with the smaller attachment scars.

The range in locule number is given here in addition to the analysis on locule numbers which will be given later. The locule number in certain varieties is very consistent while in others it is quite variable. Table XXXIV shows the range in locule number for each variety.

Each variety possesses a distinct and characteristic ripening habit. These were classed as uniform color gene, green shouldered, or apple green. The extremely green shouldered fruits, as exemplified by Bison and Earliana, may remain green around the stem when the other portions of the fruit are fully ripe. This creates an unattractive appearance and may result in considerable waste. The apple green fruits are a medium green when immature and ripen fairly evenly, but not as evenly as the uniform color gene varieties. The uniform color gene fruits ripen evenly to the attachment scar, but often do not develop into a deep red like the green shouldered fruits. This seemed to be true for all early determinate varieties. However, Early Red Chief, which possesses the uniform color gene, develops into a very deep red when fully ripe. It is an indeterminate variety in the second early group.

Characteristics of the Flower and Flower Truss

In the fifty varieties studied it appeared that weather influenced pistil length to a greater extent than did variety. However, it seems that all varieties are not affected equally by weather conditions. The data on pistil length is given in Table XXXV. This is not an absolute measurement, but is a result of several observations. Although one may find both types on the same plant in fully developed flowers, the data shows the type found most frequently.

In the varieties tested none produced their first inflorescence

before the fifth internode and none higher than the tenth. The small determinate plants appear to produce the inflorescence on a lower internode than do the indeterminate varieties.

The data on leafiness of inflorescence does not agree with that reported by Chodat and Gagnobin (6). None of the plants in any variety produce leafy inflorescences exclusively. In some varieties there would be an occasional plant with a leafy inflorescence, but usually only one per plant. This would indicate that it is not a genetic characteristic, but is an expression of anomalies during its development.

Observations also showed that all varieties possessed the jointed pedicel characteristic.

Number of Locules Per Fruit

In 1958 Earliana (Mrs. Young's) and Bison were significantly higher in locule number than other varieties tested. All strains of Earliana were high in locule number. Meteor, Early Harkness, Stokes-alaska and Selandi were significantly lower in locule number than all others tested. In 1959 Bison and Earliana (McFayden Special) produced fruits with the highest locule number. Burpeesana Early Hybrid and Rhode Island Early were the lowest in locule numbers.

For the varieties tested in both years, Bison was higher in locule number than any other. It was followed by Earliana (McFayden Special), which was the only variety in the second highest division.

Rhode Island Early and Stokesalaska were the lowest in number of locules.

The studies conducted here show only the difference between variety since all data was collected on the same day. All data on locule numbers is given in Tables XXVI, XXVII, and XXVIII.

CRANES & CREST

CHAPTER V

SUMMARY

Genetic characteristics of most first early tomato varieties listed in commercial catalogs, plus a few other selections, were studied in 1958. In 1959 sixteen of these varieties were chosen for further study in addition to a new variety New Hampshire Surecrop.

Major differences observed between varieties were number of locules per fruit, type of plant (determinate or indeterminate), ripening habits, and fruit size. The varieties were divided into three distinct groups on the basis of locule numbers per fruit. Approximately one tenth of the varieties had fruits with an extremely high number of locules, as exemplified by the strains of Earliana. Another one tenth of the varieties produced fruits extremely low in locule numbers. The remaining varieties produced fruits intermediate in number of locules without much varietal variation. Type of plant and ripening habits are distinct genetic characteristics not altered by weather. Thirty-three varieties were indeterminate in type. Thirty-two varieties produced fruits with the green shouldered characteristic. Twelve possessed the uniform color gene, and seven were intermediate, or apple green. Fruit size varied considerably. The fifty varieties tested in 1958 were divided into thirteen groups on the basis of size. Each group was significantly different from every other.

Twenty-five of the varieties tested in 1958 did not differ in

total production. Early Red Chief and Stokeschatham were in the highest yielding group for both years. This would suggest that they would be good parent varieties for stabilizing yield as well as for productiveness. There was only a twelve percent variation in fruit shape among the different varieties. This was determined by use of the form index, which is polar diameter divided by equatorial diameter.

