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Tomato Yield and Grade As Affected by Variety, Irrigation and Fertilizer

by

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Significance of Results for Idaho

FOR early tomatoes for home gardens, the variety Early Chatham is highly recommended. Too small for commercial use, the Chatham should be restricted to home garden production. It is the earliest medium-sized tomato yet tested. Danmark and Red Cloud, other varieties in this group, may prove to be very useful for the high-altitude and short-season areas.

RESULTS of the tomato trials warrant the recommendation of the variety Sioux for canning and for general use in Idaho's warmer areas. Sioux should be ideal for the Boise valley, Lewiston, and the Snake river valley east from Boise to Rupert. It may also produce well as far east and north as Idaho Falls. Sioux is an early-mid-season variety producing several days earlier on the average than John Baer or Bonny Best.

IN THE Lewiston trials, Sioux has been outstanding in performance. In most all instances it has produced the highest percentage of U. S. No. 1 fruits and, in some instances, has produced the highest total early yield. Another Sioux characteristic that makes it valuable is its apparent resistance to blossom-end rot. In the 4 years Sioux has been under trial this disease has not been observed in the fruits. This is in comparison with other varieties such as Early Stone or Early Baltimore which, in some years, have produced 30 to 50 percent affected fruits. Sioux has given a high quality canned pack, especially when allowed to become completely ripe before harvesting.

EARLY STONE, Early Baltimore, and other varieties of this type have not given good results in the Lewiston trials and are not recommended for any Idaho area. These varieties are too late in maturing and are subject to severe cracking and blossom-end rot.

SEVERAL of the selections of the variety Moscow, which originated in Utah, have been included in the Lewiston trials. While some of these have shown possibilities for canning production, they cannot as yet be recommended for general Idaho use.

IRRIGATION experiments on tomatoes indicate that they produce best with abundant water after the fruits have started to ripen. A marked reduction in total yield resulted when water was withheld from the plants in the Lewiston district after August 15. A word of caution should be given here. In high altitude areas, or in any area where the average growing season temperatures are low, the application of irrigation water too often during the ripening season may seriously delay ripening of the fruits. This is apparently not true in areas where the average temperatures are relatively high.

THE one year's trials in fertilizing tomatoes yielded no response. This does not mean that fertilizers would not be advantageous in many tomato producing areas of Idaho. Preliminary experiments indicate that the use of starter solutions at transplanting time

may bring marked advantage. A solution made by mixing 4 pounds of a 10-20-0 fertilizer, or its equivalent, in 50 gallons of water is suitable. This should be used at the rate of one-half to one pint per plant around the roots at the time of transplanting.

IT SHOULD be emphasized that none of the varieties under test are resistant to curlytop. Where this disease is a serious factor, it is doubtful whether tomatoes can be grown consistently as a commercial crop.

An excellent fruit set on a Sioux tomato vine.

Sioux is proving itself one of the best all-purpose tomatoes for Idaho conditions.

Yield and Grade of Tomatoes as Affected by Variety, Irrigation, and Fertilizer*

JAMES E. KRAUS[1]

For several years, there have been from 60 to 100 acres of tomatoes grown for canning in the Lewiston area. Because of a long growing-season that annually runs to nearly 199 frost-free days, the locality produces excellent yields. In some instances, however, it has been difficult to produce a fancy whole pack from tomatoes grown in the area. Varieties being grown were late maturing and a high percentage of the fruits ripen in September and October when there is considerable rainfall. As a result, growers and processors have encountered difficulties in fruit rots and fruit cracking which have lowered the quantity and quality of the product for processing. Blossom-end rot has been another difficulty. Under the conditions of relatively high temperatures and low humidities encountered in late August and early September, varieties such as Early Stone and John Baer have often produced high percentages of fruits exhibiting varying degrees of damage due to this condition.

To help solve some of these problems, experiments were conducted in the Lewiston Orchards district from 1945 to 1948 inclusive.

The field investigations have included variety trials, irrigation experiments, and fertilizer experiments as they affect yield and grade. Representative samples of fruits of all varieties and treatments have been canned and graded to determine processed quality. The yields, along with other pertinent field data, are presented in this paper.[2]

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[2] The results of the canning and quality tests from these experiments will be published in a separate paper by A. M. Neubert and George H. Carter, U. S. Fruit and Vegetable Products Laboratory, Pullman, Washington. Grateful acknowledgement is hereby given to Neubert and Carter for valuable assistance during the course of these studies.