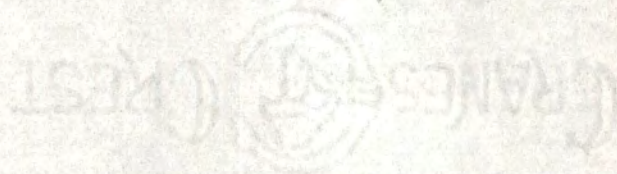
Radial cracking did not vary significantly between varieties in 1958. It varied only slightly in 1959. Circular cracking varied more between varieties than did radial cracking in either years.

Data on the sixteen varieties tested in both years shows that five out of the nine characteristics analyzed varied significantly from one year to the next. It appears that these differences are mostly due to the different climatic conditions encountered. The characteristics that varied were total yield, marketable yield, fruit size, circular cracking, and number of locules per fruit. Characters not affected by season were early yield, radial cracking, number of flowers and number of fruits on the first cluster.

There is no one tomato variety that will fill every need. It is hoped that the data presented here will be of value in selecting parental material for breeding purposes.

Rank was determined by an evaluation of fifteen characteristics. In order of rank, Early Red Chief, Moreton Hybrid, Bush Beefsteak, and Burpee's Big Early scored the highest. Moreton Hybrid, Bush Beefsteak, and Burpee's Big Early are early varieties. Early Red Chief is a second early variety with high quality and yield. Rutgers, a good midseason variety was used as a standard for comparison.

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APPENDIX



APPENDIX A



This is a picture of the tomato variety Bush Beefsteak taken just before the first harvest.



This is a picture of the tomato variety Early Red Chief taken just before the first harvest.



This is a picture of the tomato variety Stokes Early Hybrid taken just before the first harvest.



This is a picture of the tomato variety New Hampshire Surecrop taken just before the first harvest.

APPENDIX B

TABLE XXXIX

YIELD DATA ON TOMATOES IN 1958*

Variety	Total Yield	Marketable Yield	Early Yield	Fruit Size
Alpha 5	16	6	2	31
Alpha 7	23	18	17	3
Bison	4	40	6	31
Bounty	3	4	9	17
Burgess Hybrid A	6	2	2	5
Burgess Hybrid #1	5	32	3	42
Burpeeana Early Hybrid	6	1	6	31
Burpee's Big Early	4	1	1	2
Bush Beefsteak	5	2	1	3
Cavalier	7	4	2	5
Cluster-mato	5	1	2	5
Cuyano	2	6	22	17
Doublerich	5	6	32	30
Earliana #498	5	15	8	17
Earliana (Early Strain)	30	36	9	18
Earliana (McFayden Special)	22	31	2	17
Earliana (Mrs. Young's)	6	19	17	14
Early Chatham	37	21	3	48
Early Harkness	22	12	2	43
Early Jersey	4	1	32	17
Early Red Chief	1	1	9	6
Early Stokesdale #4	35	10	2	6
Early Wonder	5	16	2	17
Farthest North	30	17	2	48
Fireball	24	17	2	36
Firesteel	9	6	1	5
Harrow	3	1	23	32

*The numbers represent the rank of each variety as compared to all others tested.

TABLE XXXIX (CONTINUED)

YIELD DATA ON TOMATOES IN 1958

Variety	Total Yield	Marketable Yield	Early Yield	Fruit Size
Mammoth Wonder	13	2	24	1
Manitoba	4	2	10	23
Marman	9	34	35	28
Meteor	5	3	2	33
Monarch	6	6	2	42
Moreton Hybrid	8	1	1	3
M. D. A. G. 38	5	12	10	19
Red Cloud	3	1	3	31
Red River	3	17	8	8
Rhode Island Early	13	2	2	36
Rutgers	4	1	41	3
Selendi	8	28	32	35
Sioux	7	6	8	8
Stokesalaska	3	1	2	50
Stokeschatham	1	1	10	16
Stokescross #1	3	1	14	3
Stokes Early Hybrid	5	1	1	33
Tenn. 290	4	16	6	18
Valiant	5	3	8	8
Valiant #889	19	10	10	17
Valnorth	22	4	6	24
Vancross	8	1	8	17
Victor	10	3	13	13

*Numbers appearing in the above columns indicate the rank of each variety as compared to all others tested. The rank was taken from the statistical tables and those varieties with the same rank are not significantly different at the .05 level of probability. Varieties with lowest numbers have the most desirable characteristics.

TABLE XL

YIELD DATA ON TOMATOES IN 1959*

Variety	Total Yield	Marketable Yield	Early Yield	Fruit Size
Bison	1	3	3	11
Burpeeana Early Hybrid	2	1	2	10
Burpee's Big Early	1	1	3	1
Bush Beefsteak	1	1	2	2
Earliana (McFayden Special)	9	12	2	10
Early Red Chief	1	1	3	1
Early Stokesdale A ₁	5	1	3	2
Fireball	1	1	2	11
Firesteel	5	9	1	2
Norton Hybrid	1	1	2	1
New Hampshire Surecrop	5	1	2	10
Rhode Island Early	5	1	2	10
Rutges	2	1	5	1
Stokesalaska	2	1	1	17
Stokeschatham	1	1	4	5
Stokes Early Hybrid	2	1	1	10
Valiant	7	1	2	2

*Numbers appearing in the above columns indicate the rank of each variety as compared with all others tested. The rank was taken from the statistical tables and those varieties with the same rank are not significantly different at the .05 level of probability. Varieties with the lowest numbers have the most desirable characteristics.

TABLE XII

CHARACTERISTICS OF TOMATO FLOWERS AND FLOWER TRUSS IN 1958

Variety	No. Flowers On First Cluster	Pistil Length	Place Of Insertion	Inflorescence	Flower Truss
Alpha 5	5.00	Rn	6	NL	S
Alpha 7	4.75	Rn	8	NL	S
Bison	4.62	Rn	7	NL	S
Bounty	5.10	Rn	7	NL	S
Beugess Hybrid A	4.75	Rn	7	NL	S
Burgess Hybrid #1	4.25	Rn	7	NL	S
Burpeeana Early Hybrid	5.00	Ex	7	NL	S
Burpee's Big Early	4.37	Ex	8	NL	S
Bush Beefsteak	4.75	Ex	7	NL	S
Cavalier	4.87	Ex	7	NL	S
Cluster-mato	4.62	Ex	7	N	S
Cuyano	6.25	Rn	7	N	M
Doublerich	6.62	Rn	7	NL	S
Earliana #498	6.50	Ex	10	NL	M
Earliana (Early Strain)	7.62	Ex	7	N	M
Earliana (McFayden Special)	6.50	Ex	8	N	M
Earliana (Mrs. Young's)	6.25	Ex	7	NL	M
Early Chatham	4.25	Ex	5	N	S
Early Harkness	4.62	Ex	7	NL	M
Early Jersey	4.75	Rn	7	NL	S
Early Red Chief	5.62	Ex	7	NL	S
Early Stokesdale #4	4.62	Rn	8	N	M
Early Wonder	5.00	Ex	7	NL	S
Farthest North	3.37	Rn	5	NL	S
Fireball	5.62	Rn	7	NL	S

TABLE XII (CONTINUED)