Materials and Methods

Each year the plants were grown in the university's greenhouse at Moscow. The plants were spotted 60 to the standard flat and transplanted only once from seedling flats before being put into the field. In all trials the plants were transplanted into the field with but little soil attached to the roots to simulate commercial cannery transplanting methods. All plots were irrigated at transplanting time or immediately after. The plant spacings varied from 3 x 3½ feet in 1945 to 4 x 4 feet in 1948. Because of the large vine growth in the Lewiston area, the spacings were increased after the first year's trial. In all experiments each variety or treatment was grown on three plots chosen at random. Each contained 10 to 20 plants, depending upon the individual year or experiment.

Except where special irrigation or fertilizer treatments were used, all plots were grown as for regular commercial culture. Special irrigation procedure will be mentioned under results of the respective experiments.

Harvesting started as soon as enough fruits had ripened on one or more varieties to constitute a commercial picking. Because canning-tomatoes in the area have been purchased field-run or ungraded except for elimination of rotted fruits, no grading was done in 1945 except to remove such fruits. However, to obtain more information on variety, adaptability and fruit quality, all fruits were graded according to U. S. cannery grades in 1946, 1947, and 1948. All yield data have been analyzed by the analysis of variance method.

After the tomatoes were harvested and weighed, the U. S. No. 1 fruits from all plots of each variety or treatment were combined and used for canning tests. The tomatoes were immediately transported from the Lewiston plot to the U. S. Fruit and Vegetable Products Laboratory, Pullman, Washington, where they were canned the following day.

Experimental Results

1945 Variety Yield Trials—

Because of the close plant spacings in 1945 it was difficult to harvest the fruits from adjacent plots accurately. In addition to this difficulty there was insufficient irrigation water to keep the plants adequately irrigated. For these reasons the yields from the 1945 trials are considered only as indicative of the comparative adaptability of the varieties.

Included in the trials were 18 varieties of which 15 can be considered as standard for commercial canning or fresh market. The other three varieties, Danmark, Early Chatham, and Red Cloud, produce fruits which are too small for commercial can-

ning. They were included in the trials to determine their relative earliness and suitability for home and market gardens in the area. The data are shown in Table 1.

The yields are expressed in tons per acre and have been arbitrarily divided into early and total marketable classes. Those harvested up to September 7 were considered early. The variety Danmark produced a significantly higher early yield than any other variety. Early Chatham, Bounty, and the strain of John Baer used also produced high early yields. As shown in Column 5, Table 1, both Danmark and Early Chatham produced small fruits most of which would be too small for canning.

Of the larger fruited types acceptable for canning, the varieties John Baer, Wasatch Beauty, and Sioux produced the highest total yields. The strain of John Baer used was exceptional in its performance. It is well known that many seedsmen classify John Baer and Bonny Best as identical varieties and often sell them as strains of the same variety. As indicated in these trials, however, there are strains of these that vary markedly, and the performance of either will depend to a considerable extent upon the seed source.

Other Varieties—

Sioux is a relatively new variety. It originated at the University of Nebraska as a selection from a cross between All Red and Stokesdale. It differs from other varieties in that it has the whitish-green color of immature fruits referred to by geneticists as the "uniform color gene". This character makes the fruits appear almost white in the immature stage as contrasted to the dark green shoulder color common to most other varieties of tomatoes. Because of this character the fruits appear to be completely ripe often before they are actually ripe enough for canning. For canning tomatoes the fruits of Sioux should be left on the plant until they are completely red so they will be fully colored throughout.

The variety Wasatch Beauty has been grown in the trials for 4 years. It has given good yields in all of the trials. In these trials it appeared to be quite similar to the variety Moscow. As will be shown, however, there appear to be several strains of Moscow, but Wasatch Beauty is considered by some people to be identical to one or more of these strains. In these trials the fruit type of both varieties appear to be quite similar, and it could well be that they are the same variety. In the Lewiston trials Wasatch Beauty, while giving good yields, has had a tendency to produce fruits which become soft rather quickly and which appear to be lower in vitamin C than other varieties.