CHARACTERISTICS OF TOMATO FLOWERS AND FLOWER TRUSS IN 1958

Variety	No. Flowers On First Cluster	Pistil* Length	Place Of Insertion	Inflorescence	Flower Truss
Firesteel	5.12	En	8	NL	S
Harrow	5.50	En	7	NL	S
Mammoth Wonder	4.50	Ex	8	M	S
Manithoba	4.87	Ex	5	NL	S
Marman	4.50	En	7	M	M
Meteor	5.00	En	6	NL	M
Monarch	3.87	En	7	NL	S
Moreton Hybrid	5.87	En	7	NL	S
N. D. A. C. 38	4.25	En	7	NL	S
Red Cloud	5.50	En	8	NL	S
Red River	6.62	Ex	7	NL	M
Rhode Island Early	4.37	En	6	NL	S
Rutgers	5.62	Ex	10	M	S
Selandi	6.12	En	7	NL	M
Sioux	5.37	Ex	7	NL	S
Stokesalaska	4.50	En	7	NL	S
Stokescross #1	5.37	En	7	NL	S
Stokes Early Hybrid	4.37	Ex	8	NL	S
Tenn. 29U	5.25	Ex	8	NL	S
Valiant	6.12	En	7	NL	M
Valiant #889	4.25	En	7	NL	S
Valnorth	4.75	En	7	NL	S
Vancross	4.75	Ex	7	NL	S
Victor	3.75	Ex	6	NL	S

*Column 2 (Pistil Length) Ex - Pistil extended beyond anthers and En - pistels enclosed.

Column 3 (Place of Insertion) - The node at which the first cluster appears.

Column 4 (Inflorescence) NL - inflorescence not leafy. M - Some leafy and some not.

Column 5 (Flower truss) S - Simple flower trees. M - Some simple and some compound.

TABLE XLII

TOMATO PLANT CHARACTERISTICS IN 1958

Variety	Diam. Of Stem: Ht. Of Plant: Spread Of Plant:	In Cm. : In Inches :	In Inches :	Type :	Form:	Foliage Density
Alpha 5	1.24	11.8	39.2	D	S	O
Alpha 7	1.25	16.4	41.4	D	SE	D
Bison	1.26	13.8	30.8	D	SE	M
Bounty	1.36	14.0	35.4	D	SE	O
Burgess Hybrid A	1.24	21.2	34.8	I	SE	O
Burgess Hybrid #1	1.40	11.8	37.4	I	S	O
Burpeeana Early Hybrid	1.32	25.0	40.2	I	SE	M
Burpee's Big Early	1.34	26.4	43.0	I	SE	D
Bush Beefsteak	1.28	12.2	33.2	D	SE	O
Cavalier	1.36	14.0	36.0	D	SE	O
Cluster-mato	1.36	28.0	42.2	I	E	D
Cuyano	1.48	17.0	38.4	I	SE	M
Double-lich	1.34	22.4	32.4	I	SE	M
Earliana #498	1.26	16.6	39.2	I	SE	M
Earliana (Early Strain)	1.26	17.8	44.6	I	SE	M
Earliana (McFayden Special)	1.26	19.8	37.0	I	SE	M
Earliana (Mrs. Young's)	1.32	20.8	33.4	I	SE	M
Early Chatham	1.18	13.0	24.0	I	SE	O
Early Harkness	1.32	23.8	38.8	D	SE	O
Early Jersey	1.40	20.6	38.6	I	S	M
Early Red Chief	1.28	27.8	32.8	I	SE	M
Early Stokesdale #4	1.32	27.0	54.8	I	SE	M
Early Wonder	1.32	14.8	35.2	I	SE	M
Farthest North	1.25	14.6	31.2	D	S	O
Fireball	1.16	14.0	32.4	D	SE	O
Firesteel	1.30	17.6	32.8	D	SE	M

TABLE XLII (CONTINUED)

TOMATO PLANT CHARACTERISTICS IN 1958

Variety	Diam. Of Stem: In Cm.	Ht. Of Plant: In Inches	Spread Of Plant: In Inches	Type*	Form	Foliage Density
Harrow	1.30	19.8	31.8	I	SE	M
Mammoth Wonder	1.42	25.2	31.8	I	SE	M
Manitoba	1.30	12.6	27.8	D	SE	M
Marman	1.36	18.0	35.8	I	S	O
Meteor	1.40	14.8	27.0	D	SE	O
Monarch	1.26	10.6	30.3	D	SE	O
Moreton Hybrid	1.34	22.4	42.6	I	SE	M
N. B. A. 38	1.32	16.6	38.4	D	SE	O
Red Cloud	1.38	18.0	40.6	D	SE	M
Red River	1.38	17.8	42.6	I	S	O
Rhode Island Early	1.30	22.2	54.6	I	S	O
Rutgers	1.50	27.2	38.2	I	SE	D
Selondi	1.14	26.2	41.0	I	SE	D
Sioux	1.44	20.4	40.0	I	SE	M
Stokesalaska	1.22	15.6	33.8	I	SE	D
Stokesatham	1.30	23.2	42.8	D	SE	D
Stokescross #1	1.38	25.4	36.8	I	SE	M
Stokes Early Hybrid	1.28	17.0	41.8	I	SE	M
Tenn. 29U	1.38	17.8	41.4	I	SE	O
Valiant	1.36	22.4	27.2	I	SE	M
Valiant #889	1.52	23.4	45.0	I	SE	M
Valnorth	1.30	20.4	52.0	I	S	O
Vancross	1.22	22.6	36.0	I	SE	M
Victor	1.20	15.0	36.0	D	SE	O