As shown in Table 1, the fruit size of many of the standard canning varieties was rather small. The reason for this is not known. The size was determined by taking the weight of a random sample of the marketable fruits. It may be that the

Table 1.—Yields of 18 varieties of tomatoes grown at Lewiston, Idaho, 1945.

Variety	Early yield* U. S. No. 1 & 2 tons per acre	Total yield U. S. No. 1 & 2 tons per acre	Average fruit size ounces
Danmark	18.09	24.27	2.6
John Baer	13.24	24.27	4.5
Wasatch Beauty	8.76	19.99	6.6
Sioux	9.72	19.52	3.6
Stokesdale	9.36	17.97	4.6
M 12 HTH (Stokes)	9.27	17.78	3.7
Bonny Best	6.76	17.42	4.2
Valiant	7.47	16.43	6.0
Red Cloud	9.17	15.96	4.9
Bounty	10.12	15.79	5.7
Early Chatham	12.86	13.49	2.5
Firesteel	5.28	13.48	7.0
Rutgers	4.03	13.37	4.5
Early Baltimore	3.23	12.61	6.5
M 15 (Stokes)	2.07	11.56	4.4
Master Marglobe	2.88	11.51	3.9
M 12 (Stokes)	5.36	11.48	5.2
Early Stone	3.51	9.82	7.6
Least Diff. for Sig. (19:1 odds)	3.92	6.57	——

* Includes fruits harvested to September 7.

close spacing and lack of sufficient irrigation water resulted in small size. It may also be that had the size been determined on the U. S. No. 1 fruits, as is commonly done, the average fruit size and would have been larger. The size as shown for similar varieties in later year's trials give a better picture of what would normally be expected.

The varieties Early Baltimore and Early Stone are important canning varieties in other areas, and each has been grown rather extensively in the Lewiston area. Each is a large-fruited variety and produces excellent fruits for canning. However, as shown in Table 1, neither of these varieties produced as high early or total yields as Sioux, John Baer or Wasatch Beauty. It should be emphasized that these data support observations which have been made in the area indicating the unsuitability of Early Stone and Early Baltimore, two of the commonly grown varieties. Both of these varieties start ripening comparatively late. They produce high yields if the season is long enough to allow for a high percentage of the fruits to ripen, but if the fall rains start early, a high percentage of the fruits are not usable because of severe cracking and rotting.

Blossom-end Rot—

One of the most serious difficulties with tomatoes in the Lewiston area is the occurrence of blossom-end rot in many fruits. This condition, as far as is known, is highly correlated with the soil moisture supply, temperature, and relative humidity of the air. In many years, up to 50 percent of the fruits may be affected on some varieties even though good cultural practices are used. Varieties differ markedly in their susceptibility to this disease.

Early Stone is one of the most susceptible varieties. It seems almost impossible to prevent its occurrence on a large percentage of these fruits. Early Baltimore and John Baer have been seriously effected in some years. For this reason alone Early Stone and Early Baltimore are not recommended for culture at Lewiston. The variety Sioux appears to be almost completely resistant to the disease. In fact, no affected fruits have been observed, even under conditions causing a high incidence of the disease with Early Stone and Early Baltimore.

1946 Variety and Irrigation Trials—

In 1946, 15 varieties of cannery tomatoes were grown in the trials in which irrigation water was applied weekly throughout the season. Five of these varieties were also grown in plots to which no water was applied after August 15. It has been the opinion of many growers and others that irrigation after harvesting begins tends to delay ripening, reduces yields, and lowers the quality (drained weight) of the canned product. All varieties on both irrigated and non-irrigated plots were canned periodically to determine the quality in addition to the yield.

The amount of curly-top virus of tomatoes varies from year to year in the Lewiston area. In 1945 the damage was negligible but was severe enough in 1946 to make it advisable to record the number of plants affected. Column 2, Table 2, shows the percentage of plant loss due to curly-top. The percent stand shown in Coulmn 1 indicates the percentage of healthy plants for each variety. The difference between the sum of columns 1 and 2 and 100 percent stand is the result of loss of plants due to other causes than curly-top. The yields in all instances are calculated from the plot yields without any correction for plant stand or disease.

Yield differences.—Although there are marked differences in yields between the five varieties grown on limited irrigation, the differences approach significance in only two instances. According to the data in the first part of Table 2, Wasatch Beauty appeared to be the best variety on the plots receiving limited irrigation. The significance of these data is doubtful because of the exceptional yield which occurred on one of the four plots of Wasatch Beauty. It is difficult to explain otherwise why this variety appeared exceptional in this part of the experiment and mediocre in the irrigated plots.

Statistically the data from the plots given limited irrigation cannot be legitimately compared directly with those given normal irrigation because they were not randomized in a single experiment. Difficulties encountered in plot design and in land area involved made it almost prohibitive to set these up in a single randomized experiment. For this reason the two irrigation experiments were planted end to end but each in a separate ran-

Table 2.—Effect of irrigation treatment and variety on yield per acre, and fruit size of tomatoes grown for canning. Lewiston, Idaho, 1946.

Variety	Stand	Percent curly-top	Early yield*				Total yield				
			U. S. No. 1 tons	U. S. No. 2 tons	U. S. No. 1 & 2 tons	percent U. S. No. 1	U. S. No. 1 tons	U. S. No. 2 tons	U. S. No. 1 & 2 tons	Percent U. S. No. 1	Average fruit size ounces
	Irrigated weekly until Aug. 15						No irrigation after Aug. 15				
Wasatch Beauty	91.3	5.5	6.84	5.17	12.01	57.0	9.98	9.58	19.56	51.0	5.9
Stokesdale	85.0	13.2	3.86	5.29	9.14	42.1	7.41	10.40	17.81	41.6	6.2
Sioux	86.3	7.2	4.62	5.86	10.47	44.1	7.26	10.79	18.05	40.2	6.4
Valiant	78.8	7.9	2.67	5.41	8.25	32.4	5.34	10.51	15.85	33.7	5.8
John Baer	87.5	7.1	2.58	3.61	6.19	41.7	5.41	9.09	14.51	37.3	5.7
Least Diff. for Sig. (19:1 odds)	——	——	2.49	Not Sig.	3.47	——	Not sig.	Not sig.	Not sig.	——	——
			Irrigated weekly throughout the season								
Sioux	88.9	11.1	5.36	4.31	9.94	56.6	14.69	14.13	28.82	51.0	6.7
John Baer	95.5	4.4	2.94	4.38	7.28	40.4	11.08	14.11	25.19	44.0	6.5
Canner's Jewel	93.3	6.7	2.39	4.41	6.80	35.1	9.09	15.50	24.59	37.0	5.9
Early Baltimore	82.2	15.9	4.57	4.84	9.42	48.5	10.56	14.08	24.64	42.9	6.4
Valiant	77.8	10.3	3.01	5.60	8.61	35.0	8.31	15.44	23.76	35.0	6.5
Hybrid 1121	84.4	11.6	4.86	6.02	10.88	44.7	9.34	13.58	22.29	41.9	4.5
Stokesdale	84.5	13.6	3.48	4.20	7.69	45.3	10.84	11.82	22.66	47.8	6.2
Pritchard	80.0	20.5	2.54	2.41	4.95	51.3	11.65	9.57	21.23	54.9	5.7
Garden State	80.0	20.0	3.03	1.91	4.94	61.3	11.64	9.40	21.04	55.3	7.2
Hybrid 1132	86.7	13.3	2.14	1.96	4.10	52.2	10.75	10.19	20.94	51.3	7.2
Firesteel	91.1	8.9	3.47	4.42	7.89	44.0	8.41	12.43	20.83	40.4	6.9
Pearson	75.6	24.4	0.88	0.49	1.37	64.2	8.80	10.65	19.46	45.2	8.5
Wasatch Beauty	88.9	4.8	3.27	2.82	6.09	53.7	9.41	9.31	18.72	50.3	4.9
Rutgers	86.7	11.4	0.94	0.89	1.83	51.4	9.42	8.36	17.78	53.0	7.0
Early Stone	80.0	16.3	1.89	2.34	4.23	44.7	7.50	10.03	17.53	42.8	8.2
Least Diff. for Sig. (19:1 odds)	——	——	1.12	1.15	1.85	——	3.29	2.47	4.56	——	1.8

* Includes fruits harvested to September 1.

domized block design. It is believed, however, that general comparisons can be made of the yield and that the differences are indicative of what might be expected because soil samples indicated a rather homogeneous soil type over the entire area.