*Column 4 (Type) D-determinate, I-indeterminate. Column 5 (Form) S-sprawling, SE-semi-erect, E-erect. Column 6 (Foliage Density) O-open, D-dense, M-medium. All of these measurements were made at the time of the first picking.

TABLE XLIII

FRUIT DATA ON TOMATOES IN 1958

Variety	:No. Of Fruit:									
	Polari:	Equatorial:	Form :	Days Earlier:	Circular:	Radial :	No. Of :	On Fruit	No. Of :	
	Diam.:	Diam.	Index:	Than Rutgers :	Cracking:	Cracking:	Cluster	Locules:		
Alpha 5	5.06	6.16	.821	17	7	.75	13	18		
Alpha 7	5.74	7.04	.815	11	2	.50	4	11		
Bison	5.10	6.64	.768	17	17	2.75	36	1		
Bounty	5.04	6.46	.780	17	2	2.00	10	11		
Burgess Hybrid A	5.94	6.92	.858	7	14	4.13	2	11		
Burgess Hybrid #1	5.30	5.98	.886	17	7	4.25	10	18		
Burpeeana Early Hybrid	5.22	5.96	.876	11	10	2.25	4	18		
Burpee's Big Early	5.96	7.26	.821	17	7	5.25	14	5		
Bush Beefsteak	6.22	7.58	.821	17	16	3.25	4	8		
Cavalier	5.94	7.48	.794	11	17	5.00	17	18		
Cluster-mato	6.16	7.32	.842	17	12	4.13	4	5		
Cayano	5.08	6.82	.745	7	16	2.00	10	2		
Doublerich	4.90	5.22	.939	11	7	4.25	13	23		
Earliana #198	5.04	6.12	.824	17	17	2.25	13	6		
Earliana (Early Strain)	5.20	7.36	.707	11	16	5.18	1	2		
Earliana (McFayden Special)	5.22	6.60	.791	11	16	1.86	1	2		
Earliana (Mrs. Young's)	5.64	7.28	.772	11	17	4.75	25	1		
Early Chatham	4.36	5.22	.835	17	3	2.50	23	11		
Early Harkness	4.42	5.44	.813	11	12	3.75	4	36		
Early Jersey	5.86	7.34	.798	3	7	3.25	5	9		
Early Red Chief	5.58	6.50	.858	7	6	4.25	4	11		
Early Stokesdale #4	5.48	6.46	.848	17	12	2.75	5	23		
Early Wonder	5.62	6.74	.834	7	3	2.38	4	11		
Farthest North	4.82	5.44	.886	17	3	4.38	27	20		
Fireball	5.22	5.60	.932	17	3	4.25	17	11		
Firesteel	6.10	7.72	.790	11	12	5.25	1	2		

TABLE XLIII (CONTINUED)