Effect of water on yield.—Several general comparisons between the varieties on the two irrigation blocks are of interest. Early yield—to September 1—did not appear to be affected

Table 3.—Yield and grade of 11 tomato varieties grown for canning at Lewiston, Idaho. 1947.

Variety	Per-cent Stand	Per-cent Curly-top	Early yield* U. S. No. 1 tons per acre	Early yield* U. S. No. 2 tons per acre	Early yield* U. S. No. 1 & 2 tons per acre	Early yield* per-cent U. S. No. 1	Total yield U. S. No. 1 tons per acre	Total yield U. S. No. 2 tons per acre	Total yield U.S. No. 1 & 2 tons per acre	Total yield Per-cent U. S. No. 1
Sioux	100	33.3	7.11	1.22	8.33	85.4	13.25	4.52	17.77	74.6
Wasatch Beauty	100	33.3	4.96	4.05	9.01	55.0	9.21	7.18	16.40	56.2
John Baer	100	33.3	4.49	2.30	6.78	66.2	9.60	5.51	15.11	63.5
Moscow No. 4	100	40.0	3.36	2.15	5.52	60.9	9.54	5.55	15.10	63.2
Early Baltimore	95	40.0	3.16	1.49	4.65	68.0	8.02	5.68	13.70	58.5
Moscow No. 6	100	33.3	3.13	1.71	4.84	64.7	7.80	5.18	12.99	60.0
Improved Pearson	100	19.0	1.14	0.99	2.12	53.8	7.45	5.31	12.76	58.5
Early Stone	100	14.2	2.86	1.99	4.04	70.8	8.17	4.23	12.41	65.8
Calif. Pearson	100	33.3	2.78	0.97	3.75	74.1	8.79	3.36	12.15	72.3
Stokesdale	100	33.3	4.06	1.50	5.56	73.0	7.32	3.99	11.31	64.7
All Purpose	98	51.0	1.62	0.84	2.46	65.9	5.02	2.81	7.83	64.1
Least Diff. for Sig. (19:1 odds)	——	——	2.18	1.26	3.03	——	Not sig.	2.17	Not sig.	——

* Includes fruits harvested to September 1.

materially by withholding water after August 15. This was to be expected because only 15 days elapsed during this period when no water was applied to the low irrigation plots. However, withholding water did have a marked effect on total yield. With the exception of the variety Wasatch Beauty, withholding water after August 15 resulted in a reduction in total yield of marketable fruits of 5 to 10 tons per acre. The plants on these plots

were without doubt suffering from lack of water as was evidenced by their appearance.

Comparisons of the 15 varieties which were irrigated normally indicate their relative values for the Lewiston area. The variety Sioux is outstanding in several respects. Early in the season—to September 1—it produced a significantly higher yield of U. S. No. 1 fruits than any other variety except Burpee Hybrid 1121. The latter is considered too small-fruited to be used as a canning variety. Sioux also produced the highest total marketable yield, although not significantly more than John Baer, Canner's Jewel, or Early Baltimore. However, with two exceptions, Sioux outyielded all other varieties in total yield of U. S. No. 1 fruits for the season. In this respect it did not yield significantly more than Garden State or Pritchard, but since it did outyield both of these varieties in total yield, it is considered superior to them. It is evident that under normal irrigation, Sioux is far superior to those varieties now being grown in the area as far as grade or percentage of U. S. No. 1 fruits is concerned. (See Columns 6 and 10 of Table 2).

When irrigation was discontinued after August 15, Sioux was not better than any of the other varieties tested, and it was inferior to Wasatch Beauty in the percentage of U. S. No. 1 fruits produced.

1947 Variety Yield Trials—

Two experiments were conducted with tomatoes in 1947. One consisted of testing the more promising varieties of previous tests as well as new varieties and selections. In the second experiment, various fertilizers were added by band placement after transplanting to determine their effects on yield and processed quality.