FRUIT DATA ON TOMATOES IN 1958

Variety	Polar: Equatorial		Form	Days Earlier	Circular: Radial	: No. Of Fruit:	
	Diam.:	Diam.:				: On Fruit	: Locules
						Cluster	
Harrow	4.98	5.56	.896	7	3	4	23
Nammoth Wonder	6.50	8.12	.900	7	12	13	8
Manitoba	4.88	6.02	.810	17	2	25	11
Marman	4.64	6.34	.732	3	17	4	5
Meteor	5.26	5.67	.928	11	1	23	28
Monarch	5.40	6.56	.823	17	6	4	3
Moreton Hybrid	5.78	7.12	.812	11	12	1	5
M. D. A. C. 38	5.48	6.72	.815	7	7	17	3
Red Cloud	5.26	6.44	.817	7	2	13	9
Red River	5.62	7.18	.783	11	17	4	3
Rhode Island Early	5.12	6.14	.834	17	2	23	3
Rutges	6.24	7.64	.817	0	3	2	16
Selandi	4.88	5.22	.935	7	14	1	48
Sioux	5.96	7.12	.837	7	6	13	16
Stokesalaska	3.40	4.12	.825	17	2	4	43
Stokesatham	5.60	7.12	.787	7	15	5	16
Stokescross #1	5.76	7.06	.816	7	17	2	20
Stokes Early Hybrid	5.16	6.02	.857	17	17	14	23
Tenn. 29U	5.58	7.10	.786	17	12	23	2
Valiant	6.26	7.52	.832	11	17	23	9
Valiant #889	5.42	6.62	.819	7	12	1	16
Valvorth	6.02	6.98	.862	17	12	36	6
Vancross	6.14	7.30	.841	7	12	4	5
Victor	5.72	6.72	.851	7	7	5	18

(Footnotes on next page)

TABLE XLIII (CONTINUED)

FRUIT DATA ON TOMATOES IN 1958

Variety	No. Of Fruit:			
	Polar: Equatorial: Form	Days Earlier: Circular: Radial	On Fruit	No. Of
	Diam.: Diam.	Index: Then Rutgers	Cracking: Cluster	Locules
*Column 1	- Polar Diameter in Cm.			
Column 2	- Equatorial Diameter in Cm.			
Column 3	- Form Index. 1.00 is essentially spherical, .500 is extremely oblate.			
Column 4	- Number of days ripening before Rutgers.			
Column 5	- Rank in Circular Cracking - 1 being the no. of cracks.			
Column 6	- Radial Cracks in Cm. Difference not significant in 1958. All varieties would rate 1 on scale.			
Column 7	- Rank in number of fruit on first cluster.			
Column 8	- Rank in number of locules per fruit. Varieties with rank of one have the greatest number of locules.			

TABLE XLIV

FRUIT DATA ON TOMATOES IN 1959

Variety	*Polar:Equatorial:Form :Days Earlier:Radial :No. of									
	Diam.:	Diam.:	Index:	Than	Rutgus	Cracking:	Cracking:	Cluster	:On Fruit	:No. of
										:Locules
Bison	5.12	7.38	.694	12	10	16		3.63		1
Burpeeana Early Hybrid	5.63	6.38	.882	12	5	7		3.63		12
Burpees Big Early	6.50	8.75	.743	7	7	16		3.88		5
Bush Beefsteak	6.30	8.05	.783	7	7	7		3.13		5
Earliana (McPayden Special)	5.53	7.58	.730	12	10	7		4.25		1
Early Red Chief	6.38	7.68	.831	7	9	7		3.63		3
Early Stokesdale #4	6.10	7.53	.810	7	9	8		2.88		6
Fireball	5.73	7.15	.801	7	3	2		4.00		5
Firesteel	5.95	7.83	.760	12	3	12		1.75		3
Moreton Hybrid	6.43	7.83	.821	7	7	10		3.38		3
New Hampshire Surecrop	5.40	7.15	.755	12	3	10		5.00		10
Rhode Island Early	6.05	6.70	.903	12	1	12		3.88		12
Rutgers	6.10	8.00	.763	0	3	10		3.38		6
Stokesalaska	3.45	4.58	.753	12	2	1		4.88		10
Stokeschatham	5.93	7.60	.780	7	2	7		2.50		6
Stokes Early Hybrid	6.00	7.00	.857	12	7	12		3.75		10
Valiant	6.75	7.68	.879	7	7	12		2.88		7

*Column 1 - Yield polar diameter in centimeters.

Column 2 - Yield equatorial diameter in centimeters.