The results of the variety and strain trial are shown in Table 3. From 30 to 40 percent—Column 3, Table 3—of the plants of most of the experimental plots did not produce any fruits due to curly-top virus infection. The yields have been calculated on the basis of the total land area without correction for plant stand. No correction for stand was made for two reasons. First, it is doubtful whether such corrections should be made because of the possible error involved in determining yields of missing plants from those which were left. At best the yields of different plants are highly variable and considerable error might be involved in calculating missing plant yields. Second, the grower is interested in the actual yield obtained under the actual conditions occurring in the field. From this standpoint it is believed the yields as presented are more important than yields calculated on the basis of a perfect stand. They show what the grower would have obtained in 1947, a serious curly-top year. It is significant that the total yield of the best variety, Sioux, was 17.77 tons with only a 66.6 percent plant stand.

In 1947 Sioux was superior to all other varieties under test in early yield of U. S. No. 1 fruits. In marketable yield of U. S.

1 & U. S. 2 early in the season, Sioux was no better than Wasatch Beauty, John Baer, Moscow No. 4, or Stokesdale. The grades show one important fact—the high percentage of U. S. No. 1 fruits produced by Sioux. Of the early yield 85 percent was U. S. No. 1 or 11.3 percent higher than California Pearson, the next best variety. It is significant also, to note that those varieties commonly grown in the area—Early Baltimore, Early Stone, and John Baer—produced much lower percentages of U. S. No. 1's in addition to yielding fewer total fruits.

In total season yield, Sioux produced the highest U. S. No. 1 yield and the highest total marketable yield of all varieties tested. However, none of the differences between varieties were statistically significant. It is probable that the uneven loss of plants in the plots due to curly-top increased the variability to such an extent that the experimental error was unusually high. It is believed, however, that since the yield trend for Sioux is the same in 1947 as in 1946, it is a superior variety, especially in the season yield of U. S. No. 1 fruits. The importance of this is borne out by the fact that it produced a much higher percentage of U. S. No. 1 fruits for the entire season than any other suitable variety for the area.

Origin of Moscow variety.—Both strains of Pearson were definitely too late maturing to be used. Wasatch Beauty was comparatively high in yielding ability but it appears to produce a lower quality canned product. Of the standard varieties now grown in the area, John Baer and Early Baltimore appear the best. The two varieties designated as Moscow 4 and Moscow 6 are selections made by M. D. Wallace, Department of Horticulture, Brigham Young University, Provo, Utah. According to recent information[3] the original variety Moscow was first grown in Weber County, Utah, in 1927. It was a selection made from some varietal trials planted by A. D. Claptier and his Japanese neighbor, Mr. Masue, near Ogden, Utah. It has been used in Utah as a canning variety by several processing companies but is reported to be declining in importance. As shown in Table 3, neither of the selections grown in the 1947 replicated trials were as good as Sioux and showed no outstanding characteristics to warrant their recommendation. However, several good single plant selections were made of Moscow from some segregating material obtained from Wallace and were included in the 1948 yield trials.

The yield data on the fertilizer experiment are omitted because there were no significant differences in yield from any of the fertilizer treatments. The fertilizers used were ammonium sulfate and treble superphosphate alone and in combination at two different rates; gypsum; ammonium nitrate; and borax. The soil on which this experiment was conducted was typical for the district. It had had at least 3 years of row crops on it previous to the tomatoes without any addition of fertilizer. Chemical analyses

[3] Personal Correspondence from Mr. A. D. Clapier, Marsing, Idaho. January 2, 1949.

made before the 1946 crop indicated this soil had sufficient phosphorus and potash but was slightly deficient in nitrogen. The fertilizers were applied by band placement by hand after the plants had been transplanted to the field and it may be that the amount applied, the time of application, and the position of placement were not correct for best response.

1948 Variety Yield Trials—

In 1948, a replicated variety yield trial was conducted which included Sioux, Stokesdale, Bonny Best, and Moscow selections 44-1, 44-2, and 44-3. For observation, 12 additional varieties or selections were grown in single plots. The early and total yield data for all these varieties are shown in Table 4. The data for the additional varieties give only an indication of their performance and should not be taken as conclusive evidence of what might be expected from them.