Column 3 - Form index. 1.00 is essentially spherical. .500 is extreme oblate.

Column 4 - Shows the number of days each variety is earlier than Rutgers.

Column 5 - Gives the rank in circular cracks. No. 1 having the highest number of cracks.

Column 6 - Gives the rank in radial cracks. No. 1 having the highest number of cracks.

Column 7 - Shows the no. of fruit on first cluster. Time difference were not significant

in 1959 all varieties would rank 1.

Column 8 - Gives the rank in locules number per fruit. Varieties with the rank of 1 have the highest no. of locules.

TABLE XLV

SUMMARY OF TOMATO YIELD AND FRUIT DATA FOR 1958*

Variety	Total Rank	Variety	Total Rank
Alpha 5	70	Firesteel	58
Alpha 7	69	Harrow	70
Bison	172	Mammoth Wonder	76
Bounty	47	Manitoba	69
Burgess Hybrid A	35	Marman	137
Burgess Hybrid #1	101	Meteor	77
Burpeeana Early Hybrid	60	Monarch	86
Burpee's Big Early	39	Moreton Hybrid	36
Bush Beefsteak	38	N. D. A. C. 38	85
Cavalier	54	Red Cloud	62
Cluster-mato	39	Red River	72
Cuyano	101	Rhode Island Early	80
Doublerich	97	Rutges	56
Earliana #498	84	Selandi	211
Earliana (Early Strain)	138	Sioux	85
Earliana (McFayden Special)	113	Stokesalaska	137
Earliana (Mrs. Young's)	141	Stokeschatham	86
Early Chatham	138	Stokescross #1	82
Early Harkness	115	Stokes Early Hybrid	129
Early Jersey	75	Tenn. 298	133
Early Red Chief	29	Valiant	122
Early Stokesdale #4	73	Valiant #889	100
Early Wonder	49	Volnorth	169
Farthest North	130	Vancross	83
Fireball	101	Victor	83

*Varieties with the lowest number have the most desirable characteristics. In this rank the fruit with 5 locules was considered best, and given a rank of one. Others were ranked accordingly.

TABLE XLVI

SUMMARY OF TOMATO YIELD AND FRUIT DATA FOR 1959

Variety	Total* Rank
Bison	43
Burpeeana Early Hybrid	39
Burpee's Big Early	34
Bush Beefsteak	25
Earliana (McFayden Special)	52
Early Red Chief	25
Early Stokesdale #14	34
Fireball	25
Firesteel	35
Moreton Hybrid	25
New Hampshire Surecrop	41
Rhode Island Early	43
Rutgers	28
Stokesalaska	34
Stokeschatham	26
Stokes Early Hybrid	43
Valiant	38

*Varieties with lowest number have the most desirable characteristics. In this rank the fruit with 5 locules were considered best and given a rank of one. Others were ranked accordingly.

TABLE XLVII

FINAL RANK FOR TOMATO VARIETIES TESTED IN BOTH YEARS

Variety	Rank*
Bison	12
Burpeeana Early Hybrid	8
Burpee's Big Early	4
Bush Beefsteak	3
Earliana (McFayden Special)	11
Early Red Chief	1
Early Stokesdale #4	6
Fireball	7
Firesteel	5
Moreton Hybrid	2
Rhode Island Early	9
Rutgers	4
Stokesalaska	10
Stokeschatham	6
Stokes Early Hybrid	11
Valiant	9

*The lowest numbers in this rank represent the most desirable characteristics.

APPENDIX C

LIST OF VARIETIES

The following list shows the varieties tested, where the seeds were obtained, and gives information on parentage when possible.

Alpha 5 - (F₁) Alpha Seeds, Lompoc, California.

Alpha 7 - (F₂) Alpha Seeds, Lompoc, California.

Bison - Burgess Seed and Plant Co., Galesburg, Michigan. Parentage (Coopers Special X Red River).

Bounty - Stokes Seeds Limited, St. Catharines, Ontario, Canada. Parentage (Allred X Break o' Day).

Burgess Hybrid A - Burgess Seed and Plant Co., Galesburg, Michigan.