Inspection of the data for the replicated trials would lead one to believe that Bonny Best was much superior to the other varie-

Table 4.—Results of tomato variety yield trials Lewiston, Idaho. 1948*

Variety	Early yield†				Total yield for season				
	U.S. 1 tons per acre	U.S. 2 tons per acre	Total tons per acre	Total pounds per pl.	U.S. 1 tons per acre	U.S. 2 tons per acre	Total tons per acre	Total pounds per pl.	Percentage U.S. 1
Sioux	2.86	1.50	4.86	3.66	20.5	7.8	30.0	23.1	68.3
Moscow 44-1	3.35	1.74	5.71	4.19	19.9	8.4	31.2	23.5	63.8
Moscow 44-2	2.93	1.83	5.50	4.14	17.3	8.7	29.2	23.1	59.2
Moscow 44-3	2.45	1.79	4.61	3.65	18.6	9.5	30.7	24.3	60.6
Stokesdale	1.56	1.54	4.11	3.02	16.0	9.4	27.3	20.6	58.6
Bonny Best	4.19	2.03	7.04	5.17	15.5	9.9	27.5	20.7	56.4
Moscow 44-4				2.93				20.5	66.7
Moscow 6				2.85				23.2	53.5
Moscow 4				4.49				30.5	51.9
Moscow 43				3.57				21.1	38.2
Moscow 50				2.03				21.3	54.0
Lubkens Special				5.40				23.4	59.9
U. S. 46 CS - 24				1.02				22.1	55.4
U. S. 348				1.02				22.4	47.4
U. S. 148				1.24				20.6	83.7
U. S. 448				0.89				25.2	74.3

* The data for the replicated trials (first 6 varieties) were analyzed statistically, but no values for significance are given because none of the differences between varieties were statistically significant.

† Early yield includes fruits harvested up to and including September 1.

ties in early yield. However, analyses of these data show that none of the differences between varieties are statistically significant.

None of the varieties differed significantly in total season yield, but it is interesting to note that the trend in total yield figures is reversed from that for early yield. As in former years, Sioux produced a higher percentage of U. S. No. 1 fruits than most of the other varieties tested—Column 4, Table 3. From this

standpoint alone Sioux is recommended because of the differential in price for U. S. 1 versus U. S. 2 grade for market and canning.

Several selections of the Moscow variety appeared promising, but further tests are needed to determine whether they can compare with Sioux or the varieties now being grown.

Discussion and Summary

TOMATO varieties were tested at Lewiston, Idaho, over a 4-year period for adaptability for production for canning.

Results of these trials warrant the recommendation of the variety Sioux for canning, market and home garden use in Idaho's warmer areas. In early and total yield, Sioux has been outstanding in performance 2 years and was equal to other varieties the other 2 years. In most all instances Sioux produced the highest percentage of U. S. 1 fruits, and in years of late fall rains it excelled other varieties more than in years of relatively light rainfall during the latter part of the season.

John Baer or Bonny Best would follow Sioux in variety recommendations. However, both are subject to blossom-end rot. This is particularly true under conditions of low moisture, low relative humidity, and high temperatures.

Early Stone and Early Baltimore are not recommended for Idaho. Both varieties start ripening so late that the yields usually obtained before September 1 are quite low. The fruits of these varieties crack badly if irrigated or if rain occurs during the ripening season. Early Stone is especially subject to blossom-end rot and normally produces a high percentage of affected fruits even under ideal conditions.

Wasatch Beauty has given good yields in some of the experiments. However, it has a tendency to become soft rather quickly in the field. Wasatch Beauty is similar to the variety Moscow and is reported to be identical to it. These varieties appeared to be very similar in these trials. The Moscow variety seems to be rather variable and selections have been made which differ considerably. These selections have been under trial for only 1 year, but some of them may have possibilities for canning production after further tests.

Limited irrigation experiments indicate that it is not advisable to withhold irrigation water from tomatoes after they start ripening. The best recommendations are not to over-irrigate, but to apply water whenever the plants need it. Withholding of water after August 15 resulted in a marked reduction of yield. It should be stated that this recommendation is applicable only in the warmer areas of Idaho. Other experimental work and observations very definitely indicate that in areas where the average daily temperatures are relatively low—below 55° to 60° F.—application of irrigation water during the ripening season will retard ripening and delay harvesting.

One year's trials with band placement of fertilizers failed to show any response on tomatoes. Such failure may have been a result of too shallow placement so the fertilizer was not readily available in the root zone early enough in the season.

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