Burgess Hybrid #1 - Burgess Seed and Plant Co., Galesburg, Michigan.

Burpeeana Early Hybrid - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

Burpee's Big Early - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

Bush Beefsteak - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

Cavalier - Stokes Seeds Limited, St. Catharines, Ontario, Canada. Parentage (Bounty X Valiant).

Cluster-mato - Glecklers Seedsmen, Metamora, Ohio.

Cuyano - Glecklers Seedsmen, Metamora, Ohio.

Doublerich - Ascar H. Will and Co., Bismarck, North Dakota. (Parentage Lycopersicon peruvianum X Michigan State Forcing) followed by several back crosses to early commercial varieties.

LIST OF VARIETIES (continued)

- Earliana #498 - D. V. Burrell Seed Growers Co., Rocky Ford, Colorado.
- Earliana (Early Strain) - Burgess Seed and Plant Co., Galesburg, Michigan.
- Earliana (McFayden Special) - McFayden Seed Co., Winnipeg, Canada.
- Earliana (Mrs. Young's) - McFayden Seed Co., Winnipeg, Canada.
- Early Chatham - Stokes Seeds Limited, St. Catharines, Ontario, Canada.
- Early Harkness - Stokes Seeds Limited, St. Catharines, Ontario, Canada.
- Early Jersey - D. V. Burrell Seed Growers Co., Rocky Ford, Colorado.
- Early Red Chief - Stokes Seeds Limited, St. Catharines, Ontario, Canada.
- Early Stokesdale #4 - Stokes Seeds Limited, St. Catharines, Ontario, Canada.
- Early Wonder - Burgess Seed and Plant Co., Galesburg, Michigan.
- Farthest North - McFayden Seed Co., Winnipeg, Canada. Parentage (Bison X Red Currant).
- Fireball - Joseph Harris Co., Rochester, New York. Parentage (Round Plum Line X Valiant).
- Firesteel - Burgess Seed and Plant Co., Galesburg, Michigan.
- Harrow - Stokes Seeds Limited, St. Catharines, Ontario, Canada.
- Mammoth Wonder - Burgess Seed and Plant Co., Galesburg, Michigan.
- Manitoba - Stokes Seeds Limited, St. Catharines, Ontario, Canada.
- Parentage (Marglobe X Bounty) X Redskin.
- Marman - Glecklers Seedsmen, Metamora, Ohio.

LIST OF VARIETIES (continued)

Meteor - Stokes Seeds Limited, St. Catharines, Ontario, Canada. Parentage (Bonton X Earlinorth).

Monarch - Oscar H. Will and Co., Bismarck, North Dakota. Parentage (Bounty X Early Chatham).

Moreton Hybrid - Joseph Harris Co., Rochester, New York.

N.D.A.C. 38 - McFayden Seed Co., Winnipeg, Canada.

New Hampshire Surecrop - Dr. A. F. Yeager, University of New Hampshire.

Red Cloud - D. V. Burrell Seed Growers Co., Rocky Ford, Colorado.

Red River - Oscar H. Will and Co., Bismarck, North Dakota. Parentage (Earliana X Sunrise).

Rhode Island Early - Stokes Seeds Limited, St. Catharines, Ontario, Canada. Parentage (Earliana X Victor) X Denmark.

Rutgers - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

Selandi - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

Sioux - Glecklers Seedsmen, Metamora, Ohio.

Stokesalaska - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

Stokeschatham - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

Stokescross #1 - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

Stokes Early Hybrid - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

Tennessee 29U - Dr. W. E. Roeber, University of Tenn., Agriculture Experiment Station.

Valiant - Stokes Seeds Limited, St. Catharines, Ontario, Canada.

LIST OF VARIETIES (continued)

Valiant #889 - Joseph Harris Co., Rochester, New York. Parentage
(Selection from Stokesdale).

Valnorth - Stokes Seeds Limited, St. Catharines, Ontario, Canada.
Parentage (Valiant X Farthest North).

Victor - Oscar H. Will and Co., Bismarck, North Dakota.